

## Combo dorm-field house built to attain LEED Gold

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Naperville, Ill. — North Central College, a small private school here in this western suburb of Chicago, needed new dormitory space and a new field house. The existing field house track is a non-standard 11 laps to the mile, so the school couldn't hold indoor track meets there. The solution? Four stories of community and dormitory space surrounding a 62,000 sq.ft. field house with 50-ft. high walls and 180-ft. of clear span space from side to side.

The tightly insulated building should attain LEED Gold certification from the U.S. Green Building Council. The structure incorporates a geo-exchange heat pump system and radiant floor heat, installed by Premier Mechanical, Addison, Ill., fire protection system by F.E. Moran Fire Protection Inc., Northbrook, Ill., and water-saving plumbing by Caldwell Plumbing, Wheaton, Ill.

The walls of the structure are an R-20 sandwich of lightweight aggregate concrete, foam core and more concrete in the interior. The 6,000-psi panels are molded in a brick pattern and will be painted to look like brick. Dukane Precast, Naperville, Ill., cast all of the panels for the building in its shop, including floor panels containing PEX tubing for the radiant floor system.

### Geothermal system

Sixty geothermal wells were sunk next to the building to 650-ft. with 8-in. supply and return piping into the mechanical room. The ground-source water runs through a central plant water-to-water heat pump assembly manufactured by Multistack LLC, Sparta, Wis.

The heat pump system comprises four 70-ton modules, which can provide heating and cooling simultaneously. One could provide domestic hot water, explained Premier Mechanical Superintendent Martin Schulz, while the other three are cooling.

If the geothermal system is providing heat, it heats the water to 130°F and distributes it to various loads through heat exchangers supplied by a Danish firm, Sondex A/S. Domestic hot water, for example, would be tempered down to 120°F or lower for the ADA showers. Hot water for the radiant floor system is distributed via Bell & Gossett pumps through Rehau PEX tubing to three radiant zones, north, south and east elevations, because they will have different sun loads, even during the winter months.

"Depending on the outside air temperature and the demand, the floors will have differing temperatures," said Schulz. "The hot water in one zone could be 90°F, and another could be 85°F or 95°F, so you can mix different water temperatures in each elevation of the building."

Trane thermostats in each room provide an on/off control, opening and closing valves in each room. The thermostats also control Trane fan coil units in each room that provide cooling from either the Multistack or free cooling when the temperature in the geothermal wells drops below 60°F.

The fan coil units don't have to carry all the latent load themselves. Five energy recovery ventilators from Desert Aire, Roswell, Ga., preheats and precools ventilation air. Schulz said the ERVs can provide as much as 100 tons of cooling capacity.

Heating and cooling inside the field house is provided by 100 tons of Trane water-to-air heat pumps distributed through Ductsox fabric ductwork.

The nominal 480 tons of total capacity was designed to handle a pool addition that the school has in the planning stages, or to handle the extra load if graduation ceremonies are brought into the field house.

### Fire protection system

F.E. Moran Fire Protection Inc. installed a wet-pipe sprinkler system with standard pipe and hose connections throughout North Central College's new residence hall/recreation center.

The fire protection company is versed in installing systems in college and university living quarters — the company has installed systems in other dormitories on the campus of North Central College and DePaul University.

Even though the company is experienced in dormitory projects, installing a system in this unique building was a different experience.

“The project is the first building ever built with a dorm around a gym,” said Kenneth P. Votava, senior sales and project executive of F.E. Moran. “We were able to give them an efficient system in keeping within the budget by eliminating the cost of the fire pump and going back once the dorms are complete to finish up. Basically, this is a maintenance-free system.”

F.E. Moran worked with the Naperville fire department to create an economical type of system design.

“We were able to value engineer out a fire pump, so it would work with the city water pressure with our design,” said Votava. “Basically, the system is fed by a loop that runs inside the field house, and feeds into dorm areas. This alleviated any conflicts with ceiling space above the ceiling with duct work and other piping. We made it a clean design, so there wasn’t so much piping above the ceilings.”

Communicating with the college and fire department was key during the bidding process to ensure everyone was on board with the design of the fire protection system.

“I had a lot of communication with Michael J. Hudson, assistant vice president for business operations at North Central College, and John Meyers, the fire prevention supervisor at the Naperville fire department, to make sure when we submitted drawings everyone knew what they were getting,” explained Votava. “We approved everything hydraulically with calculations and that’s how we got away without a fire pump. We stressed design before we installed.”

Another unique aspect of the fire sprinkler system is that the company created a design that would minimize any potential tampering of the system components.



“The piping is as tight as it can be to the ceiling,” said Votava. “We went into this project knowing that we are dealing with college kids, so we have cages and guards on the sprinkler heads. In each of the stairways there are hose valves locked in cabinets to minimize possible hazards and tampering that college students could have in mind.”

It took approximately six months for F.E. Moran to complete the fire sprinkler system installation. Due to weather conditions, there were some delays to other aspects of the construction project, affecting installation of the system.

“We had to fight through the weather conditions and erection schedule, that was challenging, but we were able to give them a system,” said Votava.

Another challenge of this project was to have the building ready for the fall semester. Students will move into the dorm this month.

“It was an interesting design with the way we had to do the dorms first and then come back and do the field arena,” commented Votava. “They did that in order to get occupancy for the building. The building doesn’t need the field to be completed, but the dorms need to be ready to go.”

The final aspects of the project were trimming out the sprinkler heads once the ceiling was completed on the first three floors and finishing the fourth floor. Even though the fourth floor is being completed at a later date, the entire building needs to be protected by a sprinkler system for it to open.

“Because of the layout of the building, we have the system ready, so when they build out the fourth floor, the heads are already in place, so we don’t need to go back and do the dorm rooms,” said Votava.

## Plumbing system

Plumbing on the project was performed by Caldwell Plumbing Co., Wheaton, Ill. Project superintendent Ron Santilli said his firm’s role was basic, although he appreciated being in on the early planning stages of the LEED project.

“This was the first building in 30 years of being a plumber that I was involved from the beginning,” Santilli said. “It makes you feel important.”

Caldwell Plumbing installed toilets, lavatories and showers in locker rooms, family bathrooms and dorm shower rooms. The facilities used Sloan flushometers on Mansfield wall-hung toilets, Sloan Optima sensor faucets, and Symmons shower valves. Domestic hot water came from the geothermal heat pump system.

The field house has its own locker room toilets and shower facilities. In addition, there are dorm shower rooms on each floor with water closets, lavs and showers, including an ADA accessible shower. There are also laundry facilities on each floor.