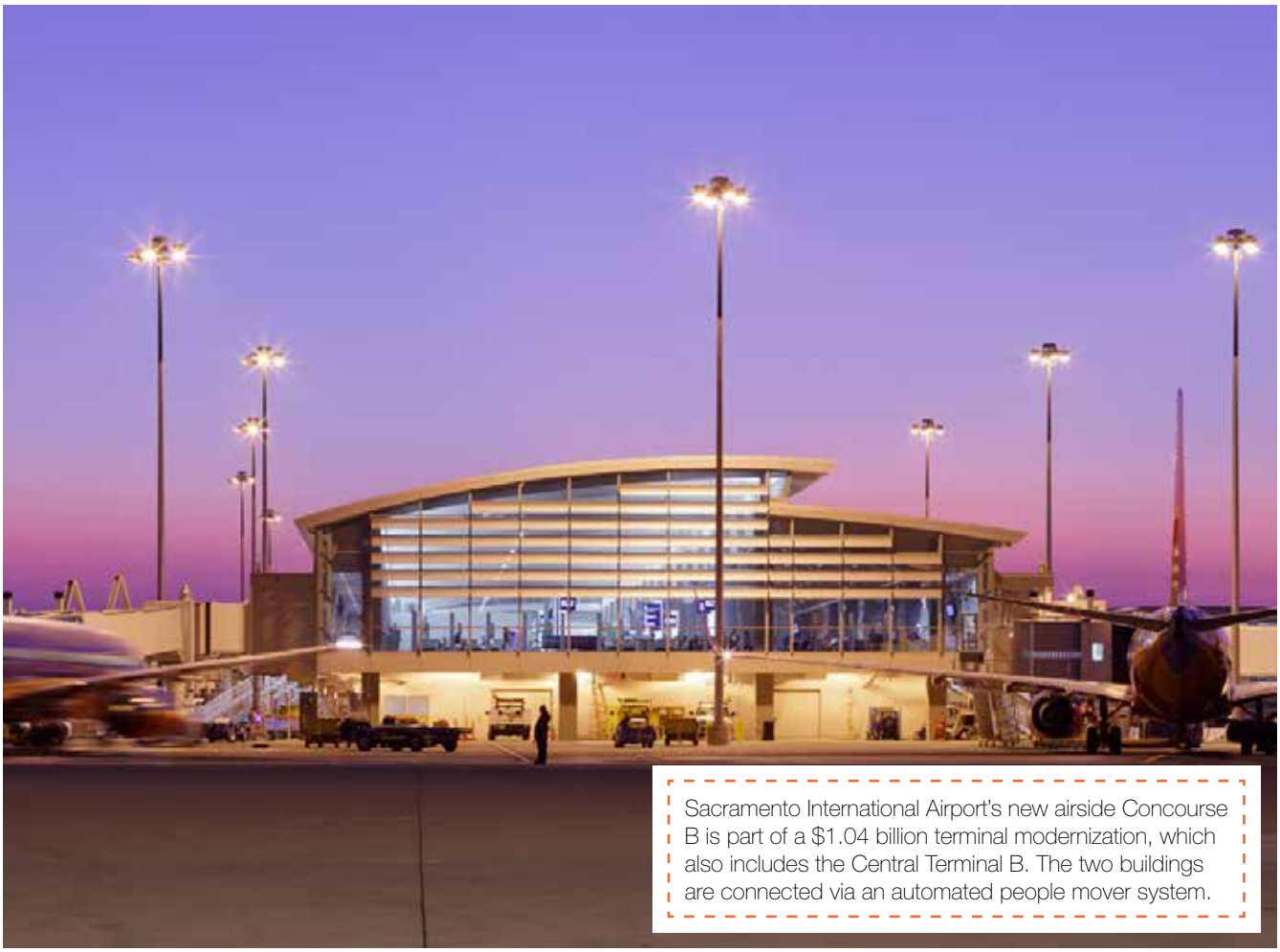
Sacramento International Airport Expansion

Sacramento, Calif.



Sacramento International Airport's new airside Concourse B is part of a $1.04 billion terminal modernization, which also includes the Central Terminal B. The two buildings are connected via an automated people mover system.

