A Cantilevered Honeycomb of Light and Shade

The Audrey Irmas Pavilion features a GFRC façade that plays with angles and light

by Deborah R. Huso

At nearly a century old, the Wilshire Boulevard Temple was the first synagogue built in Los Angeles, CA, USA. When the temple's congregation set forth to establish a new community center in 2015, one of the challenges was to create a building that would both complement the existing iconic Byzantine- and Romanesque-style temple and have its own identity as a civic anchor for the oldest Jewish congregation in Los Angeles.

The result is the newly completed Audrey Irmas Pavilion, named after the congregant who provided a $30 million donation to launch the project. An arresting structure in its own right, the pavilion, with its unique façade of hundreds of cutout windows, literally bows in deference to the 1929 temple it serves while leaning out toward Wilshire Boulevard to invite in the public (Fig. 1).

Designed in part by OMA and led by Partner Shohei Shigematsu and Associate Jake Forster from the firm's globally active office in New York, NY, USA, the mass of the

Fig. 1: Audrey Irmas Pavilion *(image courtesy of OMA New York, photography by Jason O'Rear)*

5070 m^2 (54,600 ft^2) Audrey Irmas Pavilion is formed by two trapezoids joined by parallelograms, resulting in a unique sloping design. Combined with the generous fenestration, this form allows the interior to be filled with natural interior light, creating a contemporary, yet complementary, community space for the adjacent, historic Byzantine Revival-style temple (Fig. 2).

"We imagined the relationship between the temple and the new [pavilion] and wanted to carefully balance them," says Forster, the temple's Project Architect and Associate-In-Charge with OMA. "The existing building has an iconic presence, and we didn't want to compete with it. We wanted to find a [way] to complement it and provide a new perspective."

A Design That Bows To and Frames History

Three stories tall and consisting of stacking spaces that both frame striking views (like the temple dome) and carefully filter light into the interior, the pavilion creates feedback between the two buildings. With the second-floor pavilion chapel outlining the temple dome through a vast window opening (Fig. 3), the structure's design allows one to see the dome from above ground level, which makes for "a beguiling relationship with the dome," according to Forster, "but also an unusual vantage of the dome at a high level."

Fig. 2: The sloping design increases the building's natural interior light *(images courtesy of OMA New York, photography by Jason O'Rear)*

The design team at OMA, aided by Los Angeles-based Gruen Associates as executive architect, started with a simple box shape tilted dramatically away from the temple on the north to pay respectful homage to the original historic structure it serves and to also provide an invitation to passersby on Wilshire Boulevard, as the building is cantilevered out toward the street. The tilting back of the pavilion's north side also draws light into the courtyard between the temple and pavilion.

The pavilion's façade complements the geometry of the adjacent temple's interior dome, which spans an impressive 30 m (100 ft) and is patterned after the Pantheon in Rome, with its dramatic pattern of interlocking hexagons. The exterior features 1230 hexagonal glass fiber-reinforced concrete (GFRC) panels in a jigsaw-like pattern, punctuated by variously angled windows and a seemingly mottled façade with colors and patterns that change with the shifting sunlight (Fig. 4).

Forster says the pavilion's "abstractness" connects it with the temple and its Jewish patterns of hexagons and triangles while also reflecting the design of the temple's interior dome.

"We didn't want to be overtly explicit with it," he remarks, adding that hexagons also offer an inherently flexible geometry. "The hexagon is a useful shape because you can rotate it with indifference. We could create a façade that allowed a multiplicity of orientation for windows to create interesting alignments between the interior and exterior [of the building]."

Modular Dynamism

The hexagonal panels that make up the Audrey Irmas Pavilion's façade are about 2 m (6 ft) point to point by 1.5 m (5 ft 3 in). Some of the panels feature windows measuring 1 x 0.5 m (3 x 2 ft), while others feature infills like louvers needed for mechanical venting or darker glazings. According to Forster, the hexagonal panel module was designed to some degree to integrate the technical needs of the building.

OMA chose GFRC to address the need for a monolithic surface that was also lightweight and strong, in part to meet the seismic requirements of its Southern California location. "GFRC had the qualities of concrete—the exposed aggregate—to create a sense of materiality of the panel itself," says Forster, pointing out the ribbed texture of the hexagonal panels as well. While all the panels have the same color and pattern, adjacent panels are rotated to generate the building's dynamic façade (Fig. 4).

