AirportImprovement™

Denver Int'l Expands into "Airport City" With Hotel, Conference Center & Transit Link

Photo: Carl Kerridge Photography

Myrtle Beach Int'l Rehabs & Relights Sole Runway

Five-Year Terminal Renovation Worth the Wait for Central Wisconsin Airport

AIRPORT STORIES INSIDE: CHO I CWA I DEN I EUG I HOU I MFR I MSP I MYR I SJC I SNA I STL I YTZ

Toronto Island Airport Adds Underwater Pedestrian Tunnel

Solar Panels Power Parking at Rogue Valley Int'l

M-B COMPANIES SERVICE SUPPORT

Ask Our Customers

Award Winner of the 2014 Wisconsin Governor's New Product Award.

MB5

Airport tasks are specialized. Service support must be specialized, too. M-B technicians focus only on our products and you. Our equipment. Your airport. Join the partnership if you haven't already.

Single Engine Blower

AIRFIELD SNOW REMOVAL

AMV

RUBBER, PAINT & GLYCOL REMOVAL

P5500-C

CUPPING RAMP PLOW

SINCE 1907

M-B Airport Maintenance Products

Verisys Registrars®
ISO 9001:2008 Certified

800.558.5800 | www.m-bco.com

NJPA AWARDED CONTRACT

080114-MBC | 113012-MBC

A Practical Approach to AOA Safety

Optimize value, performance, and guidance with proven pavement marking materials supplied from one source.

AirMark® Preformed Thermoplastic for Multi-Colored Markings at 150+ Airports / Benefit Cost Analysis Available

Fast-Dry and High-Build Waterborne & Solvent Based Paint / FAA Listed Buy-America / NJPA Awarded Contract

www.ennisflint.com

Ennis-Flint 115 Todd Court Thomasville NC 27360 sales@ennisflint.com Phone: 800-331-8118

Publisher
Paul H. Bowers
paulbowers@airportimprovement.com
262.510.7832

Editorial Consultant
Rebecca Douglas
rebeccadouglas@airportimprovement.com
815.621.4525

Social Media Director
Kristin Shaw
kristinshaw@airportimprovement.com

Creative & Production Director
Becker 505, LLC – Chad Becker
chad@becker505.com

Circulation Director
Lisa Monday
lisamonday@airportimprovement.com

Webmaster
Matt Tews
matttews@airportimprovement.com

Contributing Writers
Jennifer Bradley, Nicole Nelson, Robert Nordstrom, Jodi Richards, Michael Schwanz, Kristin Vanderhey Shaw, Thomas J. Smith, Ken Wysocky

Advertising
Paul H . Bowers
paulbowers@airportimprovement.com
262.510.7832

Adrienne Gibson
adriennegibson@airportimprovement.com
262.844.4368

Vicki Jensen
vickijensen@airportimprovement.com
414-331-9768

AirportImprovement

columns

advertiserindex

AIRPORT IMPROVEMENT published bi-monthly by Chapel Road Communications LLC, 3780 Chapel Road, Brookfield, WI 53045.

World class airports are replacing storefront "pull-down gates" with HUFCOR movable glass walls

SEE THE DIFFERENCE

Why Hufcor...passenger experience

- "Sell while Closed" with Movable Glass Wall
- Eliminate the "prison-like" feel of pull-down gates
- Enhance Passenger's Experience
- For more information visit **www.hufcor.com/airport**

HUFCOR®

OPERABLE | VERTICAL LIFT | GLASS WALL | ACCORDION

2101 Kennedy Rd. | Janesville, WI 53547 | 800-542-2371 Ext. 214 | **www.hufcor.com**

Fresh Blood

There are certain moments in life that stick with you forever. I vividly remember my first AAAE annual conference at the Dallas Loews (or whatever it was called back in 1993). The airport industry was new to me, and it was quite intimidating to watch industry veterans interact so easily.

On the last day of the show, I heard my name called over the public address system as the winner of an oriental rug. My first airport show, and I won a prize! It would be the highlight of a stressful new experience. But when I walked over to collect my prize, the person in charge looked at me and told me I hadn't won the rug. I showed her my nametag, but it didn't matter. As it turns out, there was another Paul Bowers in the industry (who I now know), and *he* won the rug!

It was tough enough being new to the industry and a first-timer at the show. But having someone dismiss me without much explanation was a bitter lesson that has stuck with me to this day. So why bring this up?

Some say that NFL quarterback Aaron Rodgers' unique sense of leadership comes from the way he interacts with teammates — even those on the practice squad, who may never make it into a game. He knows that without the support of the entire team, it's tough to get everyone working together and performing at a winning level. Aaron gets it and goes out of his way to include the newbies.

The same should be true within the airport industry. Our future is dependent on the fresh blood that is coming in. Taking time to meet the rookies, even mentoring them, will help determine our future successes. Programs like ACC's Young Professionals are needed to break the barriers of our good old boy network.

We all want to feel like insiders, that we belong. With 2016 just getting underway, let's make it a priority to get to know and include everyone on the airport industry team.

Cheers!

Paul

New International Terminal Opens at Houston Hobby

BY JODI RICHARDS

In mid-October, Houston's William P. Hobby Airport (HOU) opened a new terminal, bringing the world of international travel to its passengers. The five-gate facility is the first international terminal for Southwest Airlines, which fully funded and led the development of the project.

The $146 million, 280,000-square-foot project adds five international gates capable of accommodating aircraft such as the Boeing 737 and A320. Southwest will preferentially lease four of the gates; the fifth is available for other HOU airlines.

The recently completed terminal also includes a new Federal Inspection Station, an expanded and reconfigured security checkpoint, a new ticketing hall with additional Southwest ticket counters and additional concessions in the new concourse.

Based on a study commissioned by the Houston Airport System, which owns and operates HOU, the international terminal project will bring in an additional 1.6 million air travelers annually. The study also estimates the project added approximately 10,000 jobs to the region and had an additional $1.6 billion annual impact on the local economy.

Randy Gillespie, director of airport affairs for Southwest, explains that the airline was looking for its first international opportunity, and HOU stood out as an excellent starting point. "Our acquisition of AirTran Airways enabled us to begin sampling the near-international marketplace," explains Gillespie. "And we identified our strong opportunity in Houston, one of our top domestic bases, where local customers were forced to pay very high airfares for international travel."

Adding service to Latin America and the Caribbean are particularly important to the airline's ongoing evolution, he adds.

Southwest led the design, construction, procurement and communication for the international terminal project at HOU, which was approved by the city of Houston in May 2012. Under a Letter of Agreement with the Houston Airport System, the airline held all the contracts for the project, specifies Denise McElroy, senior manager of corporate facilities for Southwest Airlines.

"Southwest Airlines worked closely with the city of Houston and the Houston Airport System to create and implement a cohesive design that works seamlessly with the existing terminal and surrounding infrastructure projects," McElroy notes.

Photo: Corgan

During the terminal project, HOU managed and funded complimentary projects, including construction of a new parking structure and skybridge, roadway improvements and installation of a new central utility plant.

In addition to its multimillion dollar investment in a new international terminal, Southwest Airlines made a multi-decade commitment to the market with a 25-year use and lease agreement with the Houston Airport System that began in 2013.

Design & Wayfinding


JONATHAN MASSEY

As lead architect and designer of the new international terminal, Corgan was charged with creating a modern expansion to the existing facility, while also ensuring a seamless integration with the concurrent airport projects, explains Jonathan Massey, a company principal. The goal was to ensure that the various pieces didn't look completely different, he relates.

Corgan lead series of workshops with the airport and Southwest to explore various architectural options. The input helped the design team "make the facility feel like it was already there — like it was a part of the original architecture," comments Massey.

Architects tied the look and feel of the two structures together by continuing the roofline from the current facility to the new terminal and carrying some "big architectural gestures" from the existing building to the new, he explains.

The existing structure's age created challenges during renovations. "There were some unique things done at the time of the previous expansion to accommodate the old structure and old systems, and some of those things proved problematic over the years," says Massey.

HOUSTON AIRPORTS

FACTS&FIGURES

Primary Project: New International Terminal

Supporting Projects: Parking structure & sky-bridge; central utility plant; roadway improvements

Location: Houston Hobby Int'l Airport

TERMINAL

Cost: $146 million

Size: 280,000 sq. ft.

Gates: 5

Architect & Designer: Corgan

Construction: JV Hensel Phelps Construction Co.

Lead Contractor: CBIC Construction & Development

Seating: Arconas

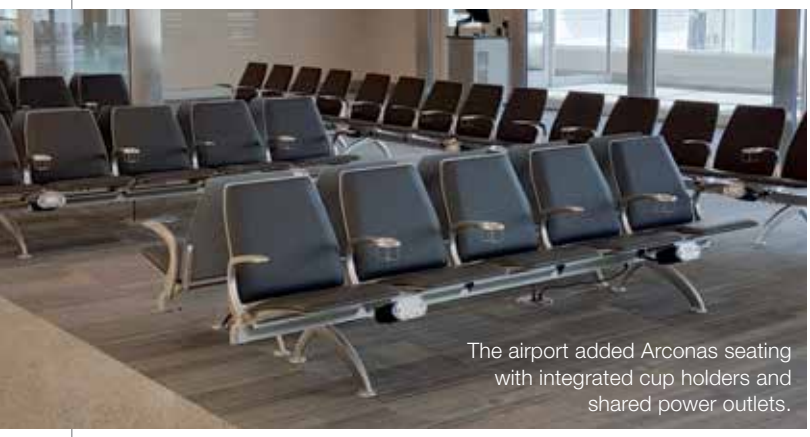
Crowd Control Equipment: Visiontron

PARKING STRUCTURE

Cost: $55 million

General Contractor: SpawGlass Contractors

Parking System: SWARCO Traffic Americas



The airport added Arconas seating with integrated cup holders and shared power outlets.

One of the problem areas addressed by the project was the security checkpoint. After responding to changing security requirements over the years, HOU had developed a reputation for long security lines. Sometimes passengers waited 45 minutes or more, Massey details. The constrained physical space made it challenging to queue and process passengers in an efficient manner.

The way the screening machines were positioned and queues were formed made the previous security checkpoint inefficient, adds McElroy.

With the addition of six new lanes during recent renovations, the checkpoint's capacity increased markedly. In addition to enhancing the processing capacity of the checkpoint, it was also crucial to clarify where passengers needed to flow after screening, notes Massey. With the new layout, passengers pass through the checkpoint and proceed straight ahead to the old gates or turn right to head toward the new.

Color and the orientation of lighting across a wall can draw people's eyes in the direction they need to be traveling, Massey remarks. "In our interior design, we have a lot of focus on guiding the eye of the traveler."

The Corgan team worked diligently to make the terminal as intuitive as possible, he relates. "We're strong believers that space, volume, light, color and material can go a long way in helping people navigate these environments," says Massey. For example, designers used a consistently muted background palette for materials on walls, ceilings and floors in much of the concourse, but changed the materials around restrooms. The visual difference draws visitors' attention and helps them find the facilities without relying on signs, Massey explains.

While aspects such as restrooms, holdrooms and ticketing areas are standard design components for Southwest projects,

some elements at HOU represented new territory for the airline. The Federal Inspection Station, for instance, was the first it has built. With six passport inspection stations and three international baggage claim devices, the station at HOU can process up to 800 arriving passengers during peak travel times.

"So this was a learning curve for us," McElroy notes. "Working closely with both federal and local CBP (Customs and Border Protection) personnel was a critical piece of the project."

Designing a terminal for both domestic and international operations was another first for Southwest. By employing swing gates, the airline can operate an international flight alongside a domestic one. "That was all new to us, too," McElroy adds.

Despite the new ground Southwest was treading, it finished the project on time and $10 million under the original $156 million budget.

Stretching the Budget

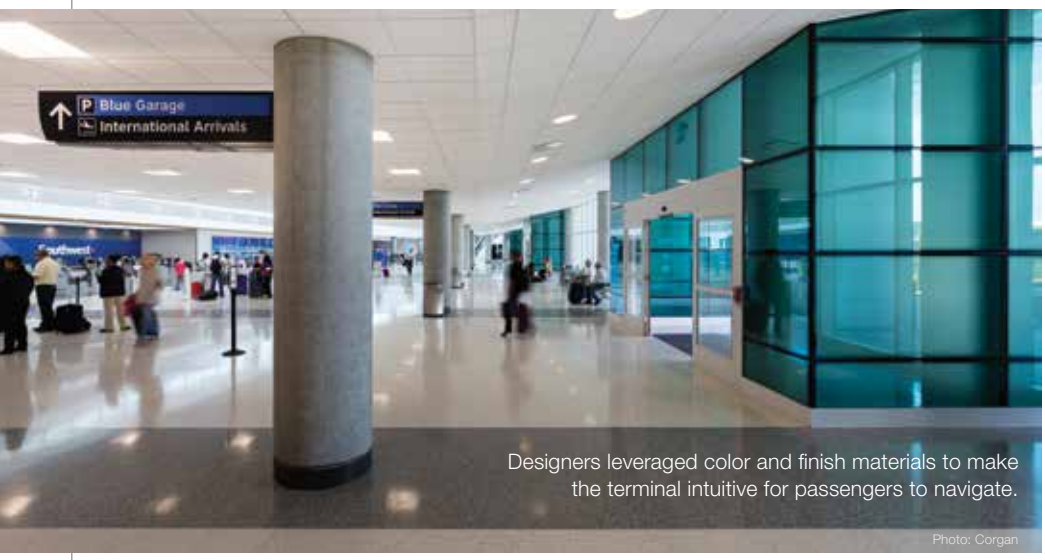
In general, Massey describes the new concourse as a "fairly simple, straightforward space that has a very clear materiality." By keeping the structure basic and creating standardized portals that various concessionaires plug into helps individual offerings really stand out, Massey explains. "The building doesn't compete with the concessions and the restrooms, because those are the things we want people to find," he elaborates.

Using relatively basic architectural and design elements also provides cost savings in construction, Massey adds. "You don't need to spend a lot of money to have somebody naturally look in a direction. That could be as simple as a paint color. The (HOU) facility is quite cost-effective in its construction," he reports.

According to Massey, structure and volume, as well as phasing, largely drive the cost of terminals. "Our ethos is to put the money where it counts — put the structure and the volume and the big expression in places where a lot of people are going to see it and that it serves a purpose. That enhances wayfinding and helps people understand where to go," he informs.

"The rest of the building is kind of a backdrop, and it lets us control cost in a very appropriate way. (At HOU), the focus was on passenger flows and spending money in the right place."

To help control costs in the future, the new facility was engineered to be flexible for growth, when and if it's needed. Currently a five-gate concourse, the facility has the ability to accommodate seven additional gates. "We did a design solution that could be mirrored to the other side [of the ticket wing] if they ever choose to do so," notes Massey.



Designers leveraged color and finish materials to make the terminal intuitive for passengers to navigate.

Photo: Corgan

The Customs and Border Protection facility was also designed with integrated flexibility. Raised access flooring was used under self-service kiosks so more kiosks can be added and/or modified over time.

Similarly, the Federal Inspection Station was designed to process up to 800 passengers per hour; but one wall can be bumped out to expand the facility for more capacity, notes McElroy.

Improved Amenities

The entire length of the new ticketing hall provides passengers with more curbside access to help improve the flow of vehicle traffic. A secondary road allows commercial vehicles to drop off passengers on the lower level, which takes volume pressure off of the upper roadway, McElroy reports.

With the addition of international counters in the new ticketing hall, Southwest now has twice as many ticket counter positions as before.

Previously, the airline's ticket counters were located in the path of the corridor that connected the existing terminal to the new facility. To reduce the impact to travelers, the new ticket hall was constructed first and opened six weeks earlier than the rest of the facility, on September 1. This allowed the construction team to move the ticket

counters into the new facility, demolish the old area and then tie the two buildings together, McElroy explains. The entire new ticketing facility opened on October 15.