Project Team

Owner
Sacramento County Airport System

Architect
Corgan Associates, Dallas, Texas, in association with
Fentress Architects, Denver, Colo.

Structural Engineer
Buehler & Buehler Structural Engineers, Inc., Sacramento, Calif., and
L.A. Fuess Partners (LAFP), Dallas, Texas

Structural Steel Subcontractors
Schuff Steel, Stockton, Calif., and
Herrick Steel, Stockton, Calif.

Contractors
Turner Construction /
Austin Walsh Construction Joint Venture,
Sacramento, Calif.

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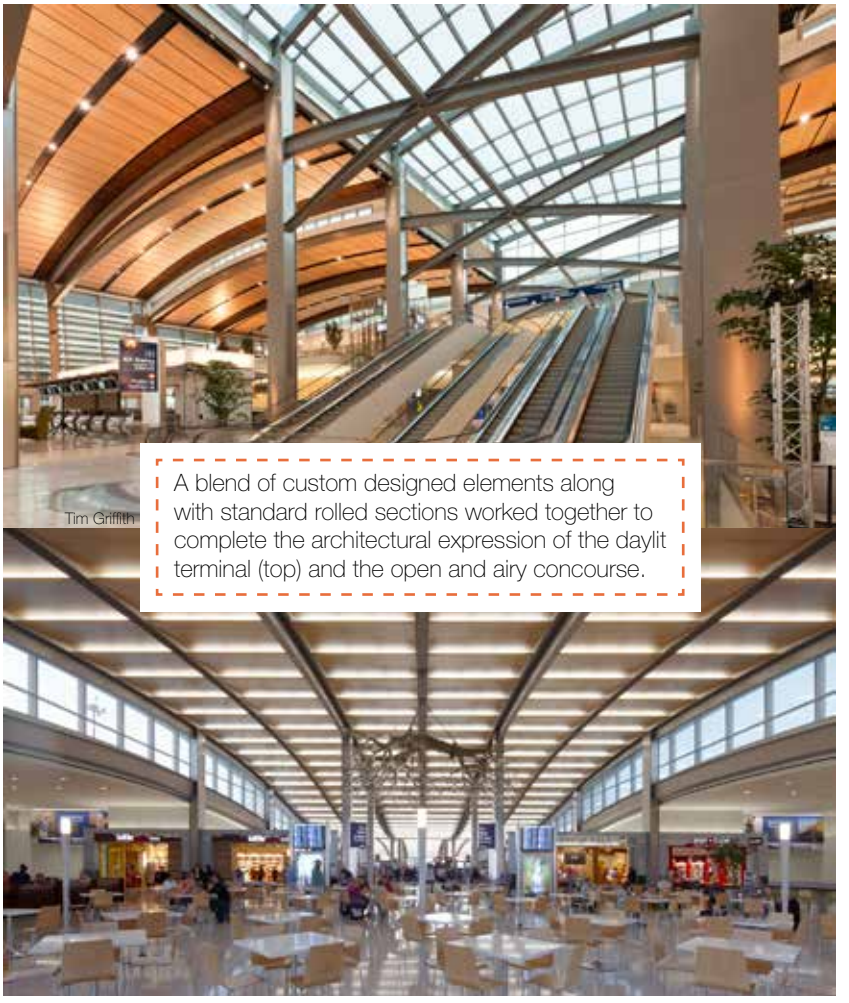
Long-Span Steel Roof Framing Provides Airport with Open Spaces; Evokes Natural Wonders

Custom-designed steel elements and standard rolled sections provide gateway for Sacramento airport terminal and concourse; steel frame enhances wayfinding and traveler experience by providing column-free space, inviting natural light, and creating a sense of place representative of the region.

Sacramento International Airport's Central Terminal and Concourse B is the largest public construction capital improvement project undertaken by Sacramento County to date. This $1.04 billion terminal modernization project, called the "Big Build," is comprised of two individual buildings. The facility boasts a new landside Central Terminal and the new 19-gate airside Concourse B, which are connected by an automated people mover. The two structures house passenger processing, international arrivals, passenger security checkpoints, in-line baggage screening, and more than 42,000 sq. ft of passenger amenity space.

