2015 PCI DESIGN AWARDS

Precast/Prestressed
Concrete Institute



















Precast Concrete Delivers High Performance

Sarah Fister Gale

"Better, faster, cheaper" was the rallying cry of project owners featured in the 2015 PCI Design Awards, and precast concrete solutions delivered on all three demands. This year's winners showcase versatility and performance, projects delivered with minimal disruption to the environment, lower costs, and more time savings than competitor designs, and more-durable and low-maintenance results.

Some of the highlights include a new training center and storm shelter built to withstand hurricane-strength winds without skipping a beat; a hospital and school rebuilt in ravaged Joplin, Mo., that now provide the community with beautiful, safe shelter and functional spaces; and the elegantly designed Church of Latter Day Saints (LDS) in Tijuana, Mexico, with a sparkling white facade that the owners love so much they've made it the model for all future LDS churches across South America.

"Precast concrete is the only material that could deliver the complexity and longevity that this structure required," CRSA architect Wallace Cooper says of the LDS project. He wasn't alone in that sentiment. Time and again the engineers, architects, and precasters interviewed for these awards praised the many functional, environmental, and aesthetic benefits that precast concrete brought to these projects.

Choosing the winners was certainly difficult. PCI relied on 11 judges from across the industry to assess over 100 submissions and ultimately gave awards to 20 buildings and 6 bridges, with several more honorable mentions. Leading prizes include the Harry H. Edwards Industry Advancement Award for the Comstock graduate housing project in California; the Sustainable Design Award that went to Gulf Power's Douglas L. McCrary Training and Storm Center in Florida; and the All–Precast Concrete Solution Award that was given to the new Gordon Food Service home office in Michigan. Other awards celebrate the best healthcare center, school, stadium, theater, special solutions, and a variety of bridge types and lengths. The following pages showcase the projects selected by our judges.

This year's PCI Design Awards winners showcase high performance—versatility, efficiency, and resilience.

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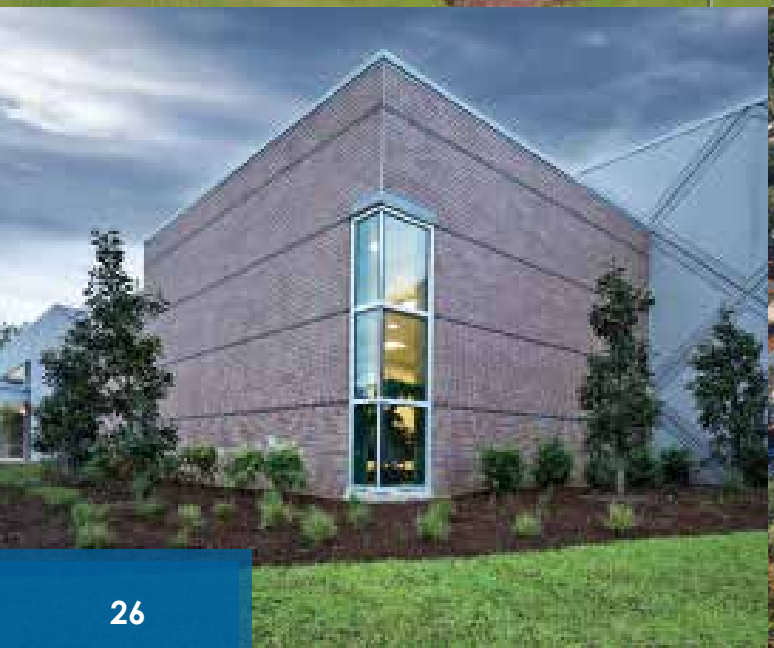

Stephen J. Seguirant, PE, MASCE, FACI, FPCI, is vice president and director of engineering for Concrete Technology Corp. (CTC) in Tacoma, Wash. Seguirant began his career at CTC in 1979 as a project engineer and is now a registered civil engineer in Washington State. In his 35 years with CTC, he has held various posts, including project manager, chief project manager, and vice president and director of project management and quality assurance. Currently, he is a member of several committees at PCI, including the Research and Development Council, the Prestressed Concrete Piling Committee, the Bridges Committee, and the Transportation Activities Committee. He is also a member of the American Concrete Institute's Committee 318, Building Code Requirements for Structural Concrete, and chairman of Subcommittee G, Precast and Prestressed Concrete. Seguirant is a fellow of both PCI and ACI. He was principal author of chapter 3 of the *PCI Bridge Design Manual, Fabrication and Construction*. Seguirant has won numerous awards from PCI and ASCE for publications in *PCI Journal*, and was named among the eight Technology and Materials Innovators in the American Road & Transportation Board Association elite list of America's Top 100 Private Sector Transportation Design and Construction Professionals of the 20th Century. Seguirant earned a bachelor of science degree in civil engineering from St. Martin's College and a master of science degree in civil engineering from the University of Washington–Seattle.

Geoff Walters, AIA, LEED AP, is a principal at Cannon Design. As director of quality, he is focused on aligning design with all aspects of building performance and technical quality. He promotes full collaboration across disciplines in driving a high level of technically resolved design in both documentation and the final realized project. With over 35 years of experience crafting solutions for a wide range of project scales and complexity in government, education, healthcare, corporate, and civic building types, he brings a depth of knowledge and passion to this role. His responsibilities include the development and evolution of technical and document standards, project phase quality reviews, staff mentoring, and promoting an optimized project process. Walters works closely with the firm's sustainable design leadership to minimize the environmental footprint of all of its client work. He has a bachelor of architecture from Virginia Polytechnic Institute and State University.

Helmuth (Helm) Wilden, PE, FPCI, Vice President, Wilden Enterprises Inc. Helm Wilden has been involved in the precast/prestressed concrete industry for more than 45 years. After positons as a project engineer for Formigli Corp., one of the country's largest precast concrete manufacturers in the early 1970s, he held management positions with Thomas A. Hanson & Associates and PCI producer member Universal Concrete in Stowe, Pa. In 1978, he formed H. Wilden & Associates (HWA), a specialty engineering firm offering design and shop drawing services to precast/prestressed manufactures. Upon HWA's acquisition by TRC Worldwide Engineering in 2004, he retired from HWA in 2004 and formed Wilden Enterprises Inc., offering limited consulting services to the industry. Wilden has been active in PCI since 1976, when he served as the chairman of the first PCI Tolerance Committee. Since then, he has served on the PCI Board of Directors on four different occasions, representing professional members, the Technical Activities Council, the Research and Development Council, and the Educational Activities Council. He is an inaugural honoree as a PCI Fellow in 1994 and a PCI Titan in 2004 and a recipient of PCI's Medal of Honor in 2010. He has served on the Industry Handbook Committee since the third edition, was technical editor of the seventh edition, and serves in this capacity for the eighth edition, which is currently in progress. Wilden received a bachelor of science in civil engineering from Michigan Technological University in 1965 and was inducted into the Academy of the Civil and Environmental Engineering Department in 1999.

Photo: Bernard Andre Photography

"Two major research projects sponsored by the precast concrete industry directly allowed precast concrete to be the solution of choice in these buildings located in a very high seismic area."

Susie Dow Nakaki, KPFF

Harry H. Edwards Industry Advancement Award

Comstock Graduate Housing Project

Stanford, Calif.

Owner	Stanford University, Stanford, Calif.
Architect	Kenneth Rodrigues & Partners Inc., Mountain View, Calif.
Precaster	Clark Pacific, West Sacramento, Calif.
Engineer of record	Nakaki Structural Design Inc., Tustin, Calif.
Contractor	Vance Brown, Palo Alto, Calif.
Cost of precast concrete	$13.798 million
Project size	288,000 ft^2 (26,800 m^2)

This year's Harry H. Edwards award winner is a shining example of how precast concrete can bring durability, performance, and efficiency to any project. All of these benefits came together in the new Comstock graduate student housing at Stanford University, where the owners faced serious time and cost challenges. The project included replacing nine low-rise, two-story buildings that provided 79 beds with four new buildings to accommodate more than five times as many students. The new structures also needed to include student meeting and social gathering spaces, laundry facilities, computer clusters, music practice rooms, game rooms, and other spaces. The schedule was critical because it all had to be finished in time for the 2014 school year.

To meet these needs in the allotted schedule, the designers chose precast concrete rather than wood, says Mark Palmer of Clark Pacific, the precast concrete producer for the project. "With the speed of erection, the general contractor was able to deliver the student housing within one school year, getting students in quicker and allowing the university to start bringing in revenue earlier."

The buildings feature architecturally finished, structural precast concrete, unique vertically posttensioned, precast concrete walls for seismic resistance, and a first-ever in this region, a pretopped plank system for the flooring. The floor system consists of pretopped, prestressed concrete planks spanning from exterior wall to exterior wall, over interior bearings walls, and resulting in a two-span plank. "The integration of the performance of a structural system with the finish of an architecturally clad precast concrete product saved time and money for everyone involved," he says.

The team had to create up to 100 casts per week to match the fast-paced nature of the project. By prefabricating the components off-site, installation crews were able to keep the crowded campus clear of extra materials using just-in-time delivery, allowing cranes to lift the precast concrete pieces directly from the trucks and immediately install them. Palmer says that up to 30 truckloads arrived daily, carrying wall panels and floor planks, during precast concrete erection. "Installation crews were able to set an entire floor of wall panels and floor planks about every three days." he says.

A medium sandblast was used on all of the panels to match existing colors of the other buildings on the campus, while green and brown accent colors were used at the top of each building to add visual interest and contrast. Formliners were also used on the fourth-story panels to create a ribbed texture that wrapped around the upper floor of the dormitory buildings.

This precast concrete design also delivered a more durable solution that will require minimal maintenance and meet seismic design requirements. "One of the most interesting aspects of this system is its ability to move like a hybrid moment frame," Palmer says. "After a seismic event, the building will pull itself back to its original position." Construction on the housing complex began in April 2013 and was completed in June 2014, well in advance of the academic year, Palmer says.

The owner of the new Douglas L. McCrary Training Center on the Gulf Power Pine Forest Road campus in Pensacola, Fla., wanted a structure that offered open flexible spaces but was also durable enough to serve as an emergency operations center for the utility when high-powered hurricanes and other storms blow through town. To meet the emergency operations center requirements, the building does not just have to withstand the impact of 200 mph (322 km/hr) hurricane wind loads. It needs to remain functional and usable immediately following the weather event. That's one of the many reasons the team chose precast concrete, says Bob Cordes, facility manager for Gulf Power. "We liked the strength and the sustainability attributes that precast concrete brought to the project," Cordes says.

