Precast's Aesthetic Versatility Allows Parking Structures To Evolve

Precasters help designers meet challenging aesthetic requirements by creating innovative solutions.

— Craig A. Shutt

Parking structures offer unique challenges for designers, as they require long, open bays often vulnerable to weather. Today, those durability and accessibility needs are being complicated by demands for more creative aesthetic designs. Precast concrete's aesthetic versatility allows designers to create the required appearance—whether that means fitting into a campus design, creating a contemporary statement, or blending with an historic neighborhood and hiding the structure's function.

"Aesthetics are definitely more important to parking-structure owners today," says Joseph Mastropaolo, an architect in Tampa, Fla. "Many don't want their structures to look like a parking garage, particularly if it's in a historic urban environment."

Adds Anthony Caputo, senior project manager with Perkins + Will in New York, "Owners definitely are paying more attention to the details of their parking structure's look and the overall aesthetics. They want the buildings to blend into the campus environment and not stand out just because they're designed for parking."

"Generally, we're seeing owners want to go beyond the typical spandrel-like parking structure and add as much aesthetic value as they can," says Frank Fox, president of Greenfield Architects in Lancaster, Pa. "In part, I think that's because owners can see what's being accomplished with materials like precast concrete, and they realize they can demand more from their project. We're seeing more decorative looks and the use of panels rather than spandrels, with more projections, louvers, and screens on façades."

The following parking structures from around the country give an idea of what designers are achieving with precast concrete, meeting a variety of challenges in addition to providing an aesthetically pleasing appearance:

Precast Sets the Standard for the Future of Hartford Hospital

Administrators at the Hartford Hospital in Hartford, Conn., presented designers from Perkins+Will with a daunting challenge. After the firm completed a 30-year master plan for the hospital campus, administrators asked the team to "set the language and design approach for all future work" with a new building: a nine-story, 1250-car parking structure.

"Using this project as the foundation for the tone of future work made it an important assignment," says Anthony Caputo, senior project designer. "But parking structures are a very different type of building due to their function, mechanical requirements, spanning needs, etc." At the same time, the designers were working with the Hartford city officials, who wanted to ensure new projects acknowledged the historic relevance of buildings near the campus's edge.

"We had to evolve to provide a new language for the hospital campus that took these various needs into account and express them with the parking structure such that it could serve as a base for future projects," he explains. "We had to create a very interesting blend to bring all of that together."

The result was a precast concrete structural system that features a typical design of double tees, beams, columns, shear walls, and spandrel panels. To meet the aesthetic needs, the façade consists of a series of three-

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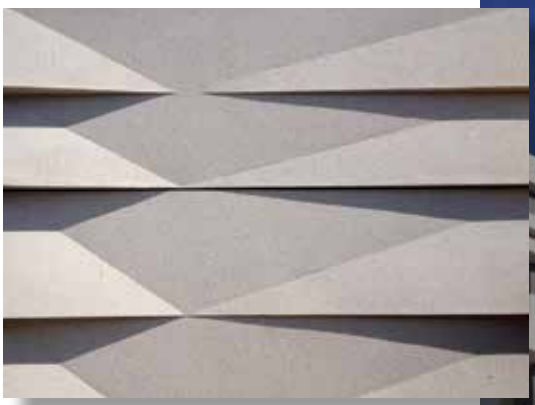

At the Hartford Hospital in Hartford, Conn., designers used an all-precast concrete structural system and a façade design that features three-dimensional "folded" panels stacked across the façade. The design was the first in a 30-year master plan and sets the foundation for later buildings.

PROJECT SPOTLIGHT

Hartford Hospital Parking Structure

Location: *Hartford, Conn.*

Designer: *Perkins+Will, New York*

Owner: *Hartford Hospital, Hartford, Conn.*

Engineer: *Desman Associates, Rocky Hill, Conn.*

Contractor: *Downes Construction Company, LLC, New Britain, Conn.*

PCI-Certified Precaster: *Unistress Corp., Pittsfield, Mass.*

Precast Components: *Double tees, columns, beams, shear walls, stair towers, and spandrel panels.*

Photos courtesy of Unistress

dimensional "folded" panels stacked across the façade. The panels have symmetrically placed "warps" that curve out similar to small eyebrow windows.

