SPANNING THE SKY

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Exposed steel trusses composed of steel pipe sections provide dramatic open spaces for Orlando International Airport's fourth airside terminal

To provide an appealing environment for the traveler and allow flexibility for airports, most of the passenger terminal buildings built over the last few years have been designed with large open spaces. Open space is achieved through the use of long-span roof systems, which eliminate the need for columns. Column-free spaces permit airports or airlines to reconfigure areas in the concourse for concessions, airline operations, passenger processing or security reasons, without having to work around interior columns.

Long-span roof systems often become part of the architecture of the building—both inside and out. Because the traveling public's first impression of an airport is often from the air, a unique and unusual roof structure often becomes an integral part of the architecture of the airport. Such signature roofs in terminal structures around the world create grand open spaces and leave lasting impressions on travelers.

One example of this concept is the newest passenger terminal building at Orlando International Airport—Airside 2. Steady growth since the airport's opening in 1981, fueled by the region's tourism industry, has resulted in the need for a fourth airside terminal, dubbed Airside 2. Completed in 2000, Airside 2 completes the original master plan for the airport, allowing it to serve over 31 million passengers annually.

AIRSIDE 2 ARRIVES

Airside 2 is, by design, similar in concept to the other existing three airsides at the North Terminal. Hellmuth, Obata + Kassabaum (HOK) Aviation was the lead architect for the project, with associate architectural partners Helman Hurley Charvat Peacock Architects and Rhodes + Brito Architects.

The 16-gate, 318,870 square foot building contains two major levels: a service level at grade and an elevated concourse level. A partial third level contains an airline lounge. Departing passengers enter the building at the concourse level through a central area—the "hub" of the building—whose focal point is an immense skylight. Spacious areas for passengers and ticket counters feature floor-to-ceiling glass, allowing unobstructed views of the outdoors.

In order to increase the openness and volume of space, the architects chose to make the central skylight as light and airy as possible. The resulting structural solution is one composed of an elegant long-span steel truss supporting cable trusses, which in turn support the glass skylight panels. The skylight is in three segments and is supported with a curved, Y-shaped central steel truss that spans 150 feet in two directions over the spine of the atrium. For aesthetic and structural reasons, the main trusses are composed of round sections in the top and bottom chords with smaller round sections comprising the diagonals and bracing between the main perimeter trusses. Tension cable trusses span from the adjacent roof to the top chord of the Y-shaped truss. The underside of the steel trusses is exposed to view.

The main truss is a two-way system that varies in depth from 4'-0" at the supports to 8'-0" at mid-span. Both the top and bottom chords are 16" diameter pipes, vertical and diagonal web members are 6" to 8" diameter pipes, and horizontal internal braces between the top chords and bottom chords are 4" to 8" diameter pipes. All of the steel

Architecturally exposed steel trusses and a tension cable truss skylight allows travelers to enjoy Florida's sunshine.

was designated as AESS (Architecturally Exposed Structural Steel, per the AISC Code of Standard Practice), and full and partial joint penetration welds were used for all of the truss connections to eliminate gusset plates. Close coordination of the erection sequence and camber allowed the construction of the hub truss to proceed incredibly well.

The complex design of the roof system was achieved using three-dimensional computer analysis, which was generated by a three-dimension CAD model. Several construction details were shown in the contract documents in three-dimension, to assist the steel fabricator and erector in understanding the geometry and details of the complicated truss. The roof meets all of the aesthetic requirements that the architect requested and is also an extremely efficient truss, in terms of steel weight in pounds per square foot. The truss connection design was also carefully thought-out and detailed in order to meet all of the various structural requirements and to enable them to be easily constructed and unobtrusive. Large connection forces in multiple directions are imposed on the truss system by the high hurricane wind uplift loading, the curved and skewed truss geometry, and the tension forces generated by the cable truss system.

Open space is also maintained along the two wings of the building by using long span trusses and plate girders to create an open space of over 100 feet wide by 320 feet long. These trusses are partially exposed to view at the center, where a metal-framed skylight system allows natural light into the concourse area.

Composite steel moment frames at the concourse level, in combination with the long span steel roof trusses, form the lateral system along the length of the building, minimizing the amount of interference that braced frames would have caused with the functions of the interior spaces. The composite steel floor framing easily allows for the greatest flexibility in terms of future modifications, such as the addition of large floor penetrations or the strengthening of beams and columns for increased load capacity

CONVENIENCE AND CAPACITY

The Landside / Airside concept employed at Orlando makes for an incredibly efficient and passenger-friendly airport. The International Air Transport Association cited Orlando International Airport as the Number One Airport in North America for Overall Passenger Convenience, in the "Over 25 Million Passenger Category" three years in a row, and the airport has recently been recognized for passenger satisfaction and convenience by Consumer Reports magazine, by J.D. Power and Associates and the Wall Street Journal

As part of a major capacity enhancement plan, site preparation has begun for the first phase of the new South Terminal Complex. The first phase will feature a four-level landside building and a two-level airside building, with 12 gates, on which Walter P. Moore has begun the design. When fully built, the $1 billion project will service both domestic and international passengers with 120 gates. The addition of the South Terminal will allow Orlando International Airport to serve over 70 million passengers annually.

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