The precast concrete design was able to meet the stringent performance requirements of the structure while providing an aesthetically pleasing, sustainable final product at an affordable price point, says Ben Townes of Townes + architects. It would also help the building achieve LEED certification, which was another priority for the utility company. "The use of precast concrete was instrumental in achieving LEED points," Townes says. "The precast concrete components were manufactured regionally, and include recycled material and are fully recyclable." he says. "Precast concrete also contributes to overall sustainability of the project by providing durability and reducing maintenance."

The use of precast concrete double tees brought both a long-span capability and exceptional strength to the building. Reducing the number of interior columns and beams needed provided open, flexible interior space, Townes says. "It is an efficient use of the structural material that both lowered cost and improved erection times."

That was key as the owner had a short time line for the project to have it ready for the coming storm season, he says. "We were able to leverage speed of construction with precast."

The requirements for impact resistance of the walls and roof during a major weather event were met by using solid precast concrete wall panels and a double-tee roof structure. The wall panels are one piece from foundation to parapet, which reduces the number of joints and weak points that make conventional wall construction more susceptible to failure in high lateral load events, says Adrian Lovell of PTAC Consulting Engineers. "Eight inches of solid reinforced concrete has a natural and inherent capability to resist the forces of high wind and protect the occupants from windblown debris."

The designers also added series of unique angles and forms to the exterior of the building to protect openings from windblown debris, and to add stiffness and the additional strength of a folded plate. "The angles created natural recesses to tuck in the window openings," Lovell says.

"This project is a real feather in our cap," Cordes says. "It meets our sustainability goals, and we know that it will survive even after a major storm."

Sustainable Design Award

Gulf Power Douglas A. McCrary Training Center

Pensacola, Fla.

Owner	Gulf Power Co., Pensacola, Fla.	**Precaster**	Metromont, Hiram, Ga.
Architect	Townes + architects PA, Pensacola, Fla.	**Contractor**	Morette Co., Pensacola, Fla.
		Project cost	$6.8 million
Engineer of record	PTAC Consulting Engineers, Pensacola, Fla.	**Project size**	30,886 ft² (2,867 m²)

"The fact that we could come up with a cost-effective sustainable solution that could withstand 200 mph winds is testament to the benefits of precast."

Ben Townes, Townes + architects PA

Photo: TOWNES + architects PA

Photo: Justin Maconochie Photography

"The precast concrete floor system was a perfect fit for this approach as it proved to be the lowest first-cost solution with the fastest construction time."

Scott Vyn, Integrated Architecture

All–Precast Concrete Solution Award

Gordon Food Service Home Office

Wyoming, Mich.

Owner	Gordon Food Service, Wyoming, Mich.
Architect and engineer of record	Integrated Architecture, Grand Rapids, Mich.
Structural engineer	JDH Engineering, Grandville, Mich.
Civil engineer	Exxel Engineering, Grand Rapids, Mich.
Precaster	Kerkstra Precast, Grandville, Mich.
Precaster	Gate Precast, Winchester, Ky.
Precast concrete specialty engineer	Ericksen Roed
Contractor	Dan Vos Construction Co. Inc., Ada, Mich.
Cost of precast	$5.9 million
Project size	384,500 ft² (35,720 m²)

When Gordon Food Service (GFS) decided to build a new corporate headquarters on its 50-acre (202,000 m²) Wyoming, Mich., campus, they wanted the building to reflect the company's culture and values, which include conserving resources for the future, and investing in the local community. To embody those goals, they chose a precast concrete design that used locally mined and manufactured precast concrete pieces, which delivered sustainable attributes while creating an elegant, maintenance-free, cost-effective structure, says Scott Vyn, of Integrated Architecture.

"While several factors contributed to the choice of precast for the building's structural system, the two most prominent performance attributes of precast concrete highlighted on the project are speed of construction and durability," he says. "The overall precast concrete structural system reduced the construction period significantly, while the durability of the concrete allowed for interior columns, ceilings, and the building's exterior to remain exposed." The natural fire rating of precast concrete also supported the creation of simple, clean ceiling lines.

The new facility consists of three main areas that include test kitchens, meeting spaces, and offices that are all linked by a light-filled connector zone. This zone features a curved-glass curtain wall to transition between the spaces. The building structure, floors, and exterior walls are all made of precast concrete.

Early on, designers decided to use a raised floor hollow-core precast concrete system, which added several performance and economic benefits to the project.

"The precast concrete floor system was a perfect fit for this approach as it proved to be the lowest first-cost solution with the fastest construction time," Vyn says.

In addition to acting as the structural system for the floor, the underside of the precast concrete panels provided a paintable finished ceiling. That meant the need for a typical layer of cast-in-place concrete to create the finished floor level was eliminated as the raised platform sits directly on the panels. Vyn's team estimates that this decision alone saved roughly $1 million and weeks of construction.

Using precast concrete for the new headquarters also provided aesthetic versatility for both the exterior and interior of the building, he says. The exterior's architectural precast concrete cladding, combined with the glass and metal curtain wall, helped provide the rich, modern and timeless appearance. In addition, the use of structural precast concrete allowed for long clear spans which helped open up the office area. As a result, it provided the owner with virtually limitless options for office configuration, Vyn says. "The great thing about this project, in addition to the staff at GFS, is the timeless longevity that I am confident this building will enjoy."

2015 PCI DESIGN AWARDS
Building Awards Jury

Best Government or Public Building
The Broad Museum in Los Angeles, Calif.

Best Stadium or Arena
Toronto Pan Am Sports Centre in Toronto, ON, Canada

Best Healthcare/Medical Structure
University of California at San Francisco Medical Center at Mission Bay in San Francisco, Calif.

Best Higher Education Building
John Brooks Williams Natural Science and Technology Center–South Building at St. Edward's University, South Austin, Tex.

Best Higher Education Building
Whitney Museum of American Art in New York, N.Y.

Best Higher Education Building
St. Mary's Hall, Boston College in Chestnut Hill, Mass.

Best K-12 School
St. Mary Catholic Church and School in Joplin, Mo.

Best Hybrid Parking Structure
University of California at Davis Medical Center Parking Structure III in Sacramento, Calif.

Best All–Precast Concrete Parking Structure
Massachusetts Bay Transit Authority Salem Intermodal Commuter Rail Station in Salem, Mass.

Best Parking Structure Facade
Pomona College South Campus Parking Structure in Claremont, Calif.

Best International Building Structure
Latter-Day Saints Tijuana Temple in Tijuana, Mexico

Best Theater
Bellevue Youth Theatre in Bellevue, Wash.

Best Retail Facility
Nordstrom, The Woodlands, in The Woodlands, Tex.

Best Warehouse/Storage/Distribution Center
City of Loveland Service Center in Loveland, Colo.

Best Warehouse/Storage/Distribution Center
College of DuPage Campus Maintenance Center in Glen Ellyn, Ill.

Best Custom Solution
Manhattan West in New York, N.Y.

Best Mixed-Use Building
Fassler Hall and Dust Bowl Lounge and Lanes in Oklahoma City, Okla.

Brad Gildea is an associate and senior project manager at the Phoenix, Ariz., office of SmithGroupJJR, one of the largest architecture, engineering, and planning firms in the United States. As a member of the science and technology studio, he is responsible for managing the design as well as overseeing the construction process of complex laboratory projects. Most recently, Gildea was responsible for managing the $135 million Energy Systems Integration Facility for the National Renewable Energy Laboratory in Golden, Colo. He was instrumental in this design-build project, working closely with the client and contractor to deliver one of the largest and most technically advanced energy research facilities in the world for the Department of Energy. He has also served as adjunct faculty teaching design at the Arizona State University College of Architecture from 1996 to 2004. Gildea received bachelor of science and master of architecture degrees from The Ohio State University.

Thomas M. Gormley, AIA, NCARB, LEED AP, is principal, project manager, and project architect at GBBN Architects Inc. He has provided leadership on a diverse range of projects for GBBN's markets of healthcare, education, and community development. Gormley has directed teams on small and large projects in both urban and suburban locations, methodically and meticulously documenting projects to successful outcomes. Leading over $750 million in built construction, he has remained vigilant in his commitment to design integrity, the quality of the details, and the overall project constructability. He has intuitive knowledge of construction and project delivery methods that allows him to clearly define a project's scope. Gormley received his bachelor of science degree in architectural engineering technology from the University of Cincinnati and holds a master's in architecture with high distinction from the University of Michigan. He is a registered architect in Ohio and Kentucky.

Marlene Imirzian, FAIA, is principal of Marlene Imirzian & Associates Architects, with offices in Phoenix, Ariz., and Escondido, Calif. The firm was ranked as one of the Top 50 architecture firms in the United States by *Architect Magazine* in 2014. Her work is known for its design excellence, project performance, and integration of sustainable design practices for building. Her work has received numerous design awards, including local and regional American Institute of Architects (AIA) design awards, and has been published internationally. In 2013, Imirzian was awarded Fellowship by the AIA for excellence of design. Her work includes projects for higher education, civic, medical, historic preservation, commercial, and residential clients. In addition to practicing architecture, Imirzian serves as guest critic at architecture schools, has been a faculty associate at The Design School Arizona State University (ASU) Herberger Institute for Design and the Arts architecture program, and was recently a faculty mentor for the ASU master of real estate development program. She received her master of architecture degree from the University of Michigan College of Architecture and served as a member of its Alumni Board of Governors. She is licensed to practice in Arizona, California, and Michigan.

Cathleen McGuigan is editor-in-chief of *Architectural Record*, the nation's leading architecture publication for more than a century. McGuigan, who is the second woman to serve as editor-in-chief, was named to the post in 2011. Under her leadership, *Architectural Record* has won numerous awards, including the 2012 Grand Neal award, the top American Business Media award for journalistic excellence. A former *Newsweek* architecture critic and arts editor, McGuigan is a graduate of Brown University. She was awarded a Loeb Fellowship at the Graduate School of Design (GSD) at Harvard and has been a Poynter Fellow at Yale. Her freelance articles have appeared in The *New York Times Magazine* and *Smithsonian*, among other periodicals. She sits on the board of trustees of the Skyscraper Museum, the Center for Architecture New York, and the Alumni Council of the Harvard GSD.

Allan Teramura, BES, BArch, Fellow of the Royal Architect Institute of Canada, LEED AP, has been a partner at Watson MacEwen Teramura architect in Ottawa, ON, Canada, since 2009. He has considerable experience in heritage conservation issues and as a community advocate was instrumental in the establishment of Canada's first midcentury modern residential neighborhood, Ottawa's Briarcliffe Heritage Community District. Teramura has been responsible for the restoration of the Tropical Greenhouse at the Central Experimental Farm in Ottawa and the ongoing conservation of Parliament Hill's Centre Block. Teramura is also the Royal Architecture Institute of Canada's (RAIC) president-elect. He is also an active voice in Ottawa's architectural community. Teramura graduated from Carleton University in 1990, garnering a degree with a High Distinction, Research Thesis Prize and the RAIC Student Medal. Previously, he earned a bachelor of environmental studies from the University of Manitoba.

