Winners of the 2018 ACI Excellence in Concrete Construction Awards

Viaduct Over River Almonte received the Excellence Award

An impressive 996 m (3270 ft) long viaduct—a record-breaking concrete arch bridge with a main span of 384 m (1260 ft)—received "The Excellence Award," the highest honor in the ACI Excellence in Concrete Construction Awards program for 2018. The winning project, Viaduct Over River Almonte, was nominated by the Asociaoión Española de Ingeniería Estructural. This award is given to a project that demonstrates excellence in concrete innovation and technology and stands out above all other entries. Eleven additional projects were recognized on October 15, 2018, during the Gala event at The ACI Concrete Convention and Exposition in Las Vegas, NV.

The awards were created to recognize concrete projects at the forefront of innovation and technology, and they showcase these projects to inspire excellence in concrete design and construction around the world. Each ACI Chapter or ACI International Partner is eligible to sponsor one project in each of six possible categories.

The esteemed judging panel comprised **Corina-Maria Aldea**, FACI, an international expert in construction materials design and engineering; **Dean A. Browning**, FACI, retired Senior Vice President/Chief Operating Officer, Charles Pankow Builders; **Mario A. Chiorino**, ACI Honorary Member, Professor Emeritus, Politecnico di Torino; **William Klorman**, FACI, President, CEO, and Founder, W.M. Klorman Construction Corporation; **Debrethann R. Cagley Orsak**, FACI, Principal, Cagley & Associates, Inc.; and **Anita Sircar**, Architect and Project Director.

For 2018, the winning projects included:

Decorative Concrete

- First Place: **Roofing of the Montpellier-South of France TGV Station**, Montpellier, Herault, France; nominated by the Paris Chapter – ACI.
- Second Place: **Water Garden**, Santa Monica, CA; nominated by the Southern California – Chapter ACI.

High-Rise Buildings

- First Place: **Reston Station OB1 Tower**, Reston, VA; nominated by the National Capital Chapter – ACI
- Second Place: **Nexus Shopping and Business**, Setor Marista, Goiânia, Brazil; nominated by Instituto Brasileiro Do Concreto (IBRACON).

Infrastructure

- First Place: **Viaduct Over River Almonte**, Garrovillas de Alconétar, Cáceres, Extremadura, Spain; nominated by Asociaoión Española de Ingeniería Estructural (ACHE).
- Second Place: **Viroflay Underground Train Station**, Meudon, Hauts-de-Seine, France; nominated by the Paris Chapter – ACI.

Low-Rise Buildings

- First Place: **University of Iowa Visual Arts Building**, Iowa City, IA; nominated by Iowa Chapter – ACI.
- Second Place: **Design & Build of South Marina Yacht Club at Lusail (BP15)**, Doha, Qatar; nominated by the Qatar Chapter – ACI.

Mid-Rise Buildings

- First Place: **1200 Intrepid Avenue**, Philadelphia, PA; nominated by the Eastern Pennsylvania & Delaware Chapter – ACI.
- Second Place: **Royal Alberta Museum**, Edmonton, AB, Canada; nominated by the Alberta Chapter – ACI.

Repair and Restoration

- First Place: **Provo City Center Temple**, Provo, UT; nominated by the Intermountain Chapter – ACI.
- Second Place: **Ford Theatres Off-Season Improvements Phase 2 & 3**, Hollywood, CA; nominated by the Southern California – ACI.

Excellence Award and Infrastructure, First Place

Viaduct Over River Almonte

A new high-speed rail line is under construction between Madrid and the Extremadura, a western Spanish region bordering Portugal. The line will cross over the River Almonte on a 996 m (3270 ft) long viaduct—a concrete arch bridge with a main span of 384 m (1260 ft). Designed to carry 350 km/h (218 mph) rail traffic, the viaduct had to meet rigorous dynamic, serviceability, and safety criteria; and it required complex, staged calculations based on nonlinear material and nonlinear geometry behaviors. Nevertheless, it is aerodynamic and slender, largely due to key design features, including a four-legged arch configuration; 80 MPa (11,603 psi) high-performance concrete; an efficient erection method, with temporary towers and stays; and an innovative monitoring system.