"Conceptually, we started with the idea of alluding to overlapping cedar-shake roofs, which over time age and warp somewhat to create shadow lines. We used that image to extrapolate out to create a sense of shadow play. Our goal was to allow the building to reflect light in different ways at different times of the day while creating a modular system that would be easy to erect, ensuring it was economical."

The panel designs were produced on CAD files and given to the precaster to create shop drawings. "This approach allowed us to validate the design ideas quickly," he says. A variety of "interactive" meetings were held with the precaster, Unistress Corp., which allowed the team to mark up changes as needed quickly. Only a handful of panel types had to be created, allowing forms to be efficiently changed and adjusted as needed for a particular panel shape. The small number enhanced casting speed.

'Using this project as the foundation for the tone of future work made it an important assignment.'

Identical Waves

The wave projections were designed to be identical, with a projection of 2 in. off the 8 in. panel. Formliners were used to create the projections. "We were concerned about the weight and economy, as well as projecting off the vertical panels in some locations, so we kept to one size," he says. Caputo visited the plant to discuss the designs and then reviewed them on-site during the erection.

The white wavy panels contrast with vertical column sections finished in charcoal gray. "We wanted to create a vertical effect that would offset the very horizontal design of the parking structure." Vertical fluting was added to the panels to emphasize this, cre-

ated with stock formliners. The vertical panels received a light sandblast to slightly expose the aggregate, but not to create too textural of a surface.

Designers paid attention to aesthetics inside the structure as well. At the ramps, a two-part spandrel panel was created, with separate finished faces on both interior and exterior sides. Along the interior, the panels follow the slope of the ramp, while the exterior panels remain horizontal. "We didn't want to express the slope of the ramp for users on the floors, so this double system of panels allowed us to meet all of the needs."

Two types of metal treatments also were applied to the exterior to achieve different aesthetic goals. One type consists of perforated metal with variations in colors that match nearby brick buildings. The second is a stainless-steel mesh that diffused light from inside, minimizing light pollution for nearby areas.

Administrators also had asked for some commercial space on the first floor to emphasize the pedestrian scale and interaction with the facility. A 5000-square-foot fitness center was created along the street side of the first floor. This allowed parking to be set back away from the street.

"This project offered some unique challenges, but the result was a dramatic structure," says Caputo. "It now will set the design standard for all projects going forward at the hospital."

Historic Lancaster, Pennsylvania

At the other end of the spectrum, the new 151,200-square-foot Central West Garage built in the downtown area of Lancaster, Pa., blends into its historic neighborhood while providing a 21st-century facility. The 405-car garage features a precast concrete structural system and a façade of architectural precast concrete panels with embedded thin brick and buff-colored accents, including a cut-stone appearance at the base, columns, and accent areas.

"The owners wanted an aesthetically pleasing design that fit with the area," explains Frank Fox, president of Greenfield Architects. The site is located on the edge of the city's historic district, which includes buildings dating to the early 1700s. When the owners applied for a zoning variance for height, city officials made it clear

A traditional tripartite design with faux windows and elaborate details, including embedded thin brick in the architectural precast concrete panels, help the façade of the Central West Garage in Lancaster, Pa. fit in with its neighbors. The all-precast concrete structural system was connected on each level with an existing adjacent parking structure.

