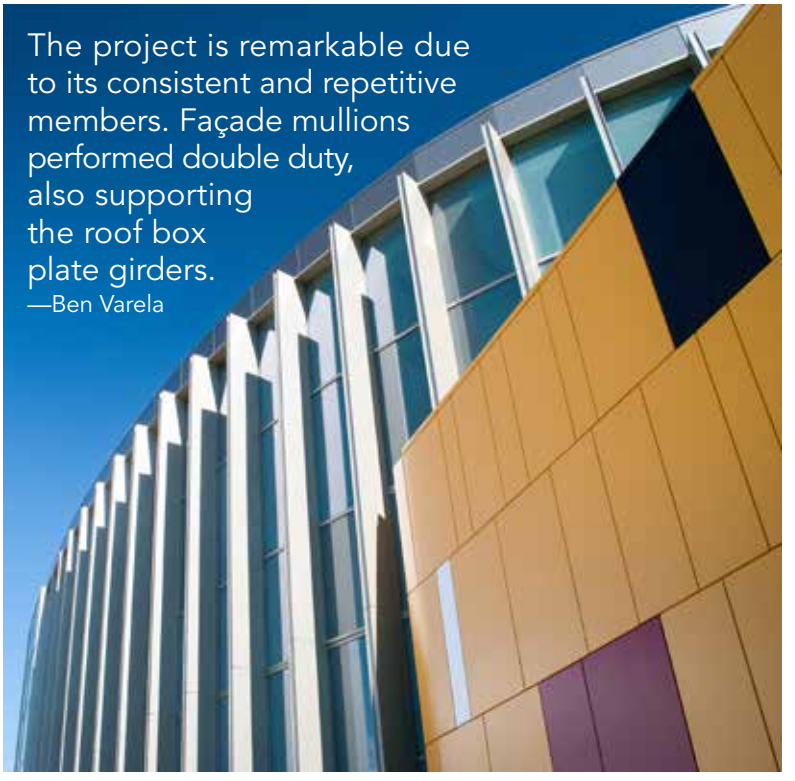


The project is remarkable due to its consistent and repetitive members. Façade mullions performed double duty, also supporting the roof box plate girders.
—Ben Varela

$15 MILLION TO $75 MILLION – NATIONAL AWARD

Terminal East Infill at Austin-Bergstrom International Airport, Austin, Texas

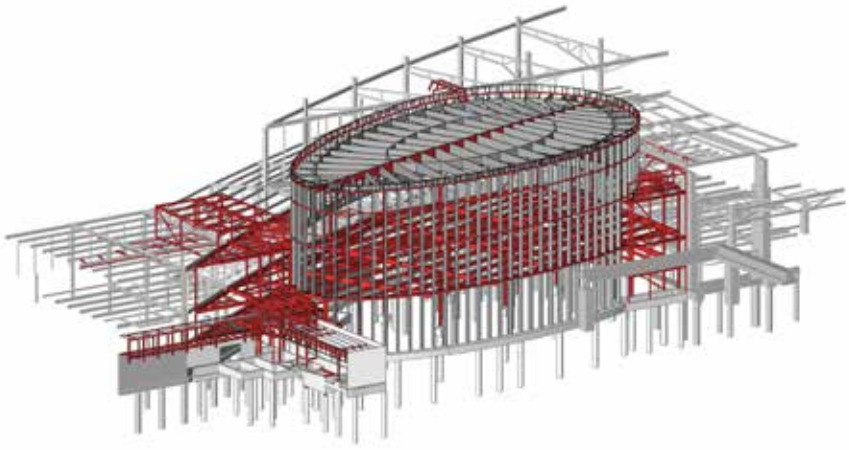
AS AUSTIN HAS GROWN, so has the need to expand its airport.

Opened in 1999, Austin-Bergstrom International Airport recently completed an expansion project—the Terminal East Infill—that included 55,000 sq. ft of new space and renovation of 17,000 sq. ft of existing space.

Bound on three sides by the existing terminal and one side by the terminal access road, the new building is ovular in shape and is roughly 115 ft by 200 ft, with its centerline rotated roughly 15° from the existing terminal. The new building's feature space is a grand hall on the concourse level. In order to facilitate passenger queuing, preserve sightlines for TSA security requirements and create a soaring aesthetic for the 50-ft-high space, the hall needed to be free of interior columns and employ a long-span roof system. Traditional systems such as long-span trusses and space grids were considered but were deemed undesirable by the architect.

Instead, the space is topped by an elegant exposed steel "two-way" roof system, in which loads are distributed in both the short- and long-span directions to the supporting elements around the perimeter. The system is composed of custom steel shapes created by welding steel plates into built-up sections; these shapes were used for all primary exposed structural steel in the new building. A central roof spine runs nearly 200 ft between the east and west ends of the building, with symmetric pairs of roof box beams flaring out from the spine to perimeter box columns spaced at 12 ft on center around the perimeter of the space. Each pair of beams joins the spine in a visually seamless "node," with welded connections providing an elegant transition between the various roof elements. Similarly, the roof beams are welded to the tops of the box columns at the perimeter.

The roof structure varies in depth from perimeter to center and along the length of the central spine, and the depth of



Photos by Architectural Engineers Collaborative

the members roughly follows the moment diagram of the two-way system. Individual roof beams are tapered, with the deepest tapering from 30 in. at the perimeter to 70 in. towards the center of the room, where the moment demands are highest. In addition, two rings of bracing members—consisting of the same built-up box sections—are located to maximize both the stability of the roof beams and the aesthetic expression of the roof structure. Similarly, standard HSS wall girts ring the oval perimeter at three different elevations, tying together and stabilizing the dozens of moment frames comprised of pairs of box columns and roof beams.

Early in the design, a mock-up was constructed to simulate the fabrication of box beam elements and their intersection at the roof, with a particular focus on the localized deformation effects due to welding during fabrication and fit-up. This exercise informed weld detailing during design and prompted the addition of internal W6×16 stiffener members in many of the roof box beams. The central spine member was also modified to a cover-plated truss to streamline constructability and facilitate full moment connections at each roof beam connection.

For more on this project, see "Looking Skyward" in the September 2015 issue (www.modernsteel.com).

Owners
Austin-Bergstrom International Airport
City of Austin

General Contractor
Hensel Phelps, Austin

Architect
Page, Austin

Structural Engineer
Architectural Engineers Collaborative, Austin

Steel Team

Fabricator
Hirschfeld Industries, San Angelo, Texas

Erector
Patriot Erectors, Dripping Springs, Texas

Detailer
Consteel, Saltburn-by-the-Sea, U.K.