The 258,000-sq.-ft. North Ridgeville Academic Center intermediate school near Cleveland uses seven mechanical rooms to keep 2,000 students comfortable. *Photo courtesy Laura Davis-Feinknopf and ThenDesign Architecture*

Seven Mechanical Rooms Serve School

The 258,000-sq.-ft. North Ridgeville middle school, near Cleveland, uses a compartmentalized HVAC and plumbing design.

Conventional, two-grade middle schools are slowly becoming a thing of the past, especially in larger school districts. As most districts grow and replace their 40-to-50-yr.-old buildings, many are moving toward larger intermediate facilities, taking a load off their elementary schools. This inevitably alters the way school buildings are built.

Larger middle schools with a wider range of student ages–often grades 5 to 8–mean that the buildings are divided into distinct areas that actually function as independent schools, all under one large roof. Such is the case at the new, 258,000-sq.-ft., grades 3 to 8, North Ridgeville Academic Center intermediate school near Cleveland. "This building acts as four facilities within one building envelope," said Richard Dopatka, project manager for ICON Construction Solutions, Cleveland (iconohio.com), the construction manager at risk for the project. "They all function independently, are divided by firewalls, and are served by separate mechanical rooms. This approach has security, logistical, and teaching advantages that more school districts are utilizing."

One of the subcontractors ICON selected to perform the HVAC and plumbing portions of the job was MW Mielke, Medina, OH (mwmielke.com). Mielke's work on the North Ridgeville project began in early 2016 as the 2,000-student building shell came together. "Coordinating with the other trades on a project this size is always a big consideration," said Mike Clark, MW Mielke project manager. "Late in the design phase, we learned that the amount of above-ceiling space available to us was roughly half of what we expected. That threw us a curveball. We ended up having about two feet of overhead space to work with, but still managed to keep most of the ceiling heights at ten or ten-and-a-half feet."

The need to pack power, fire suppression, plumbing, communication lines, and ductwork into the limited space required installers and engineers to go back to the drawing board.

J.M. Verostko Inc., Youngstown, OH (jmverostkoengineering.com), designed the plumbing and mechanical systems for the new school. The company's assistance accommodating design changes throughout the project

The seven plumbing mechanical rooms at the Ridgeville school each feature Bradford White eF Series commercial water heaters.

was critical. Changing the size and shape of ductwork was necessary to make all the components fit in the tightened overhead space. Fortunately, the HVAC- and plumbing-system designs proved flexible enough to allow the alteration without major changes in equipment or the allotted time schedule.

DESIGN PROVIDES FLEXIBILITY

The challenge of fitting the HVAC and plumbing components into a smaller space was aided by the fact that Verostko and Mielke experts used a compartmentalized approach to equipment installation. Rather than a single, large mechanical space, they designed seven mechanical rooms, all serving different portions of the school. "We've really grown to like the numerous mechanical and plumbing system approach, and it's almost a necessity on a building this size," said Clark. "Because of the building's proportions, the sheer size of equipment, piping, and ductwork [in a conventional design], would have simply been prohibitive. The systems act independently of one another, just as the respective portions of the building do."

The school–and the systems that serve it–was designed as four different areas, each with a specific task. Locker rooms, gymnasiums, classrooms, administrative offices, laboratories, kitchens and cafeterias all have very different loads and ventilation needs. Within the building, these are all arranged in a sensible fashion with regard to student traffic and mechanical-system design.

On the plumbing side, a localized approach to supplying domestic hot water (DHW) was used. There are four mechanical rooms that feature DHW equipment. At each of these locations, two eF Series commercial water heaters are installed. The heaters were manufactured by Bradford White, Ambler, PA (bradfordwhite.com).

Because of proximity to the locker rooms, the mechanical rooms that serve areas one and three each have two, 300-MBH water heaters, while the mechanical rooms that serve areas two and four have a pair of 199-MBH tanks. All eight of the units have a 100-gal. capacity.

The commercial water heaters offer thermal efficiencies between 92% and 99%, courtesy of a three-pass heat exchanger and a better recovery rate than conventional BTU/hr. input models.

To maintain immediate availability of hot water at all fixtures, Mielke plumbers installed dedicated hot-water recirculation lines, along with Taco pumps (Taco Comfort Solutions Inc., Cranston, RI, tacocomfort.com) and Symmons mixing valves (Symmons Industries Inc., Braintree, MA, symmons.com).

Cooling capacity is provided by two, 300-ton Trane, Davidson, NC (trane.com), chillers on the roof. Three condensing boilers–two 6,000-MBH units and one 2,000-MBH unit–are used to supply hot water for the building's hydronic system.

Rooftop air handlers are used in conjunction with VAV boxes and fan-coil units to provide individual room conditioning. The air handlers also feature an ERV wheel for cost-effective ventilation. Trane controls were used for the entire HVAC project.

The mechanical systems will provide efficient operation for years to come and is designed to simplify service work. ICON was proud to turn the building over to the school district on time and on budget, offering district maintenance crews more than a month before school started to acclimate to the new facility and the systems that serve it. CA

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