Photos courtesy of High Concrete Group LLC

PROJECT SPOTLIGHT

Lancaster Central West Garage

Location: *Lancaster, Pa.*

Size: *151,222 square feet*

Cost: *$11.1 million*

Designer: *Greenfield Architects Ltd., Lancaster, Pa.*

Owner: *Lancaster Newspapers, Inc., Lancaster, Pa.*

Engineer: *Providence Engineering Corporation, Lancaster, Pa.*

Contractor: *High Construction Company, Lancaster, Pa.*

PCI-Certified Precaster: *High Concrete Group LLC, Denver, Pa.*

Precast Components: *Load-bearing spandrels, nonload-bearing spandrels, double tees, lite walls, beams, girders, L-beams, shear walls, wall panels, and stairs with landings.*

that they didn't want the building "to look like a parking structure," Fox says. "We got the message clearly."

A detailed study was done prior to design work to ensure the economics of the precast concrete panels with embedded thin brick. Designers also considered load-bearing panels as well as panels with laid-up brick

'From every angle—aesthetics, schedule, efficiency, cost, etc.—the precast concrete panels made the most sense.'

installed after erection. "From every angle—aesthetics, schedule, efficiency, cost, etc.—the precast concrete panels with embedded thin brick and attached limestone projections made the most sense." High Concrete LLC supplied the precast concrete components.

Adding to the complexity was the building's location abutting three-story row houses on one side and an existing parking structure on another. The new parking structure had to connect to an existing one, which was owned by the same company. "This project was going to essentially provide an addition to the existing building, but it had to reflect more of the history of the area." To accomplish that, designers created an appearance on the visible sides of the building that reflects to proportions of the row houses but at a scale to match its seven-story height."

The building features a traditional tripartite design of base, center, and cornice. The base features precast concrete panels cast with formliners to resemble cut stone, a popular design for some of the older, larger buildings in the area, Fox explains. These were enhanced with limestone accents that project out from the façade. They were added after the panels were erected, fitting into recesses with anchors.

"The projections for some of these pieces were fairly large, up to 8 inches, and we calculated that it would be more economical and attractive to set them in rather than try to cast them into the panels," he says. "These were high-profile pieces at eye level, where we wanted to focus our budget." The panels feature large window openings that mimic the look of retail storefronts. These were covered with dark aluminum panels and mesh to hide the interior while allowing the building to remain open.

Brick Veneer Blends

In the center section, a 40-40-20 mixture of red brick shades along with black ironspot stippling mimics the faces of the nearby buildings. Designers reviewed a variety of thin-brick options before deciding on the combination that provided the rich, near-orange tint they desired. Belt courses and accent bands in buff-colored precast concrete mimic the stone appearance used on the base.

Punched window openings were created on a regular pattern and filled with an aluminum grid that replicates the look of mullioned windows. Beneath these two windows per bay are three square windows with a decorative grille of concentric circles. The aluminum pieces were installed in the openings at the precaster's plant prior to shipping. Other portions of the center section feature the cut-stone appearance of the lower level.The cornice level features precast concrete panels with alternating bands of embedded thin brick and buff-colored, limestone-like textures. The combination provides a dark, textured look to the building's roofline.

The detailed mixture of brick and limestone appearances continue about 30 ft around each corner, where the design shifts to a more traditional spandrel-like open appearance for sides away from public view. "This approach allowed us to represent the historic detail on the public faces of the building while allowing the majority of the structure to remain open," he explains. In some of the enclosed areas, vents, louvers, mechanical systems, and sprinklers were installed to meet code requirements for enclosed parking structures.

The garage's driving surface comprises double tees reinforced with carbon fiber, which makes them corrosion-resistant. The carbon reinforcing also allowed the precaster to reduce concrete cover ordinarily used to protect welded wire-mesh reinforcement. As a result, the tees are $3^1/_2$ in. thick on most floors, a half-inch less than usual, which allowed a weight reduction of 8%. On the first floor, where a two-hour fire rating was required, flanges were $4^3/_4$ in. thick. Each double tee is 15 ft wide and spans 60 ft long.

