FDNY rescue facility made for wear and tear

Located in Brooklyn, the new Fire Department of New York (FDNY) Firehouse Rescue No. 2 facility was specifically designed and constructed for training and enabling an elite force of specialized fire and rescue workers in the city to stage and simulate a wide range of emergency conditions in, on, and around the building.

The rescue company is trained to respond to various emergency scenarios, from fire and building collapses to water rescues and scuba operations. During these emergencies, rescuers must often use voids in buildings, whether creating them to let heat and smoke out of a structure or locating them as a means of escape for themselves and others.

As the architect began to learn the tools used by these emergency workers, it helped the firm design and conceive of the structure itself as a training tool. To make sure the facility would be able to meet all of the needs, the architect opted for precast concrete, given that it was ideal to withstand the wear and tear from the fire company for a variety of different training scenarios. High Concrete Group in Denver, Pa., was selected as the precaster.

The three-story building is organized around two large interior voids and enclosed by precast concrete insulated sandwich wall panels, strategically punctured by windows and openings. These interior voids and facade openings enable the fire company to practice multiple rescue scenarios and to mimic conditions and emergency situations that can occur in urban environments.

In addition, with an *R*-value of 16, the insulated sandwich wall panels help improve the thermal efficiency of the building envelope and reduce the overall HVAC system needs. A green roof, geothermal system, and solar water-heating system also reduce energy use, lowering the building's carbon footprint.

High Concrete Group worked closely with the general contractor to make sure that interruptions were minimal. "High Concrete Group was involved from early on to assist with the BIM coordination," says Sean Dixon, vice president of construction for High Concrete Group. The New York City Department of Design and Construction required a fully coordinated building information model for this project. "The utilization of the model was essential for the coordination between the precast and the terra cotta on this project," he says.

In this urban area, transportation and delivery were important considerations. "HCG had to pay close attention to the delivery schedule and coordination because of the size of the street and the off-site storage," Dixon says. "The precast panels were not small or lightweight, so we also had to consider permits, bridges, city maneuvers, schedule, and storage effectively. Staying true to a schedule and communication on site was the best way to keep this project moving effectively."

Installation also needed to be especially precise. "Maintaining uniform joints while ensuring the openings for the terra cotta installation were maintained required a high level of detail," Dixon says.

—William Atkinson

The new Fire Department of New York Firehouse Rescue No. 2 in Brooklyn, designed for training specialized fire and rescue workers, selected precast concrete for its durability and sustainability. Courtesy of High Concrete Group.

Four Interstate 89 bridges in Colchester, Vt., were rehabilitated and had their decks replaced over the course of just four weekends using precast concrete and careful planning. Courtesy of Kubricky Construction Corp./The Fort Miller Co. Inc.

Vermont rehabs four interstate bridges with minimal closures

In an extremely busy region of Vermont, four Interstate 89 (I-89) bridges that had become severely deteriorated, were rehabilitated and decks were completely replaced over the course of just four weekend closures. In addition, it took just six weekends to complete the entire project, including substructure and steel repairs. The scope of work included deck replacement, steel repairs, and replacement of backwalls, approach slabs, and sleeper slabs.

Precast concrete was immediately identified as a means to execute the goals of this accelerated project, and the Fort Miller Co. Inc. of Greenwich, N.Y., was selected for the project.

The precast concrete panels were match cast in the precaster's production facility with interlocking shear keys to provide reliable shear transfer. The shear keys also self-aligned when being installed, thereby allowing for rapid field setting. During installation, the panels were compressed together by jacking against the girders on the bridge, thereby leaving the completed decks in compression and without cracks. This satisfied the goal of extending the life of the bridge decks by an estimated 40 years.

In all, Fort Miller manufactured 23,535 ft^2 (286 m^2) of bridge deck panels, representing 58 panels, 32 precast concrete approach slabs, 8 precast concrete sleeper slabs, and 32 precast concrete backwalls for the project.

"Manufacturing was done in a long-line match-cast configuration, which provided a higher degree of accuracy for the final product," says John Gonyea, the estimator who worked on the project. "By match casting, every other panel was cast, and then the panels between the previously cast panels were cast." The process was relatively simple, but attention to detail was essential. Casting in this manner allowed for checking the geometry prior to stripping the panels from the casting bed. The match-cast process also allowed the panels to self-align during the installation process, contributing to quick placement in the field.

Transportation and delivery presented challenges. The project was located 120 mi (193 km) from Fort Miller's plant and all of the deliveries associated with the deck panels were oversized, requiring permits and escorts. "Due to the travel time, the restrictions associated with the deliveries, and considering that each individual bridge was to be replaced over 54-hour weekend closures, it was necessary to deliver the panels in advance of the installation dates to an on-site marshalling yard," Gonyea says. By doing so, all of the panels were on site before demolition started, and the contractor had full access to the panels as soon as the decks were removed.

Installation tended to go smoothly, despite some difficult conditions. "The planning process leading up to the installation of each of the bridges was done in such detail, most every challenge was addressed," Gonyea says. The northernmost bridges had access challenges, resulting in the loads having to be backed down into the unloading position, which had a substantial grade and was located within the median between the northbound and southbound bridges. The panels were lifted carefully, using load equalization hardware that automatically adjusted as the panels were lifted. In addition, the match-casting process, specifically the self-aligning characteristics of the panels, contributed to quick installation despite rain and wind affecting a portion of the lifting and placement operation.
—William Atkinson

Match casting allowed for quick placement in the field during the rehabilitation of four Interstate 89 bridges in Colchester, Vt. Courtesy of Kubricky Construction Corp./The Fort Miller Co. Inc.