

SPOTLIGHT

WaterFurnace International, Inc.

Case Study 7

Last century's structure retrofitted for the next

Key Features

Square Footage: 6,600

Type of System: Closed Vertical Loop

Number of Units: 6

Total Capacity (HVAC Tons): 32



A Victorian renovation

On January 7, 1990, McGill University in Montreal, Quebec, nearly lost one of its architectural landmarks. Lady Meredith House, one of the area's many turn-of-the-century buildings, was gutted by arsonists' fire.

The three story building (6,600 square feet of conditioned space) was to be restored to its original condition. Provisions were made for the possibility of installing earth-coupled heat pumps as an alternative to conventional heating and cooling equipment. The resulting renovation project combined intricate Victorian detailing with modern convenience and efficiency.

The alternatives to conventionality

The new heating and cooling system was engineered by the campus Engineering and Design Department—Physical Plant of McGill University. Members of the department had attended a seminar conducted by the University of Ottawa's Engineering Department which featured a campus geothermal, also known as GeoExchange, retrofit with a horizontal ground loop installation. The McGill engineers were intrigued by this system, as well as the opportunity for a little "internal competition" between their department and the Ottawa engineers.

When analyzing which heating and cooling system to install, McGill University discovered the advantages of an alternative system. Since the building had a combination of high ceilings, drop beams and very limited service shafts, the traditional method of running ductwork from the air conditioning unit (located in the mechanical room) was not feasible. An outdoor condensing unit would also detract from the building's exterior beauty.

One of the most attractive features of GeoExchange technology is

that it does not require noisy, unsightly outdoor equipment. This was ideal for the preservation of the architectural splendor of Lady Meredith House. The GeoExchange comfort system was also preferred because of proven performance, minimal maintenance, space considerations, financial payback and environmental benefits.

Shopping for GeoExchange

In order to choose the best GeoExchange comfort system for the project, the university commissioned consultants Le Groupe Prodapec. Their design took into consideration a minimal mechanical room and a system which used a closed vertical loop energy source. The new inside piping distribution network would follow the existing piping units and the existing radiator locations were to be occupied by new fan-coil units. The building has a total cooling requirement of 164,364 Btu/hr, and 65 fan coil units to supply six zones.

Six WaterFurnace WXW059 units featuring 387,720 Btuh total cooling capacity and 224,400 Btuh total heating capacity were installed. The reverse return piping design loop system required seven vertical boreholes (3,751 feet of bore) with 8,573 feet of high density polyethylene pipe. The system also utilized U-tube technology using socket fusion, a total of 84 GPM of water and methanol solution and two 2 hp circulating pumps on the energy source side. The geothermal heat pump system is interfaced to direct digital controls and monitoring equipment. Using

state-of-the-art computer technology, Le Groupe Prodapec was instrumental in establishing the control sequence and the monitoring strategy.

Plugging in

On December 5, 1991, the Lady Meredith House GeoExchange comfort system was put into service. Occupants of the building were unaware of the operation of the GeoExchange system, however they would appreciate the rich features of the interior, dark mahogany and winding staircases. "The fan coil units are hidden behind walls that are about three feet thick," states Marc Belanger of Le Groupe Prodapec. "The system blends in beautifully."

Familiar with the maintenance of boiler systems, the McGill maintenance staff are amazed with the ease of GeoExchange. "In the beginning, I kept getting calls from the maintenance department asking 'What do we need to do? When do we need to service the units?'" exclaimed Mr. Belanger. "I basically told them to just check the temperature readings and do nothing."

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A GeoExchange future

McGill University initiated the Lady Meredith House retrofit as a pilot project. The campus area features a number of Victorian landmarks which are being considered for similar renovations. Officials are monitoring the performance of this first installation as a model for future historic and environmental preservation efforts.

Capital Cost: \$112,000.00

Incremental Cost: \$27,776.00

Total Operating Costs for One Year

Conventional heating	\$9,268.00	
Conventional cooling	\$3,441.00	
		\$12,709.00

Geothermal heating	\$4,718.00	
Geothermal cooling	\$3,166.00	
	\$7,884.00	

Therefore, annual savings **\$4,825.00**

This gives a payback of **5.7 years**