

KATY HIGH SCHOOL

Building HVAC, Controls, & Retrofit



“Katy ISD worked with Hunton Services in order to optimize the main chiller plant for Katy High. We were very pleased with the initial estimated project savings. Now, with almost a year of run time, we are seeing even higher than projected savings. With the improved efficiencies the plant is providing, our number of customer complaints for this campus has dropped tremendously.”

-Mark Tiedt
Executive Director Operations & Maintenance, Katy ISD

PROJECT AT A GLANCE:

- “Like-for-Like” Solution:
\$1.1 million
- Hunton Solution:
\$2.1 million
- Estimated Savings Per Year Over “Like-for-Like” Solution:
\$125,000



Re-engineering the chiller plant at an established educational facility to perform reliably at maximum efficiency.

◆ CHALLENGE

Katy High School is the result of multiple independent expansion projects designed and implemented by different teams over the last 50+ years. This project was originally conceptualized and proposed as a “like-for-like” replacement of three R-22 chillers. While reviewing the proposal, the Katy Facilities team inquired as to whether Hunton Services could help with operational issues with the school’s chiller plant. During the Hunton Energy Services team’s first visit to the school on a cool, overcast day, they found all 13 pumps operating in the chilled water plant, including those serving a disabled chiller. Primarily a result of over-pumping the primary loop, the running chillers were operating in an inherently inefficient way (below 30% load). This indicated that the system lacked the controllability to stage chillers to match the required cooling load. When a second chiller was manually turned off to see how it would affect the others, the pumps serving it also remained running. Correcting these issues would cost substantially more than a simple chiller replacement. To make the cost justifiable to the school board, the team would need to propose a solution that established this project as a positive investment for the district.

◆ SOLUTION

The Energy Services team focused on developing a load profile to better understand the school’s cooling requirements. They built an energy model that defined the current energy consumption and developed a variety of possible solutions to be modeled and compared. It became clear that a reconfiguration of the central plant would be required to meet the efficiency targets. The team then focused on estimating the installation costs while developing creative workarounds to access issues and limitations on downtime in critical areas. The scope of work included replacing three nominal 250-ton RTHBs with a 600-ton, high-efficiency, variable-speed Trane CVHF to serve as the primary chiller during most conditions and a 300-ton variable-speed RTHD to handle night, weekend, and holiday cooling requirements. Also replaced were 11 pumps and 13 VFDs along with manufacturer designed modifications to the existing cooling towers to allow for a wider acceptable flow range. Although not originally targeted for replacement, two aging 600-ton Trane chillers received R’newals® and AdaptiView™ control panel upgrades, both

KATY HIGH SCHOOL

Building HVAC, Controls, & Retrofit



EDUCATIONAL

ENERGY SAVINGS:

SAVINGS TO DATE:

- kWh Saved
850,000
- Costs Saved
\$60,000
- CO₂ Emissions Reduced
1,300,000 lbs
- Equivalent to
Powering 105 homes for a year

NORMALIZED FOR WEATHER AGAINST BASELINE PERIOD:

- kWh Saved
570,000
- Costs Saved
\$37,500
- CO₂ Emissions Reduced
890,000 lbs
- Equivalent to
Powering 70 homes for a year

PROJECT TIME LINE:

- Energy Evaluation/Audit
October 2017
- Project Started
June 2018
- Mechanical Work Completed
August 2018
- Energy Control Platform Commissioned
November 2018
- Results Reported Through
January 2019

with five-year warranties, to ensure their reliability and integration into the new chiller plant control system. To improve the response to changes in the building, robust and highly accurate differential pressure (DP) sensors were appropriately placed in the system while electro-magnetic flow meters were installed to accurately measure primary and secondary chilled water flow in the plant. This allowed for implementation of a flow matching strategy to eliminate wasted pumping. A Trane control system, working in coordination with an administrative system built by Hunton Services Energy team, operates the plant. The administrative platform monitors real-time energy use and makes recommendations to the Trane control system regarding sequencing of the chilled water production and distribution equipment. The goal is to operate the equipment in a manner that produces the best overall chilled water plant efficiency while improving operational performance for the connected buildings.

◆ RESULTS

Two electric meters serve Katy High School. One is responsible for the plant and a portion of the building, while the other is responsible for the rest of the building. The savings shown are based on the meter which serves the central plant, as well as logging the administrative platform, the actual energy consumed, and cooling produced by the plant. The mechanical work and controls installations were performed over the summer. During the first three months of operation (August, September, and October of 2018), the meter serving the plant recorded 500,000 fewer kWh than the year before and the electrical costs decreased by \$35,000. When normalized for weather the plant still showed a substantial decrease in consumption and costs at \$21,000, an improvement of approximately 15% for the quarter. Final programming and commissioning of the supervisory system were completed during the fall, and the system went live in November of 2018. Because the school requires less mechanical cooling during the cooler months, the reduced ton-hours of operation lessen the financial benefit of those months, but the increasing savings percentage indicates that larger savings should be expected as the weather warms. During November, December, and January the meter recorded 350,000 fewer kWh of consumption and a savings of more than \$25,000. Normalized for a cooler winter the electrical costs still decreased by \$16,500 which represents a 21% savings over the baseline period. This "increase in savings" period after optimization was implemented is a strong indicator of increased operational savings over and beyond the mechanical retrofit.

KATY HIGH SCHOOL

Building HVAC, Controls, & Retrofit



EDUCATIONAL

◆ WHY CHOOSE HUNTON SERVICES?

In addition to world-class systems and innovative solutions, Hunton Services is known for its expert and reliable people - the team that delivers energy efficient HVAC systems, top-notch facility service and parts support, sophisticated open control systems, financial solutions and now, as a retro-commissioning agent for CenterPoint® Energy.

◆ FOR MORE INFORMATION, CONTACT:

marketing@huntongroup.com
713.643.8336



*First page photography credited to G. Lyon Photography