

200 CLARENDON STREET

BOSTON PROPERTIES

When Boston Properties purchased 200 Clarendon Street in 2012, it found the iconic, 62-story tower was in dire need of modernization. The company, determined to be a long-term owner, developed a multi-year capital improvement plan to replace the 40-year-old building's mechanical systems and controls, with a goal of reducing energy consumption and boosting thermal comfort and sustainability.

The first phase of the plan involved several mechanical improvements to the low-rise and high-rise chiller plants, secondary chilled and hot water systems, tenant condenser water system, air handler chilled water coils, and supply/return fan motors and variable frequency drives. Additionally, free-cooling heat exchangers were added to both chiller plants to allow the building to utilize advantageous outside air conditions when available.

CHILLER PLANT RECONSTRUCTION

Reconstruction of the 2,750-ton chiller plant included replacing three inefficient 1970's-era chillers with high-efficiency equipment with variable

speed drives technology and new high-efficiency chilled water and condenser water pumps. Updated programming and control devices optimize plant operations by allowing chilled water and condenser water temperature setpoint resets.

BOSTON PROPERTIES

Boston Properties has a strong commitment to responsible management of energy, water and greenhouse gas emissions. The company has exceeded 2020 targets by reducing energy use intensity 23 percent, water use intensity 26 percent and greenhouse gas emissions intensity 38 percent below a 2008 base year.

HEAT EXCHANGER ADDITION

The fully-glazed southern façade of the building created challenging solar heat gain exposure during the winter months when the northern zones require heating, while the southern zones simultaneously require cooling to overcome radiant solar heat. The installation of new plate and frame heat exchangers allowed the building to provide cooling to various systems by sending water through the building's cooling towers instead of using traditional mechanical cooling (chillers). This new flexibility resulted in a 35 percent reduction in chiller runtime and significant electric energy and cost savings.

CONDENSER WATER LOOP ACTIVATION

The existing condenser water loop system allowed unrestricted constant-volume condenser water flow

for tenant and building supplemental cooling systems. To improve the system's efficiency, Boston Properties added two-way valves to regulate flow, and a cooling tower retrofit that significantly reduced water needed to pump through the system at any given time. As a result, the amount of cooling capacity available for tenant and building systems doubled with the same flow and cooling tower equipment, all while reducing energy consumption and operating cost.

ENERGY MANAGEMENT SYSTEM (EMS) ENHANCEMENT

While each of these first-phase projects also included a targeted scope of controls work, building staff knew there was untapped value in the EMS. This came to define phase two of the capital plan – a comprehensive retro-commissioning of the EMS that revealed the building's true potential.

Over the years, the EMS was randomly programmed and manually adjusted to troubleshoot heating and cooling system deficiencies. Many sensors had never been replaced, and the equipment had drifted out of calibration. EMS improvements included programming of a universal sequence of operations, retro-commissioning, inspection and calibration of all equipment and sensors, installation of new air flow monitoring stations and CO2 sensors to modulate the intake of outside air to meet demand, and complete modernization of the system user interface graphics.

Effective automation and control systems make the building more comfortable, monitor how well systems are operating, promptly identify faults, and operate equipment as efficiently as possible. The \$1.2 million automation system retro-commissioning project delivered each of these benefits, resulting in a large decrease in tenant occupant service calls, along with significant energy consumption and cost savings.

“The numerous upgrades and improvements undertaken to date have enabled 200 Clarendon to perform at a thermal comfort and energy efficiency level comparable to any Class A tower in the city.”

-Mike Fitzgerald, Director of Engineering at Boston Properties.

ENERGY STAR

In 2012, before any improvements, the building was significantly underperforming the broader market with an Energy Star score of 38. By the end of 2017, 200 Clarendon Street's Energy Star score improved to 83 and the building was awarded the Energy Star Label signifying superior energy performance and conservation. Electrical consumption had dropped more than 27 percent, while steam usage for heating dropped 25 percent.

WATER

Over 30 percent of water used in the building's cooling towers is recycled, non-potable water recovered from the steam condensate system. Every new tenant customer fit-out includes water-efficient fixtures, and all common-area fixtures have been replaced with low-flow models. As a result, 200 Clarendon Street's domestic water use is 45.5 percent lower than the baseline year of 2012.

WASTE

Employees of 200 Clarendon Street have blue, desk-side recycling bins that facilitate recycling of paper, cardboard, metal and plastic items. In addition, recycling and disposal services are provided for e-waste such as computers, monitors and printers, and for batteries, lamps, bulbs and furniture. In 2017, 67 percent of waste was recycled, saving 11,021 trees and 246,373 gallons of oil.

TRANSPORTATION

The building includes bicycle racks to promote green transit for occupants and visitors. Approximately 15 percent of tower occupants walk or cycle to the property.

Having met its 2020 targets three years early, in April 2018, Boston Properties announced new 2025 goals (from a 2008 baseline) to reduce energy use intensity by 32 percent, GHG emissions from energy consumption by 45 percent, and water use by 30 percent.

“The adoption of these new targets is an indicator of our capacity to implement policies, programs and projects that complement sustainable development and operations.”

--Ben Myers, Director of Sustainability at Boston Properties

The Boston Green Ribbon Commission is a group of business, institutional, and civic leaders in Boston working to develop shared strategies for fighting climate change in coordination with the City's Climate Action Plan. Learn more at www.greenribboncommission.org.