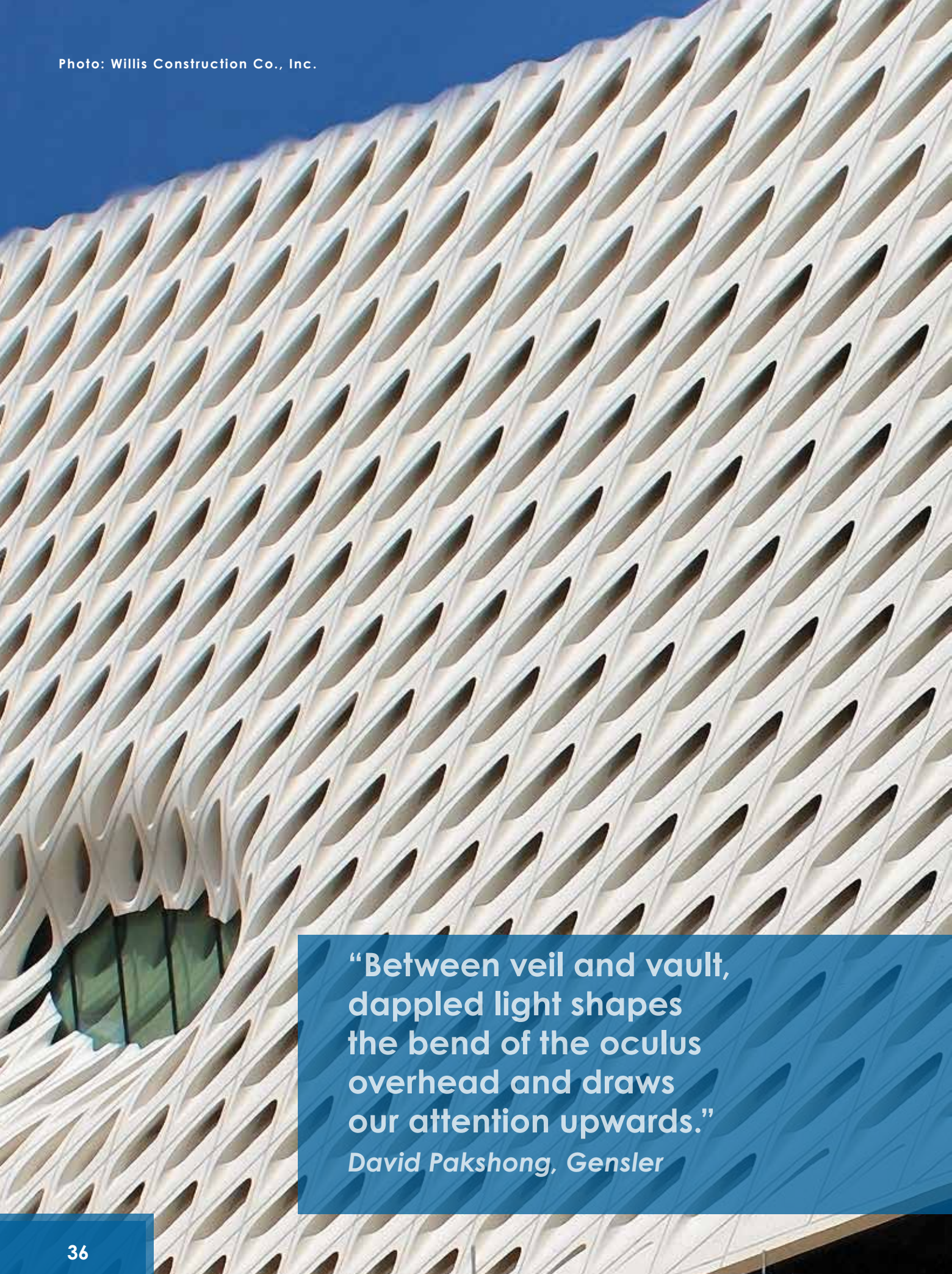

Photo: Willis Construction Co., Inc.

"Between veil and vault, dappled light shapes the bend of the oculus overhead and draws our attention upwards."

David Pakshong, Gensler

Best Government or Public Building

The Broad Museum

Los Angeles, Calif.

Owner	The Broad Art Foundation, Santa Monica, Calif.	**Engineer of record**	Nabih Youssef & Associates, Los Angeles, Calif.
Architect	Diller Scofidio Renfro, New York, N.Y.	**Contractor**	Matt Construction, Santa Fe Springs, Calif.
Executive architect	Gensler, Santa Monica, Calif.	**Project cost**	$140 million
Precaster	Willis Construction Co. Inc., San Juan Bautista, Calif.	**Project size**	120,000 ft² (11,100 m²)

The new Broad Museum in Los Angeles, Calif., looks like a white wedding veil sparkling against the blue California sky. Indeed, the structure has been dubbed "the veil and the vault" by designers who created the unique facade to wrap around the museum's two key spaces: the public exhibition space and the archive/storage space that will support the foundation's extensive lending activities.

The glass-fiber-reinforced concrete (GFRC) skin ensured the additional strength and durability required for the structurally unique panel shapes, allowing for smaller tube framing and accommodating tight tolerances for panel placement to the structural steel. "GFRC proved to be the most cost effective of all the materials analyzed, while meeting the schedule and durability requirements," says David Pakshong, executive architect at Gensler.

The vault is enveloped on all sides by an airy, cellular exoskeleton structure made up of 2500 GFRC panels and 650 tons of steel lifts that span across the block-long gallery; it provides filtered natural daylight. Choosing a product with the demands for hundreds of different unique curved shapes for the exterior skin was a big challenge for the design team. Creating hundreds of conical light openings for the building and replicating the front oculus from a parabolic curve would need a product that was flexible and versatile to adapt to this design shape.

The designers created complete geometric information for each panel in three-dimensional (3-D) computer models first. The precast concrete producer imported this data directly into the tool path software to create instructions for the five-axis, computerized numerical control machine to carve molds out of high-density foam. Before skinning in fiberglass, the foam molds were sanded and sealed to create the negative formwork for the GFRC panels. The high strength of the GFRC skin ensured the additional strength required for the structurally unique shapes. The skin strength and durability allowed for smaller tube framing for the skins, which helped accommodate tight tolerances for panel placement to the structural steel. The panel strength also meets the long life and durability requirements needed at the ground floor where the public has access.

"GFRC proved to be the most cost-effective of all the materials analyzed, while meeting the schedule and durability requirements," Pakshong says.

The frames had to be fabricated to tight tolerances so the locations of the components and connection points were checked with a total station survey before and after welding. The survey data was imported back into the 3-D model of the frame to verify accuracy. Before spraying the skin, the frames were positioned on the mold, surveyed, and verified against the model. Then the setting jigs were locked into position, and the frames were removed. This step in the process was never required before. The skins were sprayed, and then the frames were replaced into the jigs and resurveyed. Finally, they did a full 3-D scan of the finished product to ensure compliance with the model.

Pakshong sees this building as one of the more innovative projects he has ever been a part of. He says, "After four years of working on the building, I am still surprised by the ability of the architecture to challenge the way we see space."

Photo: Shai Gil Photography

"The overall effective use of precast for various elements throughout the building enabled a cost-effective solution to specific design issues."

Mark Campbell, WSP Canada

Best Stadium or Arena

Toronto Pan Am Sports Centre

Toronto, ON, Canada

Owner	Toronto Pan Am Sports Centre Inc., Toronto, ON, Canada
Architect	NORR Ltd., Toronto, ON, Canada
Precaster	RES Precast, Innisfil, ON, Canada
Precast concrete specialty engineer	Precise Detailing, Inc., Vaughan, ON, Canada
Engineer of record	Parsons Brinckerhoff Halsall Inc., Toronto, ON, Canada
Contractor	PCL, Mississauga, ON, Canada
Project cost	$205 million CAD
Project size	311,000 ft^2 (28,900 m^2)

When the leaders of the Pan Am Games envisioned their new Sports Centre, they wanted it to be a showstopper. The new venue is the largest sport new-build project for the Pan Am Games and the largest investment ever made in Canadian amateur sport history.

The use of precast concrete helped the designers achieve high-performance goals that were important to the owners. The building features a fully pressure-equalized rain screen system that is durable and robust, and the siding extends above the roof plane in a number of locations to provide parapet screening around the cooling tower and generator units.

Precast concrete slabs were also used for portions of the second floor where greater ceiling spaces were required in the floor below, and precast concrete seating was used for the competition pool viewing areas to achieve larger spans with minimal depths.

The project used 256 insulated precast concrete sandwich wall panels with a blend of light-sandblasted and exposed-aggregate finishes, along with 42 panels and platforms for the dive towers.

Choosing a precast concrete design helped them achieve the grand size and dramatic look and feel, while still staying within the rigid schedule and highly scrutinized budget. "The project obviously needed to be completed in time for this summer's games, and since it is a high profile project, it was in everybody's best interest that the budget was not exceeded," says Mark Campbell, project manager of WSP in Canada, which recently acquired Parsons Brinckerhoff Halsall, the project engineer.

The design features a uniquely pitched structure and striking custom patterning that replicates themes from nature. The facade features sloping custom precast concrete panels that play against the counter slope of the main pool and field house to the north and defines the edge of a new civic plaza to the south. "The building's distinct silhouette and design was inspired by the geology of the southern Ontario landscape and the dynamic sports activities it houses," says David Clusiau, design principal at NORR Ltd. "The custom surface pattern on the exterior precast cladding and the sculptural design of the precast dive tower were key parts in communicating this theme."

The custom pattern featured on the facade combines a lightly sandblasted field with bands of exposed aggregate and reveals a pattern reminiscent of fissures and veins in a rock formation. This effect is reproduced inside the building with precast concrete cladding on the dive tower that features glass ceramic tiles rather than exposed aggregate to represent quartz veins sparkling in the background.

The dive tower, which was prefabricated at a remote site and then installed through the roof in pieces, had to meet precise tolerances to achieve international accreditation.

The use of precast concrete also helped the designers achieve high-performance goals that were important to the owners. "The overall effective use of precast for various elements throughout the building, including the cladding, slabs, bleacher seating, and dive tower, enabled a cost-effective solution to specific design issues," Campbell says.

Photo: Stantec/Rien van Rijthoven

"Precast concrete cladding provides a quality, solid look to this building while being very economical."

Helen Fehr, Rutherford + Chekene

Best Healthcare/Medical Structure

University of California at San Francisco Medical Center at Mission Bay

San Francisco, Calif.