The viaduct's 384 m (1260 ft) main span makes it the largest railway bridge in Spain and the world's largest concrete arch bridge for high-speed rail service. Its design combines structural efficiency, out-of-plane stability (as required by deformation limits), improved response against cross wind effects (verified in boundary layer wind tunnel tests), and aesthetics. The design is also environmentally friendly, as the bridge comprises durable materials, has been designed for expedient maintenance, and will include a bespoke barrier that will force birds to soar upward and above the overhead mast line. The bridge arch comprises high-performance, self-consolidating concrete (C-80). The complex erection procedure required the development of singular construction devices. The bridge was constructed using a ground-breaking instrumentation and monitoring system that provides information regarding the behavior of the structure during construction and service.

The arch was erected from both sides of the river as cantilevering arch segments supported by temporary cables. The arch was divided into 32 segments on each side, plus the key central segment. Construction required the use of specially designed form travelers that allowed every single dimension of the section to be adapted to the variable arch shapes. Due to the geometry of these segments, as well as the complex and dense positioning of the reinforcing bars in them, the use of a self-consolidating concrete was needed to guarantee that all the segments were correctly filled without leaving voids.

Selected materials and main characteristics included Ultraval SR Special Cement, with low quantities of C_3A to help avoid delayed ettringite formation caused by elevated temperatures during hydration; river sand to provide a concrete mixture that could be pumped 200 m (655 ft) horizontally and 80 m (260 ft) vertically, yet resist segregation; and fly ash and the latest generation of high-range water-reducing admixtures, to provide 90-minute workability and ensure adequate consolidation.

Project credits: Arenas & Asociados, Owner; Arenas & Asociados – IDOM, Architect and Engineer; FCC Construcción – Conduril, General and Concrete Contractor; and CG Hormigones, Concrete Supplier.

Viaduct Over River Almonte

Decorative Concrete, First Place
Roofing of the Montpellier-South of France TGV Station

Montpellier-South of France TGV Station is a major step on a critical European corridor and a key facility for tourism and economic growth of the "French sunbelt." The roof over the 10,000 m^2 (107,640 ft^2) area of the new station is a perforated mineral latticework comprising 115 modular and self-supporting precast elements, known as "palmes," made from white ultra-high-performance fiber-reinforced concrete (UHPFRC). The palmes cover five identical spans over the railway lines, while 6 m (20 ft) cantilever canopy shells overhang from the edge to eaves on all four sides. The double-cambered palmes, 2.4 m (8 ft) wide, have an average thickness of 50 mm (2 in.) and span 17.5 m (57 ft). They mainly comprise a central longitudinal rib with a variable cross section and a post-tensioning tendon; a warped, perforated shell, in which the 400 x 160 mm (16 x 6 in.) spaces for treated glass inclusions are arranged; a thin V-shaped diaphragm at midspan; and peripheral thin connecting walls and bearing joists. The design parameters included a serviceability limit on tensile stresses of 4.8 MPa (696 psi), and this required development of a new UHPFRC mixture with a high stainless-steel fiber content. All roofing elements were prefabricated within a 5-month period. They were installed with tight geometrical requirements (± 2 mm [± 0.08 in.] for the bearing points) in only 2 weeks.

Project credits: Fondeville, Owner; Marc Mimram Architecture et Inégnierie, Architect; Lamoureux & Ricciotti Ingénierie, Engineer; Fondeville, General Contractor; Méditerranée Préfabrication, Concrete Contractor; and LafargeHolcim, Concrete Supplier.

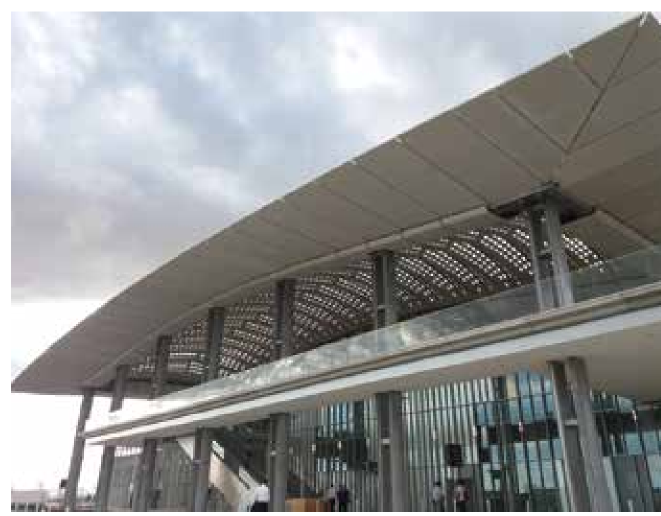
Decorative Concrete, Second Place
Water Garden

