

Church of St. Joseph's

Rosemount, MN

Project Showcase Summary

Overview:

The Church of St. Joseph is a Catholic parish with K-8 Catholic school curriculum located in Rosemount, MN. The church and school were in a transition period. The parish moved the sanctuary from their old site in 2007 to their current location. With financing in place and approval from the Arch Diocese, the church was able to construct a new 44,000 sq. ft. addition to their existing building to house their K-8 education program, which was still operating at the old location.

The new addition consists of a large social hall and kitchen, eleven classrooms, a library, a computer room, administration space, shipping and receiving, and a gymnasium with storage and future locker rooms.

This project was originally under design using conventional gas fired/DX mechanical systems. The church priest has a passion for GeoExchange systems based upon his experience with these types of systems in North Dakota. After the church was presented with two water-to-air heat pump system options, the project architect brought TRAK International in to make a presentation to the construction team on their unique GeoExchange system that uses central plant water-to-water heat pumps with a four-pipe individual zone fan coil arrangement and several energy recycling components.

A church or school is an ideal candidate for implementing a GeoExchange system because they will own and operate the building for many years. The increased initial construction costs generally result in an increased monthly mortgage payment. However, the utility expense savings month after month by installing a high performance, energy efficient mechanical system is usually greater than that of the added principal to the mortgage. This cash flow scenario results in a positive cash flow situation from day one.

Details:

The original building construction consists of a sanctuary and narthex of 17,700 sq. ft. This structure is heated and cooled using a conventional mechanical system consisting of boiler generated hot water and an air-cooled condensing unit for cooling the sanctuary. In addition, the complex houses an administration and meeting space of 10,800 sq. ft. The ancillary space is cooled with two independent DX rooftop air handling units and heated with hot water zone coils.

The energy efficient TRAK International GeoExchange system consists of ground source heat pumps, solar panels, energy recovery coils, borefield and a building management system.

Two (60) ton water-to-water hydronic heat pumps were implemented to provide simultaneous heating and cooling to zone fan coils. One (10) ton water-to-water heat pump with a double wall heat exchanger was used to provide domestic hot water for the building. These industrial quality heat pumps are custom designed for each project by TRAK International and manufactured at Harris' fabrication shop, Midwest Fabrication and Supply (MFS) located in Zumbrota, MN.

Forty solar panels provide "free" direct heating, or source heat for the heat pumps, or recharging of the ground loop depending upon which control sequence is initiated. The location of the panels on the roof saved general construction costs because the city officials allowed the solar panels to be used as rooftop air handling unit screen wall in lieu of a manufactured system for some of the views.

details continued on inside back cover



Client: Church of St. Joseph

Gary Mitchell, Business Administrator
Scott Kaufman, Facilities Administrator
13900 Biscayne Avenue West
Rosemount, MN 55068
Project Cost: \$1.5 Million

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Project Showcase Summary *(continued)*

Two energy recovery coils reclaim waste heat from the exhaust and building relief air streams and put it back into the heating or cooling systems depending upon which control sequence is initiated. Six circuits of 10 boreholes each compose the ground loop capacitor. Each hole was drilled to approximately 165' deep. The location and orientation of the borefield proved to be challenging due to existing restrictions of the site including; building location, a city easement, landscaping and utilities.

In addition, the team worked around the possible expansion of two educational wings. Each of these items were drawn to scale on the site plan and every borehole was individually located around these obstacles and the information was relayed to the well driller.

The TRAK system incorporates the use of a KMC building automation system that operates the heat pumps, air handling units, fan coils and several control valves to direct heating or cooling fluid and distribute the recycled energy for maximum system efficiency and performance. This web enabled system provides the operations staff to see their systems operational performance from any place at any given time.

Installing a ground source water-to-water heat pump central plant resulted in general construction cost savings as well. TRAK International and Harris Companies were able to design and build the central plant within the boundaries of their existing mechanical and electrical room. Harris Companies detailed the new mechanical system using a 3D modeling program. This information was sent to MFS for full fabrication of the mechanical room piping.

Taps were provided to cross connect their existing mechanical system in the future to supplement their current heating and cooling needs. If this is implemented, the TRAK system may be able to alleviate the use of their conventional system during the shoulder seasons and greatly reduce operation of the equipment during the rest of the year.

Contact Information:

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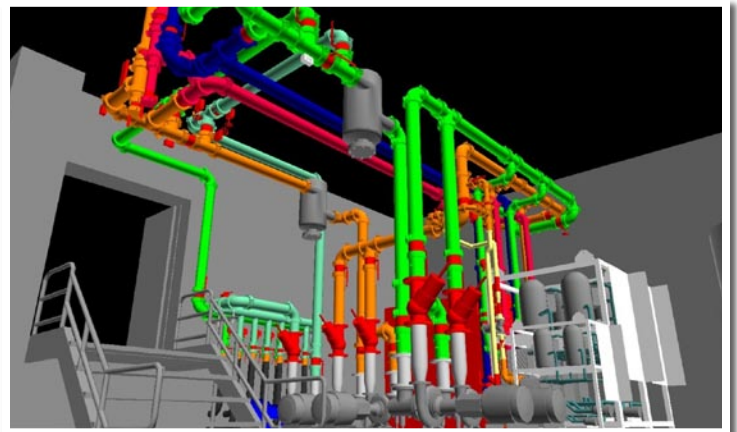
Project Team:

Steve Lutz, PE, LEED AP, TRAK International, Engineer of Record
 Mike Biebl, LEED AP, Harris Companies, Mechanical Project Manager
 Chris Ehly, Harris Companies, Prefabrication Detailer
 Mike Ostertag, Harris Companies, Pipe Fitter Foreman
 Ken Schmidt, Harris Companies, Plumber Foreman
 Don Avery, Harris Companies, Sheetmetal Foreman
 Glen Dahn, Harris Companies, Control Engineer
 Gary Mitchell, Church of St. Joseph, Business Administrator
 Scott Kaufman, Church of St. Joseph, Facilities Administrator
 Rich Pelletier, Greystone Construction, General Contractor

Equipment Utilized:

Hydronic Water-to-Water Heat Pumps
 Domestic Water-to-Water Heat Pumps
 Intelligent TRAK Energy Device Box
 Temperature Controls
 Rooftop Air Handling Units
 Heat Recovery Coils
 Exhaust Fans
 Pumps
 Variable Frequency Drives
 Fan Coils
 Cabinet Unit Heaters
 Solar Panels

TRAK International
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 KMC
 McQuay
 Greenheck
 Greenheck
 Bell and Gossett
 ABB
 First Company
 Rittling
 Solar Skies MFG



GeoExchange System Summary

- 60 borehole, GeoExchange well field
- Free heating energy through 40 solar panels
- Energy recovery coils on building relief & exhaust systems
- Two – 60 ton custom hydronic heat pumps
- One – 10 ton custom domestic water heat pump
- Simultaneous heating/cooling for each zone year round.
- 3D modeling of the Mechanical Room
- Design/Build mechanical construction