Self-tagging at the ticket counter is a new amenity designed to expedite the check-in process at HOU. In the Federal Inspection Station and Customs area, automatic passport control kiosks and Global Entry kiosks provide more automation for passengers traveling through the new facility. In the gate area, passengers can now find an electrical outlet at every other seat. More cup holders were added as well.

Supporting Elements

To make room for the new facility, designers had to relocate the airport police department, TSA offices and some airport administration offices.

In support of and in conjunction with Southwest's work, HOU designed and built a roadway that connects a new parking garage (also designed and built by the airport) to the new terminal. The $55 million parking structure, located along the northwest corner of an existing parking garage, provides more than 2,500 new parking spaces, an automated parking space locator system from SWARCO, and a third-floor pedestrian bridge to the terminal.

The roadway modification project, to support the new international terminal and multi-level parking garage, began in September 2013. The project added a new entry road to accommodate the new garage, an elevated roadway and an extension of the drop-off curb.

In addition to making exterior upgrades, HOU also installed a new central utility plant with a tunnel running from it under the new terminal.

Denver Int'l Expands into "Airport City" With Hotel, Conference Center & Transit Link

BY JENNIFER BRADLEY

When plans for Denver International Airport (DEN) were first conceived in the 1980s, airport executives knew a hotel and mass transit connection to downtown Denver would eventually be needed. Their foresight is now beginning to take shape, in the form of an on-airport hotel/conference center that opened in November, and a new transit center slated to open this spring.

"We never lost sight of that," notes Stuart Williams, DEN's project manager. "It may have taken us 20 or so years to get there, but we were able to fulfill that vision in a very unique and efficient manner, while adding to the overall iconic nature of the Denver International Airport."

The roof of the Jeppesen Terminal, designed by Fentress Bradburn Architects to remind viewers of the area's snow-capped mountains, is likely the most emblematic feature designers kept in mind when building upon DEN's iconic nature. Replacing Stapleton International Airport in 1995, DEN soon made a name for itself — currently as the fifth busiest U.S. airport. DEN made news this fall with the opening of the 519-room, 15-level Westin Hotel and Conference Center that connects with its main terminal. A transit center that will link DEN to downtown Denver via commuter rail is scheduled to open in the spring.

As the overall architect/engineer and program manager for the sweeping project, Gensler is cognizant of its significance within the industry. "This is the beginning of airport cities — the airport function, hotel function and transit center function are intertwined," explains Kap Malik, design director and principal with Gensler, and program manager for the DEN project. "This project has opened the gateway to how airport hotels are thought of. Airports are no longer just about travel; they're about creating an experience."

Mountain-size Project Scope

Creating "an experience" readily translates into "extensive projects," which, in turn, include a seemingly endless stream of details. In plainer terms, Parsons provided program management for the duration of the $544 million, multi-year project, with its first contract signed in September 2009.

Scott Steckler, aviation studio leader at HNTB (subcontractor to Parsons), says that advance planning and concept development dominated the team's first 18 months on the project. In late 2010, the team delivered its initial report, and the airport decided to move forward with a transit center and 730,000-square-foot hotel conference center.

The conference center alone is 26,000 square feet, with facilities that can accommodate up to 2,500 people. An 82,000-square-foot open-air plaza is located between DEN's main terminal

Photo: Westin Denver International Airport

and the hotel. “This is a public venue space that can accommodate 4,500 people for city and airport events such as concerts, farmers’ markets, art shows, exhibits, even car shows,” says Amber Brenzikofer, Parsons’ DEN improvement project manager. “The goal of the plaza and hotel conference center is to host events that will draw people from the city and surrounding areas to the airport, essentially making it a destination.”

To help that goal become a reality, travelers will soon be able to ride from Denver’s downtown Union Station to the airport (or vice versa) in 37 minutes. New two-line commuter rail service, slated to begin in April, will also allow for expanded bus service by tying to the Regional Transportation District. “This allows DEN to integrate into the surrounding communities like never before,” notes Brenzikofer.

The new 22-mile rail segment will also be a huge benefit for many of 30,000+ people who work at the airport, adds Steckler. “It really changes the dynamic,” he observes. “It’s more in line with the European model of transportation with this kind of hub.”

Anderson Mason Dale, architect of record for the transit center project, was responsible for designing that hub. Andy Nielsen, a firm principal, agrees that the concept is new in the United States, especially the connection between the plaza, hotel and transit center. “It (the plaza) is centrally located and will be a crossroads as people make their way from the train and hotel to the Great Hall,” he explains. “The integration of major conference functions within the podium of the hotel will be an important new amenity for the airport. Not only will it make corporate or conference events easily accessible for air travelers, but the connection to the heart of Denver at Union Station will make access to and from the city a snap.”

For customer convenience and airport security, a TSA checkpoint was designed into the Transit Center. Passengers arriving by train or bus from downtown Denver will be routed from Level 1 in the transit hall to Level 4 of the terminal, and then travel a secure corridor into the Great Hall, already processed through the new screening area. The new checkpoint will initially have 30 lanes, and was designed to accommodate 18 more in the future.

DENVER INTERNATIONAL AIRPORT
TOGETHER WE SOAR

FACTS&FIGURES

Project: Westin Hotel & Conference Center; Transit Center; Open-Air Plaza

Location: Denver Int’l Airport

Owner: City & County of Denver Dept. of Aviation

Cost: $544 million

Program Management Team: Parsons; HNTB; CMTS; LS Gallegos; Civil Technology; CIG

Parsons Subcontractor: HNTB

Lead Architect/Hotel Architect of Record: Gensler

Associated Architects/Transit Center Architects of Record: Anderson Mason Dale; Iron Horse Architects

Primary Contractor: Joint Venture of Mortenson, Hunt & Saunders

Excavation, Bridges, Roadways & Utility Relocation: Kiewit

Hotel & Conference Center: 519-room, 15-level, 730,000 square feet

Notable Features: 150-foot canopy; pool on 11th story; rooms with mountain views; largest glass curtain wall in U.S. hospitality sector

Conference Center Capacity: 2,500 people

Public Plaza Between Hotel & Airport: 82,000 sq. ft.; capacity for 4,500 people

Rail Line Connection to Downtown: 2 tracks; 22 miles; 37-min. travel time

Security Checkpoint: 30 lanes initially; room for 18 more

KEY SUBCONTRACTORS

Fire Protection: Aero Automatic Sprinkler Co.

Food Service/Laundry Equipment: Baring Industries

Heating/Venting/Air Conditioning: Burgess Mechanical

Steel: Canam Steel

Roofing: Douglass Colony Roofing

Flooring: Floorz

Doors, Frames, Hardware: Gilmore Construction

Glass & Glazing: Harmon Glass

Millwork & Casework: ISEC

Low Voltage/Communications: Johnson Controls

Structural Concrete/Drilled Piers: Sky Blue Builders

Mechanically Stabilized Earth Walls: Slaton Brothers

Framing & Drywall: Spacecon

Electrical: Sturgeon Electric

Elevators & Escalators: ThyssenKrupp

The Sky Lobby offers travelers a new place to unwind.

Travelers arriving on Level 1 will be able to check in for flights and submit their bags for screening inside the transit center, then proceed to the plaza or airport terminal, just 200 feet away. Plans for a baggage system that is tied directly to the main terminal building are already in the works.

Hospitality Highlights

While DEN's manmade mountain range of white roof peaks has welcomed passengers to the airport and area for two decades, the new Westin Hotel and Conference Center has become an additional focal point. Its design represents a bird in flight, says Brenzikofer. "The saddle in the middle of the hotel preserves the vista of the terminal roof and mimics the curved lines of the terminal roof peaks," she adds. The signature design of the hotel complex is the 150-foot-long porte cochere, which cantilevers beyond the plaza and toward the Jeppesen Terminal.

The hotel rooms offer spectacular views that connect guests with mountains to the west, plains to the east and the airport's internationally recognized tent peaks to the north, Nielsen relates. While Munich Airport in Germany offers similar conveniences, the volume of new activities and amenities at DEN have set a new standard for airports and hotels in progressive U.S. cities, he notes. "Even Munich does not offer an experience like you find in the hotel's pre-function space that overlooks that dramatic train station below," says Nielsen. "Nor does it have a plaza that so seamlessly connects to a powerful architectural space like DEN's Great Hall."

Malik concurs, adding that guests and passengers are "always having an experience" in DEN's new facilities. "The hotel guests are connecting to the transit hall or the existing airport terminal," he begins. "The main hotel lobby floats at Level 6, one level above the plaza. It was designed to give exclusivity to hotel guests, but also connect to whatever events are happening down below."

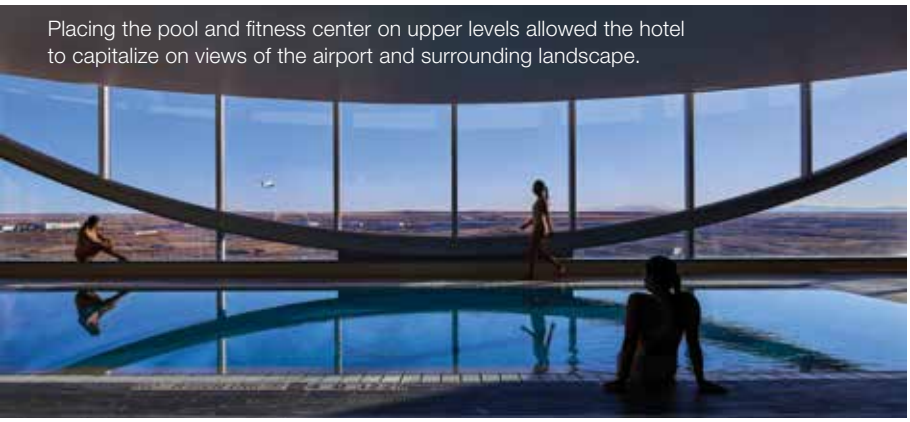
Other noteworthy features include a pool on the 11th level, floor-to-ceiling windows to showcase the Denver skyline and Rocky Mountains, and a 7-foot-tall, 13.5-foot-long glass curtain wall system, which Malik says is the largest ever used in a U.S. hospitality project.

He describes the integration of art into the facility as seamless and in perfect harmony with the architecture. "We didn't want to dilute the iconic design," he explains. "In the future, this will be the heart and face of Denver."

You Say Potato ...

When discussing the massive DEN project, Malik prefers to talk about opportunities rather than challenges.

Space constraints were a pervasive "opportunity" noted by multiple team



Placing the pool and fitness center on upper levels allowed the hotel to capitalize on views of the airport and surrounding landscape.

members. Many people assume DEN has a lot more breathing room than it actually does, says Steckler. Contrary to popular belief, designers had to work within plenty of height and length requirements to squeeze in the aggressively sized project, he explains.

Major bridges and roadways limited the width of the podium that accommodates the hotel lobby, transit station, baggage check and conference facilities, adds Nielsen. They also affected vertical transportation, rights-of-way for tug and baggage handling, major mechanical systems, hotel food service, retail space and loading, just to name a few. "Many of these functions had specific and uncompromising vertical and horizontal alignments, which had to be strategically arranged," he explains. "The payoff is that the density of activity creates great energy throughout the facility."

For Malik, a particularly exciting part of the project was creating the "passenger path" that helps visitors transition from airline passengers to hotel guests. With the airport as a functioning machine in its own right, designers had to pioneer ways to connect services such as baggage screening and security, and guide passengers/guests through a hotel — while still creating an iconic gateway, he emphasizes.

"The height of the hotel is capped because of the radar system and sightlines for the airport," he notes, offering just one detail. Traffic laws and a bylaw prohibiting anything that blocks the view of the tent peaks for arriving passengers were other architectural constraints.

Design standards from Starwood Hotels, Westin's parent company, were also a factor that required regular meetings with several groups, adds Steckler.

Improving Efficiency From Design to Long-Term Maintenance

Building information modeling (BIM) was used from the onset of the hotel/transit/plaza project at Denver International Airport (DEN).


KAP MALIK

While many within the industry focus on the initial capital costs of using the digital technology, Stuart Williams, DEN's project manager, explains that BIM offers real savings in operations and maintenance. A 3-D model for DEN's $544 million, multi-year project was built from the very beginning, and then incorporated directly into the construction process, says Kap Malik, design director and principal with Gensler, and program manager for the DEN project.

"We were able to hand a model to our construction managers," Malik recalls. "It's really amazing how basically no one was carrying drawings around. You go to the job site, and everyone's on the iPad, pulling up the model, modifying details in real-time, then sending it back. We were able to innovate the entire design and construction process with BIM."

Given the huge number of details contained in the mammoth project model, DEN dedicated a new technology team to managing

it. Scott Steckler, aviation studio leader at project subcontractor HNTB, notes that when the project is complete, the team will provide the deliverable model to the airport, which can then be used for facilities management. "It will be a fully up-to-date model with all the hidden stuff: mechanical systems, telecommunication systems, any RFIs that went into the project and came back to our Revit model."

Williams was thrilled that contractors could make design or product changes in the field, and those changes were reflected immediately in the model. "We are very committed to this process at the airport, to be able to predict maintenance and forecast costs for years to come."

Co-locating key working groups for the duration of the project mitigated the challenges of working in an airport that operates 24/7 and coordinatiing so many vital participants, reports Williams. “It was really a huge benefit,” he reflects. “Decisions had to be made quickly and things had to be vetted in a fast manner. Just having everyone here to be able to gather around was a big benefit.”

With the November inauguration of the hotel and conference center still fresh, focus is accommodating the transit service, which is scheduled to start in spring. Once that is complete attention will eventually shift to long-term plans for future expansion: a terminal and east/west concourses, as well as a new baggage system. For now, though, DEN personnel are enjoying the excitement of an impressive finished product.

“People in the city are incredibly proud of it,” reports Williams. “They see the benefits, especially as the metro area continues to grow and traffic congestion with it. Visitors are thrilled with the design, and the project definitely has a lot of ‘wow’ factor to it.”

The on-airport Westin hotel includes 15 levels and more than 500 rooms.

Photo: Westin Denver International Airport

John Wayne Airport Considers Software to Track Fee Payment from Ride-Sharing Vehicles

BY KRISTIN VANDERHEY SHAW

JOHN WAYNE AIRPORT
ORANGE COUNTY

FACTS&FIGURES

Project: Managing Transportation Network Companies

Location: John Wayne Airport (Orange County, CA)

Strategy Under Review: Software that tracks TNC vehicles & manages cost recovery of related fees

Software: TNC-Ops,TM by GateKeeper Systems

GateKeeper's Aviation Partner: TransCore

Trans. Network Participants: Lyft; Uber; Wingz

When Uber burst onto the scene several years ago, using a smartphone app to arrange rides from privately owned vehicles struck a chord with select customers. Early adopters bragged enthusiastically about the money they were saving, other companies launched similar services and a new business model was born: transportation network companies (TNCs).

It wasn't long before travelers began using TNCs for rides to and from airports — promptly triggering pushback from taxicab operators and shuttle services with established relationships and associated fee agreements to operate there. In certain markets, TNC drivers were ticketed, fined and/or summarily banned from airport property. But a portion of those airports are now adjusting their posture toward TNCs — some begrudgingly (driven by customer requests) and others more willingly (after finding potential financial upside).

Lyft and the city of Austin Aviation Department reached a one-year pilot program agreement in March of 2015. Just before Thanksgiving, Midway and O'Hare International airports began allowing Lyft and Uber drivers to pick up passengers at the terminals, joining other large metropolitan airports like Reagan National near Washington, D.C., to create working structures for TNCs. One of the country's busiest airfields, Hartsfield-Jackson International Airport in Atlanta, and others still do not allow TNCs on their property.

In New York, the airports have established dedicated lots for Uber near John F. Kennedy International, LaGuardia and Newark International airports, where drivers wait for a ping indicting a rider is waiting.

Is Software the Solution?

