Marvin Hartsfield

President, Hartsfield & Associates, Springboro, Ohio

Marvin Hartfield formed Hartsfield & Associates in 2005, where he provides consulting services to building owners, architectural design and construction professionals, and precast concrete producers/manufacturers. His firm has consulted in numerous architectural precast concrete cladding projects throughout the United States

Prior to opening his own firm, Hartsfield began his career in architectural precast concrete in 1978 as a design engineer for Concrete Technologies Inc. Over the years, he worked on hundreds of projects, moving steadily up the ladder. He was eventually elected president and COO of the company. Hartsfield has also been an active member of PCI for more than 40 years. He received his bachelor's degree in civil engineering and master's degree in civil/structural engineering from the University of Cincinnati.

Sean Nohelty

Principal, David M. Schwartz Architects, Washington, D.C.

Sean Nohelty is a principal at David M. Schwarz Architects and serves as corporate secretary and project manager. He joined the firm in 1997, shortly after receiving his bachelor of architecture degree from the University of Notre Dame School of Architecture. Sean is a registered architect in the District of Columbia and in Texas, and holds LEED AP BD+C accreditation.

Outside the office, Nohelty is actively involved in the Institute of Classical Architecture & Art and the American Institute of Architects. He has also served two terms as a member of the Notre Dame School of Architecture Advisory Council.

Moses Vaughan

Associate senior architect at WRNS Studio, San Francisco, Calif.

Moses Vaughan is an associate senior architect at WRNS Studio in San Francisco. With almost 30 years of experience, he has built his practice of design on the idea that a comprehensive understanding of the tools and methods of construction always results in a more evocative architecture. A strong proponent of empirical and iterative design, he often builds hand-crafted prototypes, which lead to formal mock-ups and more detailed vendor-produced samples, all intended to prove (or refute) the validity of specific design solutions.

Vaughan helped develop innovative curtain wall envelopes for SOM, Ellerbe Beckett, and others prior to joining WRNS Studio. He has woven these into many high-profile projects, including new work for Adobe, UCSF Mission Bay, Intuit, Dolby, and the Trust for Public Land. He is a licensed architect in California, and received his bachelor of architecture from Cornell University College of Architecture, Art and Planning.

Keauhou Lane Honolulu, Hawaii

Photos: hi•arch•y llp.

Hawaii is known for its commitment to sustainable energy, agriculture, and building practices. So it's no surprise that this year's Sustainable Design Award goes to Keauhou Lane, a six-story mixed-use precast concrete building in Honolulu that is home to restaurants, retail, and affordable residential units.

"This project represents the first LEED-certified affordable rental mixed-use project delivered in the state of Hawaii," says Jennifer Camp, principal of hi•arch•y llp, the Honolulu-based architect. This project is special because it proves that green buildings can be accomplished with limited resources.

From the start, the project faced serious budget constraints that were exacerbated by rising labor prices in the market, Camp says. Her team looked at several material options to meet the budget requirements, and the estimating analysis showed precast concrete delivered a significant savings over other approaches. "Precast was able to offer a stable product that was fairly insulated from the chaotic swings we were seeing in other deliverable structural systems," she says. "The bulk of the deliverable product could be single-sourced from a reputable supplier who utilized in-house labor and was willing to work with the team to hold budgetary estimates through design until a firm contract was locked down." Using precast concrete also shaved months off the erection time and allowed rough-in and finishes to commence sooner than any of the other options available.

"The affordability of the precast approach literally made this project viable." Jennifer Camp, hi•arch•y llp

A NEW KIND OF DOUBLE TEE

Despite the many cost-saving benefits of precast concrete, the project faced ongoing financial challenges. Early in the design process, the team went through a round of value engineering where the schematic design was stripped of many key features, and some worried whether the project would ever be completed. However, through close collaborations with GPRM Prestress, Camp's team was able to gain new efficiencies through the use of repetitive shear panels and by maximizing the use of hollow-core slabs to span three separate units. In doing so, the unit count and the construction efficiency increased, which benefitted the development and reduced construction costs, she says. "Without the savings that were ultimately realized through the design team's collaboration with the precast team, the project might not have made it beyond design."