Water Garden is a transformation of a 1990s office campus into a 17 acre (6.9 ha) sustainable creative office experience located in the heart of Silicon Beach. Decorative concrete played a major role in the modernization, which included the renovation of the landscape, hardscape paving, and lighting over the existing podium deck. Adding to the complexity, the entire project had to be constructed with minimal impact to a fully occupied office complex. Over 3800 yd^3 (2905 m^3) of concrete were placed, resulting in a total of 101,227 ft^2 (9400 m^2) of structural slab and architectural topping slab, and over 2680 linear ft (817 m) of walls and bench seating. Due to the loading restrictions on the podium deck, the site was constructed over a waffle system comprising expanded polystyrene blocks. The paving design features a rectilinear paving pattern within a curvilinear outline with inlayed LED lights. The field is a natural gray light wash finish. Bands are graphite integral color with a light wash finish. Other paving types include white cement seeded with silver mica, seeded blue glass, and seeded mother of pearl shells. The completed design also includes three new water features constructed with two complete systems of dampproofed slabs to complement four refurbished water features.

Project credits: Water Garden Realty Holding LLC & Water Garden Company LLC, Owner; HLW International, Architect; AMA Consulting Engineers, Engineer; Morley Builders, General Contractor; Shaw & Sons, Concrete Contractor; and Catalina Pacific Concrete, Concrete Supplier.

High-Rise Buildings, First Place
Reston Station OB1 Tower

The new office destination at Reston Station is a step above any other office space in the greater Washington, DC area. The building features an exposed concrete frame. The tower slopes outward from the base to a roof area of 300,000 ft^2 (27,870 m^2). The exterior columns are all angled and form giant "X" shapes as they rise from the platform slab on the



Roofing of the Montpellier-South of France TGV Station

Water Garden

east and west façades. Columns with limb-like forms are visible on the north side of the structure—these included structural steel cores and were constructed using about 400 yd^3 (306 m^3) of a 10,000 psi (68.9 MPa), self-consolidating concrete mixture. Other exterior columns were constructed using a 10,000 psi mixture over the full height of the building. This mixture had normal consistency, so it was consolidated using internal and external vibrators to ensure a high-quality architectural concrete finish. Interior columns had a maximum concrete strength of 12,000 psi (83 MPa) at the base, decreasing to 7000 psi (48 MPa) at the upper levels. Slab mixtures included high-early strength, 5000 psi (34.5 MPa) concrete, and 7000 psi (48 MPa) lightweight concrete.

Project credits: Vulcan Materials, Owner; JAHN, Architect; Thornton-Tomasetti, Engineer; Davis Construction, General Contractor; Miller & Long, Concrete Contractor; and Vulcan Materials, Concrete Supplier.

Reston Station OB1 Tower

Nexus Shopping and Business

Viroflay Underground Train Station

High-Rise Buildings, Second Place

Nexus Shopping and Business

The Nexus Shopping and Business complex is one of the biggest urban projects in Brazil. It consists of three multipurpose towers, with the tallest at 518 ft (158 m). The total floor area is 1,400,000 ft^2 (136,000 m^2). To improve building performance, many structural optimizations were implemented. Excellent mechanical properties of the soil allowed for the use of footing foundations. Main foundation elements for one of the towers were cast in layers and the concrete temperature was monitored, allowing the elements to be constructed without the need for precooling of the concrete and minimizing the risk of thermal cracking. The superstructure concrete was designed to achieve a high modulus of elasticity of 794,000 lb/ft^2 (38 GPa) at 28 days for the first floors and 710,000 lb/ft^2 (34 GPa) for other floors. A high mortar content in the initial mixtures led to the need for special measures to avoid high shrinkage and thermal stresses. Due to these requirements, improvements in concrete mixture, optimization of the concreting process, and structural design adjustments were made.