An increasing number of airports seem to be striving to find a way to work with TNCs that serve their local market. John Wayne Airport (SNA) in Orange County, CA, is turning to technology as a possible solution. Currently, it is testing software designed to track TNC traffic in specified areas on airport property and collect data about their operations.


SCOTT HAGEN

"Airports don't know how to appease all parties yet, but this is a service our passengers wanted," says SNA Deputy Airport Director of Operations Scott Hagen. "Frankly, the TNC model can be cheaper, and some corporations are even encouraging their traveling staff to use TNCs vs. taxis when they're on the road."

Orange County, which owns and operates SNA, allows Lyft, Uber and Wingz to pick up passengers curbside. The airport's numbered column system makes it especially easy for passengers and drivers to find each other. The airport charges TNCs the same fee — a flat rate per pickup — it charges SuperShuttle vehicles and limousines.

Taxicab operators pay either $.18 per deplaned passenger or a minimum annual guarantee of $883,000, whichever is greater. Taxicabs are not charged fees via SNA's automated vehicle system — a policy that might change under a new contract that will be put out for bids early this year, notes Hagen.

TNCs provide the airport with data about their trip volume, and SNA is reviewing software programs to manage cost recovery. One of the options it is testing is TNC-Ops, a product from GateKeeper Systems that uses radio-frequency identification (RFID), license plate recognition, and/or GPS to track TNC vehicles on airport property.


LYNN RICHARDSON

"GateKeeper software receives data from the TNCs' systems when TNC vehicles are reported on the airport roadways through the deployment of geofence technology," explains Lynn Richardson, the company's chief executive officer. "A geofence is an electronic line made up of latitudinal and longitudinal points; GPS coordinates are connected to see when a vehicle enters the circle. When it crosses that line, the device sends a message to the TNC server that says 'here I am.'"

Airport personnel can log onto a website that lists TNC vehicles coming onto and leaving the property in near-real time (GateKeeper estimates a 5-second lag). This allows airports to charge for pickups, drop-offs or both. Either way, an agreement with TNCs to provide data is required.

The software helps airports meet their oversight responsibilities and enhances enforcement efforts, explains Richardson. From an accounting/financial standpoint, it allows airports to audit TNC vehicle trip data and provides an opportunity to create support data for their internal invoice systems, he adds.

One feature that appeals to Hagen is the ability to pay for a one-time automated vehicle identification (AVI) system upgrade instead of being charged per transaction for the service. "They (GateKeeper) would provide a direct data feed from TNCs into our existing AVI system, and it would show up as another account," explains Hagen.

SNA doesn't consider software a magic bullet. "Whatever system you use, the data is still the TNCs' data," says Hagen. "Either way, we'll still do random checks and confirm against data streaming in. We get monthly reports from the company, and the data should be the same as what is in our AVI system. The manual checks can't really go away, because we don't necessarily want to be reliant on one source of data."

McCarran International (LAS) in Las Vegas is also testing software to monitor TNC traffic. GateKeeper reports that Lyft and Uber recently began offering service at LAS using its software, and

other TNCs are actively working with the company as part of their preparations to offer service at the airport.

Airports across the globe are struggling to understand and quantify how TNCs will impact operations and profitability. Hagen says that it's too early to assess whether lost parking revenue is a factor at SNA, but one thing is obvious: "In the seven months we have been allowing TNCs at the airport, we are seeing double-digit monthly increases in TNC pickups."

Taxi companies operating at the airport estimate they will see a 10% drop in business, he adds.

On the potential upside, Hagen believes TNCs might bring a new revenue source to the airport: fees collected from TNC drivers who replace friends, family and co-workers who drop off/pick up passengers without parking.

Why the Fuss?


FORREST SWONSEN

As the first company to broadly launch a product for managing on-airport TNC activity, GateKeeper partnered with aviation ground transportation hardware specialist TransCore.

"The TNC uptick happened very quickly and was surprising to everyone," explains Forrest Swonsen, TransCore's associate vice president of Airport Systems and Services. "They enter a city as a competitor to the cab companies and immediately start taking fares to the airport. However, the TNCs found that there is a very different set of business rules for working at an airport, which is a heavily regulated environment. In some instances, they were running into airports that had a closed taxi system [which limits operations to a finite number of companies] and the business models collided. The airports didn't permit the private cars in this capacity, and fines were levied and cars towed. But the thing was, customers wanted the service and the demand determined the offering."

Restricting TNC drivers from dropping passengers off at airports can prove difficult, because customers contact them from outside the airport, and it is hard to distinguish between TNC drivers and unpaid friends or family members providing the same service. Airports can more readily detect and manage TNCs picking up at the airport, because travelers are on airport property when they use an app to arrange a ride — sometimes by using the airport's free Wi-Fi network.

"The TNC model is a disruptive technology," asserts GateKeeper's Richardson. "Customers like that they are able to use their tablet or phone to request a vehicle and have everything automated for them. However, this crosses the paths of all of the typical rules and regulations airports have. At this point, we are way beyond the feeling that this is temporary or that it will go away. Now airports have to figure out ways to make it work for them."

With many airports expressing concern about how TNCs will impact their business, the American Association of Airport Executives and Airports Council International both began addressing the topic at their annual meetings a few years ago. As airports began sharing their positive and negative experiences with TNCs, more operators are shifting focus to finding ways to work with ride-sharing companies operating in their markets.


BAKARI BROCK

Ensuring that TNCs don't enjoy unfair advantages compared to taxis and other more traditional ground transportation options is a primary concern. Bakari Brock, senior director of Business Operations at Lyft, contends that TNCs often pay *higher* fees than other services to operate at airports. Insurance coverage for TNC drivers is another primary concern. Many airports believe that the personal insurance TNC drivers carry is not adequate, because most personal policies exclude car-for-hire usage, notes Richardson.

As airports navigate the various challenges TNCs bring to their curbs, there's no denying that the TNC model is growing in popularity. "We'll continue to see consumer demand increase," Brock predicts. "I also think as we continue to partner with airports and information tech teams, we will continue to provide more operational data. Going forward, this data can be deployed to manage curbside congestion patterns and (be used) to provide better service to passengers."

After working with several U.S. airports, Brock believes the road ahead can be smooth. "We want other airports to know that we want to be the best possible partner," he says. "We are the only TNC that has an airport team, and we want to continue to build our list of partners. There is a misconception that TNCs don't want to follow the rules, and that's not true. We're here to offer alternate transportation modes. And if you talk to some of our customers, they will tell you that our business is all about welcoming, affordable rides."

Richardson considers information the most effective tool for understanding the impact of TNCs at airports. He advises collecting trip data on all modes of ground transportation and merging it into a single system that allows manual and automated analysis of the information.

Swonsen counsels airport operators to look at how their ground transportation mix is going to change with the advent of TNCs. "The smart airports are planning ahead," he observes. "For instance, are we building too many parking decks? Millennials are using more Zipcar and Uber; maybe 20 years in the future we won't need as many spaces. What will revenues look like? The airports will have to take a good look at the cost recovery to ensure they are compensating for any loss of revenue."

Swonsen also advises operators not to get caught up in the details of particular TNC operations, but to think more broadly: "Airports need to reassess their total business mix and as soon as they can try to figure out the impact of TNCs, fractional rental cars, FlightCar [which helps customers parking at the airport rent their vehicles to other approved traveling members] and rental cars. How does this affect consolidated rental car facilities? They have to stop thinking about how to manage TNCs on a day-to-day basis and try to understand that this is causing a sea-level change for non-aeronautical revenue."

(For more information about TNCs at airports, visit AirportImprovement.com. Our September 2014 edition discussed how Denver International and San Francisco International were addressing the issue.)

Myrtle Beach Int'l Rehabs & Relights Sole Runway

BY ROBERT NORDSTROM

myrtle beach INTERNATIONAL AIRPORT

FACTS&FIGURES

Primary Project: Runway Rehabilitation

Associated Projects: New Lighting & Markings

Location: Myrtle Beach (SC) Int'l Airport

Cost: $19.4 million

Timeline: August 2014 – April 2015

Engineer of Record: CHA Consulting

Prime Contractor: Anthony Allega

Electrical: Atlantic Electric

Lighting Fixtures: ADB Airfield Lighting

Scope of Installation: 70,000 linear ft. of cable; 20,000 ft. of conduit; 113 runway & taxiway lights

Performance Planing: Pavement Products & Services

Engineering/Inspection: Castles Engineering

Quality Assurance Testing: Terracon

Runway Markings: Hi-Lite Airfield Services

Major Challenge: Keeping airport operational during rehabilitation of its sole runway

How does an airport with just one runway maintain operations while rehabilitating that runway? After nine months of intense and highly coordinated work on Runway 18-36, Myrtle Beach International (MYR) has some answers.

Although the project cannot officially be considered a full reconstruction because base stone was not removed, it was more complex than most mill-and-fill projects. In addition to repaving its 9,500-foot runway, the South Carolina airport also installed new lighting and markings.

Engineer of Record CHA Consulting devised the plans for crews to mill off variable depths and construct two variable-depth leveling courses to achieve the proper grades to meet current FAA standards for profile and section. The firm also engineered plans to create a new uniform surface course of asphalt with saw cut grooves for friction and new markings. During paving operations, crews replaced the entire runway edge lighting system and in-pavement lead-off lights for the runway's two high-speed exits.

BILL BARLEY

Work for each night had to be planned and executed carefully, so the airport could be operational again before the first scheduled flight the following morning, explains Bill Barley, P.E., CHA's market segment vice president - aviation design. Monday through Thursday, MYR closed its sole runway between 10:45 p.m. and 6:45 a.m. Friday through Sunday, it was out of operation from 11:45 p.m. until 5:30 a.m.

Photo: Carl Kerridge Photography

Because work had to be completed during the airport's off-season — fall, winter and early spring — cold temperatures and other weather issues presented wildcard factors for scheduling purposes.


JASON TERRERI

"Our air traffic is very seasonal," explains Assistant Director of Airports Jason Terreri. "Our summer months are very busy, so we had to get the project done before the summer push began in May. All of this took a lot of coordination with the airlines and the FAA."

With nighttime closures beginning in September, airport officials worked closely with the airlines to make the necessary schedule adjustments to ensure that the runway work could be completed, Terreri recalls.

Milling & Paving

Preparation was key to the success of MYR's project, Barley emphasizes. The project required an onsite asphalt plant, which contractors set up in August. Other preparatory steps included obtaining air quality permits and moving "mission control" items into place.

"We required redundant equipment to make sure we had backups in case of machinery breakdown," Barley explains. "We were prepared. You do your best with risk management to make sure you have all the people and equipment ready to handle any problems that may pop up once heavy construction begins."

General contractor Anthony Allega followed suit with contingency planning. "We had backup pavers, backup milling machines, backup everything," says Jim Allega, the company's vice president. "The only thing we didn't have a backup for was the asphalt plant."

Having extra equipment onsite proved its worth when the engine on a paver blew up. "We immediately put our backup paver out there and got back to work," reports Allega.

Most nights ran smoothly, though. "We lined up the equipment like racecars," he recalls. "As soon as the runway lights went off at 10:45, we'd head out."

Work began with performance/micro milling, using machines with closely spaced teeth to create a smoother runway surface for landings and takeoffs. Performance milling creates a surface that is smoother than the standard milled typically used on roadways, and thus produces a surface acceptable for aircraft operations, explains Barley.

Due to varying grade requirements, crews had to mill down the surface different amounts, leaving as little as 1/2 inch in certain sections and up to 3 inches in others. During a typical work night, crews milled 700 to 900 feet of the 150-foot wide runway.

In some areas, geotextile material that wasn't discovered in core borings or documented on drawings caused asphalt raveling problems, and workers had to mill deeper to get beyond the

The only work crews were able to perform during the day was repair and overlay installation on Taxiway A.

material. If the milling left a thin asphalt layer over the intermittent fabric, the airport risked creating debris that could potentially damage aircraft engines.

"When the job was first bid, nobody knew the fabric was there," Allega explains. Fortunately, a contractor who laid the asphalt back in the 1980s raised the topic during a pre-event meeting. "Although the engineers thought we wouldn't be going deep enough to hit it, we did," comments Allega. "Sheets of asphalt started blowing off during the middle of the day. We had crews out there around the clock cleaning the pavement. At night, we backed up and milled down another several inches to get the fabric out."

Another surprise emerged during the electrical work for the runway edge lights: undocumented duct banks. "I can't tell you how many hundreds of thousands of feet of wire we removed," Allega muses.

Crews also constructed a 40- to 70-foot transition between the newly milled surface and existing runway surface each night. Once the transition was complete, crews cleaned the pavements with broom machines and blowers, and then painted on temporary markings for the next day's air traffic. Because the markings weren't permanent, workers did not have to apply glass beads. The airport was also able to obtain a modification of standard from the FAA to eliminate the runway edge markings on a temporary basis.

Crews used a GPS programming system, for which Allega owns a patent, to lay out the temporary striping. The same system was used during paving operations to control paving width and length, and also during milling operations to ensure milled grooves remained perpendicular.

The GPS equipment expedited the nightly marking process, notes Barley

"We would literally finish our night's work at 6 a.m., get our mess cleaned up, and at 6:46 planes were taking off and landing," recalls Allega.

Once the milling was completed, paving work began. On a typical night, operators were able to lay a lift of approximately 1,000 feet of full-width runway, create a transition and then re-paint the markings. A total of three lifts of asphalt were laid and then tested.

"The FAA specifies a minimum of 93% compaction," Allega explains. "We used a notched wedge on our longitudinal joints that we reheated on every pass and were able to obtain 95% to 96% compaction, which is almost unheard of."

Airport officials were hoping to complete paving by Christmas, but cold weather delayed asphalt work that required at least 45° C ambient and surface temperatures.

"We were hoping the temperatures would be warm enough throughout the fall and early winter to complete the paving, but Mother Nature didn't see it that way," Terreri recalls. "The airlines were aware that this might happen, but we made it a priority to work with them. If they needed an additional 15 minutes for a particular flight, we would always try to accommodate them."

Contractors were able to install two asphalt lifts before Christmas so aircraft didn't have to operate on the milled surface; but the third lift was not completed until April. Hi-Lite Airfield Services then painted final pavement markings to FAA Part 139 standards.

Electrical

Throughout the milling and paving work, electrical crews installed new incandescent runway edge lights, cables and wiring. The new light cans were offset by 5 feet, but still within FAA requirements. Installation of centerline lights at two of the high-speed exits was coordinated with paving operations. The existing lighting system remained in use throughout construction; and once the new system was powered up, crews removed the old system.

During the project, the airfield experienced a few lighting outages, primarily caused by jet blast affecting temporary circuits and jumpers.

"It wasn't the commercial jets that caused it," explains Barley. "Myrtle Beach brings in some fairly large four-engine military aircraft. If the outer engine's jet blast happened to catch an edge

light that was set temporarily, it might pull the circuit. We were replacing the old cable and light fixtures, which were at the end of their useful life. If a circuit got disconnected either by jet blast or a construction vehicle, we basically had to send a crew out to find the problem and get it corrected as quickly as possible."

"Whenever that happened," adds Terreri, "we let the airlines know immediately, so they could hold their aircraft at their departure point until we got the system back up."

All told, crews installed approximately 70,000 linear feet of cable, 20,000 feet of conduit and 113 runway and taxiway lights.

Nail-Biting Stakes

Terreri enthusiastically views the project as a huge success for MYR and attributes that success to great teamwork. Throughout the project, airport staff and representatives from Allega, CHA, Atlantic Electric and key subcontractors held meetings every morning to discuss issues from the previous night and talk about what would happen that night.

"To construct a runway at an airport with only one runway without any serious impact on its operations is a significant feat," he exclaims. "One big hiccup and the airport doesn't open. That didn't happen. We had no damage to aircraft and no closures that materially hurt our operations. Every morning the airfield was inspected by the contractor, the engineer and our staff, then reopened in compliance with Part 139 standards. Through teamwork and collaboration, we were able to address everyone's concerns throughout the project."