OWNER:
Gerding Edlen, San Francisco, Calif.

PCI-CERTIFIED PRECAST CONCRETE PRODUCER:
GPRM Prestress, Kapolei, Hawaii

PRECAST CONCRETE DETAILER:
DesignCast LLC, Broomfield, Colo.

ARCHITECT:
hi•arch•y llp, Honolulu, Hawaii

ENGINEER OF RECORD:
Allison-Ide Structural Engineering LLC, Honolulu, Hawaii

GENERAL CONTRACTOR:
Hawaiian Dredging Construction Company, Honolulu, Hawaii

PROJECT COST:
$54.16 million

PROJECT SIZE:
80,430 ft²

The precast concrete producer and designers also worked together to develop a hybrid precast concrete double tee with lowered outwings on the flanges, which could structurally engage the double-loaded corridors while providing increased headroom and space for mechanicals and piping. “We created a brand-new shape to meet the requirements of the project,” says Les Kempers, vice president of GPRM in Kapolei, Hawaii. The new design, dubbed the “low-winged double tee,” allowed utility and waste stack penetrations to occur through the flanges, saving significant time and expense.

To help ease the disappointment over losing many of the architectural attributes due to budget constraints, GPRM created a series of triangular fin walls in critical locations, which allowed the precast concrete interior walls to protrude to the exterior of the building and replicate the aluminum fins that had previously been valued-out of the project. “It was a game-changer from a design standpoint,” Kempers says. “It kept the budget in check while providing a desired design feature, which made the designers and the owners happy.” Precast concrete erection was completed on March 28, 2017, and the grand opening occurred in late November 2017.

While the project team had originally planned to pursue LEED gold certification, thanks to the extensive collaboration between the designer, contractor, and precast concrete producer, they exceeded their sustainability goals and are now pursuing LEED platinum—the highest rating for these structures. “The use of precast concrete for this project, which was all locally sourced and fabricated within a short drive from the jobsite, helped the team to pursue LEED platinum,” Camp says. It will also help the team secure points for innovative design, environmentally preferable products, off-site fabrication, and construction waste reduction.

Camp argues that this is more than just a LEED success story. It is proof that LEED can be done on a budget. “It represents a new standard in being able to deliver a product that is both affordable and sustainable, which is something every community sorely needs.”

Key Project Attributes

- Precast concrete helped meet very tight budget constraints with a sustainable design.
- Hollow-core slabs span three separate units, adding further savings.
- The project expects to achieve LEED platinum, the highest certification possible.

Project and Precast Concrete Scope

- Build a six-story, 180,000-ft^2 mixed-use building with affordable housing.
- Precast concrete elements include 2221 pieces, totaling over 280,000 ft^2.
- Project was completed in 18 months, and precast concrete erection was completed in nine months.

The Phillip and Patricia Frost Museum of Science Miami, Fla.

Photos: Gate Precast Company.

This year's winner of the Harry H. Edwards Industry Advancement Award proves that precast concrete can be used to deliver even the most complicated design ideas in a high-performance, cost-effective package. Designers of the Phillip and Patricia Frost Museum of Science in Miami, Fla., wanted to create a structure that would surprise and delight patrons before they even walk through the door. Their solution was to create a three-dimensional façade and construct a massive, dome-shaped planetarium with cutting-edge acoustics and a surface so smooth it can be used as a movie screen.

The resulting six-story museum features open-air parking covered by five stories of museum comprising approximately 250,000 ft² of interior and exterior space. The most prominent element of the design is the freestanding 67-ft-diameter dome, which houses the planetarium theater. While designers hadn't initially considered precast concrete for any part of the project, their early research determined it was the most flexible and durable solution, particularly for the dome.

