Public Safety Complex
Variable-flow chilled water plant provides efficiency, best value, lowest life cycle cost; addresses office, dispatch and environment-critical data center needs
Tallahassee, Florida

The two-building, 70,000 square foot Public Safety Complex (PSC), a joint effort of the City of Tallahassee and Leon County, serves as a dispatch center and hub for first responders. The PSC is the new home for professionals from a variety of key city and county public safety agencies and operations, including the Consolidated Dispatch Agency (CDA), Leon County Emergency Medical Services (EMS), Tallahassee Fire Department (TFD) Administration, the City of Tallahassee Regional Transportation Management Center and the Leon County Emergency Operations Center.

The state-of-the-art Public Safety Complex was built to withstand 200-mile-an-hour winds, with the glass designed to take the impact of a fifteen-foot two-by-four traveling 100 miles an hour.

Designed for flexibility, redundancy and collaboration
With N+1 redundancy throughout, the unique Public Safety Complex was built to support critical safety operations, and serve as an emergency shelter for the local community in the event of a natural disaster. The joint City of Tallahassee and Leon County facility allows key emergency service units to work closely together and to share vital information, often in situations where every second counts. Designed to foster interaction and collaboration between the various safety agencies, the building features a single employee entry and an open floor plan with glass walls.

A 24-hour, multiple-function facility
The complex includes dispatch centers, administrative offices and conference rooms. Critical to the facility’s operation is a 2,500 sq ft state-of-the-art data center, which houses management functions for four different entities. More than 140 employees work in the building during normal business hours, with several entities requiring 24-hour staffing. During an emergency activation, the complex’s population can grow to nearly 400 people. Any changes in staffing needs can be easily accommodated with the building’s flexible, forward-thinking design, which features modular furnishings and moveable walls.
Challenge
The complex project team knew that the facility would require unique solutions for its cooling systems. Criteria included:
- High reliability to ensure the continuing operation of the facility’s safety entities and four critical data centers
- Redundancy to adhere to zero downtime requirements
- Flexibility to provide a comfortable environment, 24/7, with varying load requirements
- Efficiency to ensure prudent use of taxpayer dollars
- Local sales and service support with the added benefit of boosting the local economy

Solution
Leon County Division of Facilities Management and Construction worked with engineering consultant, H2 Engineering, Inc., to develop specifications for the mechanical, electrical and plumbing systems. The team used Trane Trace™ 700 analysis software to get a solid understanding of the building load profile, and weighted the different ton hours to identify the best match.

Initiating a performance-based selection process
Working with the Public Safety Complex team, H2 Engineering developed an innovative performance-based selection process with a sophisticated life cycle cost analysis to evaluate suppliers for the building’s HVAC systems. Components of the bid evaluation included chiller performance, first cost, 10-year parts, labor and refrigerant warranty cost, 10-year service agreement cost, chiller and pumping consumption and demand costs, and other data. Suppliers were provided a spreadsheet with tonnage and electrical requirements, and efficiency targets.

Identifying the lowest life cycle cost chiller
Trane engineers used the life cycle cost spreadsheet to evaluate a multitude of equipment options. Rather than basing the chiller selection on first costs, Trane took into account the long-term efficiency of the system, realizing how critical electrical consumption, pumping costs and low pressure drops were in the life cycle cost analysis. Trane suggested a CenTraVac™ centrifugal chiller for the complex. The spreadsheet costs were brought to a net present value for final comparison. Of the three bids, the Trane system demonstrated the lowest life cycle cost.
Providing assurance of environmental claims
The Trane CenTraVac™ chiller is the first and only commercial chiller in the world to earn Environmental Product Declaration (EPD) registration, following the requirements of ISO 14025. Environmental facts about CenTraVac chillers are documented and substantiated through a third-party reviewed Life Cycle Assessment study. The evaluation considers all phases of the product’s life including materials, energy use, emission and reclamation. Results of the assessment were certified following predetermined parameters. The EPD gives building owners the assurance that environmental claims relating to the product have been proven and documented.

Demonstrating performance and pride
As part of the bidding process, the project team visited the Trane plant in LaCrosse, Wisconsin, for a factory witness test. The equipment was tested at off-standard points that were part of the building’s load, demonstrating the efficient performance of the CenTraVac chillers. The plant visit provided the opportunity for the group to see how the CenTraVac chillers are built, and understand how the chiller’s simple design, with the industry’s fewest moving parts, results in easier maintenance and long-term reliability. The team was also able to see firsthand the pride of ownership that Trane employees put into the manufacturing process.

Providing reliability and redundancy
Three 250-ton Trane CenTraVac water-cooled centrifugal chillers were installed in a variable-flow primary chilled water plant. One chiller handles the base load associated with normal operations. The second picks up additional load requirements to maintain operational integrity throughout a hurricane, tornado or other emergency event. The third unit provides the N+1 redundancy needed in case of equipment failure. The chillers run in series for equal run time, with the idle chillers bypassed to eliminate pressure drops.

Increasing system efficiency
The water-cooled chillers use a once-through ground source well system, which includes two geothermal wells and an injection well for the cooling loop on the chillers. The geothermal wells pump spring water out of the Florida aquifer from approximately 400 ft deep. At a year-round temperature of 72 degrees, the wells yield lower condenser water temperatures for increased system efficiency.

The Public Safety Complex was designed to foster interaction and collaboration between the various agencies, with a single employee entry and an open floor plan using glass walls to maintain visual contact between the data centers.

Critical to the facility’s operation is a 2,500 sq ft state-of-the-art data center, which houses data functions, or management functions, for four different entities.
Sustaining an optimal environment
The chillers provide consistent operation and are capable of sustaining precise temperatures that are crucial to environment-critical data centers. In-row cooling within the racks of the data center uses chill water from the central plant, at an elevated chill water temperature, to provide the needed cooling capacity. Hot aisle/cold aisle containment between the rows of the cabinets eliminates the need to subcool the data center to keep the server equipment cool, saving energy.

Ensuring high-performance system operation
A Trane service agreement allowed the facility to lock in maintenance and repair costs for ten years and provides an exceptional cost-to-benefit ratio for the Public Safety Complex. While the agreement ensures that the chillers are properly operated and maintained, facility managers are becoming well versed on using and servicing the machinery, preparing them to take over the process.

Results
The state-of-the-art Public Safety Complex opened under budget and on time, with the dispatch center and hub for first responders ready to deliver life safety functions to area residents. Vital to the critical application facility and data center are three high-efficiency 250-ton Trane CenTraVac™ centrifugal chillers installed in the building’s central chiller plant. The water-cooled chillers, which use a ground source well system, provide the complex with reliability, efficiency and the lowest life cycle cost vs. competitor bids. “In the life cycle cost analysis, it really comes down to energy efficiency and operational cost,” said Matt Scaringe, president, H2 Engineering. “What the city and county were looking for was the lowest lifetime operating cost of the machines.”

In addition to the cost reductions due to efficiency, the low-pressure machines allowed the complex to eliminate the heat exchangers originally specified for the project, saving first costs and lowering the Public Safety Complex’s capital investment. Additional operational savings are also being realized due to the reduced condenser water temperatures used in the system.

Ten-year warranty and a service agreements allow the facility to enjoy fixed operating costs and enjoy peace of mind knowing that Trane’s local service team can quickly respond should any issue arise. “The entire Trane team tackled the project like it was their own building and proved their system to be the most efficient all the way across the board,” said Public Safety Complex project manager, Carl Morgan. “They have a service staff in town that can take care of any issues. On top of that, I am expecting them to perform all of the preventive maintenance and everything else associated with the equipment. I believe that relationship will do well.”