Allega estimates that an average of 40 to 50 workers were onsite seven days a week for approximately nine months to complete Runway 18-36. "During the day you were prepping, so that when the runway shut down you were ready to roll," he remarks.

Even though rehabbing a runway while keeping it operational is not his preference, Barley notes that the project at MYR worked out well. "A lot of credit goes to the airport team and the way they responded to issues and needs," he comments. "If we needed maintenance equipment or to coordinate with the airlines, they were there to take care of it. As they say, 'It takes a village.' They have a runway now that will last them a good 20 years. This isn't a project an airport wants to undertake very often."

An on-site asphalt plant helped contractors stay on schedule.

Photo: Carl Kerridge Photography

San Jose Int'l Gains Second Fixed Base Operator

BY JODI RICHARDS

NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT

FACTS&FIGURES

Project: Fixed Base Operation

Location: Norman Y. Mineta San Jose Int'l Airport

Owner/Operator: Signature Flight Support

Cost: $82 million (100% privately financed)

Building Size: 270,000 sq. ft.

Lot Size: 29 acres

Design Architect: Gensler

Architect of Record: Shenkel Schultz

Contractors: Weitz Co.; Granite Construction

When Signature Flight Support opened a new $82 million corporate aviation facility at Norman Y. Mineta San Jose International (SJC) in early November, airport officials were thrilled to have a second fixed base operator on the field. They also viewed the new tenant as a larger symbol of what is and has been happening at the airport that serves California's Silicon Valley.

One of the primary tenants at the new facility is Blue City Holdings, which represents the principals of Google. In fact, the company financed a significant portion of the hangar development, reports Signature.

John Aitken, SJC's assistant director of aviation, notes that recent investments by Signature and Blue City have prompted a collective "moment of realization" for the airport and community regarding the impact that the local tech community can have on aviation (and vice versa).


JOHN AITKEN

"To motivate Signature to invest that much money in our community means that they also saw something here beyond our 33,000 annual general aviation operations," Aitken explains. "It was a moment of pride for us."

The new 270,000-square-foot facility includes an executive passenger terminal, seven

hangars, ramp space to accommodate large business jets and aircraft servicing facilities. Signature, a subsidiary of BBA Aviation, committed to a 50-year lease.

According to Aitken, the new facility represents the largest private investment on the airfield by "many millions." It's also a well-timed sequel to the $1.3 billion modernization program SJC completed in mid-2010.

Rent for the 29 acres Signature leases will add $2.6 million per year to SJC's ledger. "Getting the maximum value for every acre is key for us," Aitken comments, noting that the airport has only 1,000 acres total.

In addition to significant rent revenue, Signature guarantees of $400,000 in annual fuel flowage fees to the airport. The city of San Jose stands to gain as well — $70,000 in tax revenue the first year and $300,000 the fifth year and beyond. "The revenue package for both the airport and city was very impressive and is going to work very well for us," Aitken comments.

Signature's new facilities have added 36 permanent jobs at the airport. Officials further estimate that 150 to 200 construction jobs were supported while the facility was being built, and about 370 direct and indirect jobs will be created thanks to Signature's arrival.

Airfield Reorganization

The land that the new facility occupies became available when SJC relocated employee and long-term customer parking lots during its $1.3 billion modernization program. By moving the parking lots from the west side of the airport to the east, 44 acres were opened up for development. The airport also saved money on bussing costs, because the lots were moved closer to the passenger terminals.

SJC officials issued a request for proposals to develop the newly available land in April 2012. The airport purposely took a broad approach to the request, inviting proposals for any use allowed

under its master plan to elicit a variety of ideas for developing the acreage, explains Aitken. "We were looking for the highest value and best use of the land," he elaborates.

The airport will likely take a similarly open-ended approach when seeking proposals for the remaining acreage.

Prior to Signature's proposal prevailing, SJC had one fixed base operator: Atlantic Aviation — a company that has done a great job taking care of the business community at the airport, notes Aitken. The need for additional corporate services became evident as corporate demand increased over the years, he adds. "We have a lot of positive things happening here," Aitken explains. "The corporate market was trending upward, so we knew we needed to expand facilities and support growth in operations."

According to airport statistics, 105 companies reside within 18 miles of SJC. Together, they represent $628 billion in global sales and $39.3 billion in capital expenditures.

ERIC HIETALA

Eric Hietala, Western Region vice president for Signature, says that the worldwide fixed base operator network saw a tremendous opportunity at SJC. "(The company) thought the aviation and larger community could be better served by competition on the field," says Hietala.

"We are space constrained, but these two facilities [Signature and Atlantic] are going to be able to push a lot of aircraft through a small footprint," Aitken notes.

In fiscal year 2014, SJC's general aviation operations numbered about 29,600, and volume increased to 33,200 in fiscal year 2015. "We anticipate those numbers will continue to grow," Aitken adds.

Growing Opportunities

ROSEMARY BARNES

"Atlantic Aviation has served our general aviation and business community well for many years," relates Rosemary Barnes, A.A.E., public relations manager for SJC. "They've been an amazing partner and tenant for us. However, the time had come when we needed to support the growing private aviation needs of local high-tech and other companies, and Signature was the right company at the right time."

In addition to bringing customers and based aircraft to the field, Signature Flight Support also relocated its Western Region headquarters and associated managers, accounting and

human resource personnel to SJC. "The location is very significant for us," notes Hietala.

The company saw a tremendous opportunity for growth potential due to pent-up demand in an underserved area, he explains. "The market was looking for additional competition. Silicon Valley as a whole is growing," he relates.

San Jose fits well into Signature's portfolio of more than 100 other locations, because Silicon Valley was previously a "major void" in the network the company wanted to fill, notes Hietala.

"Signature also saw the growing investment in our community from the sports and entertainment industry," Barnes adds. The new Avaya Stadium, built for Major League Soccer's San Jose Earthquakes, sits directly across the street from the airport. Nearby Levi's Stadium, new home of the San Francisco 49ers, will host Super Bowl 50 in early 2016.

Conducive for Construction

Because the project site was formerly a parking lot, it didn't require much preparation. Signature removed asphalt, concrete curbs and some light poles and developed the parcel to its needs. The nearly greenfield site with plenty of room to operate allowed Signature to move the project along aggressively, without phasing, Hietala reports. "We believe that was a wise decision, because now we have a high degree of interest in all of the hangar and ramp facilities," he adds.

Slight airside modifications — the addition of two S turns in a taxiway — were needed to meet FAA standards that prevent straight-on access from ramp to runway. Per Signature's original proposal, it assumed the responsibility and cost of initial capital investments for the taxiway reconfiguration; SJC will maintain the pavements going forward.

While much of the facility construction was physically separated from airfield operations, tying the new facility into the movement area required careful coordination. SJC repurposed a small runway into a taxiway to allow construction crews room to work in the movement area without impeding general aviation traffic. Because SJC's two fixed base operators are fairly close to each other, tearing up the movement area in front of the new Signature facility would have also impacted Atlantic Aviation. "By using that small runway as a taxiway, we were able to eliminate that impact to Atlantic's operation and to all the corporate aircraft that were arriving and departing during the construction period," Aitken explains.

Facility Highlights

The new 270,000-square-foot facility, designed by Gensler, is tailored to meet the needs of Silicon Valley companies. (Gensler also served as the master architect for the airport's larger terminal renovation program.)

"We're really addressing what we believe has been pent-up demand," comments Hietala. Over the years, aircraft operations that would have preferred to be based in San Jose migrated out to the Central Valley and Monterey due to a shortage of hangar space and competition at SJC, he explains. "One of our goals is to bring that traffic back to San Jose."

Hietala considers the 60,00-square-foot Hangar 7 the facility's most notable feature. The partnership with and investment by Blue City Holdings helped Signature build a facility that is "unprecedented in size and scope" in the company's entire network. "We're very fortunate to work with such an organization," says Hietala.

Another noteworthy facility feature is an open-air technology garden that extends from the executive terminal. The 7,000-square-foot exterior space is filled with drought-resistant plants and exhibits from the Tech Museum of Innovation and Computer History Museum. "It's very unusual for an FBO to have an adjacent, exterior space where customers are able to enjoy the 330 days of sunshine that you have in the South Bay," Hietala remarks.

Pervasive use of light is an overall hallmark of the facility's architecture, he notes. Large picture windows provide views of the technology garden, and a row of windows lining the top portion of the hangar doors allows natural light to illuminate the space. In addition to creating a bright ambience, the design is expected to decrease the amount of energy used for electric lighting.

The heavy use of glass brings in plenty of light during the day and allows the facility to be illuminated like a lantern at night, explains Gensler Design Director Terence Young. "The building is glassy and opens up so that it's not a mysterious black box," he remarks.

A canopy shades much of the building to allow filtered light through without heat gain, notes Tim Sullivan, senior associate at Gensler. Native, drought-resistant plants were added to help the facility to blend into the Northern California landscape.


TERENCE YOUNG


TIM SULLIVAN

Sustainability is further echoed in the building and finish materials — locally procured, low-VOC products; a metal frame; concrete; glass; and high-efficiency water fixtures.

Signature will seek certification in Leadership in Energy & Environmental Design from the U.S. Green Building Council. "LEED certification is something that is important to BBA Aviation in terms or our corporate social responsibility goals and objectives," Hietala says. In fact, the first U.S. fixed base

The airport's new corporate aviation facility was built on a site that previously contained parking lots.

operation to achieve LEED certification was Signature's facility at Boston Logan International.

Spring-boarding off the emphasis placed on art elsewhere at SJC and within other city-owned facilities, Signature made art a priority in its new space at the airport. The technology garden includes trees, plants and tables, as well as unprogrammed space for artist displays. "It's sort of like a stage," Young explains.

"We see this as an opportunity to put in a kind of boutique, high-end facility and marry that with aviation and with the workplace to come up with a very interesting and creative place for private aviation to work from," Sullivan adds.

Sharing the airport's perspective, Barnes is in complete agreement: "Signature built a beautiful and impressive facility representing both SJC and the Silicon Valley community."

Establishing Roots

In its proposal to develop space at SJC, Signature committed to a variety of local investments. Aitken explains that it seemed important to Signature to demonstrate that it won't be a company that simply occupies space at the airport, but a company that will become part of the local community.

One of the benefactors is San Jose State University, which will receive "relevant experience" at the airport facility for its students. In an entirely different vein, the nearby Computer History Museum will benefit by gaining space to display pieces that highlight the importance of Silicon Valley.

"Signature wants to be more than just an FBO," Hietala says. "We want to be part of the fabric of the community."

Thinking even farther beyond the airport fence, Signature is contributing to local nonprofit organizations. "We recognize that we have a long lease here in 50 years," says Hietala. "With that brings certain obligations to the greater community."

Five-Year Terminal Renovation Worth

BY ROBERT NORDSTROM

Central Wisconsin Airport (CWA) travelers are greeted these days by a newly renovated and expanded terminal. Updates were direly needed, reports Airport Director Tony Yaron; and the nearly $38 million multiphase project took five years to complete.

TONY YARON

"The terminal was overcrowded and aging," he explains, noting that the facility hadn't been updated since the mid-1980s. "After 9/11, we had to fit a CT-80 screening device into an old travel agency office between the ticketing offices and the street. Travelers had to schlep bags through the lobby."

With one small baggage carousel and five rental car offices located nearby, passengers claiming their luggage intersected with others trying to rent vehicles. "It was a traffic flow nightmare," recalls Yaron.

Early discussions about upgrading the terminal began in 2004, with initial interest focused on building a new structure on the other side of the airfield. After talking with the FAA and consultants and putting pencil to paper, airport officials determined that the cost of a new terminal was not worth the risk — particularly given the industry downturn at the time, Yaron explains. As a result, officials consulted engineering and architectural firm Mead & Hunt about renovating CWA's existing terminal to extend its life another 20 years.

the Wait for Central Wisconsin Airport


MATT DUBBE

"Funding for terminal projects that weren't mission critical was drying up," recalls Matt Dubbe, national market leader for Architecture at Mead & Hunt. "We had to sell the idea of renovating the existing terminal back to the community after they had gotten excited about a brand new terminal. Ultimately, we were able to convince the community that the rehab project would protect them from market fluctuations in the industry while providing them with an excellent facility."

All in Good Time

Design work for the terminal renovation didn't begin until 2010, but the delay ultimately proved propitious. By then, apron work was sorely needed on the east and west sides of the terminal, explains Yaron. Because Mead & Hunt personnel had already determined that the terminal project required rerouting storm sewer, electrical, geothermal and utility corridors in order to expand the facility, civil engineers from Becher Hoppe Associates were able to design the apron work accordingly.

Plans included the removal of deteriorated pavements and installation of a new sub-base, underdrain, storm sewer and base aggregate. Ultimately, crews replaced about 9,500 square yards of concrete pavement in the terminal apron area and 2,800 square yards of asphalt in the general aviation apron area.

FACTS&FIGURES

Primary Project: Terminal Renovation & Expansion

Associated Projects: New Rental Car Facility; Parking Lot Expansion; Apron Renovation

Location: Central Wisconsin Airport (Mosinee, WI)

Approx. Cost: $38 million

Timeline: 2010-2015

Architecture & Design: Mead & Hunt

Civil Engineering: Becher Hoppe Assoc.

Site Electrical Engineering: Clark Dietz

General Contractors: Miron Construction (Rental Car Facility); Immel Construction (Phase 1); Ellis Stone Construction (Phase 2); SMA Construction Services (Phase 3)

Airfield Apron: River View Construction

Infrastructure: Earth Inc.

Parking Lots: Radtke Contractors; Integrity Grading & Excavating

Baggage Handling Systems: G&S Airport Conveyor

Electrical: Van Ert Electric; Total Electric

Plumbing & HVAC: Ron's Refrigeration; Best Mechanical; KBK Services; PGA Inc.

Geothermal: Sam's Well Drilling

Roofing: Quality Roofing

Glazing: Omni

Landscaping & Wayfinding: Quorum Architects; Integrity Grading & Excavating

Roadwork: Integrity Grading & Excavating

Baggage Conveyors & Carousels: G&S Airport Conveyor

Of Note: Design & construction was spread over 5 years to help obtain federal funding & protect airport market and industry fluctuations

Designers moved the rental car counters out of Baggage Claim to improve passenger flow.


MARIJEAN HOPPE

"Anything that needed to be installed in the apron area, we made it happen in 2010 before the terminal work began," comments Becher Hoppe Civil Services Manager Marijean Hoppe, PE. "We knew the terminal project was coming up and had the footprint in hand, so we could design our concrete grading to tie into the new terminal."

With airside preparations in place, landside work began in 2011. The process was complicated for several reasons, including the need to break the project into several phases due to funding constraints and the existing location of CWA's car rental agencies. Ultimately, airport officials decided to build a new rental car facility across from the terminal to improve customer flow inside the facility, benefiting travelers and rental agencies alike.

"Moving the small, cramped rental car agencies out of the terminal was the domino that allowed us to start working on the terminal itself," explains Dubbe.

The nearly $2.5 million facility that resulted measures about 30,000 square feet and features an all-glass front and a single sloped roof. Interior upgrades include in-floor heating, automatic light controls and generous use of wood finishes and other local materials. Travelers exiting the baggage claim area are directly in line with rental agency counters across the drive. A ready-return lot behind the facility provides each rental car agency with 36 slots in the airport's expanded lot also used for public

parking. The old lot, which also included rental car ready-return spaces, had only 1,100 spaces; the new one has 1,675. Workers fuel and prep rental cars at an offsite facility.

During construction, the road between the new rental car facility and terminal was closed to run utility feeds between the two facilities. Crews installed a completely new electrical system, including an electrical vault and backup generator. Although the public was able to drop off passengers near the terminal's entrance throughout construction, drivers temporarily had to follow a complicated maze through the parking lot to exit.

