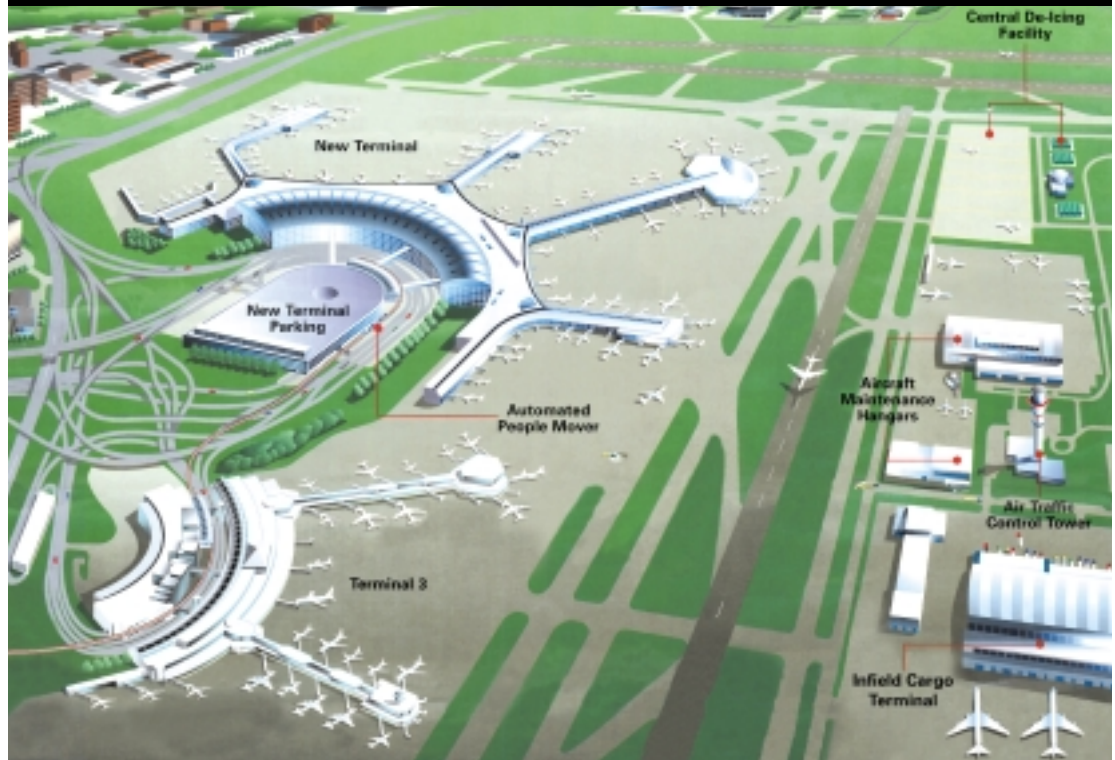




AIRSIDE / APPLIED / CONTROLS / SERVICE / SPECIAL SOLUTION / TOTAL SYSTEM / UNITARY

## Case Study – Toronto International Airport

EDUCATION / HEALTH CARE / LODGING / MANUFACTURING / OFFICE BUILDING / RETAIL / SPECIAL



## Toronto Airport Capacity Takes Off With New Carrier Systems

### Project Objectives

The goals of the 15-year redevelopment program at the Toronto Pearson International Airport in Toronto, Ontario, Canada are to modernize the airport and to increase annual passenger capacity from 28 million to 50 million by the year 2020. When completed, a 4 million sq. ft. (371,760 sq. m.) horseshoe-shaped terminal will replace the two present terminals. A new, larger central utilities plant is needed to meet future demands for increased capacity and to replace older equipment. Also, separate HVAC systems are needed for a new state-of-the-art deicing facility, an infield multi-use building, and three satellite buildings.

### Solution

Carrier's team presented a forward thinking plan for the central utilities plant, which included major contributions to an in-depth economic study that analyzed first costs, in-service costs, equipment efficiency, and electric power consumption. In comparison to competitors, Carrier projected a significant savings on in-service costs over 10 years. A solid relationship built on Carrier's superior service also allowed Carrier's team to work with project engineers to determine equipment needs for the deicing center and infield multi-use building, and to install Carrier cooling equipment in the three satellite buildings. Carrier is supplying a total of 8,280 tons of cooling capacity, with another 7,500 tons to be proposed, responding to customer preferences by supplying chillers that use non-ozone depleting, chlorine free HFC-134a refrigerant.