Constructing the building was complicated by its location, which formerly had been a surface parking lot. The structure connects to the parking structure next to it on each level and abuts the historic row houses beside it. In addition, the site sloped in both directions, dropping 4 to 5 ft in one direction and 6 to 10 ft in the other. The precast panels could accommodate the slope as well as the interior ramping to keep the building looking parallel to the street on all of its levels.

The use of embedded thin brick eliminated the need for masonry scaffolding at the congested site. The precast concrete components were staged nearby and erected by a crane set on the site. Lanes of traffic were blocked toward the end of the erection as the crane worked out to the edge of the tight site. "Using precast concrete shortened the site-construction phase by about two months," says Fox. That helps the building owner save money and generate revenues faster.

"We've done a good deal of work with structural precast concrete, and we find that it makes good sense to go with this system," says Fox. "It's less expensive than other systems in both initial and life-cycle costs, and it provides aesthetic options that can meet owners' growing desires these days to avoid a typical, utilitarian look to their parking structures."

Colorful Winter Haven, Florida

City officials in Winter Haven, Fla., had two goals for their new large parking structure at a prominent downtown intersection: they wanted to avoid having it look like a garage, and they wanted it to blend with the adjacent retail corridor. They achieved these goals with the use of a total precast system.

'Precast is less expensive than other systems in both initial and life-cycle costs.'

Photos courtesy of Lori Ballard, Photographer

Decorative touches, ranging from brick and tile to awnings, cornices, and colorful paint, create the look of retail storefronts for a new precast concrete parking structure in downtown Winter Haven, Fla. Panels were overlapped to create a varying rhythm to the façade, and a variety of lighting fixtures minimize light overflow and mimic retail appearances. Photo courtesy of Mike Potthast, Potthast Studios

Photos courtesy of Everett Whitehead & Son, Inc.

PROJECT SPOTLIGHT

Winter Haven Downtown Parking Garage

Location: *Winter Haven, Fla.*

Size: *97,608 square feet*

Parking Stalls: *261*

Cost: *$3.2 million*

Architect: *Collman & Karsky Architects, Winter Haven, Fla., and Tampa, Fla.*

Owner: *City of Winter Haven, Winter Haven, Fla.*

Structural Engineer: *McCarthy & Associates, Inc., Clearwater, Fla.*

MEP Engineer: *I. C. Thomasson Associates, Inc., Tampa, Fla.*

Contractor: *Everett Whitehead & Son, Inc., Winter Haven, Fla.*

PCI-Certified Precaster: *Coreslab Structures (Tampa) Inc., Tampa, Fla.*

Precast Specialty Engineer: *Pfeil Design LLC, Tampa, Fla.*

Precast Components: *Double tees, columns, lite walls, frame walls, spandrels, wall panels, beams, cornice caps, flat slabs, and stairs with landings.*

"A lot of forethought went into creating a façade that hid the building's true function," explains architect Joseph Mastropaolo. He served as the project architect for architectural firm Collman & Karsky Architects, which designed the structure. The three-level, 97,608-square-foot project in the city's downtown retail district is flanked by historic buildings dating to the early 1900s. The city manager and commissioners wanted to increase parking for retailers in this area, but they didn't want a large structure to dominate storefronts or look out of place.

A precast concrete panel system approach was specified rather than a spandrel system. The precast concrete wall panels allowed a variety of "doors" and fenestration patterns to be cast into them, creating a variety of appearances along the façades. Cost evaluations by the precaster and contractor showed the two systems were comparable once the different foundation needs were taken into account. Precaster Coreslab Structures (Tampa) supplied the precast concrete components.

"The key challenge was to design a different fenestration pattern at each storefront and maintain the required open area so the parking structure would not have to be mechanically ventilated," Mastropaolo explains. "Working with the precaster during the design development phase of the project made this a reality."

'We decided to use precast concrete cornices both for the high quality of the appearance and the durability they would offer from vandalism.'

