



New Nippert Stadium West Pavilion and East Concourse for the University of Cincinnati and the UC Dept. of Athletics. Architect of record: Heery International. Design architect: Architectural Research Office. General contractor: Turner Construction Company. Construction management for the university by the University of Cincinnati Planning+Design+Construction Dept.

Building Type II: Stadiums and Arenas

A Fan-Focused Frenzy

Public and private owners are ramping up new construction and renovations of stadiums and mixed-use arenas in 2015 with an emphasis on fan-related amenities

By Vicki Speed

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PROJECT: First Tennessee Park
 LOCATION: Nashville, Tennessee
 OWNER: Metropolitan Gov. of Nashville & Davidson County
 PROJECT MANAGER: Capital Project Solutions
 PROGRAM MANAGER: Gobbell Hays Partners, Inc.
 DESIGN ARCHITECT: Populous - Kansas City
 ARCHITECT OF RECORD: Hastings Architecture Associates, LLC
 INSTALLER: Alexander Metals, Inc.

Owners Emphasize Upscale Service, Widespread Connections

From big city structures to small town and college venues, the stadium, arenas and mixed-use entertainment construction business is on the rise... and the focus is on the fans. More specifically, the emphasis is on fan amenities that range from improved Wi-Fi connectivity to ever more extensive services and viewing options, at an ever-rising price tag.

John Vrooman, economics professor at Vanderbilt University, who specializes in sports and entertainment, says, "The rising cost of stadiums and arenas is more due to exclusionary luxury and opulence as professional sports clubs look to optimize the spatial price discrimination strategy. The basic economic rule in the new private venue finance is to charge half as many fans twice as much."

The shift to luxury is particularly evident in the National Football League (NFL) where four new NFL stadiums are currently in work, each with a focus on



The state-of-the-art Rogers Place sports, entertainment and event venue is the anchor to the Edmonton Arena District (EAD) in Alberta, Canada.

premium seating among other amenities. Other professional sports teams have also initiated new stadiums with a multi-million dollar price tag to improve fan amenities, such as the new \$480-million Rogers Place multi-use arena in Edmonton, Alberta, Canada (which includes the world's largest center-

hung HD video board in an arena), the \$477-million Sacramento Kings arena in Sacramento, Calif., the new \$450-million Red Wings stadium in Detroit, Mich. and the \$400-million Daytona International Speedway renovation in Florida.

While professional stadium and arena construction projects are high

IMAGE: OILERS ENTERTAINMENT GROUP



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profile, investment in venues and related facilities at colleges and universities across the country continues to rise.

Collegiate Focus

AECOM and the Ohio University Dept. of Sports Administration's The Trends in Collegiate Athletics study conducted in 2014 surveyed 136 athletic directors across all NCAA divisions, including the Power 5 conferences on a range of topics including facilities. The survey found that 84% of athletic directors would invest significantly in facility improvements over the next five years as a way to attract top student athletes and maintain or grow their fan base amidst an extremely competitive environment. The report found that athletic directors believe renovations "will drive game-day attendance and enhance the fan experience, notably connectivity, food and beverage options and premium seating."

Many of the stadiums and arenas set to finish this year certainly follow this model, with a focus on enhanced premium seating options, private suites,

club seats and more capacity. Of note, the University of Colorado, Boulder will finish its \$156-million Athletics Complex expansion in August 2015, which includes a 200,000-sq-ft expansion of Folsom Field, a new 120,000-sq-ft multipurpose indoor practice facility and the renovation and refurbishment of Dal Ward Athletic Facility. Other projects on track to finish this year include the \$75-million, 200,000-sq-ft UNO Arena, a multi-use facility that will host the University of Nebraska-Omaha's hockey, men's and women's basketball and volleyball, the \$86-million University of Cincinnati's Nippert Stadium renovation and expansion and the University of Kentucky's \$120-million renovation to Commonwealth Stadium.

Game-Day Connections

Beyond premium seating and increased capacity, stadiums and arenas are placing a priority on connectivity. The San Francisco 49ers Levi's Stadium, which opened in 2014, is equipped with one of the most advanced stadium wireless networks as well as a specialized

app that can relay wait times for bathrooms and concession lines.

