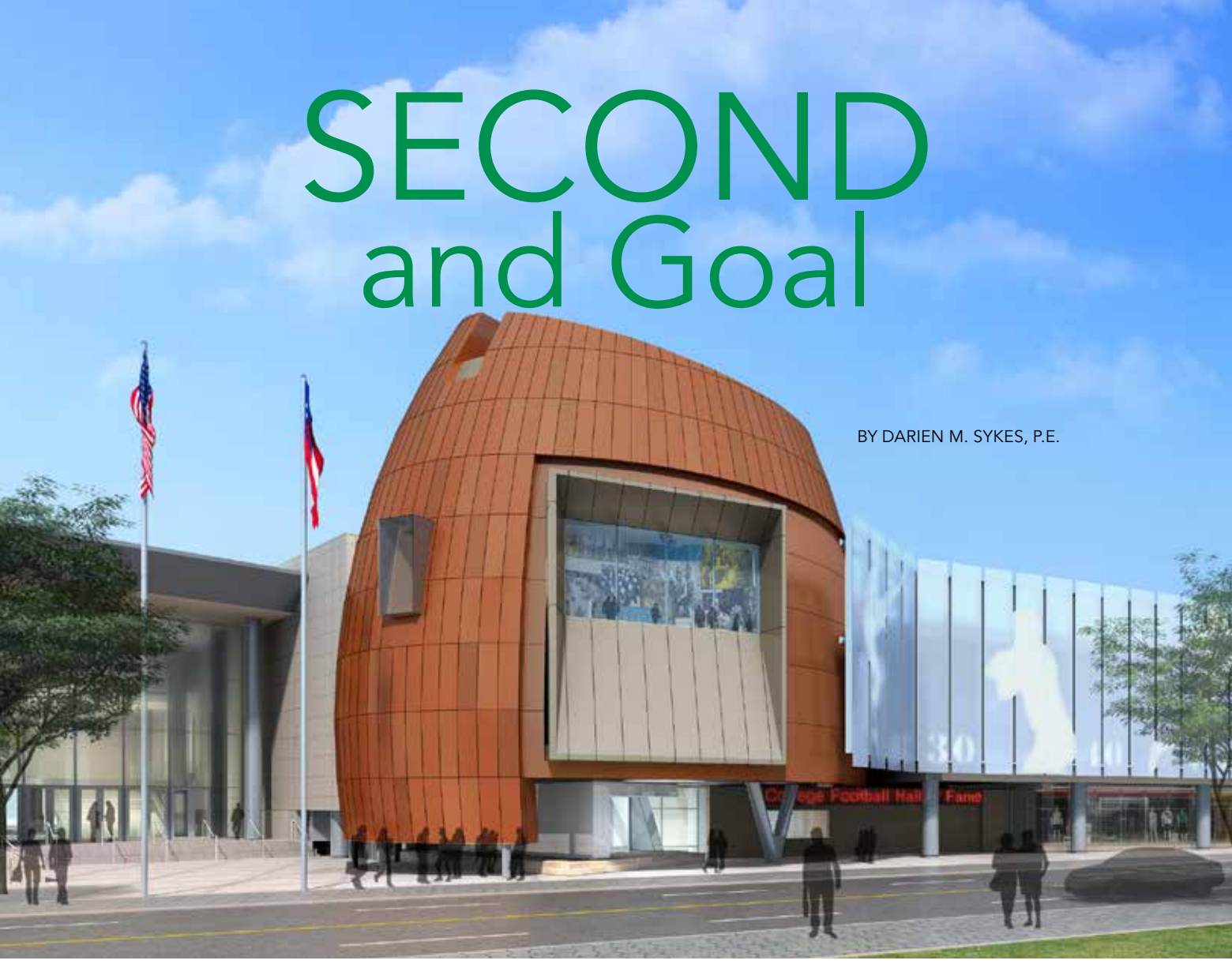
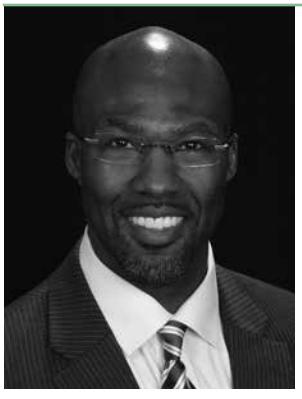
SECOND and Goal



BY DARIEN M. SYKES, P.E.

The new home of the College Football Hall of Fame hopes to attract more visitors with its enticing steel design and high-traffic location.



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FOR COLLEGE FOOTBALL FANS, the experience of game day is often elevated above that of all other sports.

