

## SHOWCASE PROJECT: WORCESTER, MA'S DEPARTMENT OF INSPECTIONAL SERVICES

### SOLUTION OVERVIEW

The Department of Inspectional Services houses administrative offices in a large, Classical Revival architectural-styled brick building, constructed circa 1911. Previously, the building served for several years as the Lamartine Street Public School No. 3. The 27,756-square foot building consists of three floors above ground and a renovated basement and provides offices for the Building/Zoning Division and Housing/Health Inspections Division in Worcester. The building is occupied Monday through Friday, 7AM – 5PM by approximately 100 full-time staff members.

The Department of Inspectional Services provided an excellent opportunity to adopt energy conservation measures. When the building transitioned to office space in the 1990s, the steam heating system was replaced with a forced-air heating and cooling system consisting of four rooftop units (RTUs) at 80 percent Annual Fuel Utilization Efficiency (AFUE). Over time, the units aged and the controls stopped working properly, leading to air-balancing and temperature issues and causing discomfort to building occupants who started to rely on personal fans and space heaters.

The efforts to address inefficiency at the Department of Inspectional Services started with a city-wide Energy Savings Performance Contract (ESPC) implemented in 2011, aimed at reducing energy use intensity (EUI) and greenhouse gas emissions across municipal facilities. From 2011 to 2014, the city conducted several energy efficiency measures at the Department associated with water conservation, building infiltration, computer power management, and facility automation controls.

In 2018, the city expects to complete a major lighting retrofit project in the building in the first half of 2018, replacing the aging lighting with efficient LED lights with sensors. The \$126,887 project is expected to have a 3.4-year payback and will save the city 100,000 kWh annually.

The following energy conservation measures were completed at the Department of Inspectional Services as part of the city-wide Energy Savings Performance Contract project:

Savings Measure*	Cost	Timeline
Building Infiltration: weatherizing 6 exterior doors	\$17,484	2011-2013
Water Conservation:	\$3,884	2012

installing sink aerators and toilet flushometers		
Computer Power Management: installing a software on 57 computers that optimizes sleeping cycles of computers not in use	\$1,058.49	2012
Facility Automation Controls: Building Automation System	\$9,628	2014
Controls - building metering	\$3,650	
Controls - building integration	\$38,550	

*\*Impacts from these measures are not included in the overall energy use and costs noted in the project overview*

**SECTOR TYPE**

Local Government

**LOCATION**

Worcester, Massachusetts

**PROJECT SIZE**

27,700 Square Feet

**FINANCIAL OVERVIEW**

\$293,000

**SOLUTIONS**

In 2014, the heating and cooling RTUs in the Department of Inspectional Services were approximately 20 years old and failing regularly. Facing the inevitable cost of replacing non-functioning equipment, the city used capital improvement funds in 2015 to replace all four natural gas heating and electric cooling RTUs with energy-efficient 25-ton units rated at 10.5 energy efficiency ratio (EER) and 10.6 integrated energy efficiency ratio (IEER).

During the implementation phase, the city's project team worked especially hard to ensure the contractor properly balanced the system by testing variable volume and temperature (VVT) terminal units, also known as dampers, and verifying that each occupied building space was provided with standard air exchange rates.

Because the RTUs and the building had different types of manufacturer-provided control systems, the project team worked closely with the installer to coordinate any control interface issues between the two systems during the commissioning phase.

In the past, building occupants tended to use portable space heaters and fans, which are inherently inefficient and can also pose a safety hazard. Therefore, properly working temperature controls and a well-balanced air distribution system were critical to maximize energy efficiency and reduce safety hazards.

Savings Measure	Cost	Savings Estimated	Notes
RTU replacement	\$293,313	43 kBtu/sq. ft.  (21% reduction in Source EUI)	Replaced 4 gas heating and electric cooling RTUs with energy-efficient 2-ton units rated at 10.5 energy efficiency ratio (EER) and 10.6 integrated energy efficiency ratio (IEER), causing reduced energy use.  Improved automatic controls, leading to even distribution of heating and cooling air supply.

### OTHER BENEFITS

The use of fans and space heaters by building occupants was drastically reduced, which lessened the burden on building plug load and reduced the safety risks associated with such equipment.

The number of complaints was also reduced, because the project increased the comfort level of occupants through more efficient and evenly-distributed air supply.

## Annual Energy Use

Baseline(2015)  
205 kBtu/sq.ft.

Actual(2016)  
162 kBtu/sq.ft.

### Energy Savings

21%

## Annual Energy Cost

Baseline(2015)  
\$78,000

Actual(2016)  
\$61,000

### Cost Savings

\$17,000