"The civil engineering planning was critical to the eventual success of the project," Hoppe reflects. "We go in early, but we're also the last to leave. When you're doing work in 2011, you have to plan for the roadway work you'll be doing in 2015."

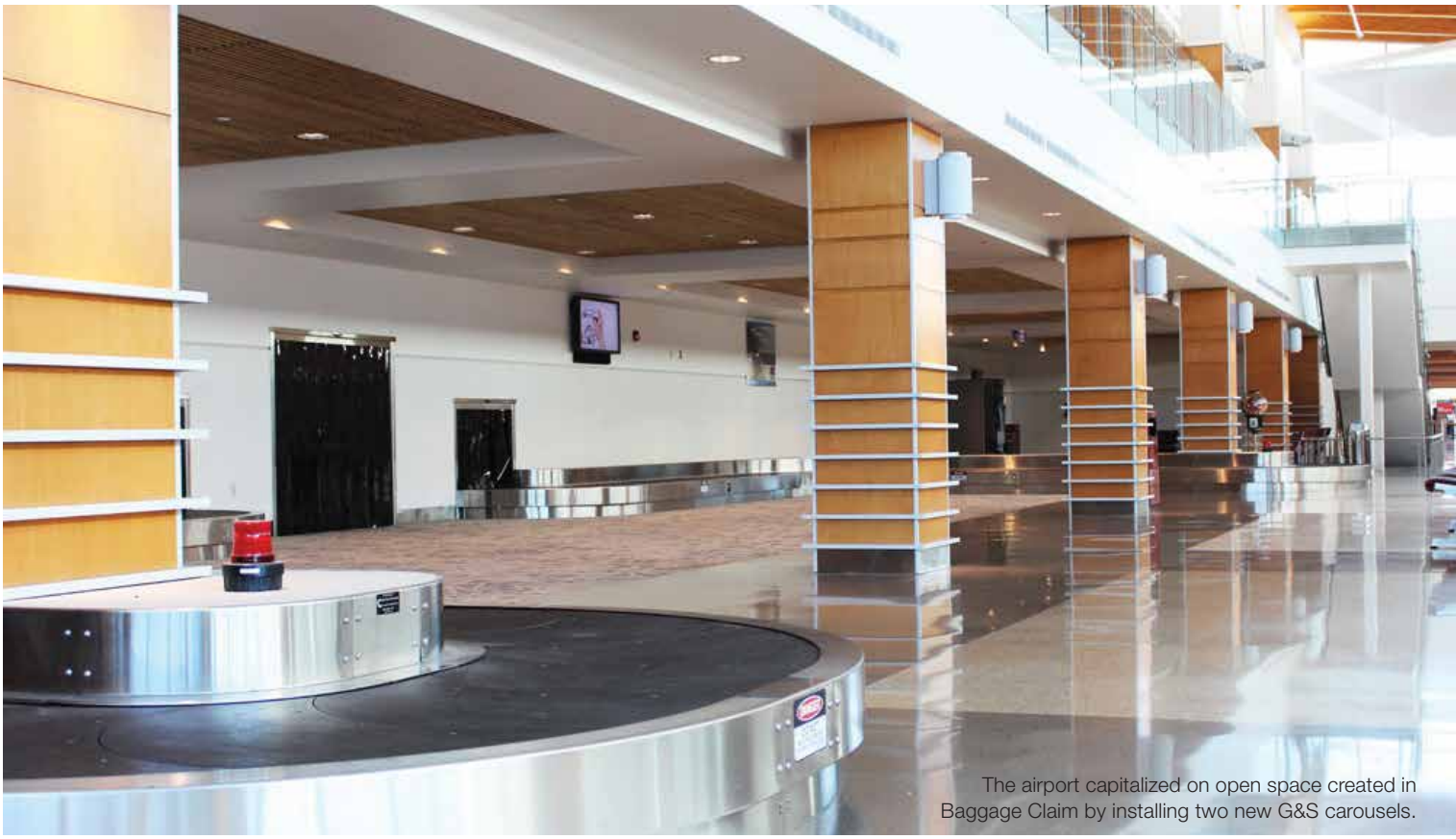
On to the Terminal

Terminal renovations were divided into three phases, each with a different general contractor (see list on Page 37). Phase 1, on the west end of the terminal, began in 2012 — right on the heels of the rental car facility project. The existing ticketing and lobby area grew considerably, as crews added fully 14,000 square feet to the west, north and south. The roof was raised to allow for clerestory lighting during daylight hours, and crews moved the CT-80 baggage screening device out of the lobby and behind a screen adjacent to the airline ticketing offices, which were also expanded and remodeled.

"The baggage makeup area was greatly improved," Yaron informs. "Under the old system, tugs would pull into or try to back into individual garages. It was congested and not very efficient. Now, we have a long tunnel running behind the entire string of airline offices. New baggage belts greatly improve operations for the airlines."

Phase 1 also included extensive utilities and mechanical work. Approximately 180 geothermal wells were dug on a plot of land just southwest of the terminal. Planners expect the new system to provide up to 80% of the new building's heating and cooling needs.

Phase 2, on the east end of the terminal, began in 2013. Less complicated because it did not require extensive infrastructure and utility work, this portion of the project added a total of 10,000 square feet to the east, north and south sides of the terminal. Workers also demolished an existing administrative office building just east of the terminal and moved the offices, conference rooms, boardroom and training classroom it previously contained into a new mezzanine area in the southern portion of the east expansion.



The airport capitalized on open space created in Baggage Claim by installing two new G&S carousels.

With rental car offices gone from the baggage claim area, the airport had space to install two new baggage carousels to replace its previous single unit.

"The two new carousels, now set in a more open and spacious area, allow travelers to find their bags more easily and create better circulation for travelers and meeters-greeters," observes Yaron.

Work in the central portion of the terminal got underway in 2014. Largely a remodel with new finish materials such as terrazzo flooring throughout the facility, Phase 3 also added several structural steel support beams to bring the building up to code. In addition, crews reconfigured the security checkpoint and expanded its queue areas to ease circulation.

Because of an existing (currently unoccupied) restaurant on the pre-security side of second floor, the new first floor space had to maintain 8-foot ceilings. In doing so, designers added "a very nice wood slat treatment and modern look," notes Yaron.

Metal panels and porcelain tile wainscoting were selected to ease maintenance work for cleaning staff. "Smaller airports have tight budgets, and maintenance costs can be a

burden," Dubbe explains. "We wanted to provide the airport with a facility that was very easy to maintain — a 'soap-and-water' approach that didn't require a lot of staff to maintain."

Exterior materials for the building's new additions provide a layered look, with a brick base that matches the existing concourse. Metal panels and terracotta masonry provide color and finish accents.

The main terminal entrance was moved to align with the new rental car facility across the road, and structural glass canopies were added to provide shelter for travelers entering and exiting the building. Designers shaped the canopies to complement the "butterfly" roof configuration of the terminal's clerestory element.

Follow the Funding

Developing a phasing schedule and funding model that was acceptable to the FAA was a major challenge, Dubbe reflects. Harsh weather further complicated the phasing schedule.

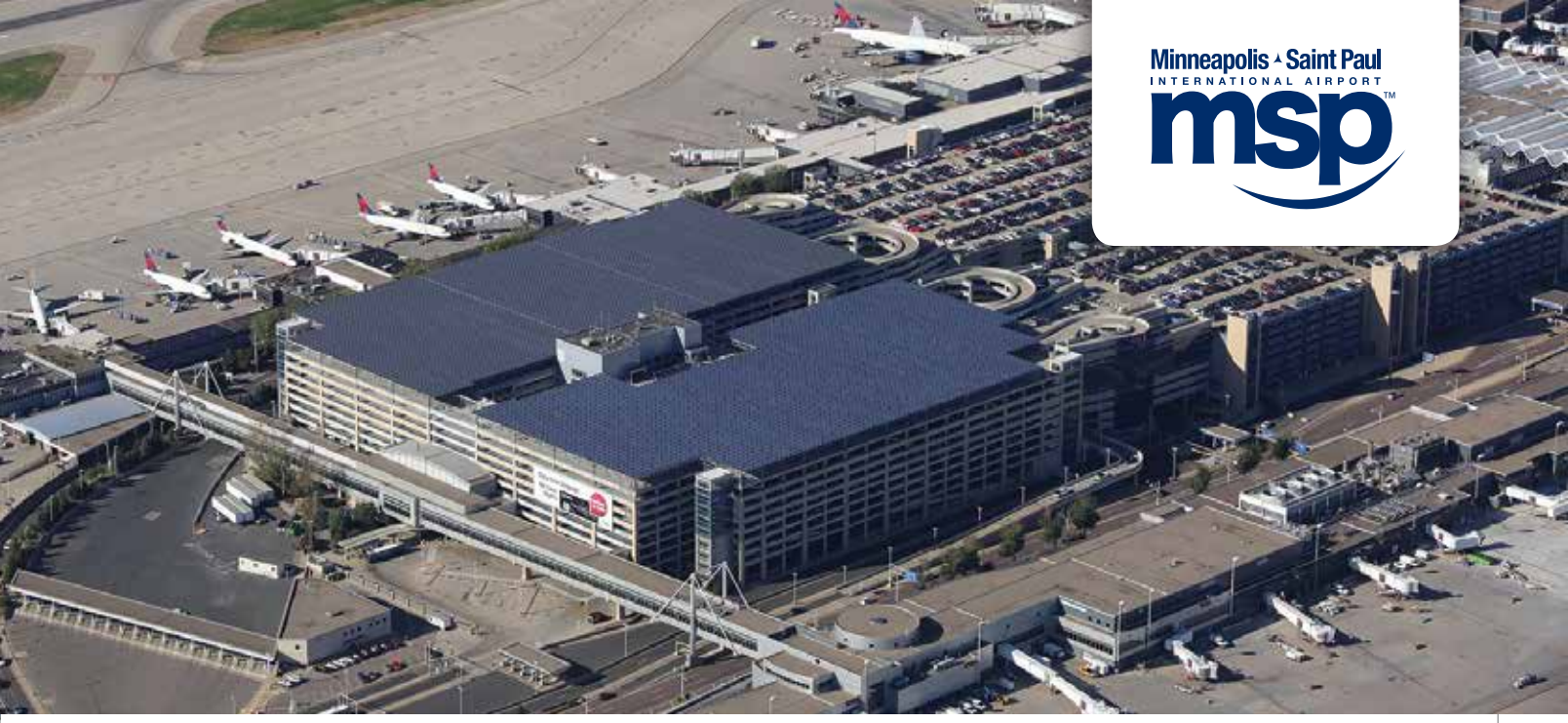
"The airport was very dependent on federal dollars for this project," he elaborates. "Terminal projects historically have low priority relative to runway, taxiway and safety area work. We had to present a compelling model as to why this project was worth the support of federal dollars. We wanted to provide the community with a 21st century facility without putting the airport in a position where one blip in the economy would put the airport in dire financial straits."

Once the FAA was on board with the project, everything fell in place, he notes.

"I couldn't be happier with the way the project turned out," Yaron reflects. "I am seeing some of our tenants investing in the airport as well, which is a good sign. While some airports are at the cusp of losing air service, we're seeing airlines investing in improving their services here at the airport."

Canopies that echo the terminal's "butterfly" roof were added to shelter travelers entering and exiting the building.

JACKSON COUNTY
Airport Authority



Solar Panels + LED Lights = Near-Zero Energy Consumption

BY THOMAS J. SMITH

Two U.S. airports — one a major hub in the North, the other a small origin-and-destination facility on the West Coast — use barely any electricity to operate some of their parking facilities, thanks to solar panels and light-emitting diode (LED) lighting.

Minneapolis-St. Paul International Airport (MSP) just turned on a $25.4 million solar array built on top of two parking garages at its Lindbergh Terminal. The 8,700 solar panels are expected to produce 3 megawatts of electricity per day.

Rogue Valley International-Medford Airport (MFR) installed three more freestanding, structure-mounted solar panels in its public parking lot last year. Now with a total of seven arrays, the Oregon airport generates 77 kilowatts of power each day.

Neither airport, however, is resting on its laurels. Both are about scheduled to begin additional solar projects in the new year.

Twin Cities Sustainability

The new array at MSP is the largest solar cell installation in Minnesota, notes Dennis Probst, executive vice president of the Metropolitan Airports Commission. "And, we think it is one of the largest, if not the largest system, on a structure in the country."

DENNIS PROBST

The airport's peak daily power consumption is 20 megawatts, so the solar panels produce 15% of the peak load, Probst explains. The power is consumed in "real time" and not sold to the local power company.

To pilots in approaching aircraft, MSP's solar array appears as two solid mirrors. Per FAA regulations, the panels were placed at an angle to prevent glare that could hamper landing aircraft. Although the angle prevents the panels from producing the maximum amount of power, it adds a vital measure of airfield safety.

The airport's contract with Ameresco, the developer and general contractor for the project, requires the array to produce at least 3 megawatts daily.

In addition to adding solar panels, MSP as part of the project also replaced all of the lights in the Lindbergh Terminal's four parking garages with LED technology. "We are very close to producing the same amount of energy required to power the lighting in the four parking ramps," Probst reports. "It is the lowering of the load with the LED lights that allows us to get near the zero energy mark."

FACTS&FIGURES

MINNEAPOLIS-ST. PAUL INT'L AIRPORT

Project: 2 Solar Arrays

Location: Atop 2 public parking structures at Lindbergh Terminal

Cost: $25.4 million

Solar Panels: 8,700

Expected Output: 3 megawatts of electricity/day

Funding: $23.3 million in 20-yr bonds (via federal program); $2.1 million grant from Xcel Energy (local power company)

Anticipated Energy Savings: At least $10 million (over 30-year projected lifespan of solar cells)

General Contractor: Ameresco

Structural Design: Caruso Turley Scott

Electrical Design: Hunt Electric

Steel Erection: Red Cedar Steel

Airport's Consultant: Kraus-Anderson Construction Co.

Accolades: Recognized at 2015 Airports Going Green Conference

ROGUE VALLEY INT'L-MEDFORD AIRPORT

Project: 7 Solar Arrays

Location: Customer parking lot

Total Est. Output: 77 kilowatts/day

Cost: $1 million

Funding: $539,821 in grants from Pacific Power's Blue Sky program; $68,940 from Oregon Energy Trust; $391,496 from airport's capital reserve fund

Design: Ron Grimes Architects

Solar Consultant: RHT Energy

General Contractors: True South Solar (Phase 1); Batzer Construction (Phase 2); Vitus Construction (Phase 3)

In October, officials at the international Airports Going Green Conference recognized MSP for the size and scope of its environmental projects.

Creative Financing Required

As public entities, neither MSP nor MFR was eligible for governmental tax incentives that defray the cost of installing solar or other renewable energy generators. Such programs are designed for private firms. MSP is operated by the Metropolitan Airports Commission; MFR is an enterprise operation of Jackson County, OR. Both airports consequently turned to power industry specialists to craft financing packages for their projects. Because incentive programs vary by state and utility, each operator opted to retain a local consultant.

When Ameresco won the proposal competition to provide MSP with solar panels, it was charged with developing multiple options for officials to consider. One strategy included a third-party owner selling power to the airport under a detailed purchase agreement. Ultimately, MSP chose to own the solar infrastructure directly, explains John Neville, Ameresco's regional director.

JONH NEVILLE

In its role as general contractor for the project, Ameresco tapped the federal Qualified Energy Conservation Bond program, one of the elements included in President Obama's 2009 infrastructure investment program. As part of the program, the state of Minnesota was allocated $55 million for energy bonds, which were subsequently distributed to counties and cities. After seven counties and cities near the Twin Cities returned their unused allocations to the state, the state re-allocated those funds to MSP.

The airport sold $23.3 million in 20-year bonds at a 0.75% interest rate. Xcel Energy, the local power company, awarded the project a $2.1 million grant.