Owner	UCSF Medical Center, San Francisco, Calif.	**Contractor**	DPR Construction, Sacramento, Calif.
Architect	Stantec, San Francisco, Calif.	**Project cost**	$1.5 million
Precaster	Willis Construction Co. Inc., San Juan Bautista, Calif.	**Project size**	878,000 ft² (81,600 m²)
Engineer of record	Rutherford + Chekene, San Francisco, Calif.		

The University of California at San Francisco (UCSF) Medical Center at Mission Bay in San Francisco is recognized around the world for its innovative patient care, advanced technology, and pioneering research. When the owners decided to expand its facilities at the Mission Bay site to house its highly regarded cancer, children's, and women's programs, they wanted to ensure that the building reflected its leading-edge identity within a reasonable budget.

"Cost was one of the biggest challenges on this project," says Helen Fehr, executive principal of Rutherford + Chekene, the engineer on the project. "We were charged with designing a high-quality, cutting-edge hospital at a below normally accepted cost."

Fehr's team considered a variety of design options and determined that precast concrete was the best choice.

"Precast came in as a very economical, durable, and attractive option," she says.

Within the facility, each center of excellence is separate but shares a platform of support services and diagnostic treatment spaces arranged along a main spine. For the facade, the designer, Stantec, went with larger precast concrete panels, ranging in size from 4 × 10 ft to 4 × 32 ft (1.2 × 3.0 m to 1.2 × 9.8 m) for fabrication and shipping efficiency, to minimize the number of joints on the building, and reduce caulking costs.

The L-shaped design feature of the project also precluded horizontal panel joints at the windowsills, requiring the tall, skinny elements between the punched windows to be integral with the main portion of the panels. To accommodate these challenges, the team posttensioned the vertical legs so that the panels could be able to span from floor to floor. Using specially designed racks to protect them as they were transitioned to the jobsite, they were then shipped vertically.

Along with being attractive and cost effective, the facade provided the owners with a high-performance, low-maintenance structure that will be able to withstand the roughest conditions and treatment, Fehr says.

"While one hopes that the building cladding will not be marred, scratched, or run into with a vehicle, if this does happen, precast concrete is far more resistant to damage than other materials."

Fehr says that the project was delivered eight days ahead of schedule and under budget in August 2014, opening in February 2015, and that everyone involved is pleased with the results. Ultimately, Fehr says, the success was due to teamwork. "I love the fact that all players—owner, design team, and contractor—worked together for the good of the project. Precast concrete is also advantageous for fire and life safety concerns and inherent longevity."

Photo: Gate Precast Co.

"[Being] able to provide the character of masonry without the maintenance headaches was a huge benefit."

John Ruble, Moore Ruble Yudell Architects & Planners

Best Higher Education Building

John Brooks Williams Natural Science and Technology Center–South Building at St. Edward's University

South Austin, Tex.

Owner	St. Edwards University, Austin, Tex.
Design architect	Moore Ruble Yudell Architects & Planners, Santa Monica, Calif.
Architect of record	STG Design, Austin, Tex.
Precaster	Gate Precast Co., Hillsboro, Tex.
Precast concrete specialty engineer	Stehler Structural Engineering, North Oaks, Minn.
Structural engineer	Datum Engineers, Austin, Tex.
Contractor	DPR Construction, Austin, Tex.
Project cost	$16.235 million
Project size	55,000 ft² (5100 m²)

When John Ruble of Moore Ruble Yudell Architects & Planners was brought in to design the John Brooks Williams Natural Science and Technology Center–South at St. Edwards University in Austin, Tex., he knew a precast concrete design was the best choice to help the owners achieve the aesthetics they wanted at a price they could afford.

But the owners were not so sure. "They had never done a precast concrete building that wasn't a parking garage," Ruble says. So when he proposed a precast concrete design for the new center, they were not convinced that it would look sophisticated enough or fit with the other brick and limestone buildings on the campus. Ruble assured them that not only could precast concrete deliver the texture and scale they wanted for the building but that it would also provide them with greater control and precision over the design in a much more high-performance and durable structure than limestone, which is porous and prone to staining and mildew.

The 55,000 ft² (5100 m²) three-story building includes a dry laboratory and classroom structure linked by a central atrium. The majority of the south side of the enclosure was developed as a precast concrete panel system that features a modular design. To provide further assurances, the precast concrete producer created a series of mock-ups in different colors to help the owner understand what the ultimate facade would look like and to tweak the final design.

"It was critical that the color not be too white," Ruble says. "In Texas, when the sun is out full force, a white surface can be blinding and powerfully hot."

They settled on an off-white color that mimics limestone but in a deeper more subdued hue. To add variety to the facade, the projected features were acid washed while the flat sections were sandblasted.

The precast concrete producer designed two forms out of poplar wood to cast all 67 panels. By shifting side rails and top and bottom rails, the precast concrete producer was able to avoid repetition in the pattern, ensuring no two panels were the same.

"The way the planes on the surface have order but are also random is reminiscent of masonry stone work," Ruble says. The dynamic surface also provides opportunities for a dynamic light and shadow experience throughout the day.

Despite their early worries, the client was thrilled with the final structure, as was Ruble. "Everyone on the team was amazed at the level of character we were able to achieve for the budget," he says. "It is our favorite precast design so far."

Photo: Nic Lehoux

"The precast concrete on the project represents a true marriage of engineering with the inherent beauty of the concrete."

Nat Oppenheimer, Robert Silman Associates

Best Higher Education Building

Whitney Museum of American Art

New York, N.Y.

Owner	Whitney Museum of American Art, New York, N.Y.	**Engineer of record**	Robert Silman Associates, New York, N.Y.
Architect	Cooper Robertson, New York, N.Y.	**Contractor**	Turner Construction Co., New York, N.Y.
Design architect	Renzo Piano Building Workshop, Genoa, Italy	**Project cost**	$248 million
Precaster	BPDL Inc., Alma, QC, Canada	**Project size**	220,000 ft² (20,400 m²)

Situated between New York City's High Line linear park and the Hudson River, the Whitney Museum's new 220,000 ft² (20,400 m²) precast concrete and glass facility is now home to the most expansive display of modern and contemporary American art in the country. The new building is as attractive as the art that it houses inside.

The eight-story structure is demonstrably asymmetrical, with a series of terraces that step back from the adjacent elevated park. The design is organized around galleries on the south side, support spaces on the north, and an exposed precast concrete core running through the middle that contains vertical circulation and mechanical ducts. "From very early on in the design process, there was a desire to architecturally express the building's central spine distinctly from the volumes on either side," says Elisabetta Trezzani, partner-in-charge from the Renzo Piano Building Workshop, the design architect for the project.

The ability to limit expensive field labor in New York was also a contributing factor in choosing precast concrete over cast-in-place concrete. Containing all of the vertical circulation and mechanical shafts, the spine of the building presented a challenge for designers. "It had to fit in the project site while still allowing ample room for the galleries and support spaces," she says. "The use of thin precast concrete panels as cladding not only expressed the idea of the central core but also saved significant space over the alternative option of cast-in-place concrete."

By combining the precast concrete panels with closed cell polyurethane foamed-in-place insulation and a double-silicone seal between panel joints, the design team was able to also deliver a high-performance system that responds to the strict interior temperature and humidity requirements of the museum,

Stabilized laterally by the concrete core, the building uses a steel frame for vertical loads and required cross bracing only at the southwest corner. The facade features a combination of architectural precast concrete panels and a steel-plate-clad unitized curtain wall system, which is hung from the top of each panel and pinned at the bottom. "Using a similar structural support system for the precast concrete panels allowed both wall types to move similarly, thereby eliminating potential complex and unsightly differential movement joints," says Scott Newman, partner-in-charge from Cooper Robertson, the executive architect for the project. "This would not have been possible with cast-in-place concrete."

These systems typically consist of stainless steel bolts that project ½ in. (13 mm) off the face of the building to which crews tether a lanyard to lock in, level, and stabilize a platform. The team took that idea and created a denser pattern of anchors that could also be used to accommodate art installation, Newman says, noting that it further adds to the artistic beauty and functionality of this structure. "When the threaded inserts are exposed, they add visual texture and sparkle in the sunlight, adding another level of detail to the building."

Photo: Boston College

"To be able to successfully replicate these elements in precast concrete not only shows the versatility of precast concrete but also showcases the high level of skill ... involved in the project."

Robin Larouche, BPDL Inc.

Best Higher Education Building

St. Mary's Hall, Boston College

Chestnut Hill, Mass.

Owner	Boston College, Chestnut Hill, Mass.
Architect	DiMella Shaffer, Boston, Mass.
Precaster	BPDL Inc., Alma, QC, Canada
Precast concrete consultant	Building & Monument Conservation, Arlington, Mass.
Engineer of record	LeMessurier Consultants, Boston, Mass.
Restoration architect	McGinley Kalsow & Associates Inc., Somerville, Mass.
Contractor	Shawmut Design & Construction, Boston, Mass.
Cost of precast concrete	$4.22 million
Project size	92,000 ft² (8500 m²)

The Boston College campus is known for Gothic early–20th century architecture. When designers were brought in to restore the 100-year-old St. Mary's Hall, they knew they would need to faithfully replicate every detail of the building's cast stone facade—but in a material that would be better able to withstand the long, cold Boston winters. They chose precast concrete to do the job. "The biggest advantage in using precast over other materials is the great plasticity of it, which allowed for a wide range of details, as well as the quality of the process itself." says Robin Larouche of precast concrete producer BPDL Inc. in Alma, QC, Canada.

To achieve the goals of the project, the precast concrete producer had to be certain that the team could reproduce every piece and feature on the building as closely to the original as possible, says Wendall Kalsow, president of McGinley Kalsow & Associates Inc., the restoration architect on the project.

The pieces, which include angels, gargoyles, crucifixes, and other gothic elements, all feature complex shapes and details, requiring extraordinarily complex designs. "We had to make sure the replicas would look great aesthetically in terms of form, color, and quality, while also ensuring there would be no damages at the moment of demolding," Larouche says. And they had to do it quickly. The project included 16,000 pieces, more than 50 of which were museum quality sculptures. All of them had to be reproduced in precast concrete in less than 18 months to meet the mason's schedule.

Before the molds could be created and placed, restoration artists needed to resculpt each piece in clay to simulate the natural stone–tooling and to be sure that the replicas exactly matched. Many different techniques were required to replicate the unweathered appearance of the original pieces. Kalsow says. "Some pieces required resculpting in an artist's studio with clay, other sculptures could be replicated by repairing the original pieces with high-density liquid resins, and others required intricate birch plywood molds."

The pieces were then manufactured with a light aggregate to prevent the cast stone from appearing dark as it weathers over the next hundred years. To improve the durability and long-term performance of the restored facade, the precast concrete producer engineered a new anchoring system, and some small units were combined to create larger units with false joints. Each unit was numbered to identify its location in the wall.