Project credits: Consciente JFG Incorporações e Participações Ltda, Owner; Consciente Construtora e Incorporadora Ltda, Engineer and General Contractor; Votorantim Cimentos S/A, Concrete Contractor; and Realmix Concreto Ltda, Concrete Supplier.

Infrastructure, Second Place

Viroflay Underground Train Station

Located at a depth of 25 m (82 ft), the Viroflay-Rive Droite and Viroflay-Rive Gauche stations were built simultaneously to extend the T6 tram line. Each station has eight prominent, white, cast-in-place concrete arches that evoke the nineteenth century railway viaducts spanning the Viroflay valley. The arches are not only aesthetically pleasing but fulfill two distinct functions: buttressing of the stations' concrete diaphragm walls and supporting the intermediate concrete slab for the technical rooms (300 mm [12 in.] thick with a 20 m [65 ft] span). The arches are about 15 m (49 ft) wide and are hollow at various levels to provide space for escalators. The diaphragm walls were constructed using a hydraulic bucket to excavate the softer surface layers and a compact hydrofraise to excavate the bases. The walls are 30 m (98 ft) high and 1 m (3.3 ft) thick, and they have a light beige color and appearance that recalls the stone that is characteristic to the Viroflay region.

Project credits: Public Transportation for Paris Area, Owner; Atelier SCHALL, Architect; EGIS Group Branch Railway, Engineer; Eiffage Travaux Publics & Soletanche Bachy; General and Concrete Contractor; and CEMEX, Concrete Supplier.

Low-Rise Buildings, First Place

University of Iowa Visual Arts Building

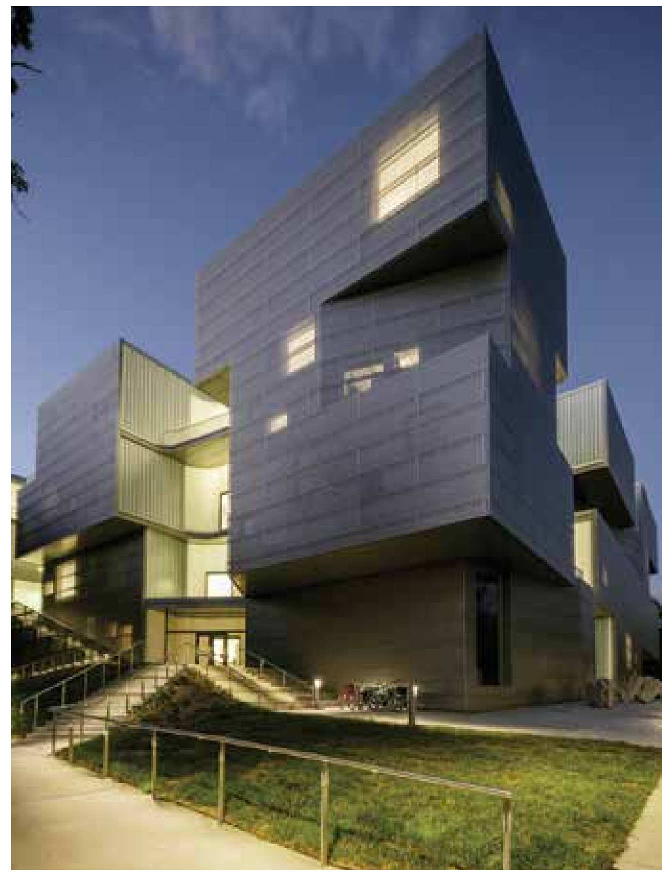
The new four-story facility for the University of Iowa's School of Art and Art History replaces the 1935 Art Building, which was heavily damaged during a flood of the University of Iowa campus in June 2008. The entire concrete structure is exposed and painted white for a clean industrial aesthetic, culminating in a sculptural central atrium for open display of artwork and studio activity of all art disciplines. The building envelope is clad with zinc and stainless-steel plate panels, channel glass wall systems, operable windows, and a green roof. The concrete frame construction is supported on drilled pier foundations. The building's foundation employs a biaxial (bubble) voided slab, decreasing the amount of material used by 30% in comparison to a typical structural concrete slab. This allowed for long spans uninterrupted by columns for generous studio spaces, and it generated savings on materials, transportation, and labor. The structural concrete skeleton of the building consists of 10 and 12 in. (254 to 305 mm) cast-in-place walls, 12.5 in. (318 mm) structural slabs, and 16 to 24 in. (406 to 610 mm) columns, all formed with Class A surface tolerances. All structural slabs were topped with a bonded 3 in. (76 mm) structural topping slab.