The precast concrete wall panels essentially served as a blank canvas onto which the architect was able to place color, materials, and ornamentation to complement the structure in its historic context. "The design-build format allowed us to continue to examine more economical approaches to those aesthetic designs while not interrupting the flow of the casting and erecting of the building," he says. "Holding off on selecting the final materials gave us time to find the optimal material to fit the budget and provide the best aesthetics." As a result, brick and tile was added in several locations when the budget proved sufficient to accommodate them.

Sections of the wall panels were offset and overlaid on top of adjacent panels to accentuate alternating storefronts, creating a three-dimensional rhythm. These protruding storefronts were finished in richer colors and received tile or brick to enhance their design. Special accent colors were selected for trim. In contrast, the receding storefronts feature neutral colors and had less ornamentation and no brick or tile.

Most of the precast concrete was cast with a standard form finish, with reveals and recesses incorporated during casting. This allowed for the design team to easily add a variety of ornamentation and treatments after installation. During erection, it was noted that the precaster provided a high quality product. The architect exploited this to further enhance the façade by incorporating smooth areas into the fields of texture.

Faux windows were used along the street facades, varying with each storefront. They were fabricated with aluminum tubes in the shop and installed after the panels were erected. To further blend the storefronts with the local architecture, stucco headers and trim were installed at selected windows and doors along with several designs and colors of fabric awnings and metal canopies. Sections of Mission-style tile roof accents were also attached to the panels at two storefronts to continue the retail corridor.

Black-out glass panels were considered for window openings along with inoperable doors to hide the building's true function along the retail corridor. Instead, perforated metal panels were installed on the backside of the faux windows and doors. They make it difficult to see into the building during the day while allowing those inside to see out. The perforated panels also reduce interior light from escaping at night and provide natural ventilation.

The window and door cutouts were cast with wood forms as well as magnet-adjusted steel forms to allow quick changes among the blockouts needed to create the openings. The designs allowed for little repetition, requiring a variety of forms. The adaptability of the forms ensured the panels could be cast quickly to keep the project on schedule.

Custom Cornices Top Structure

Storefronts featuring a cornice had unique designs, which initially were planned to be created with EIFS. However, concerns arose about its long-term durability, especially as the cornices would be within easy reach of visitors on the top level. "We decided to use precast concrete cornices both for the high quality of the appearance and the durability they would offer from vandalism," Mastropaolo says.

The cornices were cast in custom shapes and then connected to the top of the panels at the site. The fabrication process produced such high-quality pieces that the architect decided to leave them smooth and paint them a palette of colors that would complement the specific storefront.

The stair/elevator tower on the corner features a system of precast concrete frames on the perimeter and precast concrete shear walls at the elevator core. The design includes a Mission tile roof complementing the roof treatments found in the downtown, while its wide open spaces on each level offer panoramic views for garage users.

Exterior lighting also was given careful consideration. The electrical engineer and the architect investigated lighting options to wash the façade, to minimize light emanating through the fenestration at night while highlighting architectural details. They used light fixtures with both LED and fluorescent lamps to reduce the impact of the interior lighting on the sidewalk outside.

"We did mockups of the lighting installations with the precast concrete façades to determine how to maximize the impact and ensure we achieved the desired effect," Mastropaolo says. Even the height of the lamp poles on the third level were scrutinized, to provide the minimal height while maintaining the required foot-candles. This reduced pedestrian and vehicle site lines and limited illumination spilling beyond the structure.

Early in the programming phase of the project, the city considered adding retail spaces along the structure's main street front to continue the retail corridor and add activity, but ultimately decided against it. "The goal was to create accessible parking and encourage people to visit retailers and restaurants in the downtown, and the city decided it didn't want to generate additional leasable space that would compete with the landlords downtown."

Historic Traverse City, Michigan

The Old Town Parking Deck in Traverse City, Mich. also had to fit into a historic area, but this time the history reflected a northern Michigan resort area that was undergoing rejuvenation. The facility was designed to handle parking for a large national insurance company as well as focus tourist parking into one location rather than have them spread throughout the neighborhood looking for a spaces. But neighbors also wanted to ensure the parking structure didn't dominate the otherwise low-key, historic buildings.