The ribbing is oriented in a direction parallel to the windows, so as the panels are rotated, that ribbed surface rotates as well, establishing a striking play of light as the sun hits the corrugation in different ways. Further enhancing the façade's texture is the exposed aggregate.

The panels were built using fiberglass molds of hexagonal shapes into which GFRC was cast. Stromberg Architectural Products in Greenville, TX, USA, manufactured the panels using a computer numerical control (CNC) machine to carve models for the panels in foam. Then the models were hand-finished with a coating of plaster. From those models, Stromberg then crafted molds made of fiberglass and silicone rubber.

According to Lyndon Stromberg, Stromberg Architectural Products President, refining the panel design was a process of multiple iterations as the team explored different versions of color, texture, ribs, aggregate, and infill panels. The panels' exposed aggregate finish is made of marble chips and limestone, which was placed into the molds before casting the GFRC. The color of the panels (designed to complement the color of the adjacent temple's façade) was achieved through a mixture of white portland cement with a fine aggregate.

After the GFRC was cast into the molds, galvanized metal frames were cast to the back of the panels, and the panels were allowed to cure overnight. The next day, the panels were removed from the molds and water-blasted to expose the marble and limestone aggregate. Then the panels were left to cure and harden for another week. Stromberg says his factory could manufacture 38 of the 1230 panels in a day.

Grouped by the area on the pavilion to which they would be attached, the panels were palletized and placed on a flatbed truck for the 1500 mile (2414 km) journey to Southern California. Remarkably, according to Stromberg, not a single panel was damaged during transportation to the construction site.

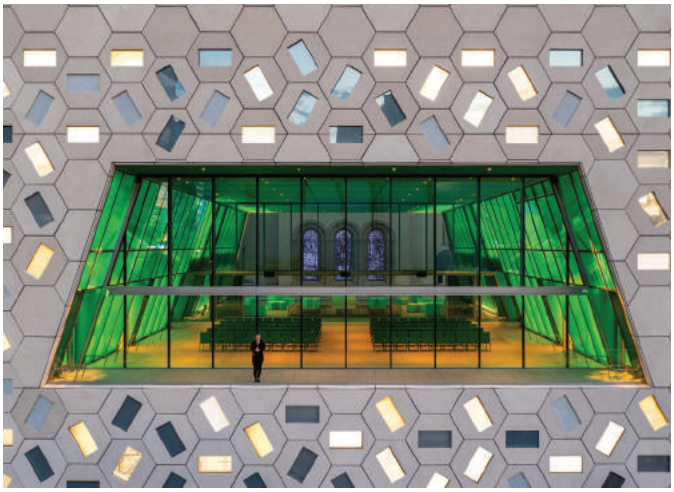

Fig. 3: The second-floor pavilion chapel outlines the temple dome through a vast window opening *(image courtesy of OMA New York, photography by Jason O'Rear)*

Installing the Hexagonal GFRC Panels

Meanwhile on the jobsite, Los Angeles-based General Contractor MATT Construction was finishing up the pavilion's structural core, establishing window cutouts, and installing windows. Next came a silicone liquid flashing layer, through which the team screwed Z clips anchored to the building's steel tube substructure or the 12- to 16-gauge studs.

Each hexagonal panel features a galvanized steel frame on the back and a series of cast-in tabs on the sides that are bolted to those Z clips. Every panel was individually numbered to indicate where on the building it should be installed.

Panels weighed 225 to 400 lb (102 to 181 kg) each, according to MATT Construction Senior Superintendent Bill Fisher. "We had a surveyor who laid out every corner of the panels and marked them to ensure proper spacing and gaps," he explains. "It was kind of like putting a jigsaw puzzle together."

Fisher says the original plan was to install the panels with a scaffolding system as they had done with installation of the substructure and Z clips, "but when it came to loading scaffold with GFRC panels, it didn't work as well as we anticipated."