For example, 17 individual stones were able to be formed into a single precast concrete unit. "This large single unit dramatically reduced the time required to install each tracery section, provided a high level of dimensional control, and improved structural performance," Kalsow says.

To meet the tight deadline, masonry work was divided into 22 lifts, and many lifts were worked simultaneously. The relentless commitment to detail and precision resulted in a historic restoration that will stand the test of time.

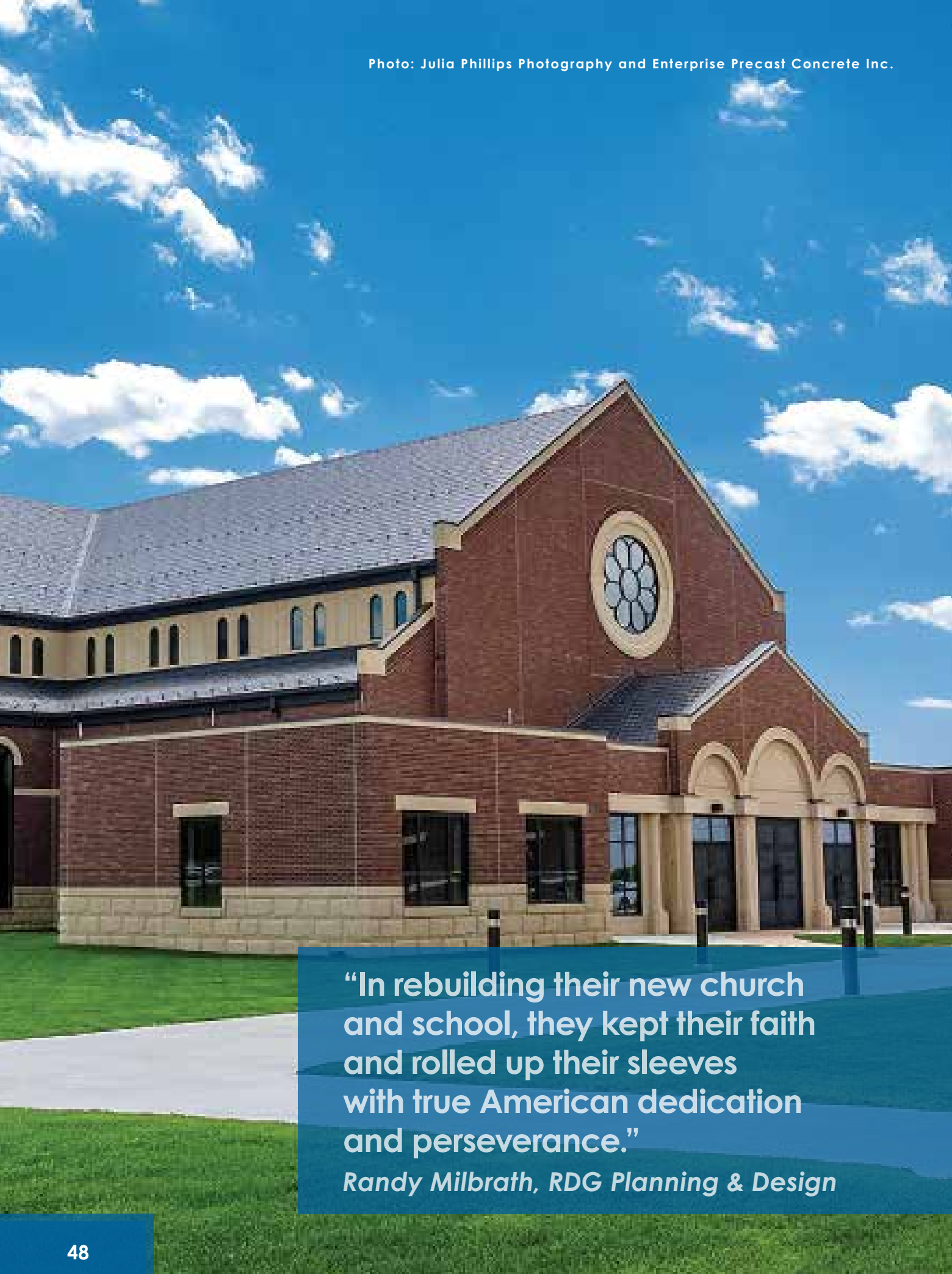

Photo: Julia Phillips Photography and Enterprise Precast Concrete Inc.

"In rebuilding their new church and school, they kept their faith and rolled up their sleeves with true American dedication and perseverance."

Randy Milbrath, RDG Planning & Design

Best K–12 School

St. Mary Catholic Church and School

Joplin, Mo.

Owner	St. Mary's Catholic Church and School, Joplin, Mo.	**Engineer of record**	Thompson, Dreessen & Dorner Inc., Omaha, Neb.
Architect	RDG Planning & Design, Omaha, Neb.	**Contractor**	Crossland Construction, Columbus, Kans.
Precaster	Enterprise Precast Concrete Inc., Omaha, Neb.	**Project cost**	$12.9 million
Precast concrete specialty engineer	Enterprise Properties Engineering, Omaha, Neb.	**Project size**	61,100 ft^2 (5680 m^2)

Everything changed for St. Mary's parish church and school on the afternoon of May 22, 2011, when a catastrophic EF-5 tornado swept through the Midwestern community and destroyed the entire parish facilities. It was officially ranked the deadliest tornado in the United States since 1947, and the town was devastated.

One structure that remained standing was St. Mary's iconic church cross, which the community embraced as a symbol of hope and courage, says Randy Milbrath of RDG Planning & Design. "It left Father Monaghan and the members of St. Mary's determined to rebuild a place of safety and peace of mind."

Local fundraising efforts supported the rebuilding. Once funds were raised, the church was eager to get the project done as quickly as possible to be ready for returning students and parish members in the fall. The owners also wanted a high-performance, durable structure that could be a haven for community members.

These goals led designers to choose a precast concrete design, featuring architectural precast concrete panels embedded with thin brick in a modern interpretation of Romanesque architecture.

"Architectural precast wall panels on the exterior allowed the new structure of the church and school to be erected quickly, which was a powerful message of hope in a city trying to rebuild much of its retail and institutional buildings all at once," Milbrath says.

The decision to go with precast concrete for the facade provided durability to the building enclosure, which was particularly important to a community rebuilding itself after a disaster. As part of the project, Federal Emergency Management Agency (FEMA) storm shelters were incorporated throughout the interior of the school. "Spaces normally used as corridors and interior rooms of the school have become safe rooms, meeting FEMA standards for the entire school population and church simultaneously," Milbrath says. The precast concrete walls of the school were finished smooth and painted but left exposed in the corridors, a request from the principal for durable wall surfaces as well as a visual reminder of their second purpose.

The designers included intricate precast concrete detailing on the facades of both buildings, including protruding brick features and areas of exposed precast concrete that simulate what cast stone would look like on a traditional masonry project. Formliners were used at the base of the school panels to emulate natural split-faced stone. Working directly with the precast concrete producer early on allowed for design, review, and production to proceed on an accelerated schedule to reopen the school in August 2014 and the church and parish hall and offices before Christmas that year.

Thanks to the use of precast concrete the tight schedule was met, and the school and church now stand as a symbol of the fortitude of Joplin's citizens, McClure says. "The same iconic cross that helped inspire the community continues to stand at its original location."

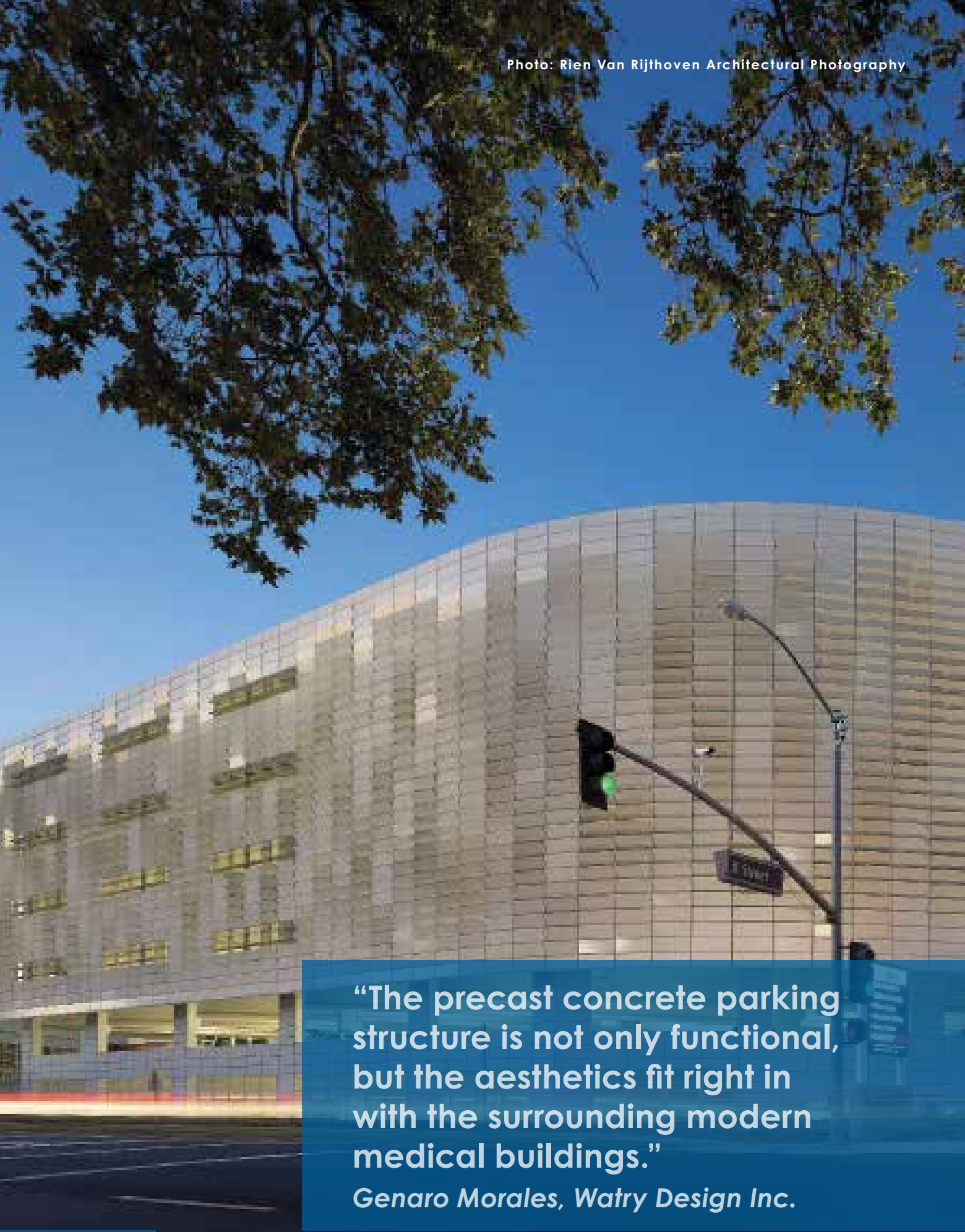

Photo: Rien Van Rijthoven Architectural Photography

"The precast concrete parking structure is not only functional, but the aesthetics fit right in with the surrounding modern medical buildings."

