

Nathan Bishop Middle School

RETROFIT CONSTRUCTION, PROVIDENCE, RI



TACO ADVANCED HYDRONICS SYSTEMS: Case Study in Real World Technology

Nathan Bishop Middle School, dating from 1929, was entirely gutted and reconstructed in a \$36 million renovation project and reopened in the fall of 2009. In committing to rehabbing and reopening Nathan Bishop at the behest of parents who protested the school's closing, the city and the state of RI wanted a model school that would gain back city students from private schools because of a new commitment to excellence, with advanced course offerings and a learning environment that offered the latest technology.



School Corridor



Library

Making the school CHPS verified was also an objective. CHPS (Collaborative for High Performance Schools), which started in California and now extends nationwide, provides free resources to school districts for attaining high performance school design, construction and operation. CHPS develops tools to make schools energy, water and material efficient, among other objectives. The new Nathan Bishop Middle School is now one of two CHPS verified schools in the capital city of Providence.

The new school comes with a new, very quiet HVAC system featuring Taco-supplied advanced hydronic equipment, Nu Climate active chilled beams for heating and cooling, Fulton boilers, and custom energy recovery units by MAFNA Air Technologies, among other the equipment suppliers. The system was designed by Griffith & Vary, Inc. of Wareham, MA, a consulting engineering firm with

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extensive experience in elementary and secondary education school HVAC design. The project came in under budget for the mechanical/plumbing work and achieved its design objective of exceeding the requirements of the RI Energy Conservation Code – in fact, the building is 40 percent more efficient than the code requirement.

Nathan Bishop is a three-story, 95,000 sq. ft. brick building with the mechanical room located in a cavernous basement that served as a civil defense shelter in the past. It was originally equipped with steam boilers that were removed during the project, along with all the rest of the old HVAC equipment, through an opening in an exterior wall that was originally used as a coal chute. With the room

completely gutted, mechanical contracting firm Delta Mechanical of Warwick, RI installed two Fulton high-efficiency, gas-fired condensing boilers, and a Canaris-supplied booster pump for domestic hot water, since the city water supply's pressure is not sufficient for servicing the school's top floor. The boilers come with a boiler control system which provides lead/



lag and combustion control. Also included are three modular Multistack (80-ton each) chillers along with eight variable speed Taco KV pumps (four for the heat side and four to serve the chillers). The vertical KV pumps' small footprint was important in

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—Wayne Mattson, P.E.

a busy equipment space, comments Wayne Mattson, P.E., a principal with Griffith & Vary and the engineering project manager for the Nathan Bishop project, who also notes that his firm specifies only Taco pumps in its work. 'We chose the Taco pumps specifically because of their flexibility. They fit the application – and the mechanical room – very well.' Additional Taco equipment includes multi-purpose pumps, an expansion tank and air separator.

"As engineers, we've been specifying Taco for years now,"

he adds. "Their products are very reliable and we've never had a problem with them."

In an area off the mechanical room Griffith & Vary specified two MAFNA energy recovery units. The VFD- equipped energy recovery units supply the school's classrooms, library, workrooms and corridors with tempered primary air via a ductwork system to a total of 300 ceiling mounted chilled beams. Use of active chilled beams helps reduce the school's overall energy consumption. Each classroom comes with two chilled beams producing even and consistent temperatures (70°F heating — 75°F cooling) throughout the rooms.

"Nathan Bishop was our first-use of chilled beams," says Wayne Mattson. "They were a perfect application for a project of this kind. They're very simple and easy to understand, there's no moving parts, and they're very quiet in operation. Air and water temperatures are moderate, and the air supply required is a lower quantity than with a typical VAV system. All in all, they make for a very comfortable atmosphere at a lower energy cost."

Restored beyond its original glory, Nathan Bishop has been recognized by the RI Preservation Society.

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