"After looking at a steel structure to support cladding panels of different materials, and considering a shotcrete dome, self-supporting spherical precast concrete structural panels proved to be the most cost effective solution," says James Palma, senior project manager at Rodriguez and Quiroga Architects Chartered. "It provided the density required for acoustics, the durable structure, and a light sandblast finish that was the perfect projection surface."

"I have successfully completed many projects in my career that used precast concrete cladding as the exterior building enclosure system, but I am especially proud of the unique way we used it in the Frost Museum of Science project."
Jim Palma, Rodriguez and Quiroga Architects Chartered

HOME OF THE DOME

Once other cladding options were abandoned, the designers worked closely with Gate Precast Company to develop the concept using precast concrete as cladding and as the

OWNER:
The Phillip and Patricia Frost Museum of Science, Miami, Fla.

PCI-CERTIFIED PRECAST CONCRETE PRODUCER:
Gate Precast Company, Kissimmee, Fla.

PRECAST CONCRETE SPECIALTY ENGINEER:
eConstruct, Omaha, Neb.

ARCHITECT:
Rodriguez and Quiroga Architects Chartered, Coral Gables, Fla.

EXECUTIVE ARCHITECT:
Grimshaw Architects, New York, N.Y.

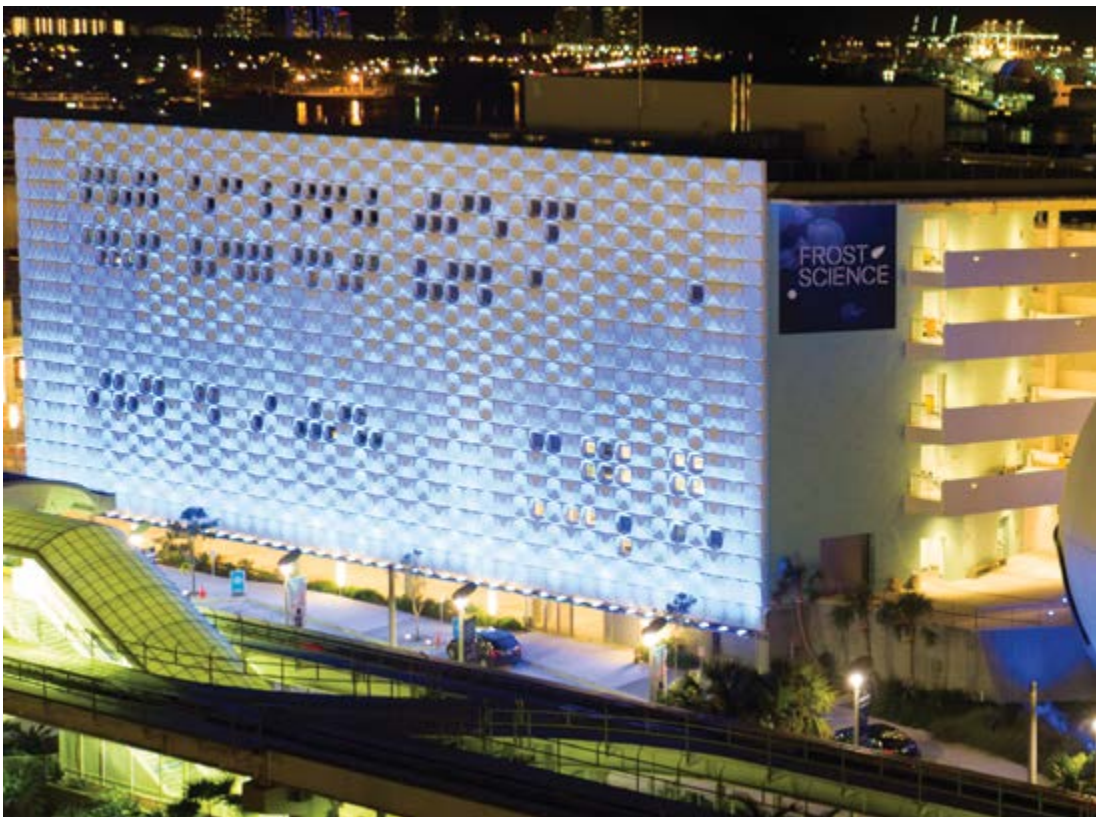
STRUCTURAL ENGINEER OF RECORD:
Donnell Duquesne & Albaisa, Miami, Fla.