Genaro Morales, Watry Design Inc.

Best Hybrid Parking Structure

University of California at Davis Medical Center Parking Structure III

Sacramento, Calif.

Owner	UC Davis Health System, Sacramento, Calif.	**Contractor**	McCarthy Building Cos. Inc., Rosevillfe, Calif.
Architect and engineer of record	Watry Design Inc., Redwood City, Calif.	**Project cost**	$20 million
Design architect	Dreyfuss and Blackford Architects, Sacramento, Calif.	**Project size**	400,000 ft^2 (37,200 m^2)
Precaster and precast concrete specialty engineer	Clark Pacific, West Sacramento, Calif.		

When you build anything in California, safety and performance are always top of mind. When leaders of the University of California at Davis (UCD) Medical Center began planning for a new six-level parking structure to accommodate 1200 cars, they knew it would have to meet the most rigorous seismic requirements. Administrators also wanted a structure that reflected the hospital's reputation as one of the leading medical facilities in the country—and it had to adhere to a tight time line and budget.

Going with a precast concrete design enabled them achieve all of these goals. "The use of precast concrete minimized the impact of the structure, while reducing the actual on-site duration of the project," says Genaro Morales, director of architectural design for Watry Design Inc. in San Jose, Calif. "Cast-in-place would have required substantially more construction activity for forming and placement of the concrete and rebar."

Acting as a highly visible front door for patrons and patients, the new UCD III parking structure that sits at the front of the UCD Medical Center facility had to stand out while blending with the rest of the campus architecture.

The architect chose a white architectural finish for the structural precast concrete columns and spandrels to match the precast concrete's color to that of the hospital finish. Reveals were added to the spandrels, alongside thin, horizontal openings to emphasize the horizontal nature of the parking structure, and aluminum louvers were attached to the precast concrete facades facing the street. The louvers were each angled to pick up lighting from passing headlights to create an image of movement from one set of louvers to the next.

"Precast concrete allowed us to meet all of the exterior facade detailing within budget," Morales says. "Shapes, textures, and color matches were much easier and economical to achieve with precast concrete than would have been possible with cast-in-place concrete."

To meet seismic design goals, designers incorporated a precast concrete hybrid moment frame to provide seismic resistance. The use of the frame also eliminated the need for shear walls, which helped to create more wide-open interiors to maximize space. "The decision to use the precast concrete hybrid moment frame was critical, given the high seismic requirements of the structure," Morales says.

The result is a strategically located parking structure that provides optimal access for patients and visitors. "Being that the structure is located in such a high-profile site, we love the fact that it meets the high and demanding qualities of the overall campus."

Photo: William Horne

"The owner had a desire to minimize long-term maintenance costs and provide a durable long-lasting structure. Dense precast concrete elements, stainless steel connectors, and locating the prestressing far below the deck level helped to satisfy these objectives."

Joseph Clark, Desman

Best All–Precast Concrete Parking Structure

Massachusetts Bay Transit Authority Salem Intermodal Commuter Rail Station

Salem, Mass.

Owner	Massachusetts Bay Transportation Authority, Boston, Mass.
Architect	Fennick McCredie Architecture, Boston, Mass.
Precaster	Unistress Corp., Pittsfield, Mass.
Precast concrete specialty engineer	TRC World Wide Engineering, Allentown, Pa.
Engineer of record	Desman, Rocky Hill, Conn.
Contractor	Consigli Construction Co. Inc., Milford, Mass.
Project cost	$44.5 million
Project size	250,000 ft² (23,200 m²)

The new Massachusetts Bay Transit Authority (MBTA) Salem Intermodal Commuter Rail Station in Salem, Mass., is a testament to the versatility and high-performance characteristics that precast concrete can bring to the design and detailing of a project.

This rail station project had several major components, including excavation of the site and construction of a five-level parking structure, a passenger waiting shelter, at-grade bus platform, taxi lane, drop-off/pick-up area, sidewalks, and a pedestrian bridge, connecting a raised street to the second level of the structure. The owners originally wanted to use brick to fit in with the surrounding historic structures; however, they did not have the time or budget necessary for a traditional hand-laid brick design. Maintaining a safe, accessible, and convenient environment for passengers during construction was also paramount.

The use of precast concrete allowed the project architects and engineers to fast track the schedule with the use of early competitive bidding and an efficient erection process, says Scott Brodsky, senior architect and associate principal of Fennick McCredie Architecture, the architect and prime consultant for the project. "The precast concrete pieces were fabricated while soil modification and foundations were being installed, then erected quickly," he says. "This was critical to making the completion date required by the stakeholders." In addition, the use of embedded brick greatly reduced the need for future maintenance associated with traditionally laid brick. "Overall, the use of precast was preferred for the minimal maintenance and long-term durability demanded by the owner."

The layout of the site featured one end at grade level for the train station with a covered lobby and a covered drop-off, which drove a desire to maximize open space to enhance sightlines and pedestrian movement. The precast concrete design was able to maximize open space through the use of fluid lock devices (FLDs) connecting double tees across the building joint between two segments of the parking structure to transmit the lateral force from the side with no shear wall to the side that has shear walls, which are resisting forces in the longitudinal direction. "By transferring loads in this manner, shear walls in one direction were eliminated in one segment, providing the open space desired," says Joseph Clark, senior engineer and associate of Desman, the engineer of record for the project. The use of precast concrete was also an aesthetic option for the design team. To acknowledge the historic significance of the former rail yard, the designers incorporated patterned precast concrete spandrels on the facade to evoke images of steam locomotive wheels and drive bars. The design was accomplished through the use of sculpted, deeply ribbed formliners.

"We loved the ability to embed the special railroad and local history right in the facade of the building by exploiting the plasticity of precast concrete," Brodsky says. "Unistress embraced the artistic aspect of this and took extra care in constructing, handling, and placing these unique elements."

Photo: StructureCast

"The use of architectural precast concrete panels gave the owner an attractive structure that blends into the environment."

Brent Dezember, StructureCast

Best Parking Structure Facade

Pomona College South Campus Parking Structure

Claremont, Calif.

Owner	Pomona College, Claremont, Calif.	**Contractor**	Whiting Turner Construction, Irvine, Calif.
Architect and engineer of record	Watry Design Inc., Redwood City, Calif.	**Project cost**	$21 million
Precaster and precast concrete specialty engineer	StructureCast, Bakersfield, Calif.	**Project size**	12,000 ft² (1100 m²) of precast concrete panels

What do you do when the parking structure that you need to build takes up valuable park space on a crowded college campus? Build a full-sized soccer field on the roof. This was just one of the many innovative design solutions that the project incorporated into this LEED platinum–certified, three-story parking structure built on the Pomona College South Campus in Claremont, Calif.

"From the beginning, the owner was very concerned about losing an existing soccer/Lacrosse field," says Brent Dezember of StructureCast, the precast concrete producer for the project.

They also wanted the structure to blend into the natural surroundings as well as with the older stately buildings that dot the campus. "Using a precast concrete facade enabled them to address all of these issues," Dezember says.

The parking structure was constructed with a cast-in-place concrete frame to meet seismic load requirements. To make it more attractive, it was then clad with 165 architectural precast concrete panels, tinted to match the surrounding architecture.

"The precast panels were a key design element to make the parking structure more attractive," Dezember says.

Because it is built on sloping land, part of the structure is underground with only one side exposed. The southeast corner of the structure is bermed so that it fuses into the campus, and provides active space on the roof.

"The result is not only a durable and aesthetically pleasing parking structure but also one that matches up with the campus initiative to go green," Dezember says.

To accommodate spectators on the soccer field, roof-level panels were designed with integral precast concrete benches. "This was one of the biggest challenges on the project," Dezember says. The benches were cast directly onto the precast concrete spandrels, which had to follow the flowline of the cast-in-place concrete structure. In some cases, the cast-in-place concrete features were not completely level, requiring Dezember's team to adjust the spandrels to achieve a level base. "Otherwise, spectators would have been sitting on tilted benches," he says.

Dezember explained that the use of precast concrete also helped the owner achieve the coveted LEED platinum rating, winning project points for producing the panels locally and for using recycled steel in all of the connectors and other metal elements, he says.

The resulting structure is attractive, resilient, and multifunctional. Dezember says, "The client is very happy with the way it all turned out."

