WASHINGTON COLLEGE HOUSING PROJECT

Gipe Associates along with the team of Ayers/Saint/Gross , were selected by Washington College to design the new Washington College Housing Project, located on the Washington College campus located in Chestertown, Maryland.

The educational facility will be completed and ready for occupancy the Fall of 2008. The Housing project is one of the many school projects Gipe Associates - Easton Office has designed for the increasing demand from the College . The heating cooling and domestic water systems are designed utilizing geothermal technology as follows:

Geothermal systems conserve energy and reduce annual operating costs compared to conventional systems using fossil fuels for heat generation and air cooled equipment for cooling. When operating in the heating mode, coefficient of performance can typically range from 3.5 to 5.0. This means for every 1 BTU of energy one buys and puts into the system, 3.5 to 5.0 BTU's of useful heat is delivered to the facility. For conventional fossil fuel systems, the coefficient of performance is typically .80 to .85. This is the combustion efficiency of furnaces or boilers. For every 1 BTU of energy one buys and put into the furnace/boiler, only .8 to .85 BTU's of heat is delivered to the space while the rest of the heat is wasted as it vents through the flue to the atmosphere.

Cooling efficiencies are comparable and vary on loop fluid temperature. Energy efficiency ratio (EER) can vary from 15 to 25 for geothermal heat pumps versus 12 to 15 for conventional air cooled equipment.

A geothermal system is simple to operate, is low in maintenance cost and does not require as much equipment to maintain as compared to conventional heating and cooling systems. The earth heat exchanger consisting of thousands of feet (or even miles) of underground piping that does not have to be maintained. A central circulating water pump circulates the loop fluid from the earth heat exchanger to the individual heat pump units, then back to the earth heat exchanger. This is a 2 pipe (supply and return) system that allows individual heat pumps to either heat or cool based on space temperature requirements regardless of outdoor conditions. One could only achieve this flexibility in a four pipe conventional systems.

Although most geothermal systems utilize a "central" earth heat exchanger, the system itself is considered a decentralized system as each individual heat pump unit contains all the components needed to heat and cool the space. In the event that a unit fails, it affects only the room that it serves. If a central boiler or chiller on a conventional system fails it affects the entire building.

As HVAC systems strive to conserve energy, more emphasis is placed on control strategies. These strategies are implemented by Direct Digital Control systems which continuously poll ever-changing data and have mechanical devices react to output signals derived from a series of software calculations based on input signals. The control strategies, associated software calculations and corresponding mechanical operating devices often create complexities and can be burdensome for the building operator.

Geothermal heat pump systems are inherently easy to operate and control. A simple thermostat or temperature sensor signals the heat pump to energize and operate in either a heating mode or cooling mode just like in one's own home. These units are typically designed to re-circulate and heat or cool air to a space or spaces.

Where outside air is required to meet ventilation code requirements, a separate decoupled system is often implemented. These systems are commonly known in the industry as "dedicated outdoor air systems" or DOAS. DOAS systems are known for their advantages regardless of the type of HVAC systems they are used in conjunction with. DOAS systems typically preconditioned 100% outdoor air and deliver the precise code required amount to each space. Components typically include a heat recovery device, pre and high efficiency final filtration, a dehumidification cooling coil, a heating coil, and a free summer reheat/heat reclaim device. High indoor air quality within a facility can be achieved by the unit as it provides dehumidification during the cooling season; and can provide higher humidity levels than conventional systems during the heating season without humidifiers through the use of rotary type/enthalpy heat recovery wheels. This type of heat recovery device has the highest heat transfer efficiency compared to all other heat recovery devices, often 70%-80% efficient. Through the use of heat recovery in DOAS systems the building's heating and cooling loads are reduced resulting in smaller pumps and piping systems as compared to conventional non-heat recovery systems.

Geothermal systems utilize heat stored in the earth and when coupled with a DOAS the system recovers waste heat/energy within the building while creating a better indoor air quality facility and reducing annual operating cost. This combination is environmentally friendly, reducing carbon emissions and is considered sustainable design. Geothermal systems are a natural choice for facilities when LEED® certification is desired.

In addition to heating and cooling the Washington College Dorms all domestic hot water is provided by geothermal water heaters.

The following are some photograph of the project in progress.

Photograph #1: Pressure Tests

Photograph #2: Geothermal Trench Mains

Photograph #3: Geothermal Trench

Photograph #4: Geothermal Fittings

Photograph #5: Geothermal Circuit and Tracer Tape

Photograph #6: Geothermal Vault Piping

Photograph #7: Geothermal Vault Wall Surface

Photograph #8: Geothermal Vault Ladder

Photograph #9: Geothermal Vaults Manhole

Photograph #8: Geothermal Vault Balance Valves