Project credits: Miron Construction Co., Inc., Owner; Steven Holl Associates, Design Architect; BNIM, Construction Architect; Structural Engineering Associates, Inc., Engineer; Miron Construction Co., Inc., General Contractor; Ceco Concrete Construction (Flat Slab Shoring) and Miron Construction (Vertical), Concrete Contractors; and Croell Redi-Mix, Inc., Concrete Supplier.

Low-Rise Buildings, Second Place

Design & Build of South Marina Yacht Club at Lusail (BP15)

Occupying a prominent position over the water of Lusail Marina District, Qatar, the iconic two-story South Marina Yacht Club can be seen from the four directions of the district and the marina sea. Features of the building include post-tensioned slabs spanning 15 m (49 ft) and providing an open indoor space, and a cantilever spanning 5.3 m (17 ft) all around (tapered in the free end to reduce dead load) to provide distinctive panoramic wide terraces. Concrete for the substructure had a design strength of 75 N/mm^2 (10,800 psi). The building is supported on a 700 mm (28 in.) raft with piles founded in Simsima limestone. The perimeter wall was continuously placed to ensure integrity. Slag cement was incorporated into the concrete mixture for the ground slab and suspended pit slab to limit the temperature of hydration, thus minimizing cracking. Other durability-enhancing factors for these slabs included corrosion-inhibiting admixtures, increased concrete cover, and reduced water-cement ratios. To



University of Iowa Visual Arts Building

Design & Build of South Marina Yacht Club at Lusail (BP15) provide corrosion protection in the piles, they were constructed with a concrete mixture comprising 60% slag cement and 8% microsilica, and the specified concrete cover was 75 mm (3 in.).

Project credits: Qatari Diar, Lusail Real Estate, Owner; Chapman Taylor Espain, Architect; MZ & Partners (Civil and MEP) and Octatube (Steel Structure), Engineers; Joint Venture of Ceinsa and Al Jaber Trading & Contracting, General Contractor; and Al Wataniya, Concrete Contractor.

1200 Intrepid Avenue

Royal Alberta Museum

Mid-Rise Buildings, First Place

1200 Intrepid Avenue

The 1200 Intrepid project is a USGBC LEED Gold certified four-story mid-rise building boasting 94,000 ft^2 (8700 m^2) of high-end office space. The predominant feature of the design is the building's eastern elevation, which makes use of compound double-curved, load-bearing precast concrete façade panels fashioned to echo the circular geometry of an adjacent park. The curvilinear wall was designed with an impressive 22-degree tilt out over the adjoining pedestrian walkway to create an exterior suggestive of a ship's bow and pay homage to the site's maritime history. Building information modeling (BIM) software was used to ensure proper alignment in each of the 421 architectural concrete panels. The precast exterior employs interlocking embeds within the concrete, eliminating the need for traditional precast spandrel panels. Each precast panel on the inclined façade has a unique slope and different angle of rotation. Computer-generated cut sheets delineated embed layout and formwork construction. Architectural self-consolidating concrete mixtures were used to produce panels with exceptionally tight tolerances and ensure uniform window frame alignment.

Project credits: Liberty Property Trust and the Philadelphia Development Corporation, Owner; BIG - Bjarke Ingels Group, Architect; Environetics, Engineer; Turner Construction Company, General Contractor; and High Concrete Group LLC, Concrete and Concrete Supplier.

