The Galt House East Hotel (1700 tons) was completed in 1984. It consists of 600 hotel rooms (750 square feet each), 100 apartments (averaging 1800 square feet each), and an additional 120,000 square feet of public area (ballroom, meeting rooms, etc.). Based on the success of the Galt House East Hotel, the owner, Mr. Al J. Schneider, has since completed the Waterfront Office Buildings in 1994. The Waterfront Office Buildings have 960,000 square feet of office space in three towers (two-25 and one-15 story buildings). The combined hotel and office complex represents over 4,700 tons, making it the largest Geothermal Heat Pump (GHP) system in the world.

With their GHP system, energy cost in the Galt House East is $25,000 less per month than the adjacent Galt House Hotel, which has an equal amount of space, but a conventional heating and cooling system.

The cost of maintenance and personnel requirements for the system has been minimal. A heat pump package does not require the skill and experience required by a centrifugal system with four pipe controls, VAV, or other systems common in large complexes.

Since the major portion of the equipment for the office building was not purchased until needed, the system also reduced capital requirements during construction. In the finished building, the GHP system saved 25,000 square feet in space which otherwise would have been used for maintenance rooms and a 4,000 ton cooling tower.

The difference in price for the geothermal system instead of centrifugal chillers and boilers for the Galt House East Hotel and the Waterfront Office Buildings was approximately $500 per ton for a total savings of $2,250,000.

Project Information

**Name and Location:**
- Galt House East Hotel and Waterfront Office Building
  Louisville, Kentucky

**Completion Date:**
- 1984 (Galt House East Hotel)
- 1994 (Waterfront Office Buildings)

**System:**
- 1200 geothermal or water source heat pumps 1 to 30 ton units on an open ground loop system with heat exchangers to separate ground water from closed building loops.

**Applicable To:**
- Hotels
- Apartments
- Office Buildings

**Developer/Owner**
- Al J. Schneider,
  Al J. Schneider Construction Co.

**HVAC Designer/Construction Manager**
- Marion Pinckley,
  Pinckley Engineering Inc.
System Design

For the Galt House East Hotel, ground water at 58°F is pumped into a 140,000 gallon reservoir under the mechanical room. Water from the reservoir is circulated through plate/frame heat exchangers. This separates the ground water from closed loop circulation systems in the buildings. The closed loops are connected to water source heat pumps which can absorb heat from the loop water or reject heat into the loop water, depending on the requirement of that space. Any space can have heating or cooling at any time.

The complex has a high internal load due to its occupants; therefore, incorporating geothermal heat pumps with the use of thermal storage has proven to be very efficient. During spring and fall, the use of thermal storage allows the controls to shut down the well pumps (sometimes for as long as a week). The Btu’s stored in the reservoir during the day from air-conditioning can be used to heat the building at night.

The pumps normally operate at 25% to 30% of full load current due to water regulating valves and variable frequency drives on the circulating pumps. With 375hp pumps (three-100hp pumps and one-75hp pump) running at 70% less than full load, savings are: 375hp x 70% x .746 kW/hp x $.065/kW x 8760 hours/year = $111,502/year.

Chemical emissions from cooling tower bleed and boiler blowdown also are eliminated by the geothermal heat pump system. Due to the reduction in power required, principle emissions from the power station were reduced by 1,870,000 lb per year of CO₂; 44,000 lb per year of SO₂; 33,000 lb per year of NOₓ; and 5,500 lb per year particulate.

As Marion Pinckley concludes, “The above adds up to lower initial cost, lower operating cost and a very friendly system to the owner, occupants, and to maintenance personnel.”

GHP Benefits

Galt House East Hotel

- Lowered utility costs by: $272,702/year.
- Electrical demand reduced by: 1,100 kW (August). This represents a 30% reduction over the original Galt House Hotel which was constructed in 1970.
- Energy savings of: 5,590,317 kWh/year.
- Incentive program: No utility rebates.

Galt House East Hotel & Waterfront Office Buildings

- Lower operation maintenance costs: Particularly on large projects that would typically have centrifugal chillers and more complicated systems.
- Lower capital cost: Saved $550/ton for a total savings of $2,250,000.
- Durable long life: The estimated life of the units is expected to be the life of the buildings.
- Simultaneous heating & cooling: Heating or cooling is available at any time in any zone.
- Smaller mechanical rooms: Provided 25,000 more square feet of rentable space.
- Environmentally safe: Meets new government energy standards, the GHP refrigerant circuits are precisely sealed at the factory and will seldom require recharging.

“Mr. Al Schneider, the owner, has hundreds of water loop heat pumps connected to boilers and cooling towers which are still operating fine after 20 years. This experience gave Mr. Schneider the confidence to invest heavily in geothermal heat pumps.” Marion Pinckley Pinckley Engineering Inc.

To order additional copies of this or other case studies, contact:

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