Hope is in the air, colors are optimistically displayed and no matter how the team plays, tailgating becomes an art and there's always the next Saturday for redemption. Capturing that game day experience was part of the design challenge for the new national College Football Hall of Fame, which opened in Atlanta in August.

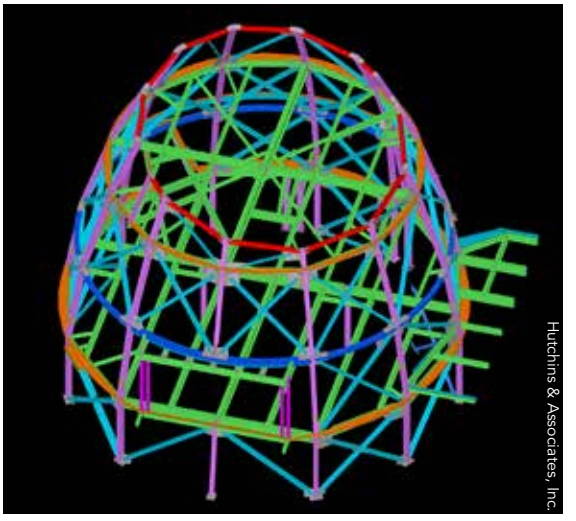
Previously located in South Bend, Ind., the venue made the move south in hopes of capturing more attendance in Atlanta's downtown tourism district—and also due to the sport's immense popularity in the region.

The National Football Foundation selected Atlanta-based architecture firm tvsdesign to create an iconic building where visitors could have an interactive and immersive game day experience. A key feature of the $66.9 million facility is the football-shaped rotunda that, as seen from Centennial Olympic Park, will become the figurative and realistic symbol of the experience inside. The exposed structure of the dynamic 94,000-sq.-ft building is intended to create a "raw" feel, like a football game. Upon entering the main entry tunnel, guests see a display containing more than 700 helmets and can use RFID technology to make their own college's helmet light up.

A view of the museum's Rotunda under construction.

Nearly 500 tons of steel were used in the project.

A framing model of the Rotunda, created in Tekla.



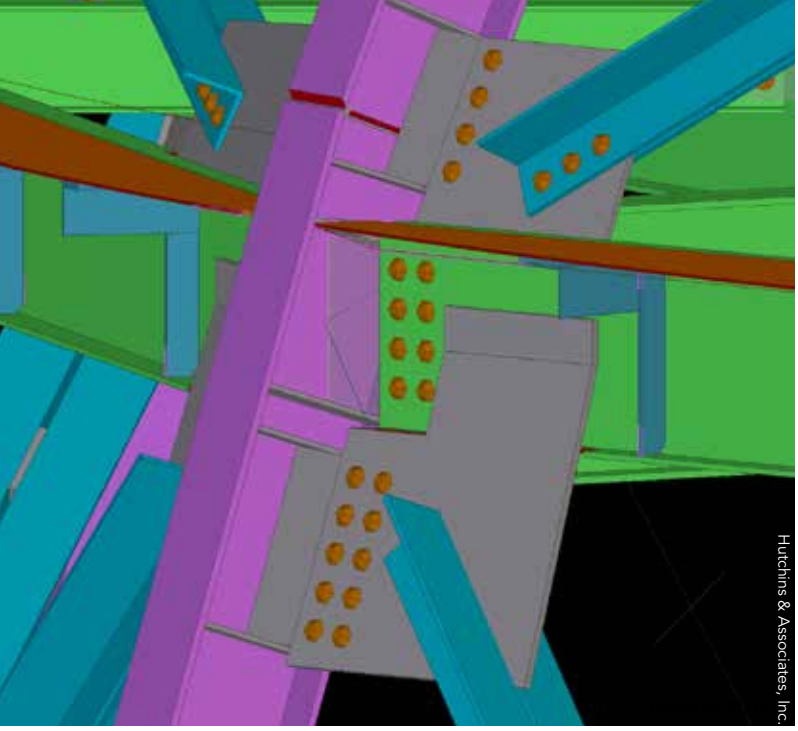
One of the greatest challenges of the project was to create an iconic building that satisfied the programmatic needs of multiple constituents, including the College Football Hall of Fame, the State of Georgia (which owns the land for the Hall) and Chick-Fil-A, a major sponsor. All this had to be done within a tight budget and a compressed schedule. Hall officials expect 500,000 guests in the first year, so the facility also needs to meet rigorous standards for receiving that many visitors; it also includes special event, retail and restaurant space.

