

ARCHITECTURE

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### SECTION 15500 HVAC

#### PART 1 -SYSTEM DESCRIPTION

##### 1.00 PROJECT OVERVIEW

- A. This project includes the construction of approximately 66,800 square foot new 5-story office building addition plus a basement level located at 300 Fore Street Portland, Maine. The new structure is to be built adjacent to and connected to an existing office building.
- B. The work included in this section of the specification consists of Design/Build of a complete HVAC system, properly tested and ready for operation. The work includes all necessary minor details and accessories required to make the work complete, even though such items may not be expressly shown or specified in the contract documents.
- C. The Work of this section shall include applicable criteria as listed in Section 15050 – “General MEP / FP Criteria as well as Division 1 as if bound herein.
- D. Related Documents:
  - 1. Section 01100 – “SUMMARY AND GENERAL REQUIREMENTS
  - 2. Section 15050 – “GENERAL MEP / FP CRITERIA”
  - 3. Provisions established within the Drawings and within General Conditions of the Contract, including General and Supplementary Conditions and Division 1 - General Requirements are collectively applicable to this Section as if rewritten and bound herein.
  - 4. All Contractors, Subcontractors, Suppliers, etc. shall be governed by all applicable Sections of these Documents with reference to their respective areas of work including coordination of their work with other trades.
    - a. Each Contractor, Subcontractor, Supplier, etc. shall review **all Sections of the Specifications and all Drawings** and shall be responsible for all work pertaining to their trade regardless of Drawing or Section of Specifications within which it is written.
    - b. Construction details of the building are illustrated on Architectural and Structural Drawings. This Contractor shall thoroughly acquaint himself with the details before submitting his bid or proceeding with engineering as no allowance will be made because of unfamiliarity with these details. Any discrepancies in the architectural construction documents shall be submitted to the Owner in writing in the form of a “Clarification Request” (CR) or a “Request for Information” (RFI) for review and response prior to the subcontractor submitting a proposal for the work or proceeding with the work.
    - c. This Trade Contractor shall place all inserts to accommodate the ultimate installation of the work of this trade. Set sleeves in place in forms before concrete is placed, and in masonry walls while they are under construction.
- E. The work under this Section shall include, but not be limited to, furnishing of all materials, labor, equipment and supplies and the performance of all operations to provide complete working systems, in general, to include the following items:

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1. Identification
2. Sleeves, Firestopping
3. Electric Motors and Starters
4. Equipment Nameplates
5. Factory Tests
6. Vibration Isolation
7. Ductwork
8. Sound Attenuation Equipment
9. Diffusers, Registers and Grilles
10. Louvers
11. Fans
12. Air Filters
13. Variable Air Volume and Dual Duct Terminal Units
14. Fan Powered Terminal Units
15. Unit Heaters
16. Cabinet Unit Heaters
17. Electric Baseboard Heaters
18. Factory Painting
19. Insulation
20. Roof Curbs
21. Relocation of existing HVAC components that interfere with new construction and removal and disposal of obsolete components.
22. Operating and maintenance instructions and manuals
23. Coordination drawings
24. Shop drawings
25. Cleaning, Testing, Adjusting & Balancing of All Ducted Systems and Equipment
26. Record (as-built) Drawings
27. HVAC Control Systems
28. Seismic Restraints
29. Training of Owner's Personnel on Equipment, Systems, and Controls

### **1.01 EXISTING CONDITIONS/DEMOLITION**

- A. The existing building consists of four (4) packaged gas electric roof top units, which serve floors 2 –5. The first floor retail areas are served by gas fired constant volume split system air conditioning units. The air-handling unit and gas

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furnace section are located in the basement space of each retail store; the air-cooled condensing unit is located on the roof of the 2-story building addition. The first floor retail space houses a restaurant, the kitchen hood exhaust is located on the exterior of the building.

- B. The HVAC demolition for this project will include relocation of the existing flue ductwork and condensing units for the first floor retail areas, rerouting of the kitchen hood exhaust ductwork to a new shaft in the existing building and a new roof mounted kitchen hood exhaust fan. Existing flue exhaust ductwork will need to be vented out a sidewall not located above a public way. In order to raise the existing building stair to the roof of the addition one of the existing packaged VAV gas electric units and supply air ductwork will need to be relocated.
- C. Demolition shall include the full area of construction scope. The HVAC contractor shall disconnect and cap all utilities at the foundation wall.
- D. Demolition as defined by the architect shall be selective.

### 1.02 PHASING

- A. There is no phasing associated with the construction of this project. Refer to the overall schedule for additional detail.