To meet these challenges, designers created a 177,226-square-foot, four-story parking structure with a precast concrete structural system. To help it fit in with its surroundings, structural precast concrete wall panels were embedded with a historic thin brick that had previously been used to face several other buildings in the area with full bricks many years earlier.

"The neighbors wanted us to maximize parking in the structure while creating a low-profile style and appearance that respected the context of the adjacent traditional two-story development," explains Matthew Jo-

Photo courtesy of Todd Zawistowski

Photo courtesy of Matt Jobin, Rich & Associates

A thin brick in a "Chicago common" style was embedded into the precast concrete panels on this all-precast concrete parking structure, mimicking the look of the historic area in which the facility is located in Traverse City, Mich. Charcoal-gray spandrels were chosen to contrast with the brick appearance in other locations.

PROJECT SPOTLIGHT

Old Town Parking Deck

Location: *Traverse City, Mich.*

Size: *177,226 square feet*

Cost: *$7.9 million*

Designer/Engineer: *Rich & Associates, Southfield, Mich.*

Consulting Architect: *Environment Architects (formerly CWS Architects), Traverse City, Mich.*

Owner: *City of Traverse City, Traverse City, Mich.*

Contractor: *Colasanti, Detroit*

PCI-Certified Precaster: *M.E.G.A. Precast (formerly National Precast), Roseville, Mich.*

Precast Specialty Engineer: *Integrated Engineering Solutions, Tecumseh, Ontario*

Precast Components: *559 pieces, including double tees, columns, inverted T-beams, lite walls, stair walls, risers, embedded-brick panels, acid-wash panels.*

Photo courtesy of Todd Zawistowski

Photo courtesy of Todd Zawistowski

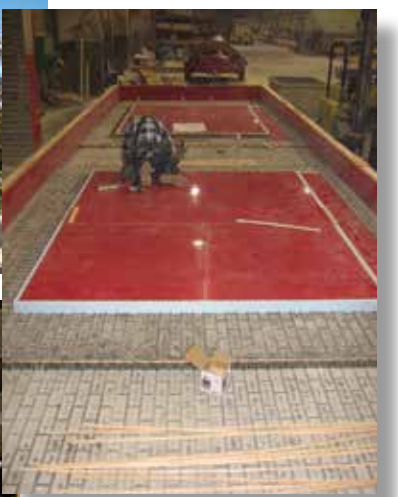

Photo courtsey of Matt Jobin, Rich & Associates

bin, project manager for Rich & Associates. The structure was placed mid-block, with development areas to the north and south to be completed later. "We wanted to tuck the parking into the neighborhood. But the neighbors made it clear that they also didn't want a vanilla box."

To achieve this, designers worked with local architectural firm CWS Architects to find a style that would blend well while reaching other goals. They found a thin brick that replicated the look of "Chicago common brick," which was used on several other projects nearby. The brick had become commonplace in the area in the late 1800s as ships took lumber to Chicago. To ensure enough ballast on the return trip, ships filled up with the brick, which was abandoned upon reaching Traverse City again. Locals began using the available brick on their projects.

The brick features a range of yellow-tan colors, intermixed to achieve the warm patina of other buildings, Jobin says. Renderings followed by mockups of the brick panels were created to ensure the proper look was achieved. The bricks were set into the forms and then the panels were cast over them, ensuring a secure connection between the concrete and the brick. Both spandrel and wall panels were used to break up the massing of the building.

Brick Contrasts With Spandrels

The entrance features charcoal-gray spandrels spanning the opening and connecting to a stair/elevator tower on the end that features more brick adjacent to a taller precast concrete tower with charcoal-gray spandrels framing large windows. The precast concrete structure consists of a simple beam-and-column grid pattern with precast concrete stairs.

