



Beaumont at Bryn Mawr Bryn Mawr, Pennsylvania



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As a result of an innovative financing arrangement, a residential life care community in a fifty-acre campus setting in Pennsylvania is now heated and air conditioned with GeoExchangeK (geothermal) heating and cooling system. Beaumont at Bryn Mawr, which consists of a constant care nursing center, common area/office building, two multi-unit residential buildings, and a number of townhouses, was able to undertake the GeoExchange installation under an arrangement in which Energy Performance Services, Inc. (EPS) agreed to pay for the cost of the system and then bill Beaumont for the energy delivered by the GeoExchange system.

The Beaumont community is built around the old Austin mansion, originally constructed in 1912. New construction was completed in 1986. The 420,000-square-foot facility consists of two three-story

buildings, containing 132 one- and two-bedroom apartments and 68 two- and three-bedroom private villas. The 29,000-square-foot Care Center contains 22 personal care units and a 28-bed skilled nursing facility. The entire Beaumont facility is heated and cooled by 316 heat pump units, with 840-ton capacity, connected to a vertical closed loop ground system. The residences have individually controlled thermostats, while common areas are centrally controlled.

The HVAC system at the nursing center consists of 57 heat pumps ranging in size from one-half to two tons, for a total of 65 tons of cooling capacity. Electric resistance duct heaters ensure that the air temperature entering the heat pumps is greater than 50° F. Each room has its own thermostat and dedicated heat pump. Reverse-return piping is used to distribute the ground heat exchanger fluid to the individual heat pumps. The building's water loop is connected to five pairs of 1 1/2" supply and return borefield runouts by the supply and return manifold located in the mechanical room. Each heat exchanger circuit consists

System Features

Ground system: Vertical closed loop

Number/depth of boreholes:

Total-187 wells, 450 to 600 ft

Nursing center: 10 wells, 500 ft

Borehole length per ton: 150 ft.

Heat exchanger length: 167,000 ft; 9,940 ft for nursing center

Heat exchanger pipe: 1 1/2" high-density polyethylene

of two wells, each connected to a single pair of runouts. The runouts are bundled into a single trench and individually insulated with 3/4" pipe insulation, and the top of the trench is insulated with 8 inches of sprayed polyurethane insulation.

EPS, a subsidiary of PECO Energy, entered into a 20-year contact with Beaumont to install the GeoExchange system and cover 80 percent of the capital cost of the system. EPS also pays for the electric energy required to operate the equipment, and is responsible for routine maintenance, and any required repair and replacement. In return, EPS bills Beaumont at a fixed rate for the Btus delivered. This arrangement attests to the high confidence in GeoExchange of the energy services contractor: if the system does not work or perform as well as expected, the customer does not pay the additional unit energy costs.

The GeoExchange system and circulating pumps were metered individually by the energy services company to determine the energy provided and consumed by the heat pumps. Comparisons of the energy consumption with a similar all-electric facility showed savings of over one third of the other facility's consumption.

Operating costs for the Beaumont facility are \$0.83 per square foot, as compared to \$1.50 per square foot for a similar project with air-to-air heat pumps in the same utility service territory. Annual building energy costs for the nursing center are \$14,792, compared to an estimated \$15,872 for a conventional system.

Advantages of the GeoExchange system cited by the Beaumont developer and residents are the system's efficiency and its unobtrusiveness -- the quiet, peaceful atmosphere of the community is undisturbed

by unsightly or noisy heating and cooling equipment. The community's developer, Arthur Wheeler, feels that the GeoExchange system has been important to the quality of life at Beaumont: "In order to make it the prime property that it is, I took a gamble...in 1986 I didn't know too much about GeoExchange system, but I was convinced that it was a system that would be the future of the technology...and we've been very satisfied with the results."

Project Participants

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