College programs are following suit. Baylor University outfitted McLane Stadium with high-density IdentifiFi™ Wireless Wi-Fi solution from Extreme Networks to provide free Wi-Fi access and high-speed connections to its fans at McLane Stadium. McLane Stadium is also equipped with an AT&T-powered distributed antenna system to optimize cell phone service and reception from any point in the stadium. University of Nebraska-Lincoln spent \$12.3 million to install the largest distributed antenna system and Wi-Fi network in any college stadium in the nation at Memorial Stadium. The university is also revamping the department's mobile app to offer special in-stadium-only features, including multiple angles of replays and live isolated camera feeds.

The new Atlanta stadium in Atlanta, Ga. will be equipped with IBM's cloud-based Smarter Stadium Network technology and a 58-ft-tall, 360-degree HD video halo board, which is expected to be the largest video board in the world. ■

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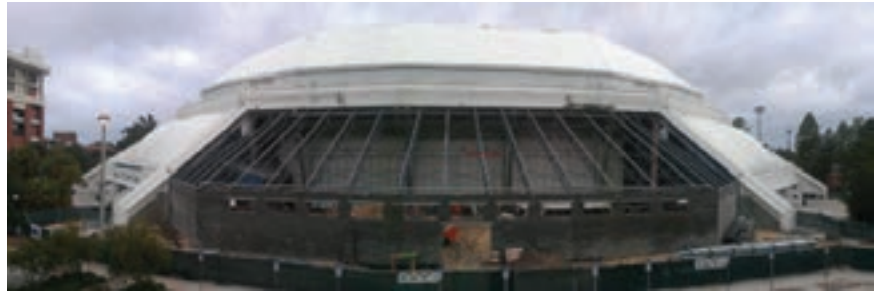
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Three Ways to Build a Better Steel Experience

On large-scale stadium and arena projects, steel joist-and-deck systems can comprise up to 40% or more of the engineered steel structure. Here are three ways to optimize this mission-critical phase of the project:

1) Design, then build. Complete the original joist and deck drawings provided by the engineer of record (EOR). The use of building information modeling (BIM) and BIM components developed and managed by the joist company to speed design collaboration and approval is optimal. In the absence of BIM, the steel joist company's detailer must proactively manage the request for information (RFI) process, while, in the best of scenarios, communicating directly with the EOR.

2) Mind the details. Proactive detailing and engineering of the steel joist and deck system on large-scale, complex



Bent plates welded to the top chord of the joist girders resolved a special canted load-bearing condition on a University of Florida stadium.

projects help minimize design oversights and complications during erection. When involved early during the design phase, New Millennium can provide preliminary profiles for the joists to address such details as length and slope, the design of the joist top chord extensions, the inclusion of hangers pre-welded to the bottom chords in lieu of field bolting, along with clear details for joist bracing.

3) Expect the unexpected. On most large-scale structural steel joist on deck projects, underlying design challenges can impact the timeline and cost of the total project. For instance,

during detailing of the steel joists and joist girders for the University of Florida's Stephen C. O'Connell Center, the team had to address a special canted condition, whereby sloping steel joists needed to bear on sloping steel joist girders. Each joist seat needed to slope in two directions. To resolve the problem, New Millennium provided bent plates welded to the top chord of the joist girders, thereby addressing the structural design challenge while providing a level load-bearing surface for efficient on-site erection. ■

For more information, please visit www.newmill.com.

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Actual EarthCam Panorama Image of Daytona International Speedway

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Energy-Absorbing Bollards Offer Truck-Stopping Capabilities

Used extensively in the 2012 London Olympics to protect people and property, specialized Safetyflex bollards equipped with patent-pending energy absorption capability are now available in the U.S. from Tymetal Corp.

Safetyflex security bollards incorporate spring steel structural components that flex and send the

kinetic energy back into the vehicle (not into the foundation). The spring steel stands up to vehicular crashes, usually requiring just a cover replacement after impact. The shallow 8-in.-deep foundations allow for fast, economical installation. The single bollard design allows the system to follow the contours of the ground and can also be used in

street furniture (such as planters, bike racks and benches) to protect storefronts and pedestrians.