As suggested by the GFRC installer PCI, the building and installation team removed the scaffolding and instead used 41 m (135 ft) two-person, high-reach aerial lifts to install the

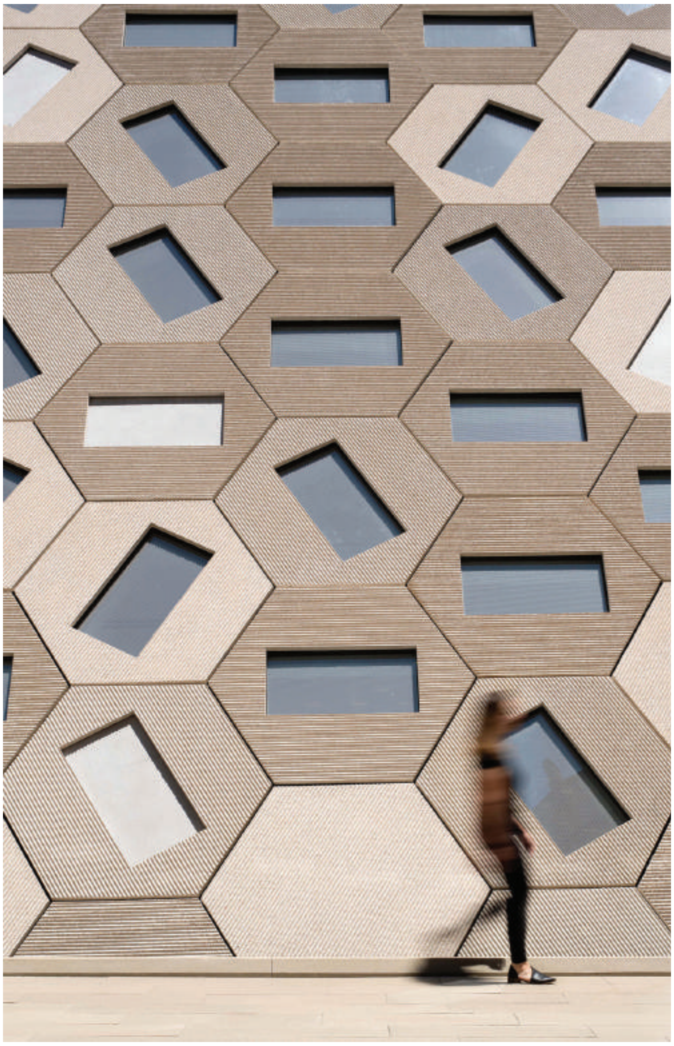

Fig. 4: Rectangular windows in adjacent hexagonal GFRC panels are rotated to create a dynamic building façade *(image courtesy of OMA New York, photography by Jason O'Rear)*

Fig. 5: GFRC panel installation *(photos courtesy of Gary Leonard)*

panels. Each lift had a rig that held the panels in place while crews installed them one at a time. “Depending on where the panels were, it took about 20 to 90 minutes to install each panel,” says Fisher, with two to three crews working at a time (Fig. 5).

Addressing Seismic Concerns

The building is located in a region of high seismic activity, which meant the structure had to accommodate movement. “This one was more challenging,” explains Matt Williams, an Associate Director of Façade Engineering at Arup, a global built environment consulting firm. “In California, we have high seismic requirements and hexagonal façades are not the norm. In an earthquake, nothing can fall off the building.”

The engineers had to allow for movement between the panels so that no two panels would hit one another in the event of a seismic event and then lift, break, or fall. Interlocking hexagons don’t provide the single horizontal line necessary for a seismic joint. “In theory, without that straight line of movement for cracking, [seismic activity] might break the panels to create a straight line,” Williams says.

Another challenge is the pavilion’s design, which results in surfaces sloping in multiple directions. In a significant seismic event, the building can drift as much as 150 mm (6 in.) between the façade top and bottom attachment points. “We really had to study how much the building was going to move,” Williams adds, pointing out the necessity of his team to plan for large cutouts like the second-story window that frames the adjacent temple dome and the three levels of the interior grand staircase where the building façade is spanning three floors.

To address these challenges, OMA and Arup provided for two seismic joints to run across the structure in horizontal lines that bisect the hexagonal panels. According to Forster, this required a lot of choreography to integrate those joints into the model of the hexagons so that the joints would cross in the same direction as the ribbed texture of the panels themselves, thereby concealing the joints.

Completed in early 2022, the leaning Audrey Irmas Pavilion, with its honeycomb-like façade, cost $95 million to design and build and is what Shohei Shigematsu, OMA’s Partner-In-Charge on the structure, has repeatedly and aptly called “a machine for gatherings.”

Williams says the pavilion was his first experience working with a hexagonal panel façade. “You don’t realize the impact something as simple as a shape can have,” he remarks as he considers his firm’s work on the structure. “It’s not a complex façade, but its design and installation reinforced [that] everyone has to work together very closely.”

Selected for reader interest by the editors.

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