The airport is paying off the bonds with on-going savings from lower electric bills, Probst explains. Over the 30-year projected life of the solar cells, MSP expects to realize at least $10 million in energy savings above the $25.4 million project cost.

"This is good news for the airport," Probst comments. "Not only is it providing energy and helping green the airport, but there is also a significant financial benefit."

Across the country, MFR followed a similar route to finance its project, but without bond

BERN E. CASE

sales. Its three recent projects cost slightly more than $1 million, and the airport paid $391,496 from its capital reserve fund, reports Airport Director Bern E. Case.


BUZZ THIELEMANN

The airport hired Medford consulting firm RHT Energy to assemble a financing package for its first solar project, and then replicated the package for its second and third phases. The airport anticipates using the same approach yet again for an upcoming solar project. For the airport's three projects, RHT consultant Buzz Thielemann helped secure $539,821 in grants from Pacific Power's Blue Sky program and $68,940 from the Oregon Energy Trust.

Blue Sky grants are subsidized by Pacific Power customers who choose to pay slightly higher electric rates to support renewable energy projects such as solar arrays. The Oregon Energy Trust is financed through a 3% monthly charge on electric bills from investor-owned utilities.

The Medford Way

MFR is located in the southwest corner of Oregon, near the California border, and is served by four carriers: Alaska Airlines, Delta Air Lines, United Airlines and Allegiant Air. Last year's total passenger volume is estimated at 750,000. Medford, the airport's hometown, is also the birthplace of Ginger Rogers and headquarters for Harry and David, a retailer known for mail-order pears and other food gifts.

Numerous vendors have approached the airport about installing roof-mounted solar panels, but Thielemann advised Case against using such systems at the airport because installation crews would have to drill hundreds of holes into the membrane roof of the terminal building, which is only seven years old. The panels would also detract from the highly acclaimed design of the building, he adds. With 1,100 acres available for free-standing panels, building-mounted panels didn't make sense.

Furthermore, Case realized that installing free-standing panels could facilitate adding a canopy that extends from the parking lot to the terminal — a feature eliminated to cut costs when the terminal was originally built. It took a series of projects, but MFR now has a de facto canopy as Case hoped.

The rules of the Blue Sky program preclude building a canopy to house solar panels, but the program was able to pay for a ground structure to house solar panels. The airport's first solar project

added a ground-mounted structure over the booth where customers pay their parking fees. "It protected the toll booth and the people when they roll down their windows," Case remarks. "It was a sizable ground-mounted structure that held a 15-kilowatt array."

Then, in 2013, MFR built three ground-mounted structures in its parking lot, with solar panels that provide cover to the sidewalk. This second phase generates 25 kilowatts per day. Finally, last year, the airport installed a second trio of ground-mounted structures that generates 36 kilowatts daily and shields more of the sidewalk.

Together, six of the airport's seven arrays effectively form a canopy, notes Case. Ron Grimes Architects designed the "canopy" arrays so the structures blend with terminal exterior.

While all of the airport's arrays are the same size, the 2015 batch generates more electricity than the others because photovoltaic solar cells have become more efficient.

The grants and airport funds were also used to re-lamp the public parking lot, two employee lots and the rental car lot with LED bulbs. "We now have a zero carbon footprint with our parking lot," Case reports proudly.

With its solar arrays in place, the airport sells power to Pacific Power during the day and buys it back in the evening to light the parking lots. "We feed more than we take," Case notes. "The power company is thrilled with the arrangement we have."

Thielemann considers the project a "triple win" for MFR – it produced economic benefits with lower energy bills; it's "green" because it produces renewable energy; and it keeps customers dry at the toll booth and walking to the terminal.

Pacific Power also loves the project, he adds, because more than 1 million area residents see Blue Sky grants at work.

What's Next?

MFR's upcoming fourth solar project will add panels in the rental car lot. At MSP, the board recently approved a solar project for the airport's Humphrey Terminal. The project will install 1.3-megawatt solar panels on one of the terminal's garages and re-lamp fixtures in both garages, at an estimated cost of $11.6 million.

Financing will be similar to the airport's previous solar project, including low interest bonds obtained through the new Clean Renewable Energy Bond program. Construction is slated to begin in spring.

Construction Crews Warmed Jobsite to Tap the Sun

Building an award-winning solar array on top of two poured concrete parking garages in the middle of winter presented unique challenges for Minneapolis-St. Paul International Airport (MSP).

"The greatest challenge in putting solar panels on a structure is the additional incurred costs," explains Dennis Probst, executive vice president of the Metropolitan Airports Commission. "In fact, 40% of the $25.4 million project cost went toward structural improvements we made so as to place the panels up there. We had to extend columns and then build a structural grid that we could then mount the panels to."

The bulk of the concrete work to extend 78 columns in the first garage was completed in December 2014. Ameresco, general contractor for the project, had not planned to perform concrete work in Minnesota that time of year, but learned that the local ironworkers union contract allows members to work in temperatures down to negative 20° F.


BRIAN CUNNINGHAM

To facilitate the concrete work, crews built a platform under the top parking deck and heated the underside of the structure. The process took two weeks, but the method allowed the project to proceed, explains Brian Cunningham, Ameresco's senior project manager. The deck temperature had to be at least 50° F for the new concrete to cure; with heat added from below, the site averaged 70° F. Because propane was used to heat the deck, a fire watchman was required at all times.

During construction, MSP closed the top parking decks of each garage. Once the garage's second level was also closed for the two-week period.

Weather and flight operations complicated the installation of the project's steel superstructure, recalls Cunningham. Per FAA rules, cranes could only operate in the area when the ceiling was at least 10,000 feet to increase safety for low-flying planes. Poor daytime visibility sometimes forced steel installation crews to work at night, when there is far less air traffic.

While Ameresco has worked on other airport projects, Cunningham says that no other project matched the challenges presented at MSP.

Safety was a paramount concern given the weather and location of the garages along roadways, he adds. Crews wore magnetic gloves and used multiple tethers on steel beams when moving the large pieces.

Furthermore, Probst describes the construction timeline in Ameresco's contract as aggressive.

Despite numerous challenges, no on-the-job injuries were reported during the recent project, notes Cunningham.

The airport's next solar project, which is slated to begin in spring, is not expected to include winter construction work.

The largest super-structure solar project at an airport in the country.

Ameresco is proud to be a sustainability partner in an innovative project with the Minneapolis St. Paul International Airport (MSP)

MSP, which is governed by the Metropolitan Airports Commission (MAC), is the 17th busiest airport in North America. As a leader in the transportation industry, MSP embraced an ambitious sustainability initiative that energized the airport. An energy savings performance contract with Ameresco added 3 MW of solar on two parking structures at Terminal 1-Lindbergh, electric vehicle charging stations, LED lighting, and a 20-year operations and maintenance agreement. The largest solar project in the state of MN, it created jobs, and is helping reduce the airport's carbon footprint and improving the MAC's bottom line.

Ameresco is a leading independent energy services provider. We provide comprehensive energy efficiency and renewable energy services that allow for flexible financial, energy-saving, sustainable solutions.

Your Trusted Sustainability Partner.

Learn more today!

1-866-AMERESCO | www.ameresco.com | info@ameresco.com

AMERESCO®

Green • Clean • Sustainable

Washington State Commissions 20-Year Capital Plan for Public Airport Network

BY MIKE SCHWANZ

FACTS&FIGURES

Project: Statewide Study of Airports' Capital & Infrastructure Needs

Client: Washington State Dept. of Transportation

Consultant: CH2M

Approx. Cost: $350,000 for Investment Study; $300,000 for Solutions Study

Data Collection & Analysis: 2 years

Scope: All 135 public-use airports in Washington state

Key Benefits: Data to help transportation dept. allocate long-term funding; strategy options to address infrastructure challenges

Key Finding: $12 million annual gap between need & funding

More Information: wsdot.wa.gov/aviation/AirportInvestmentStudy.htm

Most airport executives love the concept of having a solid long-term capital plan to follow, but creating one is often a significant challenge. The Washington State Department of Transportation (WSDOT) recently commissioned an unprecedented investment study to help it understand the 20-year capital infrastructure needs of the state's public airport system.

In addition to presenting information about preserving and improving airport facilities, the study identified a sizable annual gap between need and the funding available to address it. Analysis of the research subsequently helped develop a variety of solutions to address the state's portion of airport infrastructure needs.

WSDOT Aviation Director Tristan Atkins envisioned the study, and engineering consulting firm CH2M developed and executed it. Consultants studied traditional and alternative funding resources in detail and investigated system planning and project prioritization strategies to determine potential consequences for the continued underfunding of the capital preservation and infrastructure projects at public-use airports throughout the state of Washington.

The data assembled was long overdue, says Rob Hodgman, senior aviation planner for WSDOT's Aviation Division. "All of the information we received prior to the study came in bits and pieces," Hodgman explains. "Planning for and improving infrastructure takes a long time. For long-term budget planning, three to five years is just not enough time; you can't paint a broad enough picture."

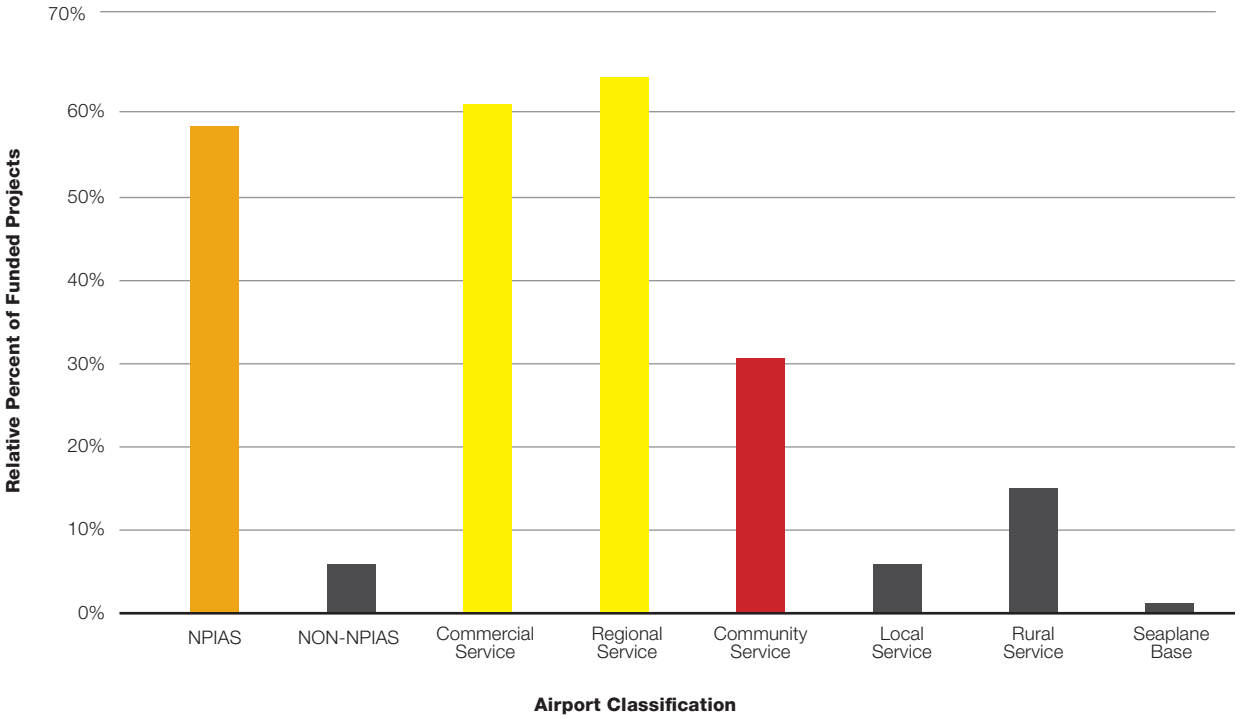
ROB HODGMAN

Although there are more than 540 airports and heliports in Washington, the study focused exclusively on the 135 public-use airports eligible for state funding. Knowing how and when to distribute WSDOT resources is a huge challenge, notes Hodgman. "Airports always have funding issues," he says. "Before launching this study, we did not fully understand the magnitude of need."

The previous uncertainty prompted him to ask: From an operational standpoint, can airports perform as intended in the future?

CH2M designed its research to provide the answer. "We had a couple of high-level goals," explains Mark Brower, the company's project manager for the study. "One of our main goals was to look at consequences for continuing to underfund airports."

Key Phase 1 Findings



Examining all sizes of airports was important, and researchers looked especially hard at safety issues, he notes. "There can be serious consequences to underfunding," Brower emphasizes.

Research & Recommendations

Brower and the CH2M team divided the project into two main phases. During Phase 1, researchers gathered capital need data from the airports; investigated federal, state and local funding forecasts; and identified gaps between need and available funding. Phase 2, which was initiated at the request of the study's advisory committee, focused on developing potential solutions to increase available funding and/or reduce capital and preservations costs. (The advisory committee included members from a variety of organizations, ranging from the Aircraft Owners and Pilots Association and Washington Seaplane Pilots Association to the Governor's Office of Aerospace and Puget Sound Regional Council to Alaska Air Group and Kenmore Air, just to name a few.)

Brower considers identifying the potential consequences of perpetuating current funding levels one of the most important elements of Phase 1. While continued underfunding would affect all airports, Non-National Plan of Integrated Airport Systems and smaller general aviation airports would be impacted most severely in terms of relative percent of projects funded, he elaborates. : (See related chart, above.)

The study estimated that WSDOT's Airport Aid Grant Program will be able to contribute approximately $1.4 million per year on average over the next 20 years. However, WSDOT's share of the overall $3.6 billion program need is more than $240 million, resulting in an average annual shortfall of more than $12 million."

Reaching this conclusion took many hours of legwork, emphasizes Brower. In the course of contacting all 135 public-use airports about their funding needs, CH2M discovered more than 5,000 projects already on the books. "We had to sort all this data," he explains. "Which projects would be completed? How long would it take? It took us several months just to collect the data."

Interpreting the information was another challenge, adds Hodgman. "The whole project involved very detailed analyses," he remarks. "To sort through all this data and arrive at an answer is a science, and a bit of an art form as well. How do you turn all this data into knowledge? How do you interpret it? Mark and his CH2M team were invaluable in helping us do this."

As the research results were assembled, WSDOT received useful input from members of the study's advisory committee, reports Hodgman, stressing their importance. "The whole purpose of state transportation is to support transportation needs of communities and businesses," he relates. "Some 36 of our 39 counties have airports. In general, the state is very forward-thinking concerning transportation. The aerospace industry is very important, with Boeing having its main plants here."

The study also included input from state lawmakers. Legislators were particularly interested in how Washington compares to other states when it comes to funding transportation, reports Brower. After examining select other states in detail, researchers ranked Washington in the middle of the pack for funding transportation. Florida, Colorado and Texas were among the leaders, according to CH2M's findings. (See chart on following page for specific funding levels.)

"In Texas, a motor fuel tax (for planes, trucks and passengers vehicles) all goes into one pot," comments Brower.

In Phase 2, consultants initially identified 33 ideas for solutions that included both new and revised funding programs and sources. They also presented ways to reduce costs for the 20-

State Aviation Funding Analysis

State	Public Use Airports	Based Aircraft	Airport Funding from State	Funding per Airport	Funding per Aircraft
Colorado	76	4,565	$20,1000,000	$264,500	$4,400
Florida	129	10,931	$164,000,000	$1,271,300	$15,000
Indiana	107	3,064	$2,400,000	$22,400	$800
Louisiana	75	2,164	$28,800,000	$384,000	$13,300
Ohio	169	4,395	$1,100,000	$6,500	$300
Tennessee	81	2,724	$43,000,000	$530,900	$15,800
Texas	396	11,535	$18,100,000	$45,700	$1,600
Washington	**134**	**5,963**	**$1,100,000**	**$8,200**	**$180**
Wyoming	41	938	$8,500,000	$207,300	$9,100

CDM Smith *Note: Airport Funding from State indicates the amount spent annually by the state on airport capital projects.*

year need. Consultants then prioritized the following 10 core solutions and provided implementation strategies, timelines, benefits and challenges for each.