### 1.03 DESIGN CRITERIA

- A. Outdoor Design Conditions
  - 1. For load calculations (ASHRAE 1% - Table 1A):  
Summer: 87 F dry bulb; 74 F wet bulb - Winter: 7 F
- B. Indoor Design Conditions
  - 1. Offices and occupied areas: Occupied cooling: 75 F (maximum 60% relative humidity)  
Unoccupied cooling: no unoccupied cooling Occupied heating: 70 F (no humidification) Unoccupied heating: 55 F (no humidification)
  - 2. Mechanical/Electrical rooms: 104 F maximum (no humidity control)  
60 F minimum (no humidity control)
  - 3. Elevator machine rooms: 90 F maximum (no humidity control) 60 F minimum (no humidity control)
- C. Occupancy and Outdoor Air
  - 1. Offices: 7 people/1000 sf at 20 cfm/person
  - 2. Corridors: 0.1 cfm/sf
  - 3. Conference rooms: 50 people/1000 sf at 20 cfm/person
  - 4. Reception: 60 people/1000 sf at 20 cfm/person
- D. Electrical Load Density
  - 1. Lighting: 1.5 watts/sf

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2. Power: 3 watts/sf

### 1.04 CODE ISSUES

- A. A fail open (normally closed) smoke damper will be provided for the elevator shaft vents. This damper will open on loss of power or a signal from the fire alarm system.

### 1.05 SYSTEM DESCRIPTIONS AND OPTIONS

#### A. Office Floors HVAC Systems

1. The typical HVAC systems serving the main areas of the building will be a variable air volume packaged gas electric roof top air-handling unit. Heating for the building will be supplied by a combination of series fan powered variable air volume terminals (FPT) with electric reheat and optional electric baseboard radiation. Building cooling / warm-up / ventilation will be supplied via a combination of the FPT terminals and variable air volume (VAV) terminals. The associated FPT box will control the optional electric baseboard radiation.
2. Provide five (5) distributed central roof mounted packaged gas electric VAV air handling units (RTU). Each RTU will be sized for 11,000 cfm sized for a minimum 25% outdoor air and maximum 475 fpm coil velocity. Each RTU shall have an intake louver, outdoor airflow monitoring station, mixing section (with air economizer dampers), 30% efficient pleated filters, gas furnace heating section, D.X. cooling coil / condensing section, power exhaust fan section, and supply fan section. Relief air for each RTU (during air economizer operation) will be by a power exhaust relief fan and back draft damper. Provide a variable frequency drive (with harmonic filters) for each fan motor with remote differential pressure for supply fan speed control and return airflow monitoring stations for relief fan speed control. Air handling units supply air shall be ducted with 4" pressure class insulated galvanized duct sealed to leakage class 6, and distributed to the VAV terminal units. The supply air ductwork shall be leakage tested per SMACNA. Air handling units return/relief air shall be ducted with 2" pressure class galvanized duct sealed to leakage class 12.
3. Each perimeter and top floor interior Series Fan Powered terminal units will have electric heating coil, wall-mounted temperature sensor, be sized according to the zone (average of 1 cfm/sf), and will be ducted with 2" pressure class insulated galvanized duct sealed to leakage class 12, and distributed to ceiling diffusers with individual duct mounted volume dampers. All systems will be equipped with direct digital controls. Conference rooms and workrooms will have series fan powered terminal units with reheat coils and CO2 sensors.
4. Toilet exhaust will be provided by 2" pressure class galvanized duct sealed to leakage class 12 ductwork from each toilet room and janitor's closet (with individual volume dampers) to one 3,000 cfm roof mounted toilet exhaust fans.
5. Elevator: Provide dedicated cooling for all elevator machine rooms. Utilize split system DX cooling unit and self contained controls. For heating, provide electric baseboard or unit heater. Maintain minimum 2' clear of all elevator equipment. All duct penetrations shall have fire dampers. Provide elevator shaft vent with normally closed (fail open) damper. Damper shall open on fire alarm signal or power failure.

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6. Computer / Server Rooms: Future tenant computer / server rooms will require dedicated 24 hour / seven day a week HVAC system. Split system DX units shall provide cooling. Heating shall be provided via electric baseboard or unit heater.
- B. First Floor Retail Areas
1. First floor retail areas will be heated and cooled via gas fired split system constant volume air handling units (AHU).
  2. Each AHU shall have an intake louver, outdoor airflow monitoring station, mixing section (with air economizer dampers), 30% efficient pleated filters, gas furnace heating section, D.X. cooling coil / condensing section, and supply fan section. Relief air for each AHU (during air economizer operation) will be by a power exhaust relief fan and back draft damper.
  3. Supply return and exhaust for the first floor retail area will be provided by 2" pressure class galvanized duct sealed to leakage class 12 ductwork.
  4. Each retail space will have its own dedicated toilet exhaust fan.
- C. Stair and Entry Heating
1. Electric cabinet unit heaters shall provide heating at all entry vestibules and Stairwells. Electric cabinet unit heaters will be installed on levels LL, two, and four of the stairwells.
- D. Miscellaneous Exhaust Systems
1. Provide exhaust systems for the following systems:
    - a. Mechanical Room Ventilation
    - b. Electric Room Ventilation
    - c. New Kitchen Exhaust Fan and Ductwork for relocated kitchen exhaust
- E. Automatic Temperature Controls
1. Provide a complete DDC controls system for the building complex. System will include a complete operating station, web-server, programming and graphics.
  2. Provide all DDC field panels and interlocking wiring to integrate all system components. All panels will be stand-alone and fully programmable.
  3. Provide adjustable high / low alarms for all sensors.
  4. Fully checkout the system and verify that all points and sequences operate per design requirements.

**END OF SECTION**