

SPOTLIGHT

WaterFurnace International, Inc.

Case Study 12

Patients treated to geothermal comfort at Dupont Medical Center

Key Features

Square Footage: 41,700

Type of System: Pond Loop

Number of Units: 19

Total Capacity (HVAC Ton): 58



Expansion for the future

When the administrators of St. Joseph Medical Center in Fort Wayne, Indiana, decided that they needed more office space and a satellite surgery center at their Dupont Medical Center facility, they concluded that the existing building could not support such an undertaking. Phase I of Dupont Medical Center, built in 1990, boasted 48,000 square feet of medical office space inside a rather plain-looking exterior. An addition would need to double the complex as well as visually tie into and enhance Phase I with consideration for additional expansion in the future.

The owner and design team also sought solutions for a more efficient way to heat and cool the second half

of their building. Rex Clark, who served as Maintenance Manager at the Dupont Center through the opening of the addition, was concerned with operating costs. "The number one reason, nationally, that tenants will not renew their lease on a building," states Clark, "is because of heating and cooling concerns and air quality." Phase I was climate-controlled with 10 gas/electric roof top heating and cooling units. This type of system is notorious for breakdowns during outdoor temperature extremes because of exposure to the elements. The owners and their

engineers, Vintage Archonics, wanted a more efficient means to heat and cool the second half of the medical center.

The geothermal solution

As a member of Northeastern Indiana Rural Electric Membership Corporation (REMC), Clark called the co-op's Cindy Materna of Business Services to see if they offered rebates on purchased geothermal equipment. He found that a standard commercial rebate for HVAC equipment and labor was available for the project. A one-acre drainage pond already on

the site made geothermal even more attractive. Since the pond loop geothermal system has a proven track record for providing reliable heating and cooling at the lowest operating cost, it was selected as the best system for Phase II.

One of the largest pond loops in the nation

The Phase II construction was under way in 1993 with a 41,700 square-foot, two-story medical office addition. It had 26,400 square feet on the first floor that included a 12,000 square-foot ambulatory surgery center and had 15,300 square feet on the second floor. The new building combined some of the distinct design features of St. Joseph's downtown medical center with the more contemporary design of Phase I. The use of geothermal technology offered a clean, aesthetic look with no unsightly exterior equipment to disturb the architecture.

Geothermal Design Associates was enlisted to design the pond size and grid system. The pond was enlarged to three acres to provide enough capacity to handle the geothermal heating and cooling requirements of the addition as well as the Phase I building in a future retrofit of the existing rooftop units. The submerged rectangular grid system consisted of nearly eight miles of polyethylene pipe. This geothermal pond coupled loop system was a record breaker and continues to be one of the largest in the nation.

The grid system design

The 10-foot by 40-foot pipe grids are connected to a two-inch supply pipe and a two-inch return pipe. A 40°F

solution is pumped through the ten pond loop grids to all of the heat pumps in the individual offices and back to the pond loop. Thermostats are located on each individual unit.

Low temperature WaterFurnace water-to-air heat pumps, ranging from one-ton to six-ton capacity as determined by Vintage Archonics, are used throughout the building. The exception is the surgery center, which is served by a central VAV air handling system with high efficiency filtration, humidification and extensive outdoor air ventilation to meet the more stringent Board of Health surgical codes.

However, the chiller unit serving the surgery center is cooled by the geothermal pond loop, and all the hot water heating is provided through 90-percent-plus efficient boilers. The heat pump loop piping in the building includes numerous valved branches to allow flexibility in arranging heat pump units, and the mains are sized to accommodate Phase I along with additional pumping in the future.

The resulting heating and cooling system emphasizes high efficiency, flexibility for space changes, good individual space temperature control and easy maintenance. According to Geothermal Design Associates' President Reva Brown, "The system offers a pleasing comfort level in a building that fits quietly and gracefully into the neighborhood."

Retrofits on the horizon

The owners and designers of the Dupont Medical Center see the use of geothermal in Phase II as a step in the right direction. "From the standpoint of engineering efficiency and

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—Rex Clark, Facilities Development Team, St. Joseph Medical Center

flexibility, they're great, and companies like St. Joseph Medical Center have only half the operating cost compared to Phase I," says Brown. "From a maintenance standpoint, the crew just has to change the filters."

According to Clark, the geothermal system allows eighty percent of the total space in Dupont Phase II to be leased to tenants, a very enviable statistic. He now serves as a member of the Facilities Development Team for St. Joseph and applies his Dupont experience to plans for the future. "It's amazing to me after 23 years in the business to be able to use 33°F pond water to heat a building," proclaims Clark. "The Dupont (geothermal) system purred like a kitten from the start-up."

As only half the pond is currently being used, future plans for the medical center include retrofitting the remaining half with geothermal technology when the rooftop units in Phase I need to be replaced. All connecting pipes were installed with Phase II, so the serene landscaping could remain undisturbed.

