

**ASHRAE Headquarters Building Renovation
Mechanical Systems Narrative
June 26, 2007 Permit Set Submittal**

EXISTING MECHANICAL SYSTEMS**I. HVAC:**

- A. The existing office building is conditioned by separate cooling and heating systems. Space cooling is accomplished by variable air volume (VAV), central station air handlers located on each floor. Each air handler includes 2" deep pleated filters, chilled water cooling coil with 3-way control valve and a 20 hp supply air fan with a variable frequency drive (VFD) controller.
- B. Air distribution is by ceiling diffusers from zoned terminal units and fan-powered boxes. Each floor is heated by an independent duct system with zoned electric duct heaters. The exterior zone heating supply fan is located in each mechanical room and supplies warm plenum return air to ceiling slot diffusers. Electric wall heaters are provided for the vestibule entries and the stairwells.
- C. Outside air for ventilation is ducted from a gravity intake hood on the roof down a common shaft into the mechanical rooms. The outside air mixes in a free return path across the mechanical room to the air handler. Electric duct heaters are provided for preheating the outside air during low ambient conditions. A roof-mounted fan exhausts restrooms, janitor closets and storage room. Building relief air hoods are located on roof curbs with motorized dampers. No air-side heat recovery is provided.
- D. Chilled water is supplied from one 70 Ton Carrier reciprocating air-cooled chiller (R22). The chiller is located at the rear of the property with chilled water lines routed underground across the parking lot to the building.
- E. The computer room is cooled by a Liebert direct expansion (DX) type split system.
- F. A Building Automation System (BAS) is provided for the existing HVAC equipment. BAS is direct digital type by Carrier with electric actuation.

II. PLUMBING:

- A. The existing water closets and urinals are wall-mounted, standard vitreous china. Sinks are counter mounted, stainless steel. Domestic cold water and hot water piping is copper. The existing soil, waste and vent piping is hubbed cast iron type.
- B. The domestic hot water system consists of a single electric 80-gallon water heater located in the first floor mechanical room.
- C. The building does not have natural gas service.

- III. FIRE PROTECTION:** The existing building is protected by a wet pipe automatic fire sprinkler system. Sprinkler heads are chrome pendant semi-recessed type.

MECHANICAL SYSTEMS RECOMMENDATIONS

- I. NEW HVAC SYSTEMS:** Each floor will be conditioned with separate HVAC systems that use a common dedicated outside air system (DOAS) from Trane as follows:

	Cooling	Heating
DOAS (Trane)	Dual-stage air-to-air enthalpy heat exchanger with packaged DX air-cooled condensers	Enthalpy heat recovery wheel
Level 1 (Daikin)	Daikin Multi-split Variable Refrigerant Flow (VRF) DX fan coil units with zoned inverter-driven outdoor DX heat pumps	DX low ambient heat pump mode
Level 2 (Climate Master)	ClimateMaster Ground Source DX heat pumps	DX extended range heat pump mode

A. Trane Dedicated Outside Air System (DOAS) Unit:

The Trane DOAS unit shall be roof mounted, dual-stage, air-to-air, total enthalpy heat exchanger with outside air supply and exhaust fans, supply air filters (1" prefilters and MERV 13 finals), motorized Type I and Type III desiccant heat wheels with pre-purge, heat wheel bypass dampers, DX cooling coil, and VFD motor controllers on supply and exhaust fans. DX cooling shall be staged from multiple split system condensing units mounted on a separate skid package. The DOAS unit shall be pre-wired, single point electrical connection, with unit mounted disconnect switch. Minimum thermal effectiveness of the enthalpy wheel shall be 75%. The air handler section shall be constructed of 2" thick insulated double wall panels with solid liner.

B. Level 1 HVAC System:

1. Level 1 (including the Learning Center addition) will be conditioned with ventilation air from the building's Trane DOAS unit and by Daikin variable refrigerant flow (VRF) systems consisting of inverter-driven outdoor DX heat pumps, ducted indoor fan coil units and non-ducted fan coil units for specialty areas. VRF systems shall use HFC 410A refrigerant.

C. Level 2 HVAC System:

1. Level 2 will be conditioned with ventilation air from the building's Trane DOAS unit and by ClimateMaster, Inc. ground source heat pumps.
 - a. Individual ClimateMaster heat pumps will be provided for perimeter and interior zones. The units will be located in the return air plenum above the ceiling. Each unit will be provided with individual room sensor, ducted supply and ducted return to the room.

- b. The ClimateMaster ground source heat pumps will be two-stage horizontal units, 27 EER with variable speed fans (ECM). A solenoid valve at each heat pump shall stop tempered water flow when the compressor is off. Heat pumps shall be ClimateMaster TTH Series utilizing HFC 410A refrigerant.
- c. The geothermal field design will be a central loop, vertical well type. The well bores and underground lateral piping runs will be installed adjacent to the Learning Center addition. Supply and return piping will be extended from the field to a pump room closet inside the addition. Variable speed pumps shall circulate tempered water through a closed loop piping system to the individual heat pumps. One pump will operate in normal mode, and the other in standby. Interior piping for the system will be insulated, Type K copper.