MEP ENGINEERS:
Fraga Engineers, Coral Gables, Fla.

GENERAL CONTRACTOR:
Skanska, Fort Lauderdale, Fla.

PCI-CERTIFIED ERECTOR:
Specialty Concrete Services Inc., Umatilla, Fla.

PROJECT SIZE:
250,000 ft²



dome's structure. The use of three-dimensional modeling was vital to ensuring every piece fit perfectly, and addressing any errors in design before construction began, Palma says.

The dome cap, dubbed the Arctic Circle, was formed from two cap pieces combined to make a 30-ft-diameter keystone. The fabrication and quality assurance teams used a laser total station for layout and verification to achieve the perfectly round design. The cap was then made by placing concrete successively around the outer perimeter of the mold once the backform was in place. Each cap piece required 17 yards of architectural concrete.

The dome panels were cast exterior-face-down, with a top interior face form to address the significant curvature. Each panel has a continuous ledge at the bottom to allow it to be set on the cast-in-place foundation wall, which was also curved to match the dome curvature. To eliminate cracking during any of the stages of production and construction, monostrand post-tensioning anchored at the top and bottom of the panel was used.

To avoid damage in shipping and erection, jobsite conditions were mimicked at the plant, including lifting pieces off the truck, and tilting and hanging them from a crane. Due to the requirement that no embeds were allowed for handling on the exterior face, steel-rope cables were attached to the underside of the pieces and wrapped on the sides. This innovative solution allowed the lifting device to fit in the gap between peel panels and then to be removed after all of the panels were installed.

Once on the jobsite, the precast concrete cap was installed first, supported by a temporary custom shoring tower, then the spherical sections were installed and welded together "once the scaffolding was removed, making the dome completely self-supporting," Palma says.

Along with the dome, patrons also love the unique geometric three-dimensional relief pattern on the façade of the north and west buildings. Gate created the design by combining 16 different geodesic shapes in various configurations on 95 panels. "The random patterning meant that almost no two panels are the same", Palma says.

The Phillip and Patricia Frost Museum of Science is now among the world's most innovative and sustainable science museums. "Miami has a rich history of using precast concrete in its civic architecture," Palma says. "This design adds the most unique use of precast to this rich collection."

Key Project Attributes

- Precast concrete was used to create a massive, free-standing dome, 67 ft in diameter.
- The dome cap mold had no square edges, requiring fabrication and quality assurance teams to use a laser total station for layout and verification.
- The three-dimensional façade features 16 different geodesic shapes combined in various configurations to reflect elements from nature.

Project and Precast Concrete Scope

- Precast concrete components include cladding panels for the museum's north and west buildings, and dome segments connected by two precast concrete cap pieces to complete a full-sphere planetarium.
- The dome features a sandblasted finish suitable for projection.
- The project was submitted for LEED gold certification and museum operators plan to share data on its sustainability with visitors.

OWNER:
City of Roseville, Roseville, Calif.

PCI-CERTIFIED PRECAST CONCRETE PRODUCER:
Clark Pacific, West Sacramento, Calif.

ARCHITECT:
LPAS Architecture + Design, Sacramento, Calif.

ENGINEER OF RECORD:
Buehler & Buehler Structural Engineers Inc., Sacramento, Calif.

GENERAL CONTRACTOR:
DPR Construction, Sacramento, Calif.

PROJECT COST:
$21 million

PROJECT SIZE:
82,944 ft²

Roseville City Hall Annex Roseville, Calif.

