



Manchester School District

Buckley Elementary

Manchester, Connecticut



Summary

Cost: \$21,570,000
Size: 67,357 SQUARE FEET
Complete: 2022
EUI: 18.1 KBTU/SF/YR (Designed)
EUI: 17.3 (Performing)

Building Certifications

Zero Energy Verified

Architect

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Project Manager
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Buckley Elementary School is the State of Connecticut's first verified Net Zero Energy K12 school and the first verified publicly funded Net Zero Energy K12 project in New England. Originally built in 1952, the ~67,000 square foot building underwent an extensive renovation focused on bringing sustainability, energy efficiency, and innovative learning to the community. Buckley Elementary was the first of three comprehensive renovate-as-new projects with similar goals. The Manchester School District also incorporated Net Zero into the design of Keeney Elementary and Bowers Elementary School. These healthy and efficient schools will save the district substantial amounts of money in operating costs. This project not only exceeded the goals set during planning and design, but it was also completed under budget.

CMTA began the project by creating an energy model and studying all features of the building envelope, including walls, windows, and roof systems. Because Buckley Elementary is an existing building, the orientation remained unchanged. The building's orientation, however, is ideally situated in a north/south arrangement for optimal glare control and daylighting. Additionally, this creates optimal space for a roof-mounted solar photovoltaic array to offset the building's utility demand. The challenge was to optimize the envelope and building systems to a point where the solar array can not only offset the consumption but also fit within the bounds of the roof. It was calculated that ~390 kW of roof-mounted solar array will generate enough energy annually to meet all the building's energy demands.

Buckley Elementary School had gas heating and cooking, but no air conditioning or mechanical ventilation. This presented a technical challenge in transforming the school into an all-electric facility while still incorporating healthy features like A/C and ventilation. CMTA's strategy to make this project successful included enhanced roof and wall insulation, air barrier and appropriate use of glazing. A whole building blower door pressure test to validate the tightness of construction, as well as thermal scanning and imaging. The pressure test results indicated an "ultra-tight" construction, with values of 0.14 cfm/SF and 75 pascals.

The HVAC system included a geothermal water source heat pump design and a right-sized dedicated outside air system deploying demand control ventilation. The geothermal wellfield provides the most efficient means of heating and cooling for all building systems. The project successfully implemented an all-electric design, including introducing air conditioning, electric kitchen equipment, and ventilation, and still saved the school district over \$50,000 in their electric bills in the first year! The project received a \$237,000 utility incentive and bid 10% under budget, including the solar PV array. Buckley Elementary was recognized by AIA Connecticut, receiving the Sustainability Award and Award of Merit for innovative design. The project also received an Award of Merit from the Connecticut Green Building Council.