GFRC proves best solution for San Francisco hotel

Serif Residences and the Line Hotel are both located in a 12-story, mixed-use residential building with 200,000 ft² (19,000 m²) of residential space for the Serif and 140,000 ft² (13,000 m²) of space for the Line hotel on a triangular block in downtown San Francisco, Calif. The scale of this project was influenced by adjacent buildings and the challenging proportions of the triangular site.

The Serif has 242 residences comprising studios and one- and two-bedroom homes. The Line Hotel has 236 guest rooms, as well as retail and dining. The structure wraps around the irregular site, culminating in a flatiron corner at Market and Turk Streets. It has a distinctive, bright white facade and floor-to-ceiling windows.

Early in the design process, the architect considered a metal panel rainscreen, precast concrete, and glass-fiber-reinforced concrete (GFRC) as potential materials to achieve the three-dimensional faceted facade. Ultimately, GFRC proved the most advantageous due to its light weight and its simplicity of detailing and installation. The owner selected Willis Construction of San Juan Bautista, Calif., for the GFRC.

The unusual floor plan configuration features various angles and curving conditions. By creating a series of repeating panels at different lengths and applying them in a staggered formation, the modular system was able to incorporate the various conditions seamlessly. To limit the number of individual forms needed to create unique panels, Willis Construction designed an adjustable form to help achieve the complex geometry and the different lengths required with only a simple adjustment.

The windows varied in length from 12 to 30 ft (3.7 to 9.1 m) and were shipped to the GFRC production facility. They were then installed directly into the panels to allow for more efficient enclosure of the structure. Traditionally, preinstallation of windows would require a horizontal joint between floors where two panels are stacked. When viewed in the building information modeling model, this joint detracted from the desired smooth and chiseled appearance. Therefore, the design team chose to install a steel tube framing component across the top of the panel. The skin of the upper panel hides the header tube of the panel below. "This larger span needed additional support during storage, trucking, and installation," says Sean Fitinghoff, senior project manager for Willis Construction. "Once on the building and attached to the structure, the additional bracing could be removed. GFRC proved to be the best solution for the design shapes and providing the preglazing option." The GFRC facade complements the architectural character of neighboring historical structures along Market Street. The combination of the light color of the GFRC and the solidity of the panel creates a contemporary rhythm within the urban context.

In all, the project includes 671 precast concrete panels made of 79,000 ft² (7300 m²) of GFRC. Panels range in size from 18 to 37 ft (5.5 to 11.3 m) and feature a white matrix with white sand and aggregates along with a light sandblasted finish.

Although the project generally progressed smoothly, there were some challenges. One was related to the design process.

Serif Residences and the Line Hotel in downtown San Francisco used 671 precast concrete panels made of 79,000 ft² (7300 m²) of glass-fiber-reinforced concrete. Courtesy of Jason O'Rear Photography.

Willis Construction used an adjustable form to create the complex geometric pattern on the Serif Residences and the Line Hotel in San Francisco, Calif. Courtesy of Handel Architects.

"The faceted panels were preglazed in the plant," Fitinghoff says. "The panel that was located on the floor above contained the GFRC header for the window below. Panel installation strategies were developed to prevent damage."

In terms of production, some of the faceted surfaces were cast separately and welded together in the plant after casting. "Alignment strategies were developed to ensure dimensions were kept within PCI tolerances," he says.

Transportation also required some innovative thinking. "Many panel shapes required several unique trailer racks and loading schemes," Fitinghoff says. "Loading diagrams were prepared by an engineer to ensure damage-free handling and transportation."

With regard to installation, panels up to level seven were installed below cast-in-place falsework directly above. "The hoist line had to be held out away from the falsework above," he says. "A mobile line standoff was developed specifically for this project. It was positioned three levels above the installation level. As a result, these panels had to be pulled into their final location."

—William Atkinson

Islanders stadium benefits from insulated panels

The New York Islanders of the National Hockey League (NHL) welcomed fans to the new UBS Arena in November 2021. The multipurpose venue is the home base for the Islanders and now also hosts music and entertainment events throughout the year.

Located in Nassau County, N.Y., the arena is part of a larger redevelopment program that involves converting 43 acres (174,000 m^2) of land around the Belmont Park racetrack into a premier sports and hospitality destination.

The new UBS Arena in Nassau County, N.Y., home of the New York Islanders professional hockey team, was designed with thermal performance and reduced energy use in mind. Precast concrete helped meet these requirements through the use of continuous, edge-to-edge insulation. Courtesy of Elizabeth Strohl.

The arena's exterior incorporates elements inspired by historic and modern landmarks in New York, such as Central Park, Ebbets Field, and Grand Central Terminal. Sitting just behind the historic Belmont Park racetrack in Elmont, just to the east of Queens, the project cost $1.1 billion.

The facade is made from five types of material: thin brick, insulated metal panels, glazed curtainwall, louvres, and approximately 1200 glass-fiber-reinforced concrete (GFRC) panels.

The project was designed with thermal performance and reduced energy use in mind. The precast concrete technology met these requirements through the use of continuous, edge-to-edge insulation. This aspect of the design proved to be a challenge because numerous changes in plane were used to create recessed accent areas within the panels. Meticulous design and execution in production of the panels resulted in achieving the design goals regarding thermal performance. Careful coordination was required between the design team, contractor, and subcontractors to ensure seamless integration between the five unique facade types, all while maintaining a continuous insulation philosophy.

The architect selected Universal Concrete Products as the precast concrete producer and Universal selected Leviat to supply the Thermomass insulation system for Universal's high-performance precast concrete wall panels.

Although the project progressed smoothly, there were a few challenges, according to Ginger Wiebers, customer service representative for the North American division of Leviat. "The exterior facade was designed to match historic landmarks around New York City, and the project as a whole was designed with thermal performance and energy efficiency in mind," she says. "Incorporating thin brick on the face of an insulated sandwich panel is an ideal solution for both goals." While certainly a challenge to incorporate all of the detailing involved in fully insulating the building envelope for a project of this scale, it is a process that Leviat has been refining for the past 45 years. Each individual panel was laid out to illustrate where the insulation and connectors were to be placed in order to ensure a continuous, edge-to-edge insulation layer. "Our engineering staff, drafters, and the software they have developed over the years really made the entire process relatively straightforward and efficient as possible," she says.

Production tended to go smoothly, largely because of the manufacturer's decades of experience. "Much like our layout process, the production of the actual Thermomass insulation pieces has also evolved to simplify what is a fairly complex process," Wiebers says. Sheets of insulation for each panel were cut to size and shape on CNC tables. Packaged with connectors, each panel's insulation materials could be assembled and fit into the formwork to ensure edge-to-edge coverage in the finished panel, maximizing the wall's energy efficiency, thermal performance, and moisture control.

—William Atkinson