

# Case study

November 2011



## Yardmen Arena

*Upgrades with ice storage improve energy efficiency 50 percent  
Belleville, Ontario*

*Building system upgrades, needed to comply with Ontario CFC refrigerant phaseout regulations, provided an opportunity for this 50,304 sq ft sports facility to make other HVAC improvements, including the installation of thermal energy storage. The results were a 50 percent more efficient system and a three-year payback.*

### Challenge

Built in 1978, Yardmen Arena's original R-11 CFC chillers were nearing the end of their useful life. Ontario regulations requiring CFC refrigerant phaseout gave the City of Belleville the opportunity to comply, while also upgrading their outdated HVAC systems to improve comfort, reliability and energy efficiency.

### Solution

The City of Belleville retained design/build contractor George A. Kelson Mechanical, Stantec and Trane to install a new turnkey chiller plant. The Trane chiller uses an alternative refrigerant instead of the phased-out R-11 CFC refrigerant.

Trane recommended going beyond the scope of the project specifications and suggested installing an ice storage system. Trane took Kelson Mechanical, Stantec and personnel from the City of Belleville to Minneapolis, Minnesota, to see an ice storage system in operation at a local school. The team also spent a day at the Trane facilities where they visited the Trane Controls Solutions Centre to see how Trane controls can be completely integrated with building HVAC systems.



*Yardmen Arena, home to the Belleville Bulls, includes ice rinks, swimming pools and gymnasiums.*

### Thermal storage system reduces life-cycle cost

The new chiller works with an ice storage system--the chiller generates ice during off-peak hours while electric rates are low, saving considerable energy expense for the arena. Although the first cost of the thermal energy storage system is higher than a conventional chiller system, the thermal storage system offers a much more attractive life-cycle cost. For example, with thermal storage, the chiller is only half the size of a chiller needed for a conventional system. In addition, electric demand rebates from Ontario Power Authority make an ice storage system with a building automation system very attractive to owners.

## BAS manages systems to improve energy savings

A Trane Tracer Summit® building automation system (BAS) provides integrated building control through a dedicated PC workstation. The BAS is used to program and manage the chiller and ice storage system to reduce energy expenses. It allows building operators to respond to alarms, view reports and trends, change control settings and program equipment.

Peter Lyng, facilities manager, Recreation, Culture and Community Services for the City of Belleville said, "We now have a building automation system instead of the old pneumatic controls. My operators say that using the Trane Tracer Summit system is a piece of cake--and that's coming from operators without a lot of computer experience."

## Results

"The design/build team of Kelson Mechanical, Stantec and Trane were chosen for this project because their solution was simple, it provided a unique green solution, came in under budget and was the most cost-effective," said Lyng. "We now have a chiller that is half the size of the original and operates during off-peak hours because of the ice storage system."

"Everyone is extremely enthusiastic since the new system was installed," Lyng added. "Our electricity expenses dropped \$60k last year, even with the added usage due to the construction project. People are looking to us as leaders for green solutions. The City's Green Task Force is ecstatic with the energy savings."

Lyng reports that the new system is exceeding expectations. "The City now anticipates a three-year payback instead of the estimated four years. The ice tanks are taking ten hours to



*A Trane air-cooled chiller generates ice during off-peak utility rate hours. The system is controlled by the Trane Tracer Summit® building automation system.*

burn the ice instead of the estimated four to five hours. Even on the hottest summer days with temperatures about ninety degrees, a thirty horsepower pump was only operating at fifty-two percent power. Prior to the retrofit, Yardmen Arena was the biggest energy consumer of all the City's assets with annual energy costs of more than \$300,000."

The Yardmen Arena chiller plant project's outstanding achievement in the application of heating, refrigerating and air-conditioning technology was recognized by the Ottawa Valley Chapter of ASHRAE (the American Society of Heating, Air Conditioning and Refrigerating Engineers). The group presented Kashyap Desai of Stantec with a first place Technology Award.

## Systems and services

- One Trane Model CGAM 120-ton chiller
- Four CALMAC ice storage tanks
- Three Trane TR200 variable frequency drives
- Trane Tracer Summit® building automation system



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