New Funding Sources

1. **Public-Private Partnerships (P3s):** Implement an educational program for airport managers about attracting private funding, adhering to federal and state laws that govern P3 programs, and understanding full and partial privatizations.
2. **Alternative Taxing of Operationally Oriented Uses:** Implement a nominal state tax/fee on either airport parking or ground transportation for commercial airports.
3. **Alternative Economic Development-Based Consumptions Tax:** Implement a nominal state hotel/motel tax applicable to communities with tourism that benefits from commercial air service.

4. **State-Sponsored Revolving Aviation Infrastructure Loan Fund:** Establish a revolving loan fund to support revenue-generating facilities on airports that are otherwise ineligible for FAA grants.

Refinements to Current Funding Programs

5. **Realign Current Transportation Revenue Allocations:** Adjust allocations of revenues from motor vehicle fuel taxes and/or rental car taxes to the aeronautics account to better align with aviation generated fuel/rental car usage.
6. **Reallocate Airport Leasehold Tax to the Aeronautics Account:** Transfer excise taxes generated by leases on publicly owned airports from the state general fund to the aeronautics account.
7. **Increase Select Aviation Tax Rates:** Adjust fuel excise tax rate to align with other states.

Revisions to Current Funding Sources

8. **Revise Fuel Excise Tax Exemptions:** Change current fuel excise tax exemptions so the $0.11 per gallon tax is applied more uniformly.
9. **Modify State Aircraft Excise Tax Program:** Adjust allocation of revenues from aircraft excise taxes so 100% goes to the aeronautics account, and consider expanding taxes to apply to unmanned aircraft.

Other Nonfunding Solutions

10. **Develop Toolkit for Airports:** Provide airport managers with a guidebook of best management practices and other tools to facilitate greater stewardship of revenue-generating assets and help improve their bottom line, reduce operation expenses and develop new ways to address capital and preservation needs.

Hodgman predicts that the study's data and recommendations will be useful to WSDOT for years to come. "We are pretty confident that, after pulling historical funding data from the last decade, our forecasts for federal and state funding will be reasonably accurate," he says. "Local funding is more volatile. There may be a need to adjust, but we are really satisfied with the analysis. We have our work cut out for us, but I highly recommend other states look into doing a similar study."

Airports Boost Security & Reduce Operating Expenses With Automated Exit Lanes

BY KEN WYSOCKY

FACTS&FIGURES

Project: Automated Exit Lane Security

Location: Charlottesville (VA) Albermarle; Eugene (OR) Airports

Main Components: Glass-walled security corridors; automatic doors operated by programmable sensors

Key Benefits: Detect & reduce landside-to-airside security breaches; tighten security by eliminating human error; reduce operating costs

System Providers: Kaba Access & Data Systems Americas; record-usa

Architecture/Engineering at Charlottesville Albermarle Airport: Gresham & Partners

Funding: Airport Improvement Program funds; passenger facility charges

From Oregon to Virginia, U.S. airports are slowly embracing the idea of replacing human guards with automated systems to prevent and detect exit-lane breaches. Those who have made the switch report that automated systems improve landside-to-airside security and reduce ongoing operating expenses.

TSA officials have been nudging airports toward automated exit lane security ever since the agency completed an evaluation of the technology roughly two years ago. After determining that automated systems are effective against wrong-way security breaches, TSA announced that it could opt to not staff exit lanes in new or recently remodeled terminals.

Currently, airport operators assuming responsibility for exit lane security have three options: airport-employed guards, private security firms or automated technology. Companies offering products for the third option include record-usa and Kaba Access and Data Systems Americas.

"When airports are tasked with the job of guarding the exit lane, they're leaning toward automated control," reports David Wurtz, Kaba's director of business development, PAS Americas. "It's a more cost-effective means of guarding an exit lane, plus it gives airports a very fast return on their investment and a higher level of security."

DAVID WURTZ

Wurtz is confident that when it comes to routine exit lane security, automation is the answer.

"Guards can be distracted or threatened; machines cannot," he explains. "(Machines) are impartial – they respond and react according to how they're programmed to stop somebody from coming through. Moreover, they allow airports to reallocate manpower … take those people sitting in chairs and watching the exit lane and use them for, say, cargo or employee screening or checkpoint screening – something more productive."

Enhancing Throughput


MELINDA CRAWFORD

In Virginia, Charlottesville Albermarle Airport (CHO) replaced its 1990s-era unmanned revolving door with an exit lane security system from Kaba in 2014. The revolving door sufficed for years, but it made sense to relocate the exit lane and install automated security as part of an ongoing $5 million renovation project, says Executive Director Melinda Crawford.

"The revolving door worked fine for the number of passengers we served at the time," Crawford explains. "But we've seen 35% passenger growth in the last 10 years, to about half a million in 2014."

The popularity of pull-behind carry-on bags also played a role in the decision. "When that door was installed, there wasn't a lot of wheeled luggage with long (telescoping) handles," she adds. "As handles became longer, we had more problems with luggage getting jammed in the door."

Whenever that happened, passengers had to wait for nearby airport personnel to extricate the luggage and reset the system. Eventually, CHO had to station an employee near the door at all times, she notes.

In addition, no formal exit lane existed for passengers. Instead, passengers snaked their way through lines of other passengers waiting at a cramped TSA security checkpoint or in the baggage claim area. "That created a lot of confusion for passengers, especially when the lines were long," Crawford recalls.

The terminal reconfiguration successfully resolved the bottlenecks, she reports. To automate its exit lane security, CHO opted for a single-lane breach-control corridor that measures 20 feet long, about 5 feet wide and 9 feet tall. The new exit lane includes glass walls, a pair of swinging glass doors at each end, a ceiling and a half-height gate barrier on the landside.

The new exit lane, as reconfigured by Gresham, Smith & Partners, also features a "throat" that funnels passengers toward a wall that then steers them to the right, into the adjacent baggage claim area. The new system discourages overly eager meeters and greeters from breaching security by running into the exit lane to welcome arriving passengers, Crawford points out.


WILSON RAYFIELD

Wilson Rayfield, a Gresham, Smith & Partners architect for the CHO project, notes that replacing the airport's low-capacity revolving door with an automated exit lane improved throughput and security while opening up the space for a complete overhaul of the checkpoint.

"If we had implemented a traditional exit lane to replace the revolving door, the airport would need extra staff to monitor it and prevent passenger backflow," explains Rayfield.

For CHO, assuming the one-time capital cost of an automated system made more sense than hiring four to six security guards, which would entail ongoing operational expenses. "As a smaller airport, we're very mindful of both present and future costs," Crawford comments. "Because our airlines are our partners, we try to keep costs as low as we can to minimize increases in airline and user fees. Everything we did on this project focused on cost-saving elements if we could find them."

Crawford also acknowledges the reliability of automation: "When you have a human element, you bring another level of inefficiency to security because it's manned and subject to mistakes."

Adjustable Automation


CATHRYN STEPHENS

Eugene Airport (EUG) is beginning the new year with a new strategy for exit lane security. The Oregon airport incorporated the installation of automated lane equipment by record-usa into its recent $17 million terminal expansion project.

Previously, TSA guards and private security personnel hired by the airport monitored the exit lane. "We've wanted some kind of technology solution to our exit lane for quite some time," reflects Assistant Airport Director Cathryn Stephens. "And the terminal expansion provided an opportunity to do it."

The expansion project included relocating the TSA screening checkpoint to a gatehold room and creating space for the new exit lane system. "The terminal was never designed to accommodate a full screening security facility, so it became constrained as passengers increased," says Stephens, noting that the airport has enjoyed five consecutive years of record enplanements. Passenger volume at EUG increased 20% during the last four years, and she expects about a total of about 900,000 passengers in 2015.

Passenger facility charge revenue was used to purchase the exit lane system. "It'll pay for itself in about three years through reduced security costs," she adds.

The new exit lane is comprised of two side-by-side corridors, each with two automatic doors and an exit swing gate. The footprint of each module is about 17½ feet long, 8 feet tall and 5

feet wide. “We wanted two lanes for more efficient movement of passengers,” Stephens explains.

Airport personnel can select one of three different operating modes. Flow mode keeps all the doors open during high-traffic periods to maximize passenger throughput. When the system in is interlock/low-traffic mode, the entry door closes after a passenger enters the corridor, and the next door will not open until the first one closes. Flow-to-interlock mode combines both modes to handle sudden surges of passengers during low-traffic periods.

The annual cost of hiring private security guards heavily influenced EUG officials’ decision to install an automated system. In fiscal year 2014, the airport paid nearly $50,000 to a private security service that secured the exit lane for about 39 hours a week, Stephens reports.

High-Tech Methods

The record-usa system relies on sensors that detect wrong-way movement in the exit lane corridor — passengers moving from landside to airside, that is.

During “normal operations,” sensors automatically open the system’s entry door when they detect the presence of a passenger, and then close it behind the passenger. The same sequence is then repeated at the end of the corridor.


BILL SEIBERT

If airport visitors try to enter the system from the landside, a sensor detects the breach and sets off an alarm. Additionally, an automated voice informs them that are going the wrong way and instructs them to turn around and go back. “The voice module can be customized to say whatever the airport wants it to say,” notes Bill Seibert, sales manager of Airports and Healthcare for record-usa.

The Kaba system relies on video-analytic detection technology that captures real-time video images. An algorithm-based software system analyzes images and decides whether to sound an alarm based on a given airport’s security protocols. “In effect, it takes video of what’s going on and sends it through analytic software that analyzes each frame and compares them to a known secure condition,” Wurtz explains. “The system knows what it’s supposed to look like when things are secure.”

Both systems also include object detectors that sense when items such as purses or carry-on bags are left behind. “If a passenger is walking through and accidentally or purposely drops something, sensors detect it and send an alarm to the airport, notifying them that something is inside the tunnel,” says Seibert. “The floor detection covers the corridor from corner to corner and

can detect objects as small as 2 inches by 2 inches by 2 inches. The system also can detect if something is placed on the walls or the ceiling."

The return on investment for such systems varies from airport to airport, depending on many variables — not the least of which is the size and scope of remodeling required to accommodate a new exit lane. Wurtz reports that the breakeven period for a single-lane system, without construction costs, can be as short as 12 to 18 months. Naturally, the timetable depends on how much an airport previously paid for security guards. "In either case, there's a quantifiable return on investment," he adds.

Trend Toward Automation

While automated exit lanes are not widely used now, Seibert and Wurtz anticipate demand to increase in the wake of TSA's decision to ease out of the exit-lane-monitoring business. Kaba has installed a three-lane and a single-lane system at McCarran International Airport (LAS) in Las Vegas. Personnel from record-usa report has six North American installations completed and three more scheduled.

The bottom line? "It's always on, and always alert," Seibert says. "It removes the human-error factor."

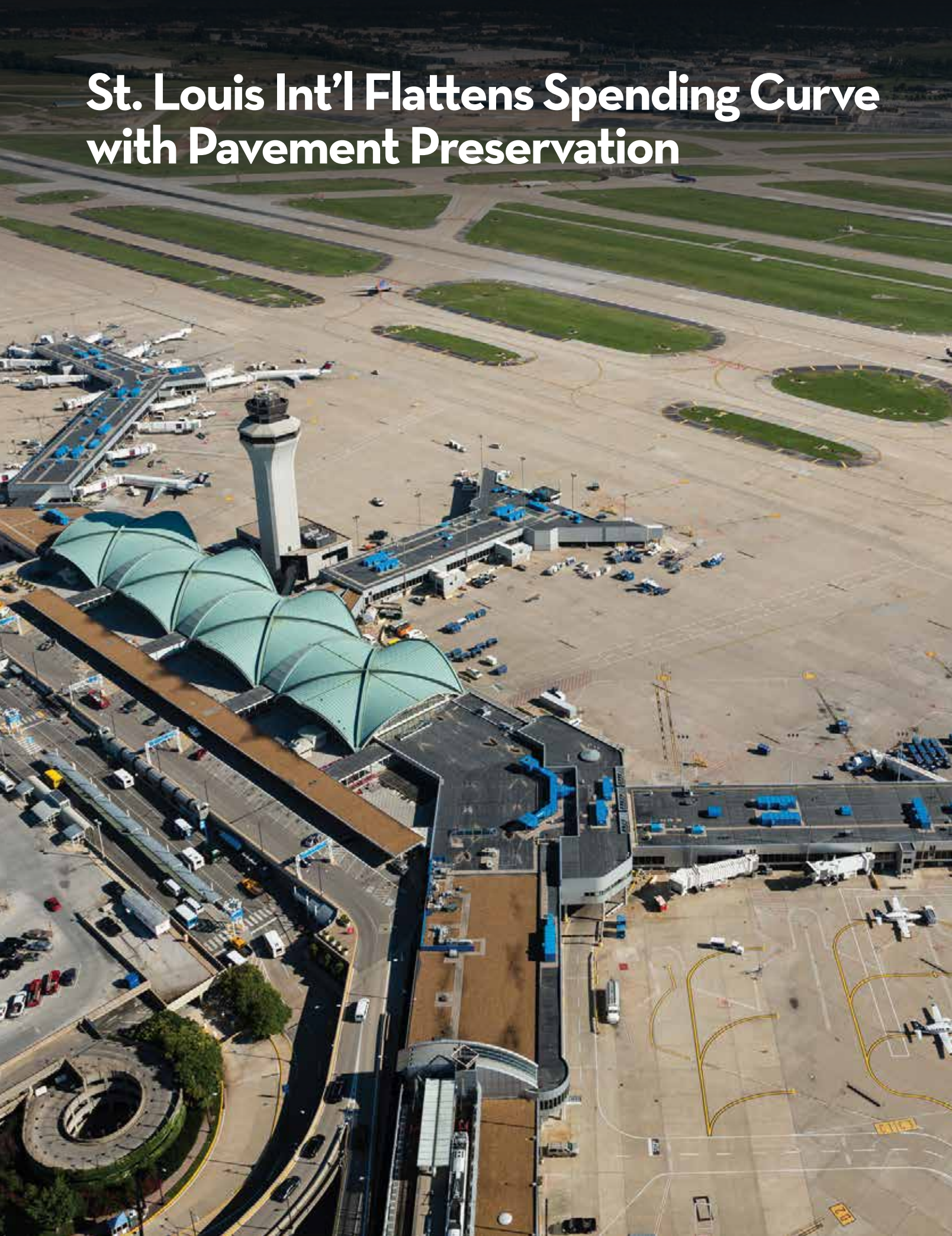
Crawford reports that she and other officials at CHO are very happy with their automated system, which was installed last October (2015). It helped immensely for staff members to meet with maintenance staff at LAS to discuss their experience with the system, she adds.

"If your airport is considering an automated system, you should explore all the technology available and visit other airports to see how it works there to determine what's best suited for your facility," Crawford suggests. "After all, it's not something you're going to do every year, so it's imperative to plan well and do it right."

Ultimately, she considers exit lane infrastructure a service issue: "Customers deserve the best improvements we can make that are focused on better service. Yes, construction does create chaos. But at the end of the day, it's worth all the pain and effort."

For more information about automated exit lanes, visit AirportImprovement.com. Installations at Seattle-Tacoma International Airport and Portland International Jetport were featured in the November/December 2013 issue.

St. Louis Int'l Flattens Spending Curve with Pavement Preservation



Many airport operators feel they have limited options when it comes to airfield pavements. As vital concrete and asphalt assets age and deteriorate, they repair areas as needed and wait for the field's pavement condition index to dictate a replacement project. When that day comes and goes, a new version of the same cycle begins again.

That's *not* the approach at Lambert-St. Louis International (STL). Officials there determined that if they strategically use all available tools, they can stretch the anticipated peak in capital improvement investments and flatten the airport's spending curve into a more manageable and consistent annual capital improvement program. Breaking out of the standard repair-replace cycle is projected to save STL $23 million in coming years.