The design was inspired by the area's rich history and culture. The design team at Corgan Associates in association with Fentress Architects created a world-class airport and a gateway to the Central Valley region while capturing a unique sense of place that represents Sacramento. In addition, the facility was designed with sustainability in mind. The result is a bright and airy space with abundant natural daylight reducing the need for artificial lighting and decreasing internal energy use. The project ultimately achieved LEED Silver certification.

The exposed structural steel roof framing members create a dynamic rhythm of light and shadow, an effect inspired by Sacramento's tree-lined streets. Wayfinding was integral to the design with unobstructed views across the public spaces, a visual connection to the central circulation spine, and ample outdoor views. The use of architecturally exposed structural steel (AESS) enhances the unique architectural expression and its use, prominent throughout the public areas, achieved the desired visual quality.



A blend of custom designed elements along with standard rolled sections worked together to complete the architectural expression of the daylit terminal (top) and the open and airy concourse.

Achieving a roof structure reminiscent of a tree canopy for the Central Terminal involved the use of curved tapered steel plate girders spanning 120 feet which dynamically intersect in the middle of the structure. In the concourse, the tapered steel plate girders span over 90 feet and include complex double-curvature geometry to sculpt a roof structure that emulates the rolling hills surrounding Sacramento.

Architectural detailing in both buildings included cladding the structural columns with steel plates to enhance structural performance and to provide concealed electrical and plumbing raceways. Integration of an added "flange" to the curved plate girders created a visual effect of the finished ceiling "resting on the girder." This blend of custom-designed steel

A site layout plan shows Central Terminal B connected to Concourse B via an automated people mover. The project team BIM model (inset) for coordination, scheduling and sequencing construction activities.

Compiled images in this graphic are courtesy of B&B

elements with standard rolled sections worked together to complete the design expression.

Meeting seismic performance goals was also critical. The exposed steel structure that best achieved the desired architectural form produced a framing configuration that did not match traditional code-based definitions. To demonstrate compliance with seismic performance requirements, the structural engineers utilized a nonlinear push-over analysis proposed as an alternate means of compliance and validated using an independent peer review process. To further enhance the seismic response, separation joints were strategically located throughout the facility. Project-specific details were developed to minimize the need for double columns at separation joints and to conceal their location with ceiling soffit framing. This approach minimizes the aesthetic impact while creating several seismically independent structures that each exhibited superior response when compared to a

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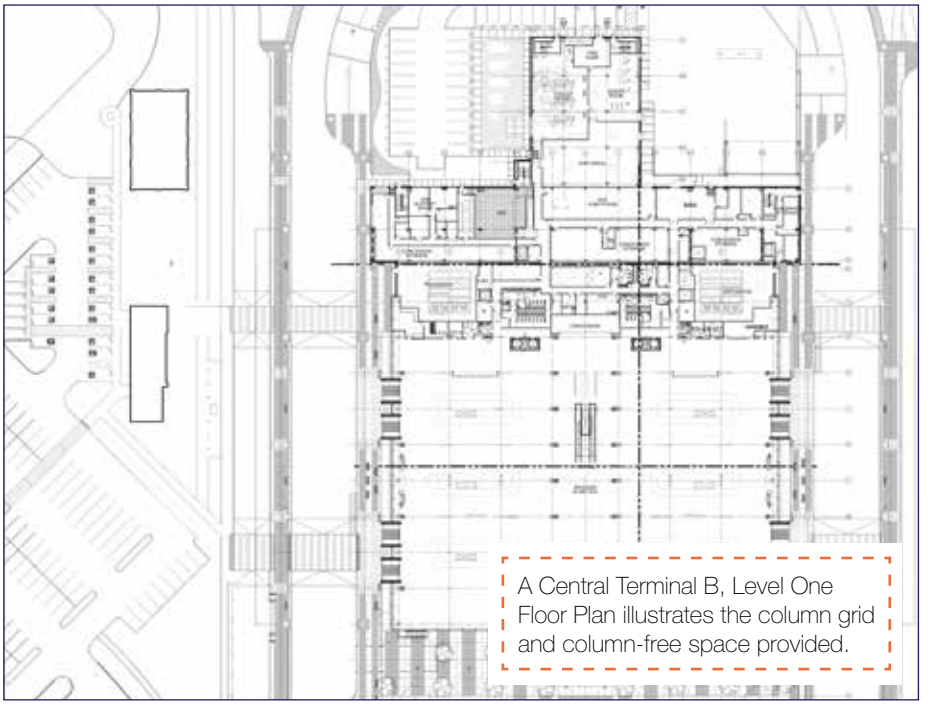
Corgan Associates, Inc.

contiguous combination of the various areas. Additionally, the joints provided improved thermal expansion characteristics for the concourse which is nearly one quarter of a mile long.

