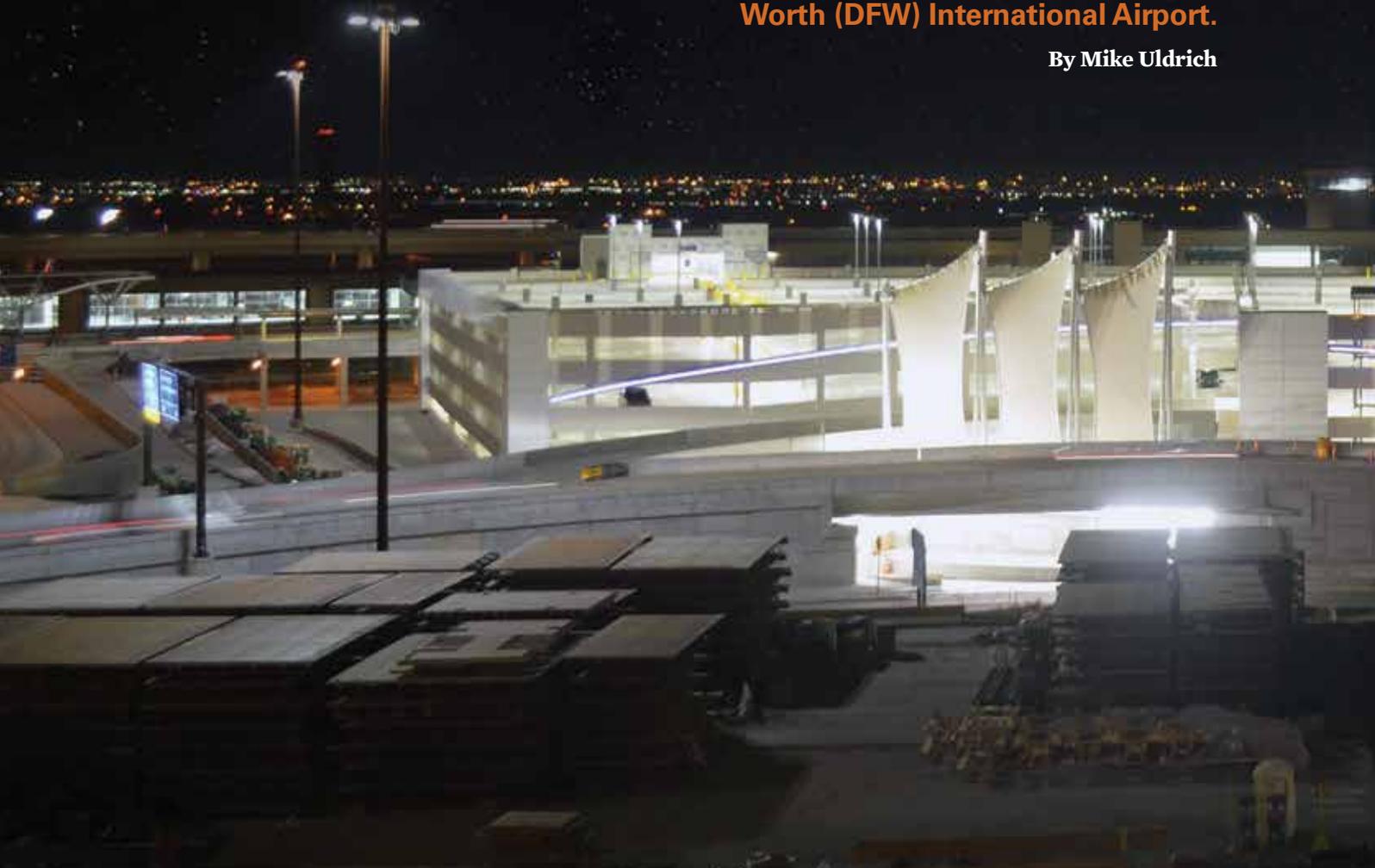


A SOARING SUCCESS

Passengers and staff enjoy a state-of-the-art new parking structure at Dallas/Forth Worth (DFW) International Airport.

By Mike Uldrich



Dallas/Fort Worth International Airport's Terminal E Enhanced Parking Structure (EPS) project is a complete update and replacement of existing parking facilities. The new structure was designed to bring aesthetic improvements to an aging infrastructure and increase parking availability, while improving both the overall experience of passengers and operational efficiency of the airlines. Substantial renovations and improvements inside the terminal have been scheduled to accompany the two-year phased EPS project. With a record 64 million passengers in 2015 and a track record for exemplary customer service, the airport challenged project planners to maintain terminal operations and passenger flow during construction.

The project goals were:

- Provide passengers with a modern and rewarding travel experience.
- Replace two aging, low-clearance, dimly lit garages with one large, well-lit, and efficient modern parking structure.
- Utilize the latest parking technology to improve terminal operational efficiency.
- Optimize passengers' time spent searching for available parking.
- Create a safe public space through the use of lighting, technology, and a fire protection system that's easily accessible to DFW emergency personnel.
- Minimize impact to terminal operations and passenger flow during construction.