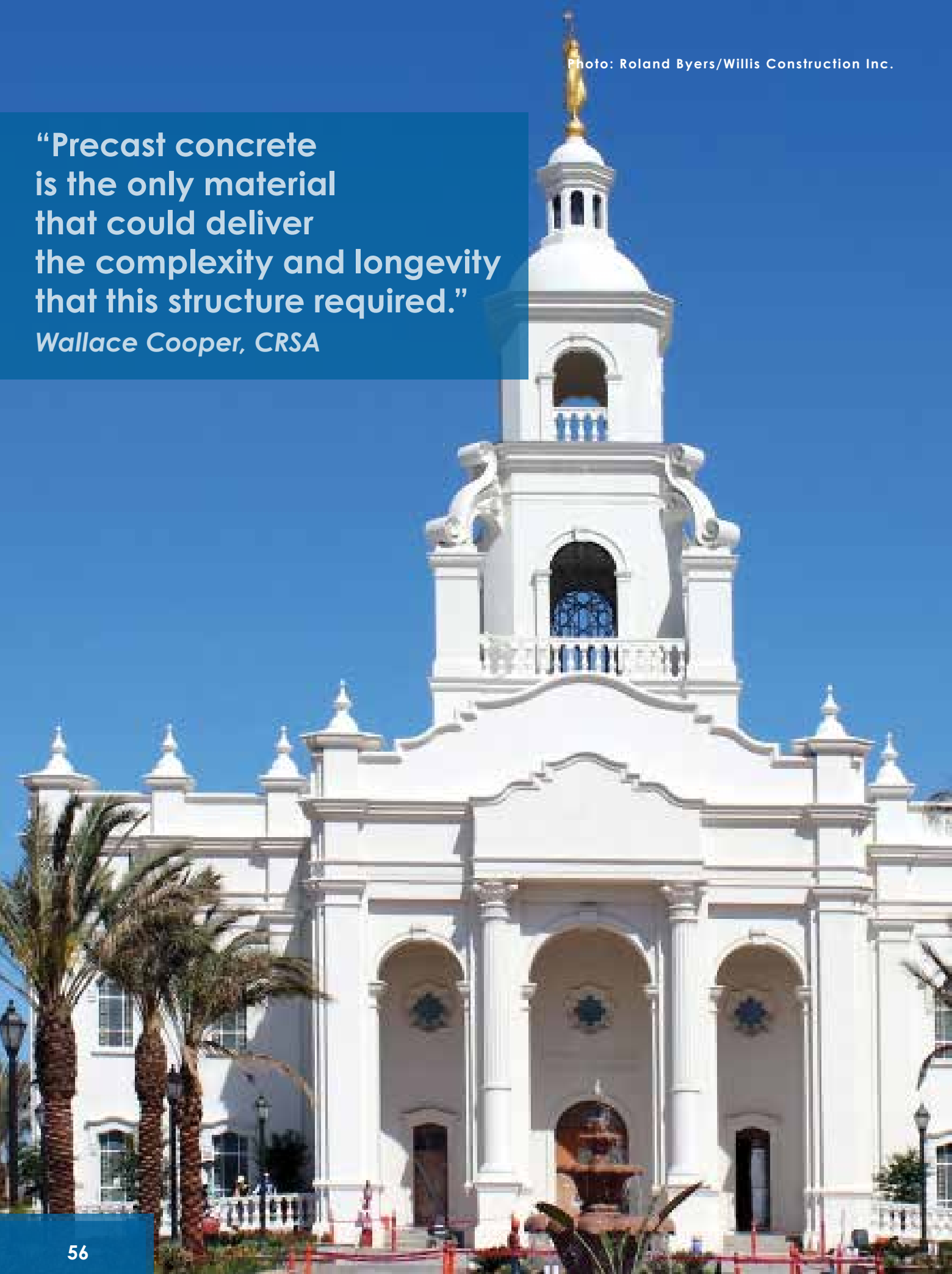

Photo: Roland Byers/Willis Construction Inc.

"Precast concrete is the only material that could deliver the complexity and longevity that this structure required."

Wallace Cooper, CRSA

Best International Building Structure

Latter-Day Saints Tijuana Temple

Tijuana, Mexico

Owner	The Church of Jesus Christ of Latter-Day Saints, Salt Lake City, Utah	**Engineer of record**	ARW Engineers, Ogden, Utah
Architect	CRSA, Salt Lake City, Utah	**Contractor**	Haskell, Jacksonville, Fla.
Precaster	Willis Construction Co. Inc., San Juan Bautista, Calif.		

The Church of Latter Day Saints (LDS) temple in Tijuana, Mexico, is more than just a religious structure. Church leaders wanted it to be a powerful statement to the people of Tijuana, says Wallace Cooper of CRSA, the architect for the project. "There was a conscientious effort to create a temple that said, 'You are incredibly important to our church.'"

The temple design went through three iterations, with each successive set of drawings pushing the designers to go further, and to create a more visually striking structure that would stand out against the crowded Tijuana backdrop. "It had to be something that was truly outstanding," he says.

Precast concrete was chosen early on in the process because it was the only material that could deliver the soaring design and sophisticated details that the church desired. "With each iteration, the precast pieces became more complicated and intricate in detail and jointing," he says.

The final design is a three-story structure with a stucco white facade that mimicks the traditional plaster finish common in Mexico's architecture. The entrance features three ornate arches reaching two stories high, and the spire is flanked by precast concrete scrolls at each corner.

According to Cooper, the ornate pieces and sweeping scale forced CRSA's team to look for creative strategies to conceal joints. To do this, they designed the facade using overlapping panels and columns so that the final structure has only one horizontal seam spanning the circumference of the building.

The designers were also eager to eliminate wall-mount holes on the backs of the precast concrete panels to keep the building enclosure tight and avoid the need for backfilling. Typically, precast concrete panels will leave an interior opening for wall mounts, but Willis Construction, the precast concrete producer on the project, came up with a system that enabled all of the panels to be mounted from the exterior of the building, completely eliminating the interior holes. "There would have been up to 1000 holes to fill with the traditional system, but with our design there were none," Cooper says. The innovative mounting strategy saved time on the project allowing subcontractors to start working on internal features while the exterior was still under construction. "It was an amazing solution," he says.

The designers also worked with only local craftspeople for construction, and a local precast concrete facility to create the panels, which allowed the team to avoid expensive cross-border taxes. Cooper says he was initially concerned about finding the right local teams to do the job—but he need not have been. "The final work was fantastic, and everyone did a great job," he says.

Cooper says the project was finished in June 2014, and the owners are so happy with the result that they are now modeling other churches across South America on this project. He says, "It has changed the way the church designs its temples."

Photo: Becker Architects for Bellevue Youth Theatre

"As architects, we love the fact that a single material, concrete—precast along with poured-in-place—was able to efficiently provide organic forms and structure that allowed for a theater to be designed as environmental sculpture"

Robert Becker, Becker Architects

Best Theater

Bellevue Youth Theatre

Bellevue, Wash.

Owner	City of Bellevue–Parks Department, Bellevue, Wash.	**Engineer of record**	CT Engineering Inc., Seattle, Wash.
Architect	Becker Architects, Bellevue, Wash.	**Contractor**	Pease Construction Inc., Lakewood, Wash.
Precaster and precast concrete specialty engineer	Oldcastle Precast, Spokane, Wash.	**Project cost**	$9.3 million
		Project size	13,448 ft^2 (1249 m^2)

How do you build a theater in a park without taking up valuable park land? Build it into the side of a hill and let the children play on top.

This was the basic design idea behind the Bellevue Youth Theatre in Bellevue, Wash., says Robert George Becker, principal and owner of Becker Architects in Bellevue. The theater includes a living roof comprising lawn, soil, irrigation, and a waterproofing system, which are all placed on top of a structural precast concrete roofing system.

"One of the main aesthetic design goals was to have an exposed concrete roof and wall structural system because it allows the building to appear as if it is extruded out of the ground," Becker says.

Coming up with a visually integrated design that both showcases the theater from the front and obscures it from the back, was only half the challenge on this project. The designers also had to address practical issues, such as how to design a waterproof roof that could handle the weight of landscaping and associated traffic while contributing to effective sound attenuation and insulation within the building. "Together all these challenges contributed to the final design approach and mandated a precast concrete roofing system that would easily join up with concrete structural and retaining walls," Becker says.

The roof system consists of precast concrete beams, hollow-core planks, and a precast concrete exhaust dome hub that was cast off-site then lifted into place over the span of a couple of weeks. "That is just a fraction of the time a cast-in-place system would have required," Becker says.

The project architect, Tanja Reiners, explained that the precast concrete beams were curved at the top with projecting steel reinforcing to engage the precast concrete hollow-core planks. She says, "By end supporting the precast concrete beams on the outside concrete wall and then supporting the beams on the interior concrete wall surrounding the main theater, we were able to cantilever the beams to the center precast concrete hub, where they are all joined together."

The precast concrete compression hub at the center of the theater was placed after all of the critical cantilevered beams were in place. The hub, which is hollow, allows unwanted air to be exhausted directly to the outside, thereby eliminating the need to use energy to recirculate the air back into the theater where it would be cooled before recirculating it back to the theater. Because the cantilevered precast concrete roof beams and hub system needed only two main concentric load-bearing concrete walls to support them, it created a wide-open theater space, optimizing capacity and viewing for performances.

The resulting structure is a durable building that has become a unique part of the broader park design, Becker says. "This theater was designed as environmental sculpture seamlessly integrated into the park's surrounding hillside lawn area."

Photo: Connie Zhou/OTTO

"Precast concrete's polished and burnished finishes elevate the design approach by blending high-end sophistication with a new modern expression for the owner's brand."

Michael Lee, Callison

Best Retail Facility

Nordstrom, The Woodlands

The Woodlands, Tex.

Owner	Nordstrom Inc., Seattle, Wash.
Architect	Callison, Seattle, Wash.
Precaster	Gate Precast Co., Hillsboro, Tex.
Precast concrete specialty engineer	Stehler Structural Engineering, North Oaks, Minn.
Engineer of record	Coffman Engineers, Seattle, Wash.
Contractor	W. E. O'Neil Construction Co., Chicago, Ill.
Project size	138,000 ft² (12,800 m²)

Nordstrom, the iconic American retail brand, has been building retail stores for decades. Its newest building in The Woodlands, Tex., represents a completely evolved approach to structure design, says Michael Lee, principal of Callison, the architect for the project. The owner wanted the facade of its latest addition to convey a sense of lightness, warmth, and elegance using multiple shades and detailing—all within a relatively tight budget.

"One of the biggest challenges in designing this building was finding a cost-effective material that could truly express the detail and articulation of the new Nordstrom facade design," Lee says.

Precast concrete was the solution. "Precast was a natural choice," Lee says. "The wide variety of textures and finishes allowed the design team the freedom to develop a complex design pattern, weaving several finishes within individual panels."

The facade was developed through design-assisted collaboration between the architect and the precast concrete producer, Gate Precast Co. The projecting feature design incorporates horizontal bands with four finishes: polished, burnished, acid etched, and sandblasted. The strategically placed finishes were designed to break down the building mass and to create an inviting scale for the customer.

Initially, Lee's team wanted a super-white base color, but the first panels were so intensely white that it was difficult to distinguish the different finishes. Gate solved the problem by using a special mixture proportioning that features limestone with a small amount of sand to provide a sparkle effect, which caused the various shades to stand out, Lee says. "The burnished, honed, acid-etched, and polished portions of the panels each reflect light differently when seen from different angles, thus taking on a light and airy quality throughout the day."

At the entry of the store are 1 in. (25 mm) thick reveals that feature a ribbed pattern that provides color contrast and dimension. Polished outer projections add further character, simulating natural stones.

To take full advantage of the high-performance aspects of precast concrete, the designer chose oversized panels with continuous insulation, which reduced the number of panel joints. This resulted in a seamless facade design, that was quick to erect and provided excellent *R*-values, helping improve the overall energy efficiency of the building, Lee says. "It also allowed the building enclosure to be completed very quickly, which in turn enabled to contractor to meet the overall construction schedule."

The final design was such a success that it has become the choice for Nordstrom's new stores. "Only through great partnership were we able to create unique mixes, finishes, and designs that surpassed all preconceived notions of concrete and supported the store brand elements," Lee says. "The combination of horizontal reveals, layers of multiple finishes, and the building's proportions formed a natural warmth from a modern mass."

Photo: EnCon United

"One of the things that is great about precast is that you can add different colors, tones, and patterns in the formliner."
Jonathan Flager, RNL Design

Best Warehouse/Storage/Distribution Center

City of Loveland Service Center

Loveland, Colo.