### Cost Comparison Over 10 Years





## Case Study – Toronto International Airport *continued*

EDUCATION / HEALTH CARE / LODGING / MANUFACTURING / OFFICE BUILDING / RETAIL / SPECIAL



*"After an extensive evaluation of the chiller proposals by our consultant, it was concluded that Carrier's proposal was superior in terms of first cost, operating cost and refrigerant choice. Our solid relationship with Carrier's service personnel reinforced our consultant's conclusion."*

Tom Brownlee,  
manager,  
Building Systems  
Operations,GTAA

### Project Synopsis

Toronto Pearson International Airport is among the world's 25 largest airports and is a centerpiece in Toronto's bid for the 2008 Summer Olympic Games. To meet these needs, the Greater Toronto Airports Authority has initiated one of the largest airport redevelopment efforts in North America, a \$2.96 billion US (\$4.4 billion Cdn), 15-year Airport Development Program. A new 4 million sq. ft. (371,760 sq. m.) terminal is the heart of the Airport Development Program. The core terminal is being constructed first. Expansions will be added as passenger capacity demands increase. The terminal with expansions will accommodate 80 gates and 4 piers for aircraft parking.

The new 55,800 sq. ft. (5,184 sq. m.) central utilities plant is designed to complement the nearly all glass terminal building and to supply current and future cooling capacity demands of 7,500 tons, beginning with the 2001-cooling season, up to 15,000 tons when the terminal building and planned expansions are fully built. A unique feature of the plant is its off-site location, which will require piping the chilled water one mile above and below ground and across one highway via a pipe bridge to the air-handling units located inside the terminal building. The chilled water will be pumped through two 36-inch diameter chilled water pipes side-by-side in an "Ultidor" next to two heating water pipes. The chilled water pipes are steel, single wall wrapped in a polyurethane/fiberglass jacket with internal leak detection. For the central utilities plant, Carrier is supplying five 1,500-ton Evergreen® 19XR chillers, which use chlorine-free, non-ozone depleting HFC-134a refrigerant. Using Carrier's Special Order Program, these chillers were customized to add extra temperature sensing capabilities to allow for closer monitoring of the chiller's motor temperatures through the central utilities plant distributed control system. This unique modification enhances equipment safety through a more effective preventive maintenance program.

As a result of a solid relationship based on Carrier's superior service, the team worked closely with project engineers to determine equipment needs for a state-of-the-art deicing center; a multi-purpose infield building for warehousing, cargo and offices; and three satellite buildings. Carrier is supplying one model 48TJ rooftop unit (10 tons) for the deicing center and four model 30GUN air-cooled chillers (550 tons) for the multi-use infield building. For the three satellite buildings, Carrier is supplying and installing five split systems: one cooling system for the maintenance and fire operations and three systems for the police station. These systems consist of model 39T air handlers, model 06E compressors, and model 09DK condensers (230 tons total). Carrier is also supplying and installing the refrigerant piping for these systems.

As the Airport Development Program progresses, the Carrier team will work with the customer on their equipment needs for the central utilities plant to meet anticipated total future cooling requirements of 15,000 tons.

### Project Summary

**Location:** Toronto, Ontario, Canada

**Project Type:** Retrofit and new

**Building Type/Size:** Central utilities plant will serve a 4 million sq. ft. (371,760 sq. m.) terminal building. Also, a state-of-the-art deicing center; a multi-use building for warehousing, cargo and offices; and three buildings for airport fire, police and maintenance facilities

**Building Usage:** Airport terminal, warehousing, cargo, offices, airport fire, police operations, maintenance facilities, aircraft deicing

**Objectives:** Replace and upgrade chillers, reduce costs

**Major Decision Drivers:** Cost reductions, life cycle cost, in-service costs, efficiency, environmental compliance

**Design Considerations:** Economic and environmental impact of equipment

**HVAC Equipment:** Five Evergreen 19XR centrifugal chillers, one model 48TJ rooftop unit; four model 30GUN air-cooled chillers; five model 39T air handlers, five model 06E compressors; five model 09DK condensers

**Total Cooling (tons):** 8,280

**Unique Features:** Supplier-customer partnership; chlorine-free, non-ozone depleting refrigerant; off-site location of new central utilities plant

**Project Cost Range:** \$1 million to \$5 million US (\$1.5 million to \$7.4 million Cdn)

**Installation Date:** Police station, 1998; 2000 and beyond for future needs