The new City Hall Annex in Roseville, Calif., is the first precast concrete building ever built in this rapidly growing city, and the first to be accredited by the U.S. Resiliency Council (USRC) for its seismic capacity.

But its strength is not the only attribute that makes this structure special. As the most prominent building downtown, the owners wanted a structure that would convey a sense of stability and stature appropriate for an important civic building, without overshadowing the City Hall next door. It was also important to demonstrate responsible use of public funds.

Like many award-winning projects this year, design of the annex did not initially include precast concrete. However, during schematic design, the project team determined that switching from steel to a precast concrete structure would result in multiple benefits for the city. "Precast concrete was a building material that provided durability, structural reliability, sustainability, and provided the presence of a stable and permanent civic structure," says Curtis Owyang, vice president and principal at LPAS Architecture + Design in Sacramento, Calif.

"The level of performance associated with the USRC platinum rating is not something every building can achieve, but this project met that standard." Farid Ibrahim, Clark Pacific

During the design phase, the precast concrete producer presented value-engineering ideas that removed columns and used double tees to create 56-ft spans, with hollow-core slab for the remaining 28-ft span. That concept reduced costs and helped get precast concrete within the cost range of the steel system, while lowering long-term maintenance costs. The panels used integral colored concrete with three different levels of sandblast to mimic the architecture of City Hall, says Farid Ibrahim, director of preconstruction services at Clark Pacific in West Sacramento, Calif. "The recessed windows set in the precast exterior also recall the pattern, proportions, and detailing of City Hall." The use of precast concrete also helped meet the tight 12-month deadline.

Photos: Clark Pacific.

STRONGER THAN STEEL

One of the most unique attributes of this project was the use of a precast hybrid moment frame for seismic resistance. This system uses precast concrete column and beam elements connected with reinforcing bars and post-tensioning to absorb energy caused by movement of the joint while simultaneously holding the joint together during an earthquake. "It has the unique ability to self-right after a major seismic event," Ibrahim says. Internally, the use of the precast hybrid moment frame system also allowed for the elimination of two lines of columns, opening up the space and providing more flexibility for planning.

No less than 538 precast concrete pieces, including panels, columns, beams, walls, double tees, and hollow-core slabs, were manufactured off-site in just 10 weeks. Casting the pieces off-site helped ease congestion and allowed for "just-in-time" delivery of pieces to the jobsite. The carefully scheduled delivery process kept the project on track, and the entire structure was erected in just 38 days. "Precast construction was efficient from a material use standpoint as well," Ibrahim says. "By fabricating the building parts in a controlled facility, a higher degree of precision can be attained while minimizing wasted material and time."

The result is an efficient, functional, resilient, and cost-effective building that effortlessly fits into the fabric of the community. Referring to the project, Mike Isom, development services manager at City of Roseville, says: "We have an obligation to our local taxpayers that we're being as efficient as possible with the resources we have available. Clark Pacific has gone a long way in helping us to do that."

Key Project Attributes

- Precast concrete design cost the same as steel, but delivered a more durable and lower-maintenance solution.
- Precast hybrid moment frame design led to a platinum rating by USRC.
- Architectural façade doubles as a redundant structural system, providing enhanced economic performance.

Project and Precast Concrete Scope

- Construct an all–precast concrete, four-story, 82,000-ft^2 civic building.
- Precast concrete elements comprise 538 pieces, including 55 column covers, 46 girders, 33 spandrels, 48 moment beams, 201 slabs, 103 tees, 17 walls, 16 moment columns, and 19 gravity columns.
- Precast concrete structure was erected in just 38 days.

Port of Juneau Cruise Ship Terminal Concrete Pontoons Juneau, Alaska

The cruise ship terminal in Juneau, Alaska, is essential for the city's economy. However, the recent evolution of Panamax and post-Panamax cruise ships, which can be more than 1000 ft long, was overwhelming the port. The capacity of the old pile-supported timber dock was limited to simultaneous berthing of one 800-ft-long and one 1000-ft-long cruise ship, preventing larger ships from docking simultaneously.