Blockouts were created in the façade panels to replicate windows, and aluminum framing units and spacer panels, minus the glass, were installed at the precaster's plant prior to shipping the panels to the site. The windows were left open both to lower maintenance costs and to ensure the structure met requirements for an open facility. Large 12-foot window-like openings were placed on the ground floor to mimic the look of nearby retail spaces and provide a base for the facility.

The first-floor panels were cast in

a vertical position 12 ft wide to match the width of the precast concrete double tees, allowing for large architectural openings at the base. The upper floors were erected in a horizontal position based on a 36-foot-wide bay. Each grouping of wall panels is topped with a cornice treatment that includes precast concrete patterned with friezes or ornamental medallions and architectural metal parapet trim. M.E.G.A. Precast of Roseville, Mich., formerly National Precast, provided the precast concrete components.

"The controlled environment afforded in production of the precast components greatly increased the level of quality control in the final product's appearance, with a level likely unable to be matched by other construction methods within the project budget," says Jobin.

Precast concrete did a lot more than just achieve the aesthetic goals. Due to the limited length of the building, the structure slopes on both sides to allow for ramping. "The precast concrete panels allowed us to keep the façade appearing horizontal and to avoid having it appear to slope," he says. The panels are structural and act as shear walls to support the double tees, which were pretopped in all areas except on the top floor where the snow-melt system was installed.

A precast concrete roof structure, consisting of wall panels, end spandrels, and double tees, was located over the floor slope from the third to the fourth level. The roof, along with a snow-melt system embedded in the sloped floor, helps maintain operation of the garage in any winter weather.

Construction moved smoothly and without site restraints, with 559 pieces erected in 50 days. That was a key element of the project, Jobin notes, as the community wanted to ensure that disruptions to the area were minimized. The precaster delivered 60 ft double tees from its plant four hours from the site—much of it along two-lane roads—without difficulty. The components were staged in an empty lot near the site, with $1^1/_2$ to 2 days' worth of pieces available to erect at all times.

The project features a green roof with 200 photovoltaic arrays to help power the facility. It also includes electric-charging stations and other sustainable-design features. Combined with the attributes provided by the precast concrete, including local manufacturing, minimized construction waste, recycled materials, and others, the project qualified for LEED Silver certification.

"We came up one point short of Gold certification, but the owner wasn't interested in changing or adding anything to achieve it," Jobin says. "He was aiming for LEED certification, and we achieved Silver without altering our plans."

'The goal was to create the image of movement from one set of louvers to the next.'

The precast concrete design ensured the project could meet all of its goals, he notes. "The notable advantages of precast concrete, such as lower project costs, speed of erection, long-term durability, ease of maintenance, use of recycled material content, and year-round construction, made it the ideal choice at the onset of the design process."

Prominent Medical Center

Designers faced the opposite challenge in creating the seven-level, 400,000-square-foot parking structure at the front of the UC Davis Medical Center facility in Sacramento, Calif. Administrators wanted to make the structure highly visible—but they also wanted it to blend with the existing campus. The facility features a precast concrete structural system and an off-white precast concrete spandrel façade covered in many areas with metal mesh, canopies, and an intricate louver system.

"The parking structure is at the 'front door' of the hospital complex by design," explains Peter Saucerman, partner in charge of sustainable planning at Dreyfuss & Blackford. "Parking structures often are treated as a utilitarian building and are stuck in the back somewhere. But people arriving at a hospital, either as a patient or visitor, often are confused and aren't sure where to go. The master plan for this hospital placed the parking up front so people would know where to go first."

At the same time, the building needed to fit in with the campus and provide a "strong, professional appearance" befitting a hospital, he notes. It is located along two heavily trafficked streets that intersect at an acute angle, creating a pentagonal-shaped footprint. "The design had to flow from one façade to another and tie in with the new hospital tower that was just built, so people could easily find it but keep it in sympathy with the rest of the hospital style."

