SHOWCASE PROJECT: PLUMLEY VILLAGE

SOLUTION OVERVIEW

Plumley Village in Worcester, Massachusetts, is a vibrant, Section 8 housing development that is home to 430 diverse families. The development consists of 15 three-story apartment buildings and a 16-story high rise, owned and managed by The Community Builders, Inc. (TCB), a leading nonprofit developer.

Built in the 1970s, Plumley Village was a prime candidate for energy efficiency upgrades. Beginning in 2013, a sweeping renovation targeted energy savings for heating equipment. Plumley Village residents remained in their homes for the duration of the project, adding some complexity.

Plumley Village stood out as an ideal candidate for a retrofit for so many reasons, many of which are discussed in detail in the Solutions sections. From the developer's perspective, the retrofit project offered these opportunities.

- Plumley Village is one of the largest properties in The Community Builders portfolio where the owner pays all utilities. This offered TCB the opportunity to fully understand the utility consumption and understand the impact of their work after it was completed. It was also financially beneficial for the owner.
- The energy use of the building was high. When TCB looked at the data consumption and looked at the metrics of the building in terms of square footage and number of residents, it stood out as a building that needed improvement.
- The large number of residents that would be made more comfortable, considering the property has 430 units, was a significant consideration for TCB as well. The fact that TCB could undertake one retrofit project and affect the comfort of that many residents was appealing to the owner.

SECTOR TYPE

Multifamily

LOCATION

Massachusetts

PROJECT SIZE

390,000 square feet

FINANCIAL OVERVIEW

$1,170,000

SOLUTIONS

The Community Builders implemented a variety of solutions for the Plumley Village project in part to improve water heating and space heating and cooling. The retrofit focused on updating specific technologies, including: fin-tube baseboard radiation, a 330 MBH atmospheric boiler operating at roughly 70% efficiency, a 60-gallon indirect water heater piped as a separate zone and lacking a priority function, and large boilers that took up most of the mechanical space and complicated service work. The project also remediated problematic wiring and corroded pipes. Faced with the challenge of working in an occupied building during the harshest winter in recent history, the end results included increased resident comfort, substantially reduced energy use, and less maintenance.

The new water heating system design uses an boiler rated at 95+% efficiency. The new layout prioritizes domestic hot water, reducing boiler capacity by 40%, which translates to further energy savings and lower upfront costs. Old water heaters were replaced with new stainless steel 60-gallon units. The temperature of stored water was raised to 140°F, eliminating any risk of legionella bacteria growth and increasing the thermal capacity of the tanks. Additional thermostatic mixing valves on each tank prevents scalding.

The existing system included three 2,500 MBH boilers that supplied both heat and Domestic Hot Water (DHW) through three 80-gallon indirect water heaters. All pumps and boilers were severely oversized, while the DHW tanks were undersized. As a result, the boilers short-cycled on both heating and DHW tanks were undersized. Without functional controls, the pumps had to be manually started and stopped, which required constant attention from maintenance personnel.

The new design separates the DHW and heating systems for maximum efficiency. This, combined with the advantage of modulating equipment, means that the system will never fire higher than it needs to regardless of how small the call for heat is.

OTHER BENEFITS

Annual Energy Use

Baseline(2013)

219 kBtu/sq.ft

Actual(2017)

173 kBtu/sq.ft

Energy Savings

21%

Annual Energy Cost

Baseline(2013)

$940,000

Actual(2017)

$818,000

Cost Savings

$122,000


Plumley Villa
The Community Builder