

Holt Public School District

PROJECT DESCRIPTION

Key Partners on this project

- Trane®- By Trane Technologies (ESCO services)
- Electro-Matic (Lighting subcontractor)
- Espen Technologies (LED Lighting Manufacturer)
- Avi-on Labs (Network Lighting Control Manufacturer)
- Consumer Energy (Utility Company and Rebate Administrator)

Scope of work/School Facts

- Lighting and Network Lighting Control retrofit in Holt Public School District in Holt, MI as part of a Trane Technologies performance contracting project.
- The lighting was installed while school was in session with no disruption to school operations
- Holt High School is a 350,000 sqft building, and is the largest High School in Mid-Michigan. The Holt Schools District has over 5,000 students in a total of 9 schools.
- Over 10,000 LED lighting fixtures and retrofit kits installed in the school district
- Almost 8,000 Bluetooth™ communicating devices in the school district and over 9,000 lighting control devices all together.
- Over 3,600 Bluetooth communicating devices in a single Mesh NETWORK at the Holt High School alone, making it one of the largest single-mesh network installations to date.
- The building was made entirely of concrete block walls with few classroom windows, which might have presented problems for wireless communications, but the Avi-on system worked with no issues, even for classrooms in distant corners of the building.
- The project controls were fully commissioned remotely without being on site.

Goal of the Project

- Generate energy savings to fund school improvements not covered by voted school bonds.
- Deliver on the school districts sustainability goals.
- Create a better learning environment for students through improved light levels and individualized setting control.
- Enable teachers to adjust light levels in classrooms at any time per teaching strategy and the specific needs of the students.
- Allow the lighting controls to automatically adapt to changing school schedules and holidays without the need for reprogramming.

- Empower the facility manager to oversee school lighting activity and make proper adjustments to energy savings and functionality of the system without having to rely on the factory (lighting control manufacturer) or 3rd party commissioning agents to maintain and personalize the lighting control system.
- Allow district-wide monitoring and management of the lights from the central office
- Allow centralized control of all lighting for emergency situations

MEASURED/PERCEIVED BENEFITS

System Type Installed

- Hybrid of NLC and LLLC. Each fixture came with a communicating wireless node built-in, but only a select number of occupancy and daylight sensors were used in each area to optimize costs. The solution combined the best of both worlds, because even the remote sensors were directly connected to the nearest fixtures. While the project technically falls in the NLC category, it shares most of the attributes of an LLLC system where every sensor was directly connected to a fixture controller and every fixture was individually controlled.
- Measured energy monitoring on every fixture every 15 minutes (better than 0.5% accuracy)
- Remote access through a single Remote Access Bridge for all 3,600 nodes.

Energy Benefits

- 64% energy reduction from the prior fluorescent lighting
- Continuous energy monitoring will provide the ability to monitor and optimize energy use for the life of the project.
- Energy monitoring allowed the project to qualify for top tier energy rebates from Consumers Energy, based on the actual measured energy savings from the project after installation.

Energy Management

- The control strategy consists of Occupancy & Vacancy sensing, Daylight Harvesting, High-End Trim and ENERGY MONITORING & MANAGEMENT to precisely quantify before/after energy savings and meet the required from Consumer Energy to qualify for Utility Rebates.
- All classrooms and hallways are primarily controlled by motion sensors and daylight harvesting.
- High end trim brought an immediate additional savings across the board
- Integration to the TRANE Building Management System could be a future consideration to leverage additional HVAC savings and consolidation of control platforms.

Operation Excellence

- Trane® comprehensive solution team worked with school district extensively to identify the appropriate manufacturer selection to deliver the desired outcomes within the financial parameters
- Avi-on pre-configured each device before shipping to the fixture manufacturer to eliminate any onsite device discovery
- Espen Technologies pre-installed Avi-on wireless controls into their lighting fixtures at their factory, virtually eliminating on-site widget installation, minus wall stations.
- Espen also moved a bar code sticker on each control node to the outside of the fixture so the control node could be identified on site from the outside.
- The Lighting Subcontractor was installing new fixtures and controls overnight, they were able to easily communicate the location of each fixture by scanning the fixture control node barcodes using an innovative mobile app available on every electrician's phone.
- The Zone Scanning app loaded the location data to the Avi-on cloud, where the commissioning agent could use the data to program the fixtures into zones automatically the next morning.
- The Remote Commissioning process was completed the next morning while students were in class without any disruption (no lights on and off; no technicians in the classroom), often finished by 9-10am.

What's noticeable & unique about this Network Lighting Control deployment?

- The project installation could proceed while school was open. Often school projects can only be done during holidays or the summer, reducing potential savings and potentially costing overtime labor.
- Installation and commissioning were extremely simple, fast and non-disruptive to the students and teachers.
- The School District was able to manage and oversee the project and controls management with no additional personnel.
- The system has an attractive rate of return that was realized more quickly than systems that could only be installed when school was not in session.
- The Holt HS is a very large building that had a potentially difficult RF environment for wireless controls, yet the project worked flawlessly.
- Fixed ceilings would have made installing intermediate gateways difficult or impossible. Cement brick walls would have limited the range of room-based systems, limiting the ability to offer the benefits of a fully networked control system by other technologies.
- Future-Proofing Design...node on every fixture. It will be easy to modify the location of sensors, add sensors, change fixture groups, add or change switch locations with no changes to the base control system installation.
- Future-Proofing BMS integration...easy to add BACnet connectivity or Demand Response without needing to add or change anything in the system architecture.

- True measured, 15-minute energy data allowed the district to maximize their utility rebate based not only on the equipment installation, but on the actual specific programming of the lighting controls and school operation.
- Easily measure and verify the savings (M&V) without post install equipment installation and additional labor.
- Industry's most secure IoT network [UL1376 Platinum level] assured the district the network was protected against any risk of intrusion or hacking.