As a solution, the harbor owners wanted a replacement dock with floating berths that created enough space to accommodate simultaneous berthing of one 1000-ft-long and one 1100-ft-long cruise ship, explains Yeliz Firat, senior engineer at BergerABAM in Federal Way, Wash. "The floating nature of the pontoons provided the added value of being able to load and unload passengers even during significant tidal fluctuations, without the need for complex operations."

"I love the fact that I can demonstrate to those who are in disbelief that a concrete box of significant size can indeed float." Yeliz Firat, BergerABAM.

Photos: BergerABAM.

1000 NAUTICAL MILES

The owners needed a low-maintenance solution that would remain durable for 50 years, which first led them to precast concrete. Unlike steel berths, which are highly dependent on periodic dry-dock maintenance, precast concrete requires minimal effort, Firat notes. "The maintenance of concrete pontoons is minimized by using appropriate concrete cover, detailing, materials, and corrosion-prevention measures during design and construction,"

The precast concrete pontoons could also meet strict criteria for the design freeboard, which is the vertical distance at the ship's side between the waterline and the deck. Freeboard requirements were set at 8 ft, with a tolerance of just plus or minus 1 in. "The freeboard is governed by the weight and the height of the pontoons, so the geometry and thickness of the hull plating had to be monitored and controlled diligently," Firat says. "Precasting the walls and the deck panels in a controlled environment was instrumental in controlling the weight."

OWNER:
City and Borough of Juneau, Alaska

PCI-CERTIFIED PRECAST CONCRETE PRODUCER:
Concrete Technology Corporation, Tacoma, Wash.

ENGINEER OF RECORD:
BergerABAM, Federal Way, Wash.

GENERAL CONTRACTOR:
Manson Construction Company, Seattle, Wash.

PROJECT COST:
$54 million

PROJECT SIZE:
300 and 400 ft

Precast concrete also lent itself to constraints of the jobsite. The project had to be completed between October 2015 and May 2017, with no disruptions to terminal operations from May through September. The two all–precast concrete pontoons—measuring 300 and 400 ft in length—were fabricated simultaneously in the dry-dock of Concrete Technology Corporation's precast plant in Tacoma, Wash., then towed 1000 nautical miles to Juneau to meet the designated timeline for on-site installation. "Simultaneous fabrication of both pontoons in the dry dock not only enabled meeting the critical towing schedule and favorable towing conditions, it also made the construction of two pontoons of significant size cost-effective by optimizing mobilization," says Firat. Both pontoons were completed and launched from the dry dock in February 2016.

In May of 2016, the Juneau Cruise Ship Terminal completed installation of the all–precast, prestressed concrete floating pontoons that now serve as loading berths for the one-million-plus tourists who pass through the Alaskan harbor every year. Both the designers and owners are pleased with the results of this novel use of precast concrete. "We love the concrete pontoons because they are aesthetically pleasing and not obtrusive along our waterfront," says Gary H. Gillette, port engineer for the city and borough of Juneau. Along with providing the harbor with two sturdy, durable, and non-slip structures that are stable in all sea conditions, the wide, open docks have become a gathering spot for Juneau residents and home to events throughout the year.

Key Project Attributes

- Each pontoon is a precast, prestressed concrete box beam internally divided into 18 watertight cells through interior bulkheads.
- The precast concrete pontoons were fabricated in Washington State and towed 1000 nautical miles to the jobsite.
- Precasting both pontoons simultaneously enabled replacement of the 2000-ft-long berth within schedule.

Project and Precast Concrete Scope

- Build two floating precast concrete berths to accommodate Panamax and post-Panamax cruise ships.
- South-berth pontoon is 300 ft long and 50 ft wide; the north-berth pontoon is 400 ft long and 50 ft wide.
- In-situ weights are 1500 kip for the south-berth pontoon and 15,500 kip for the north-berth pontoon.