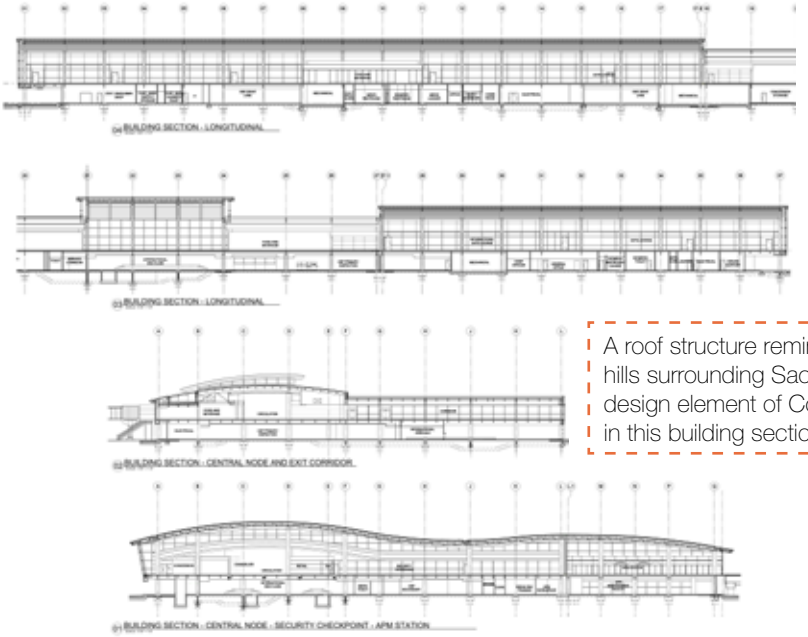
Because much of the steel framing was exposed, the design and construction team worked closely to develop details that achieved the architectural vision and were also efficient to fabricate. This direct collaboration between the design team and the project's two steel fabricators resulted in the decision to use a blend of proprietary, nonproprietary and project-specific moment-frame details. The details were developed specifically to facilitate efficient shop fabrication while also complying with AISC 341 and AISC 358 provisions without the need for project-specific testing.



A Central Terminal B, Level One Floor Plan illustrates the column grid and column-free space provided.

Fabrication of a curved beam for use in the roof Central Terminal B.

For the terminal's central spine, at left, field erection was sequenced to utilize the rigidity of the X-girders to minimize movements and the need for extensive temporary bracing.



A roof structure reminiscent of the rolling hills surrounding Sacramento is a key design element of Concourse B as seen in this building section and photo.

Fentress Architects

The fabricators made extensive use of custom jigs and fixtures to position the members in the shop to minimize welding distortion in cruciform columns and AESS curved roof girders. Field erection was sequenced to utilize the rigidity of the crossing girders in the central spine of the terminal to minimize the need for extensive temporary bracing. A system of temporary columns, guy cables and "king posts" with turnbuckles was utilized for numerous sloping columns and cantilever members to provide temporary support and fine adjustment of elevation and position.

Project Facts

- 424,000-sq-ft landside Central Terminal
  - 2,654 tons of WF sections
  - 450 tons of HSS sections
  - 1,303 tons of structural steel plate
- 316,000-sq-ft airside Concourse B
  - 1,860 tons of WF sections
  - 113 tons of HSS sections
  - 1,900 tons of structural steel plate
- Capacity: 16 million passengers annually
- 19-gates with an international arrivals facility
- Dual shuttle automated people mover system
- $8 million public art program

Fentress Architects

Steel helped bring the structural and architectural visions for the airport modernization to fruition.

Fentress Architects

Steel SolutionsCenter
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California & Vicinity
Steel Information Council
CVSIC
Funding provided by the California Field Iron Workers Administrative Trust
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