Safetyflex, a U.K.-based company, has over 40 years of experience using this spring steel technology throughout the world to provide a full range of crash-tested barriers, protecting vulnerable infrastructure from attack and people from accidents. Certified shallow-mount products (fixed or removable) include the Carstopper (tested to stop a 3,000-lb vehicle traveling 30 mph) and the Truckstopper 6 (stops a 15,000-lb vehicle traveling 30 mph). ■

See www.tymetal.com for more information, including videos showing the amazing stopping power of these bollards and a CEU course on the newly released ASTM F3016 related to pedestrian safety requirements for crash-tested safety bollards, explaining why traditional concrete-filled bollards fail this ASTM standard.



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UHPC Facade Panels Featured At First Tennessee Park Stadium

The newly opened First Tennessee Park, home to the Triple-A Nashville Sounds minor league baseball team in downtown Nashville, Tenn., is one of the first sporting venues in the U.S. to take advantage of ultra-high performance concrete (UHPC) for architectural facade cladding.

TAKTL® is an advanced UHPC that is over four times as strong as traditional precast and performs exceptionally well in demanding environmental conditions. Pittsburgh, Pa.-based TAKTL is the first company to integrate the formulation, mold design and automated manufacturing of UHPC to produce high-quality architectural facade elements made entirely in the USA.

The First Tennessee Park design team at Populous selected TAKTL facade panels because of the unique textures available in its standard program and compelling sustainability qualities that are not typical in ballpark materials. TAKTL panels' exceptional strength and durability in extreme weather conditions also played a key role in specifying TAKTL for the high-traffic, street-level areas at First Tennessee Park. With a very dense material matrix that is impervious to water and chloride penetration, TAKTL's flexural and anchor pullout strength does not degrade in freeze/thaw conditions, making it an increasingly popular choice for demanding applications.

Panels were factory-cut and drilled to the exact dimensional requirements of the project and sequenced to support



First Tennessee Park, home of the Sounds (Populous-Kansas City, Hastings Architecture Associates, LLC), featuring Custom Sand color in Reeds™ texture

streamlined installation. Precision fabrication was especially valuable to the installation team because it eliminated the need to execute unforgiving angles in field conditions.

Contractors also benefit from TAKTL's strength as cladding material in a number of ways: increased anchor spacing, ease of field cutting and drilling, and less breakage in shipment handling. These efficiencies, combined with

TAKTL's aesthetics, material advantages and unrivaled technical support, make it one of the most compelling cladding options on the market. TAKTL facade elements are available in nine standard textures, 10 standard colors and a range of custom options. They have achieved ASTM C1186, Grade IV certification. ■

For more information, visit www.taktl-llc.com.

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Live Construction Webcams Create the Ultimate Fan Experience

NASCAR fans have something more to cheer about thanks to live streaming and time-lapse construction cameras at the Daytona International Speedway in Florida. Racing enthusiasts are offered a glimpse at the DAYTONA Rising project, a \$400-million reimagining of the iconic American racetrack.

To preserve the process for future generations of fans, executives have trusted a combination of eight EarthCam robotic HD construction webcams and megapixel panoramic cameras to archive progress from 17 critical angles. A deciding factor was

EarthCam's vast experience documenting major sports arenas for organizations including the NBA, MLB, MLS, NHL, USTA and NFL, which typically span several years and require a reliable public outreach component. Live views are available on a custom, interactive web page, inviting fans to cross the finish line together as the project is completed in time for the 2016 Rolex 24 At Daytona and DAYTONA 500.

"EarthCam is the only company capable of providing and maintaining a network of construction cameras our fans throughout the country can enjoy, allowing them to experience this project from start to finish," says Joe Bonanno, manager of Venue Technology-Engineering for the International Speedway Corp.

Upon completion, EarthCam's broadcast-quality time-lapse movie will be available for millions of viewers via network television and social media, and is sure to be deserving of a victory lap. ■



At the DAYTONA Rising project, eight EarthCam robotic HD construction webcams and megapixel panoramic cameras are archiving progress from 17 critical angles.

See this dynamic project live at www.earthcam.net/daytonarising.