Challenges and Solutions

The first challenge faced was limited site access with public traffic operating on all four sides of the construction site, 24 hours a day, seven days per week. Solutions implemented were:

- Round-the-clock demolition and haul-off, with work adjacent to roadways occurring during a three-hour nightshift window.
- Use of soil nail wall excavations to prevent public roadway closures.
- Off-site staging and just-in-time delivery of materials.
- Tower cranes with the capacity to reach over adjoining roadways and pick materials from off-site yard and off-load trucks directly from the active roadway shoulder.
- Extensive traffic control planning, including coordination with





PROJECT DETAILS

PROJECT SIZE:

1,584 million square feet of parking deck with more than 3,200 spaces.

APPROXIMATE PROJECT COST:

\$90 million, including ancillary roadways, bridges, utilities, and landscape.

OWNER/OPERATOR:

Dallas/Fort Worth International Airport-Parking Division

CONSULTANTS:

Jacobs Engineering Group, Inc. (Lead)
Aguirre Roden, Inc. (Architecture)
Walter P. Moore (Structure, Civil)
Rogers Moore Engineers, LLC (Structure)
Moye IT Consulting, LLC (IT, SSI)
IEA, Inc. (Structure)
Pacheco Koch (Civil)

multiple contractors and airport departments involved in separate terminal renovation projects to properly prepare for thousands of deliveries, crane lifts, and concrete pours while minimizing disturbance to public traffic.

The project required extensive site soil conditioning to bring subgrade to acceptable building standards, including:

- Removal and remediation of old asbestos-containing drainage piping.
- Electrochemical soil injection of native clays over 130,000 square feet to a depth of 10 feet.
- Import, spread, and compaction of more than 20,000 cubic yards of special-fill material.

The project incorporated phased construction and

owner occupancy orchestrated with interior terminal improvements, including matching aesthetics/architectural features of adjoining scopes of work. Completion of the first half (Phase 1) of the EPS was concurrent with terminal renovations of corresponding airline gates served by Phase 1 parking area. This ensured that passengers could still park adjacent to their active terminal gates. Phase 1 turnover resulted in increased parking revenue generated mid-project for DFW International Airport during construction of Phase 2. This netted a 12-month head start on parking revenue for the owner.

Innovative Practices

The new garage is state-of-the-art and features multiple innovative features and practices, including a double-helix access ramp between levels. A challenging structural element to construct, the helix access ramp system has proven to be one of the most efficient design features of the EPS. Comprised of two five-story, cast-in-place, post-tensioned concrete ramps that intertwine (one for ascending traffic and one for descending traffic), the helix structure is essentially a series of three-dimensional traffic circles, with vehicles yielding to ramp traffic at each level before entering the helix to access another level of the EPS. This design limits the vertical pathway for vehicles to a much smaller footprint than conventional parking garage ramps that often run the entire length of the garage and have a tendency to get backed up as vehicles attempt to make hairpin turns at switchback locations. The use of the helix system ensures a steady

flow of passenger traffic and eliminates traffic jams within the EPS.

The EPS features a parking guidance system that assists passengers in quickly identifying and navigating to available parking spaces after entering the garage. A collaborative network of overhead indicator lights and digital signage directs vehicles to the closest available space (including standard, one-hour, and accessible parking).

As soon as vehicles enter the parking garage, drivers are met with a large digital sign providing accurate and to-the-second counts of available parking spaces on every level of the garage. Within seconds of entering, drivers know whether they should travel to a different level of the garage to find a spot. As vehicles move through the garage, additional digital signs, posted at drive aisle intersections, provide counts of available spaces down each row of parking. Once a vehicle has been directed to a row, its driver can use the overhead LEDs to determine the precise location of an available space.

Each parking space has an overhead sensor that determines if a space is occupied or available. In addition, an LED light is located over each space (at the tail end, adjacent to the drive aisle, so as to be visible to anyone peeking down a row) that switches from green (available) to red (occupied) when activated by the overhead sensor. This provides an extremely efficient tool for passengers to find an open spot and get on with their travels.

One of the most exciting applications of the parking guidance system is the ability to use data collected from the overhead sensors and EPS capacity counts to enhance operational efficiency inside the terminal. A feedback

loop between the PGS sensors and passenger ticketing kiosks inside the terminal can assist airlines and the Transportation Security Administration by predicting staffing requirements.

A Unique Partnership

DFW International Airport partnered with the North Texas Tollway Authority to equip the airport with overhead and turnstile tolling to charge passengers for daily parking at various terminals. Implemented in late 2013, this system utilizes two plazas—one each at the north and south end of the airport—that act as access gates to the entire airport facility. Passengers take a ticket on the way in or have their *TollTag* scanned overhead as they pass through the parking plaza.

Once inside the airport, passengers can park in any terminal parking facility they choose. This appears to be a convenient way to pay for parking, but the ingenuity behind the system is much more subtle. When it comes time for passengers to leave the airport, they are able to pull directly out of any of the terminal parking garages, merge with traffic, and exit through either the north or south parking plaza using the overhead or turnstile payment. This means passengers aren't getting clogged up attempting to exit a parking garage by inserting tickets and credit cards, which is a frequent issue with parking facilities on large campuses with high parking turnover rates. Instead, the point of transaction is moved to the plazas, which have upwards of 18 exit lanes each. The result is a flawless and efficient movement of passengers in and out of the airport's parking structures. **P**



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