Designers chose a precast concrete structural solution to meet their needs for the 1,200-car structure. "We always look at a range of options for design possibilities and economy," Saucerman says. "But past experience with precast concrete led us to believe that it would provide the best solution, and it did." Clark Pacific provided the precast concrete components.

The design uses a precast concrete hybrid moment frame for seismic resistance, which was critical in this high-seismic area. "Seismic requirements are always a challenge on projects in this area, but we've worked with Clark Pacific and other precasters in the area, and they know the needs and can produce designs that work."

The hybrid moment-frame system eliminated the need for shear walls, which helped create more wide-open interiors, aiding layout and security concerns. The beams and columns feature an architectural finish on exposed elements to heighten the quality of their appearance, with other areas receiving a standard gray color and finish. The resulting system is not only cost-effective, but it adds to the safety and overall experience of visitors.

The building's exterior features an integrally colored white architectural finish. "We were able to match the precast concrete's color to that of the hospital finishes, so they worked together." Reveals were added to the spandrels along with thin, horizontal "window" openings along one side to emphasize the horizontal nature of the structure.

Metal panels and mesh were placed over these horizontal elements, creating a vertical element that also blocked light from emanating out of the facility. The street-side façades also were faced with finished-aluminum louvers attached to steel substructures. Each set of louvers were set at a different angle, mathematically calculated to provide the best intersection with lighting around it and from the streets.

"The goal was to create the image of movement from one set of louvers to the next, rather than have a set cornice with one angle or shadow all

The high-profile parking structure at the UC Davis Medical Center in Sacramento features aluminum louvers and other metal decorations attached to the precast concrete spandrel panels. Each set of louvers is angled slightly differently, to cast different shadows through the day and imply movement.

PROJECT SPOTLIGHT

UC Davis Medical Center Parking Structure

Location: *Sacramento, Calif.*

Size: *400,000 square feet*

Cost: *$20 million*

Architect of Record/Engineer: *Watry Design, San Jose, Calif.*

Design Architect: *Dreyfuss & Blackford Architects, Sacramento, Calif.*

Owner: *UC Davis Medical Center*

Contractor: *McCarthy Building Companies, Inc., Sacramento, Calif.*

PCI-Certified Precaster: *Clark Pacific, West Sacramento, Calif.*

Precast Components: *Columns, beams, elevator shafts, and spandrel panels.*

day," he explains. "They all are fixed in place, but some of them look like they could be flipped open or shut." They also were designed with considerations for street traffic, so the louvers in each section can pick up headlights at night as they move past the facility.

The louver's metal substructure attached to the precast concrete façade with stainless-steel fasteners. Making the connections posed no unusual challenge, he notes. "The beauty of working with precast concrete is the precision you can specify. We can plan the dimensions as tightly as we need and you know things will fit together." The metal louvers cover the south and west façades, along the streets, while the east and north sides feature traditional precast concrete panels.

The structure's roof includes a solar photovoltaic array that generates electricity to run the parking deck and generate power for the hospital building next door. "It's hot in this part of the country, making rooftop parking less desirable," he explains. The PV panels double as carports, shading the top deck.

The project fulfills the University of California Policy on Sustainable Practices and incorporates energy efficiency and sustainable features, such as electric-vehicle charging stations. "We didn't pursue LEED certification, but we certainly have those requirements in the back of our mind, and we try to provide as many techniques as we can, even if that isn't the goal," he explains. "The precast concrete definitely helped us with that, as it was manufactured within 50 miles of the site and used recycled materials."

These projects show some of the range that precast concrete parking structures can achieve. Whether the facility must blend with its neighbors or create a dramatic contemporary statement, precast concrete's aesthetic versatility can provide a solution as well as offer additional benefits in accelerated construction, sustainable design, layout ease, and cost efficiency. ■

For more information on these or other projects, visit www.pci.org/ascent.