Owner	City of Loveland, Loveland, Colo.	**Contractor**	Golden Triangle Construction, Longmont, Colo.
Architect	RNL Design, Denver, Colo.	**Project cost**	$13.2 million
Precaster	Stresscon, Colorado Springs, Colo.	**Project size**	45,274 ft^2 (4206 m^2)
Engineer of record	Monroe & Newell, Denver, Colo.		

RNL in Denver, Colo., has been designing structures for the Loveland Service Center, in Loveland, Colo., for decades. RNL was the original master planner for the service center in 1983, and the company was again chosen for the expansion plans for the campus, adding four new buildings this past year. In the current phase, they designed new buildings for the public works' solid wastes, storm water, and streets departments.

The primary goal for this project was to create durable, low-maintenance structures that would relate to the existing campus buildings and provide a high level of thermal resistance to reduce energy costs, says Jonathan Flager, architect with RNL. They also needed to be erected as quickly as possible with minimal disruption to the active service center campus. "The various precast panel types allowed us to meet all of these goals."

Using precast concrete, the designers were able to create a uniform building envelope with multiple colors and simple detailing with an architectural gray and white acid-etched design to match nearby building color schemes.

"The use of a formliner allowed for aesthetic architectural detailing on the facade of the building without the need of an extensive and time-consuming detailing process and additional drawings," Flager says.

They chose high-performance insulated precast concrete wall panels to add durability and energy efficiency. These load-bearing panels also eliminated the need for columns inside the office, which supported the desire to maximize usable space and allow for more modular workstations. The inherent mass of the precast concrete panels and the continuous simple detailing also guard against lateral wind forces and weather infiltration at joints.

Because the panels were cast off-site, erection time and the associated disruption were limited, which turned out to be a crucial component for keeping the project on track. The original construction process was scheduled to begin in the middle of September, but massive rains and associated flooding on the project site threw the schedule off track. "The site was saturated by the rains," Flager says.

Once the storms subsided, the team spent several weeks stabilizing the site, and by the time construction began it was well into winter, with temperatures dropping below freezing.

"Because of the nature of precast concrete, we were still able to do the work, and that got the project back on schedule," he says.

The project was delivered close to schedule, Flager says. The city leaders have fallen in love with the building.

Flager says, "These facilities met all of the functional requirements with a durable and attractive design that will improve the City's bottom line through increased efficiencies for years to come."

Photo: James Steinkamp, Steinkamp Photography

"The building's concept specified wall planes that were highly textured in one color in the north/south direction, while smooth, nontextured panels in another color separated these planes in the east/west direction."

Jay Johnson, Legat Architects

Best Warehouse/Storage/Distribution Center

College of DuPage Campus Maintenance Center

Glen Ellyn, Ill.

Owner	College of DuPage, Glen Ellyn, Ill.
Architect	Legat Architects, Oak Brook, Ill.
Precaster	ATMI Precast, Aurora, Ill.
Precast concrete specialty engineer	Losch Engineering, Palatine, Ill.
Engineer of record	Larson Engineering of Illinois, Naperville, Ill.
Contractor	Pepper Construction, Barrington, Ill.
Project cost	$9.4 million
Project size	35,789 ft² (3325 m²)

The new campus maintenance center for the College of DuPage campus in Glen Ellyn, Ill., may have been designed to be durable and maintenance-free; but when the sun sets over the newly built structure, the only thing you notice is how the highly textured precast concrete panels glow magnificently in the evening light.

"This building demonstrates how beautiful a precast concrete building can be, using integral color and formliners creatively," says Jay Johnson, principal and architectural project manager for Legat Architects.

The $9.4 million, 35,789 ft² (3325 m²) building would replace a pre-engineered metal building, providing the operations and planning and development staffs with a new modern center of operations that includes a large, heated vehicle storage area with mechanics bays and a wash bay, as well as shops, offices, and storage space.

When developing the design, Johnson's team was tasked with creating a high-performance structure that would also reflect the same aesthetic expression of other student-focused facilities on each campus—all on a much tighter budget. They concluded that precast concrete was the best choice.

"Precast wall panels offered both a distinctive exterior wall and a durable interior skin without requiring multiple trade contractors," he says. That saved materials costs and sped up the schedule—the precast concrete panels were manufactured in approximately 40 days, and basic erection of the panels took only one week.

"The panels also provided for the sub-structure and superstructure, which allowed for steel joists and deck to be erected very quickly," Johnson says.

The exterior walls facing east and west feature a natural wood grain finish, which the precast concrete producer achieved using random plank patterned formliners and an "Indian brown" tint. The walls facing north and south, however, are composed of nontextured, mocha-colored panels to accentuate other planes. On the east side of the facility, a large wall of this material also screens the rear yard where mulch, gravel, plants, and other campus maintenance materials are stored. The use of precast concrete for these walls not only screens the materials but also braces the screen wall and separates the materials.

The resulting structure is beautiful and durable, and blends perfectly with the rest of the campus.

Johnson says, "This project shows how precast concrete, a material typically perceived as a solution for large, nondescript industrial buildings, can be used to create a high level of design customization and visual appeal on a modest budget."

Photo: Rey Chavez, Jersey Precast

"Choosing a precast concrete design and doing most of the construction at night dramatically minimized the disruptive impact of the project."

Amir Ulislam, Jersey Precast

Best Custom Solution

Manhattan West

New York, N.Y.

Owner	Brookfield Office Properties, New York, N.Y.
Architect	Skidmore Owings & Merrill, New York, N.Y.
Precaster	Jersey Precast, Hamilton Township, N.J.
Precast concrete specialty engineer	McNary Bergeron & Assoc., Broomfield, Colo.
Engineer of record	Entuitive, Toronto, ON, Canada
Contractor	Turner Construction Co., New York, N.Y.
Project cost	$70 million
Project size	130,000 ft² (12,100 m²)

How do you build a plaza over the busiest set of railroad tracks in the busiest city in America without bringing traffic to a screeching halt?

Go with a precast concrete design, says Amir Ulislam, of Jersey Precast. Ulislam was the precast concrete producer on the Manhattan West project to erect a massive platform over the tracks leading into Manhattan's Pennsylvania Station without disrupting the 55 live rail lines running constantly underneath. "The number of trains passing on these tracks is unbelievable," he says.

Along with not stopping traffic, a key component of the project was finding a way to span the 240 ft (73 m) without installing intermediate steel columns, which would be too close to the rails to be safe. They also needed the structure to be highly fire resistant. The designer achieved all of these high-performance design goals using massive precast concrete spans in a segmental box and lift design. Each span consists of 36 or 37 segments that weigh 1100 tons (98 kN) in total. Due to the strength of precast concrete, no additional supports were needed, and because precast concrete is noncombustable, no fire-proofing was necessary. "If we had gone with a steel design, we would have needed extra support columns, and a lot of fire-proofing," Ulislam says.

The project also included a 2400-ton (21,000 kN) launching gantry, which was designed by DEAL, a subsidiary of Rizzani de Eccher USA, the general contractor for the project. "Rizzani de Eccher added tremendous value to this project," Ulislam says.

A total of 612 precast concrete pieces were manufactured at the precast concrete producer's Hamilton, N.J. facility, each weighing roughly 56 tons (500 kN). They were then delivered into Manhattan by truck over the course of five months.

The erection crew assembled them overnight when there was minimal train traffic, though getting the pieces to the site was not easy. Because of different state transportation laws regarding movement of oversized loads, each truck had to cover the first leg of the trip through New Jersey during the day and then wait at the George Washington Bridge until dusk to finish the trip into Manhattan. "It took a lot of planning and coordination to make it work," Ulislam says.

In the end, the owner and all key stakeholders were thrilled. "We got everything done without interrupting service, and the entire team did a fantastic job," he says. "I'm very proud of this project."

Photo: Coleman Harrison with Coreslab Structures (OKLA) Inc.

"The upside-down double-tees provide a really unique planter- and bench-style seating that has never been done before."

Sean Morris, Coreslab Structures

Best Mixed-Use Building

Fassler Hall and Dust Bowl Lounge and Lanes

Oklahoma City, Okla.

Owner	Midtown Renaissance Group, Oklahoma City, Okla.	**Engineer of record**	Obelisk Engineering Inc., Oklahoma City, Okla.
Architect	Fitzsimmons Architects, Oklahoma City, Okla.	**Contractor**	Lingo Construction Services, Oklahoma City, Okla.
Precaster and precast concrete specialty engineer	Coreslab Structures (OKLA) Inc. Oklahoma City, Okla.	**Total project cost**	$5 million
		Project size	37,046 ft² (3441 m²)

Patrons who visit the Fassler Hall/Dust Bowl Lounge and Lanes complex in Oklahoma City, Okla., are immediately taken in by the roaring fire on the open deck and exposed precast concrete elements that make up the core infrastructure.

The design idea came from existing building types that are common to the Midtown District and adjacent Automobile Alley, says Jason Leach, project manager from Fitzsimmons Architects.

"This area of town was developed in the mid-20th century with a lot of board-formed concrete designs," he says. "That's what drew us to precast concrete for this project."

The designers used precast concrete columns, beams, and double tees that are similar to the board-formed tee structure found in the nearby Plaza Court building and other buildings in the district. They also incorporated areas of smooth and wire-cut brick in patterns that are only visible in certain sunlight as a subtle nod to the quilt-work pattern and finish variations that were the result of years of design upgrades to many local structures.

The precast concrete design also helped the team address operational goals, which included meeting strict schedules and budgets and working within a tight worksite.

"We were able to erect the superstructure much quicker than we could have with any other system," Leach says. "Timing was critical to the owner."

Along with being inspired by local architecture, the designers needed to find an innovative way to combine two unique entertainment concepts: a bar with an outdoor beer garden and a lower-level indoor bowling alley that met the aesthetic and structural demands of the two operations. They addressed these needs by creating separate entrances with individual identities for each—the lower level, accessed via 10th Street, is devoted to the Dust Bowl, while the upper level, accessed via Park Place, is devoted to Fassler Hall.

In the beer garden and indoor bar, they left the precast concrete tees partially exposed to reflect the utilitarian designs of the local architecture. The precast concrete tees are cantilevered and extend to different lengths over the beer garden, creating an overhang in the seating area, Leach says. The designers also employed upside-down double tees and used the flipped bases to create large combination benches and planters in the beer garden.

The innovative high-performance design was exactly what the owner wanted, and everyone was pleased with how it turned out. "This project showcases what can be done with structural grey precast concrete components besides just providing the structural frame of the building," says Sean Morris, engineering manager for Coreslab Structures. "There is enough intrinsic beauty and simplicity that an architectural statement can be accomplished as well, without the need for a facade to cover up the raw structural components of which the building is composed."