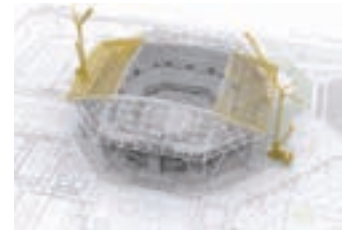
Structural Innovation in a New Era of Retractable Roofs

From the seemingly simple nested panels to ocular multi-paneled solutions, today's retractable roofs have considerably more aesthetic appeal and structural complexity.

Serge Dussault, vice president of engineering with Canam-Heavy, a highly experienced steel partner and retractable roof builder, says, "Stadiums and arenas are getting much bigger. We're called on more frequently to design and construct movable roofs with longer spans and a need for speed."

The new roof over Arthur Ashe Stadium at the USTA Billie Jean King National Tennis Center in New York is just one example. This 200,000-sq-ft, steel-and-Teflon canopy roof is independent of the stadium structure, supported by its own structural steel system. The roof, on track to finish in 2016, will be able to open in five minutes!

The retractable roof for the New Atlanta Stadium in Atlanta, Ga., borrows its design concept from the ancient Roman Pantheon's oculus. The roof incorporates eight unique triangular roof petals constructed of ETFE fabric supported by structural steel, creating a "camera lens-like" effect that exposes the inside of the facility to the open air on game and event days. Each panel is 280 ft along the hypotenuse supported by 700-ft-long steel trusses. The roof, scheduled to be complete in 2017, will be able to open in eight minutes. ■



Conceptual design for new canopy roof over Arthur Ashe Stadium

For more Canam retractable roof examples, visit www.canamheavy.com.



Teamwork and Technology Drive Success on Complex Projects

Greg Hosch, CEO, Harris Companies

Today's architects are pushing the boundaries in the design of entertainment venues. Gone are the days of simple, round structures, replaced by structures with curves, angles, unusual intersections and very few repeated walls and windows.

These signature structures create challenges to those responsible for designing, coordinating and installing all the mechanical, electrical and plumbing systems within tight budgets and tighter timelines. For these complex structures, teamwork is the glue that brings it all together and technology is the enabler. Technology, specifically advances in building information modeling (BIM), drives fast-track schedules, safety and quality. We get the job done faster, with minimal rework and few, if any, conflicts.

Venues such as the Minnesota Multi-Purpose Stadium (MMPS) could not have been built 20 years ago within the current budget and schedule. With BIM, we're able to complete more complex prefabricated assemblies. In fact, we take modeling to the finest level of detail, modeling everything down to the smallest duct and pipe. Our modeling practices have allowed us to virtually eliminate pipe cuts in the field. With BIM and high accuracy modeling, pieces just fit.

While the technology is the enabler to complex projects, teamwork—the interaction of BIM designers, prefabricators and installers—is the differentiator, effectively streamlining field activities. Now, we're finding that it's just as important to pull information from the jobsite as it is to push it to the field. Our foremen regularly have the 3D intelligent model pulled up on a screen in the jobsite trailer to review complex installations with the field team. Mobile devices are a big part of their world as well. On large complex stadiums and arenas, we look to team with a general contractor that is able and willing to orchestrate jobsite activities with technology, thereby making it possible to complete ever more complex jobs to the satisfaction of our customers. ■

Multipurpose Stadium and Activity Center Connects South Texas Community

San Marcos High School in San Marcos, Texas, is now home to a new multipurpose stadium and activity center, the first of its kind in the South Texas school district.

The district selected Lee Lewis Construction, a highly experienced stadium and arena construction manager known for its work on high school and university stadiums to construct the stadium and athletic center.

The impressive new stadium has a grandstand seating capacity of 5,000 with room to expand to 8,000 seats, a 5,000-sq-ft press box which has space for scouting, radio, TV, coaches, outdoor and indoor covered observation decks and 70-ft-wide video display board and scoreboard with sound and video that rivals any collegiate stadium.

The 83,000-sq-ft indoor student activity center includes a 60-yard synthetic turf field, full-width practice field, drop down batting cages, a collegiate-size weight room, a full-size indoor competition basketball court, administrative offices and locker rooms.

Completed in late 2014, the stadium and athletic center currently host multiple athletic and non-athletic programs including band, ROTC Training, class instruction, football, soccer, baseball, golf, tennis, wrestling and weight lifting. ■



San Marcos CISD's new multipurpose Rattler Stadium was completed in late 2014.

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