The selection of creative, yet simplified framing schemes, efficient materials and a practical construction methodology played a vital role in the success of the project. This was accomplished by extensive collaboration with the design and construction team throughout the process. The construction-manager-at-risk delivery method provided for numerous meetings during the design and construction phases, which aided in refining the design and calibrating the cost. Coordination was augmented by the collaboration of building information models (BIM), which included developing a structural Revit model by the structural engineer and a Tekla model by the steel detailer. Ultimately, 484 tons of steel were used to efficiently frame the majority of the unique and complex portions of the building.

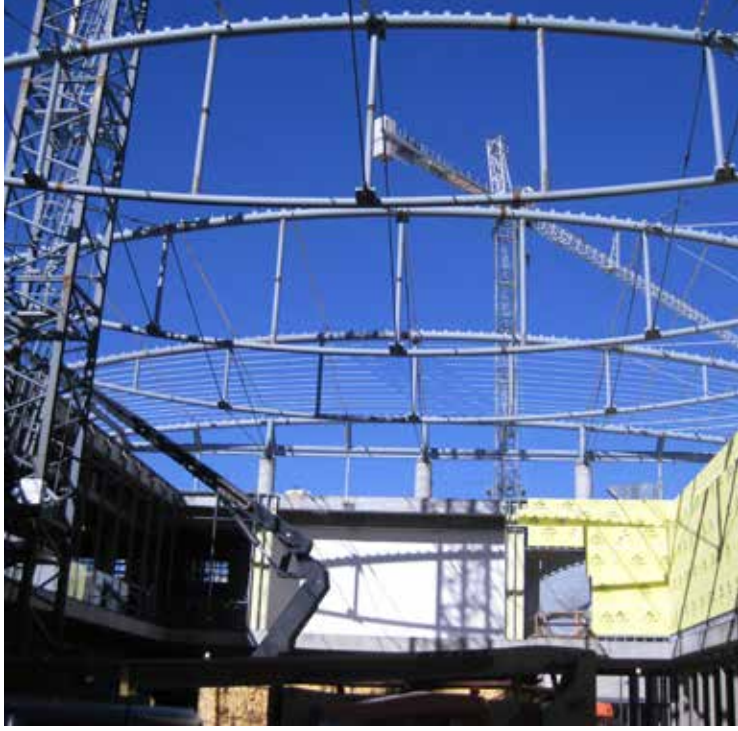
The Rotunda

One of the most prominent and complex features of the building is the 80-ft-tall football-shaped Rotunda. This structure marks the main entry into the building and houses a theater on the second floor and the "Hall of Fame" shrine on the third level. Hidden within the walls of the rotunda are segmented wide-flange steel columns laced together with beams and diagonal bracing. The conical-shaped framing is penetrated by a series of openings, including the large Press Box Window on the east side, which peers out toward downtown Atlanta. The Rotunda is wrapped with a curved steel stair that cantilevers outward with tapered HSS beams at the intermediate landing and tapered wide-flange beams at the third-floor landing. The curved parapet cantilevers 15 ft above the roof at its apex to conceal the mechanical units hidden below.

One of the most challenging details within the Rotunda involved the bracing to the beam-column joint connections. In order to avoid inducing eccentricities into the connection, the work points were originally placed at the intersection/neutral axis of the beam and column. The work point of the brace resulted in a gusset plate that conflicted with the flanges of the beams. The solution was discussed among the structural engineer and detailer, and ultimately involved slightly adjusting



Conflicts between beam flanges and work points in the Rotunda's bracing connections required slightly adjusting the work points to allow the gussets to bypass the beam flanges.



View of the 96-ft-long curved Vierendeel trusses supporting the fabric roof and the two-story hanging bridge within the playing field area.

the work point of the bracing (creating an eccentric loading condition) to allow the gusset to bypass the beam flange. Due to the varying geometry, the beam flanges were coped in some locations. The design and coordination of these details required sharing individual load cases with the detailer in order to evaluate the feasibility of the solution.

The Quad

The entry tunnel leads the visitors into a three-story lobby space referred to as the Quad. The Quad contains a two-story hanging bridge and a main egress stair, which hangs from the roof. Connected to the stair is the display containing more than 700 helmets, representing all NCAA Division I, II, III and NAIA schools.

Due to the hanging stair and exhibits, it was critical to design the roof structure to limit accelerations due to vibration. The original framing scheme consisted of truss members spaced at 15 ft on center, with a flat bottom chord and a sloped top chord to accommodate the roof slope. As the design progressed, the construction manager (with the assistance of the design team) determined that plate girders, at all but one location, proved to be more economical. The framing study was done by providing the erection engineer with the deflection of the trusses, then modeling plate girders with an equivalent stiffness. The decision to convert the trusses to plate girders ultimately saved time in fabrication and erection as well as materials.