Mid-Rise Buildings, Second Place

Royal Alberta Museum

The Royal Alberta Museum is the new home of Alberta's Natural History and Human History collections. The project boasted one of the most advanced uses of BIM ever realized in Canada. The shared model allowed for increased geometric complexity, observable clash detection, and 4-D construction scheduling. The design-build procurement method allowed for experienced and prequalified subcontractors to be engaged early in the design process. Concrete was selected for a majority of the structure due to its inherent acoustic rating, vibration and fire resistance, aesthetics, thermal mass, and durability. Cast-in-place concrete flat plate slabs were used for most of the structure to resist the exceptionally heavy loads imposed by displays and back-of-house artifacts. A spiral cast-in-place concrete stair located in the main entrance lobby acts as the focal point of the space and provides access to the second-level galleries. The museum showcases exposed concrete surfaces, including columns, slab surfaces, edges, and soffits. Basement foundation walls were constructed using shotcrete, reducing the need for formwork and thus cutting the time and crane dependency required to erect formwork. Construction of the $260 million base facility was completed in the Fall of 2016, and the new museum is now open.

Project credits: DIALOG, Owner, Architect, and Engineer; Ledcor Design Build (Alberta) Inc., General Contractor;

Pagnotta Industries Inc., Concrete Contractor; and Lafarge Canada Inc., Concrete Supplier.

Repair and Restoration, First Place
Provo City Center Temple

After a major fire in 2010, the Provo Tabernacle was transformed into the Provo City Center Temple (PCCT). Stabilizing the existing unreinforced brick masonry walls was the first step in the restoration process. Existing brick walls were five wythes thick. Stabilization comprised removal and replacement of two interior wythes with shotcrete concrete walls. The remaining brick was attached or adhered to the new shotcrete walls with helical anchors. The temporarily shored shotcrete walls were then reinforced with new concrete foundation walls. These walls were hand set to work around the shoring system and were constructed below the building's original shell. This made it possible to build two new basement floors. To resist the loads on the basement floors, reinforced concrete mat footings were constructed in each area and micropiles were driven into soils below the mat footings. A dampproofing membrane and waterstop system were placed around all subgrade structures. A dampproof admixture was also used on the subgrade concrete to create a back-up mechanism for the dampproofing system. Self-leveling fiber-reinforced concrete was used for slab-on-ground and around the temple's underground foundation walls.

Project credits: The Church of Jesus Christ of Latter-day Saints, Owner; FFKR Architects, Architect; Reaveley Engineers, Engineer; Jacobsen Construction Company, Inc., General and Concrete Contractor; and Jack B. Parson Companies, Concrete Supplier.

Repair and Restoration, Second Place
Ford Theatres Off-Season Improvements Phase 2 & 3

The Historic John Anson Ford Theatres in the Hollywood Hills is tucked into steep canyon walls in the Cahuenga Pass. From 2013 to 2017, the Ford Theatres Foundation (with support from Los Angeles County) invested in a major renovation and addition to restore the historic board-formed castle-like structure and bring the stage, lighting and sound systems, electrical infrastructure, and back-of-house areas up to current standards. Off-Season Improvements Phase 2 included reconstruction of the stage and an extensive basement expansion. The excavation was stabilized using shotcrete retaining structures while the permanent structure was built. The new tiered stage includes suspended slabs and slabs-on-ground, flanked on either end by the historic concrete stage towers. The existing stairs and walkways used to access the theater were out of code compliance. Concrete was used to create double steps that aid in bringing the stairs up to code as well as providing a way to conceal and protect the new egress lighting. Off-Season Improvements Phase 3 improvements include the addition of a new 30,000 ft^2 (2790 m^2) building with a loading dock, administrative offices, and an outdoor dining terrace for guests. The front facing walls of the new structure resemble the original with exposed concrete walls with a board-formed finish. The 12 in. (305 mm) shear/gravity walls are up to 70 ft (21.3 m) tall and are heavily reinforced due to the high-seismicity of the region.

Project credits: The Ford Theatres Foundation, Owner; Levin & Associates, Architect; Structural Focus, Engineer; Charles Pankow Builders, Ltd., General and Concrete Contractor; and CEMEX, Concrete Supplier.

Submit Entries for 2019

The entry period is now open for the 2019 Excellence in Concrete Construction Awards. To learn more, visit **www.ACIExcellence.org**, follow @ACIExcellence on Twitter, or join the conversation using #ACIExcellence.

Provo City Center Temple

Ford Theatres Off-Season Improvements Phase 2 & 3