D. Air Distribution:

1. The Trane dedicated outside air system (DOAS) unit shall supply preconditioned, low dewpoint ventilation air to variable air volume controllers on each floor. DOAS air shall be ducted to supply air diffusers in conference rooms, hoteling suites and the Learning Center addition. For all other spaces, DOAS air shall be ducted to the returns of zoned fan coil units and heat pumps.
2. Ventilation airflows shall exceed minimums of ASHRAE 62.1-2004 by 30% and shall be modulated based on CO2 monitoring in spaces with high variable occupancy.
3. Supply air diffusers will generally be 24x24 architectural plaque type for overhead air distribution throughout. Return grilles will be lay-in perforated type for plenum return. Where transfer air is required, lined transfer elbows will be used across walls to structure.
4. Building exhaust air shall be ducted to the DOAS unit for air-to-air energy recovery. Toilets and janitor closet shall be supplied with transfer air and exhausted by the DOAS unit.

E. Air Filtration:

1. High filtration MERV 13 rated air filters will be provided in the return air ductwork for each fan coil unit and heat pump. Filters shall be Dynamic Air Cleaner model V-8 filter boxes with slide out V-banks.

F. Ductwork:

1. Ductwork shall be constructed and installed in accordance with SMACNA HVAC Duct Construction Standards, 2005, third edition. Ductwork shall be rated and sealed for 2" static pressure.

- 2. Fire dampers shall be provided at all penetrations of floors and fire-rated walls in ductwork and return air openings. In general, the return space above the ceiling will be used as a plenum. All new supply ductwork will be insulated with 2" thick fiberglass blanket insulation.

- G. Building Controls: All new HVAC equipment shall include direct digital controls (DDC) from Automated Logic Corporation and ALC Controls, Inc. with a web browser interface. DDC shall interface with lighting control, electric metering and fire alarm systems.

- H. Estimated HVAC Equipment Sizes:

Dedicated Outside Air System (DOAS) Unit (Trane)	One 6,000 cfm roof-mounted air-to-air heat exchanger with dual-stage, total enthalpy wheel, and packaged DX air-cooled condensing unit (55F supply air temperature with 46F dewpoint) providing 40 Tons of cooling and 250 MBH Heating. 24 Supply VAV units (100-600 cfm). 2 Exhaust VAV units (500-1000 cfm)
Level 2 HVAC System (ClimateMaster)	Ground Source Heat Pumps: 10 units, 32 tons Geothermal Field: 10 bores on 25' centers at a depth of 400 feet each, 1-1/4" HDPE (SDR 11) piping, Thermally Enhanced Grout (TC 1.2 or greater)
Level 1 HVAC System (Daikin)	Multi-unit Variable Refrigerant Flow (VRF) DX system with twenty two (22) indoor fan coil units with two (2) common (shared) outdoor heat pump units (28 tons total)
Learning Center Addition HVAC System (Daikin)	Three (3) DX indoor fan coil units served by Level 1 common VRF heat pump units
Computer Room (Daikin)	Two (2) ceiling mounted ductless split systems
Stairwell (ClimateMaster)	Two (2) ground source heat pump units
Main Entrance Lobby (Daikin)	One (1) VRF DX fan coil and outdoor heat pump

II. NEW PLUMBING SYSTEMS:

- A. The plumbing systems will include modifications to the existing domestic water distribution system, soil waste and vent system, and rainwater system; and shall be in accordance with the 2006 Standard Plumbing Code with Georgia Amendments.



- B. All new above-grade water pipe will be type L, hard drawn copper with solder joints; below-grade shall be type K. No lead solder shall be allowed. All water piping will be insulated with fiberglass pipe insulation.
- C. Domestic water heater provided by Georgia Power shall be electric type with timed circulating system. A roof-mounted solar pre-heater (60,000 BTU/day) shall be provided with a 120-gallon storage tank.
- D. All new soil, waste and vent piping will be service weight ductile iron soil pipe with hub and spigot or mechanical joints below the floor slab. Soil, waste and vent piping above grade may be cast iron no-hub type. The space above all ceilings will be used as a return air plenum; therefore, no plumbing piping may be PVC or other plastic piping. Cleanouts will be provided as required by Code.
- E. Plumbing fixtures will be vitreous china type by Mansfield, American Standard, Kohler, or Crane. Tank-type, floor-mounted, high efficiency 1.0 gallon per flush (gpf) water closets and wall-hung urinals (waterless type) are proposed to achieve LEED WE Credit 2.0.
- F. Lavatories will be counter type, tempered water supply with battery-powered sensor type faucets. Drinking fountains will be wall-mounted, all stainless steel housing, handicapped-rated type by Halsey Taylor or Oasis. One (1) janitor's utility-type sink shall be provided on Level 1.

III. SPRINKLER SYSTEMS:

- A. The existing sprinkler system will be reconfigured to serve the renovated spaces. The water entry will be relocated.
- B. The sprinkler system(s) will be wet-type(s) designed and installed in accordance with NFPA-13, for Light Hazard occupancy except storage rooms or similar spaces will be designated as Ordinary Hazard and provided with appropriate coverage.
- C. Piping inside the building for these systems will be Schedule 40, black steel, ASTM A-53 and will be threaded in size 2" and smaller and threaded or mechanical joint for piping 2½" and larger. Supports for 4" and larger piping will be clevis hangers and supports for piping smaller than 4" will be flat-band hangers. Seismic bracing shall be provided as required by NFPA-13.
- D. Sprinkler heads will be chrome pendant semi-recessed type with escutcheons except that upright type will be provided in areas without ceilings and other special use areas.