The two-story, 65-ft-long bridge hangs from a plate girder and the main support truss. The steel erection engineer developed the concept of using the double HSS round hangers as shoring members while the supporting plate girder and trusses were erected. This was accomplished by extending the hangers down to a temporary foundation. Once the main roof structure was in place, the shoring columns were severed and transitioned to hangers for the bridge. The exposed portions of the bridge (including beams and hangers) were coated with intumescent paint to achieve the required two-hour fire rating.

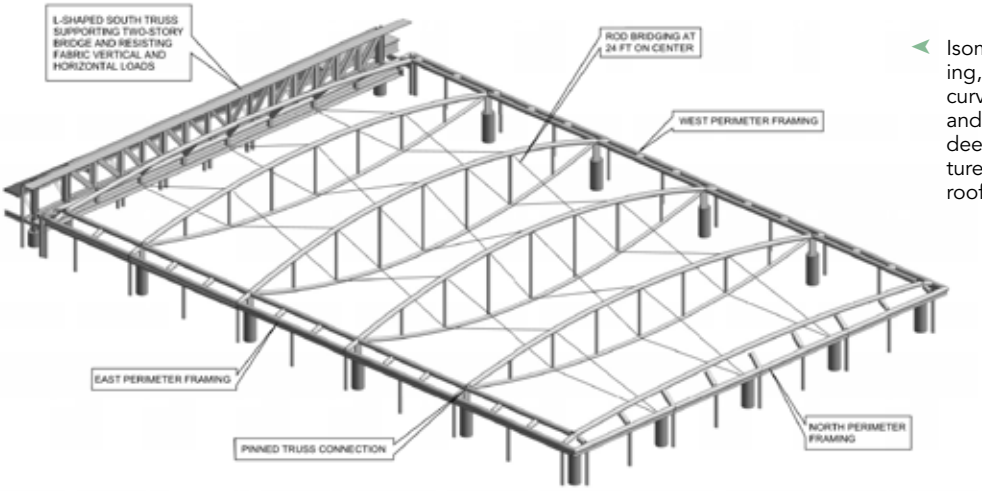
Game Field

One of the main features of the interactive attraction is a 45-yard-long turf playing field, which includes a goal post and exciting hands-on exhibits for the visitors. The field is covered by a fabric roof, consisting of a special noise insulating substrate to reduce sound entering the building. Spanning over the field are four 96-ft-long curved Vierendeel trusses spaced at 30 ft on center and framed with round HSS. The bridging for the trusses consists of 2½-in. rods located at quarter points along the trusses. The perimeter of the field is surrounded by Vierendeel trusses that resist the tension forces resulting from the fabric loads; the field trusses are supported on each end by pinned connections.

The collaboration process between the design team, construction team and fabric roof designer included developing a roof profile to accommodate ponding of the roof, coordinating loading conditions and connection details. One of the more challenging issues regarding the playing field truss design included minimizing steel tonnage while accommodating the substantial design loads (particularly due to the design load case of panel failure). While the HSS members could be optimized for strength and durability, each HSS-to-HSS connection had to be evaluated for strength. The detailing and evaluation processes included sharing connection loads and ideas for detailing concepts that ultimately minimized fabrication and erection costs and met the aesthetic requirements of the project.

Teamwork

Like football, every successful construction project requires a team effort. The national College Football Hall of Fame not only celebrates the past, present and future of college football, but also symbolizes teamwork and collaboration. The construction-manager-at-risk-process allowed the entire team to work from design through construction to create a new home for an iconic venue that will be celebrated for many years to come. ■



Isometric view of the Playing Field framing, created in Revit. The two interior curved Vierendeel trusses are 16 ft deep and the two exterior trusses are 12 ft deep. The varying truss depths and curvature of the trusses form a "pillow-shaped" roof profile.

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The National Football Foundation

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tvsdesign, Atlanta

Structural Engineer
Sykes Consulting, Inc., Atlanta

Erection Engineer
Stan D. Lindsey and Associates, Ltd., Atlanta

Steel Team

Fabricator
SteelFab, Inc., Atlanta (AISC Member/AISC Certified Fabricator)

Erector
Williams Erection Company, Atlanta (AISC Member/Advanced Certified Steel Erector)

Detailer
Hutchins and Associates, Inc., Winston-Salem, N.C. (AISC Member)