"We took control of our pavement assets," says Jerry Beckmann, deputy airport director of Planning and Development at the St. Louis Airport Authority. "And by doing so, what could have been a funding mountain was reduced to basically a speed bump."

STL has succeeded in extending the service life of runways and some taxiways 10 to 15 years, while also improving the overall pavement condition index of its airfield system. Notably, it accomplished this without dramatic increases in annual funding levels

Since 2000, STL has spent between $8 million and $12 million per year rehabilitating or reconstructing their existing pavements on airside capital construction, and officials expect outlays to remain similarly consistent for the

LAMBERT-ST. LOUIS INTERNATIONAL AIRPORT®

FACTS&FIGURES

Project: Airfield Pavement Preservation

Location: Lambert-St. Louis Int'l

Recent Project: Runway 12R-30L

Strategy: Reconstruct 1/3 of runway & aggressively repair remaining 2/3, with scheduled periods of standard maintenance & additional aggressive repairs for next 20 yrs

Cost of Recent Reconstruction/Repairs: $16 million

Construction Timeline: 6 months

Anticipated Future Savings: $23 million (present worth value)

Engineering Consultant: Crawford, Murphy & Tilly

Construction Management: Kwame/Green Joint Venture

Contractor: The Harper Co.

Topographic Surveys: David Mason

Topographic Surveys & Design Assistance: EDSI

Geotechnical Investigation & Design Assistance: TSI

Pavement Testing & Analysis: Engineering and Research Int'l


Officials opted for "strategic rehabilitation" of the main runway rather than wholesale replacement.

foreseeable future. (The annual outlay excludes the recent Runway 11-29 complex expansion.)

Personnel from Crawford, Murphy & Tilly, the airport's engineering consultant, note that the impressive results at STL underscore the value of its long-term collaborative approach to airfield pavement management and strategic use of repair methods. They also attribute the successes to officials making decisions driven by detailed data and viewing individual projects in the context of an overall capital program and its funding limitations.

Ty Sander, the company's project manager at STL, recalls seeing huge challenges on the horizon for the airport about 15 years ago. "But we were determined to develop a new game plan to address it," he adds.


TY SANDER

"When it comes to pavement projects, a great deal of value can be gained in the decision-making process when you dig down into the details at a micro level, but never lose sight of the overall capital program and your funding limitations," explains Sander.

With a runway and taxiway system largely constructed between 1978 and 1983, time and money were both issues for STL. When Crawford, Murphy & Tilly began assessing the situation with STL, the airport's pavement management system indicated that a majority of the airfield pavements were on a trajectory to require major reconstruction near 2015. Airport officials, however, knew that the prevailing economic and operational realities of the 21st century would never allow for the massive construction projects that occurred there in the early 1980s.

Strategic Rehabilitation

STL focuses on balancing reconstruction with extending pavement service life through a holistic management and design approach

that emphasizes strategic rehabilitation, explains Sander. The approach has proved highly successful in stretching the effective lifespan of individual pavement components, he elaborates.

Its long-term game plan was demonstrated most recently on the airport's main runway, 12R-30L. Based on pavement condition index values, a solid case could have been made for a wholesale replacement of the runway — a position viewed as an acceptable option by the FAA at the time, relates Sander. While an $80 million project to replace Runway 12R-30L would have undoubtedly succeeded, it would have also compromised STL's ability to adequately address other pavement and capital needs in a timely manner, he explains.

When approaching the FAA about the project, STL took a tactic the agency doesn't often encounter. Rather than proposing an expansion of the project scope that required more funds, officials suggested a less-is-more approach for Runway 12R-30L. Their logic? Spending less on that particular project would leave more resources available for other airfield pavement needs.

"Our philosophy is to look for ways to maximize the use of the good pavements that are out there — with a little more detailed value engineering up front, which can pay big dividends in overall life-cycle costs," Sander explains. "That process begins with making sure we know all aspects of the pavements condition and performance."

A "strategic rehabilitation approach" requires additional pavement testing and evaluation, he emphasizes. New data about STL's main runway was tied into archived information from previous pavement management studies. Together, it revealed that for a majority of the runway, the underlying structure of the pavement could last another 20 years. A vital part of the plan was managing surface distress on 12R-30L (and associated potential for debris that could create foreign object damage to aircraft) without depleting significant maintenance resources.

Subcontractor Engineering and Research International was hired to create and execute a testing regime to determine the amount of load transfer. Personnel used ground-penetrating radar to assess the different layers beneath the pavement. A finite element analysis determined the overall structural capacity of the pavement and modeled anticipated airfield traffic for the next 20 years.

"Through these 'ou-of-the-box' processes, we were able to get a much more precise understanding of where attention would need to be focused," Sander notes.

The end result was a design that reconstructed only the western third of the runway and employed a range of concrete pavement repair techniques for the eastern two-thirds. A life cycle cost analysis of a 20-year strategy yielded a present worth value cost savings of $23 million. The plan called for an aggressive concrete repair program the first year, normal maintenance in years two through 10, another aggressive pavement repair cycle during the 11th year, and normal maintenance in years 12 to 20.

Required Resources

Crawford, Murphy & Tilly personnel tapped into "vast amounts of data" about STL's airfield to execute the strategy. The airport's ongoing pavement management program and 15 years of pavement concrete index updates provided the team with invaluable historical resources that would otherwise have been difficult to collect, notes Sander. The format and metrics of the archived data were so uniform that the team could essentially compare apples to apples through different snapshots in time, he reports.

"The airport's maintenance staff have been an invaluable source of insight for us," adds Sander. "If you want to really understand how a pavement is performing, spend some time with the people who are out there every day working on it."

On-the-ground intelligence and historical data about the condition of specific sections of pavement allowed engineers to depart from the traditional default of full-scale replacement. Instead, they were able to focus on maintaining as much of STL's good pavement as possible.

The new mindset evolved organically, says Sander. A major transition during the 1990s and early 2000s left the airport scrambling to increase capacity with a new third runway. When the airport's primary airline tenant cut its flights almost in half as the runway program was being completed, the picture changed dramatically.

As project funding became scarcer, airport leadership challenged its design team to be more cost-effective and to instill consistency in STL's annual capital improvement program. The strategic rehabilitation program that was developed in response has been so successful that other airports are considering similar modifications to their own approaches, notes Sander.

STL is applying the savings from its shortened runway repair schedule to taxiway rehabilitation work — projects that would have otherwise been put on hold. Ultimately, delaying taxiway work would have required the airport to spend additional maintenance resources to support ongoing flight operations.

"The key to all of this is making sure that the design strategy for pavement repair concentrates resources where they make the most sense," explains Beckmann. "That's how you make this successful."

With 630 acres of airfield pavement to maintain, STL must reconstruct a certain portion of its concrete to make its investment last for 30 to 40 years and avoid an inevitable backlog of repairs, he elaborates. Strategic rehabilitation targets improvement for pavements that are within five to 15 years of the end of their service life. At that age, they are still in reasonably good shape but beginning to deteriorate at a faster rate, Sander notes. Such pavements can have their service lives extended for an additional 10 to 20 years, he adds.

Peace of Mind

A 10-year review of performance on the airport's north runway, where the strategic rehabilitation approach was applied in 2004, demonstrates that pushing major reconstruction back five to 10 years can yield surprising efficiencies without dramatically impacting maintenance costs. In that case, STL opted to limit full reconstruction to the center 50 feet of the 150-foot wide runway and performed lighter repairs to the outer panels, each also 50 feet wide. (For information about a similar partial replacement project at Hartsfield-Jackson Atlanta International, visit AirportImprovement.com.)

The outer panels have held up well, reports Sander. So rather than reconstructing them, STL is planning a second strategic rehabilitation that will address less than 10% of the overall pavement at a fraction of the cost of a full replacement. As before, contractors will fully or partially replace some panels, then seal and/or repair additional cracks and spalls as needed.

"Our goal here is to extend the service life of the full runway at least another 10 years," Sander comments. "And that's completely feasible. We've demonstrated that."

STL's previous success with strategic rehabilitation provides a reassuring effect. By proactively integrating methods that extend the lifespan of airfield pavements, airport officials can maintain control over infrastructure deterioration and achieve a more balanced capital improvement program, explains Sander. It also allows them to get ahead of the curve and develop more accurate schedules for projected needs.

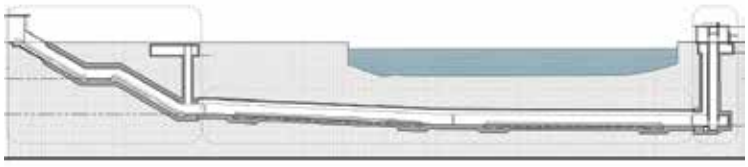
"When it comes to pavements, we no longer feel like we're just putting out one fire after another," Beckmann relates.

Sander points to STL's experiences as proof positive that airports do not need to dedicate disproportionate amounts of funding to declining airfield pavements. Even though they are complex systems with too many variables for precise project forecasting, maintaining them in a cost-efficient manner is not unmanageable, he emphasizes.

"You have to work with all of the tools that are available to you and you have to be willing to take that deep-dive, big-picture approach," Sander advises. "If you do that, then there's no reason you can't ensure the safety and pavement of your pavements well into the future."

PORTS TORONTO

Toronto Island Airport Adds Underwater Pedestrian



Tunnel

BY NICOLE NELSON

FACTS&FIGURES

Project: Underwater Pedestrian Tunnel

Location: Billy Bishop Toronto City Airport

Airport Authority: PortsToronto

Tunnel Size: 853 ft. long

Depth: 100 ft.

Cost: $82.5 million

Funding: Airport improvement fees

Duration of Construction: 36 months

Business Model: Public-Private Partnership

Lead Developer: Forum Equity Partners

Lead Designer: Arup

Architecture & Interior Design Subcontractor: : ZAS Architects

Design-Builder: PCL Constructors Canada

Tunnel Subcontractor: Technicore Underground

Facility Manager: Johnson Controls

Renewable Energy Provider: Bullfrog Power

Opened: July 2015

Concrete Poured to Create Tunnel Liner: 200 cubic meters

Accolades: Int'l Tunnelling & Underground Space Association's 2014 Specialist Tunnelling Project of the Year Award; Tunnelling Association of Canada's 2014 Canadian Project of the Year Award

PortsToronto has gone to great lengths – and depths – to provide passengers with better access to Billy Bishop Toronto City Airport (YTZ) by building an underwater pedestrian tunnel between the island airport and Canada's largest city. Airport officials call the walkway a "game-changer for operations and customer service" and consider it YTZ's new primary access route.

From an architectural and engineering standpoint, the 850-foot-long tunnel is a rare piece of infrastructure with few others like it in the world.

Previously accessible only by ferry, YTZ opened the $82.5 million underground tunnel in late July 2015. Now, pedestrians can travel to and from the aviation gateway 100 feet below Lake Ontario at their leisure, rather than riding the traditional – and ongoing – ferry that services the airport at 15-minute intervals.

To access the tunnel from the city side, pedestrians descend one of six elevator banks 10 stories in about 30 seconds. Once underground, they can ride a moving sidewalk that travels at a pace of 2.3 kilometers per hour or traverse the stationary path between the two sets of moving sidewalks for 550 feet to the south end of the tunnel. From there, travelers can climb 153 steps, take an elevator, or ascend into the airport's check-in area via one of the longest escalator systems in Canada. A full-size replica of the World War I fighter plane flown by the airport's namesake hangs in the glass-walled atrium at the top of the escalators.

Predicated Need

GEOFFREY WILSON

With more than 2.4 million passengers traveling through the airport each year, YTZ is a significant economic driver for the city of Toronto. "The success of this airport, as measured against economic achievement, customer satisfaction and industry awards, predicated the need for improved access to and from the mainland," says Geoffrey Wilson, chief executive officer of PortsToronto, the government business enterprise that owns and operates YTZ.

"We wanted to provide our passengers with convenient, predictable and reliable access to Billy Bishop Airport, and enable passengers to travel on their own schedule from the mainland to the airport," Wilson explains. "The tunnel achieves this, allowing passengers to get from the curb to their check-in counter in approximately six minutes."

The new tunnel is also a key component of the port authority's overall traffic management strategy, because it improves the flow of passengers by alleviating congestion at the airport caused by concentrated waves of travelers arriving and departing according to the ferry schedule. A more steady flow of passengers reduces queuing inside the terminal, especially in areas such as ticketing and security, explain officials.

Although the ferry takes only 1½ minutes to cross the channel, it can carry only 200 passengers at a time. Previously, passengers had to wait for the next trip when the ferry was full. These days, they can travel through the tunnel, any time of day. And the tunnel can accommodate up to 1,100 people per hour.

Public-Private Partnership

PortsToronto procured the tunnel via a public-private partnership (P3), structuring the initiative as a design-build-finance-maintain project. Forum Equity Partners acted as lead developer, with PCL Constructors Canada as design-builder, Arup as lead designer, Technicore Underground as tunnel subcontractor and Johnson Controls serving as facility manager.

The highly complex engineering feat is the first public-private partnership project undertaken by a Canadian port authority, notes Wilson. "It was through the P3 model that we were able to innovatively design and finance the project, resulting in the tunnel being delivered on time and on budget, at no cost to taxpayers — no small accomplishment for a popular and growing airport, and something of which we are very proud," he remarks. The project was funded by airport improvement fees ($20 per trip, paid by departing passengers).

Throughout the P3 project, YTZ's operations team worked closely with the tunnel's development team on way-finding initiatives. It also helped schedule work to minimize impact on airport operations and the surrounding community.

"The completion of the … tunnel is a sterling example of what can be

accomplished when the public and private sector work together," says Richard Abboud, founder and chief executive officer of Forum Equity Partners. "The framework utilized by PortsToronto provided significant advantages through the design, build, finance and maintenance phases of the tunnel project. It enabled us to successfully leverage innovations offered by the private sector and to reduce the upfront funding requirements for the project."


BRUCE SONNENBERG

In its role as design-builder, PCL worked collaboratively with all parties to attain the most innovative design solution possible to reduce the cost of the overall project and maximize value for PortsToronto, notes PCL Vice President and District Manager Bruce Sonnenberg.

"The design solution PCL settled upon with Arup and Technicore used an innovative approach to supporting the tunnel crown by drilling seven 1.85-meter diameter interlocking drift bores at the tunnel crown using compact tunnel boring machines. The drifts allowed excavation to continue under the crown, while supporting the rock above the tunnel."

In addition to carrying travelers to and from the airport, the new tunnel also acts as a utilities conduit — a private sector measure that is estimated to save $10 million in duplicate construction costs. Running much-needed city water and sewage mains to Toronto Island via the tunnel was a major advantage facilitated by the P3 structure of the project, note PortsToronto officials. Other highlighted features include custom material handling equipment that was able to function in the tight spaces and the use of an onsite cement batch plant to minimize construction traffic and congestion.


KEN LUNDY

"Constructing a tunnel of this scale and complexity 100 feet under Lake Ontario while maintaining efficient operation of a busy airport was no easy feat, but we proved we were up to the challenge every step of the way," reflects Ken Lundy, vice president of Infrastructure, Planning & Environment for PortsToronto.

The project was delivered on budget and within the 36-month timeframe announced for the project in 2012, adds Lundy. Delays prior to the 2012 mark that are largely associated with changes in Toronto's political administration created public perception that the tunnel was finished late when it did not open in time to accommodate travelers in town for the Pan Am Games July 10 to 25. Some frustrated with the pace date original plans for the project back to the 1930s.

Experiential Awareness

Within PortsToronto, the overreaching goal of the project was to design and build a tunnel that puts the traveler experience first. "A number of the tunnels I've been through have been narrow and dark, with low ceilings," Lundy explains. "But our award-winning tunnel was designed with the passenger experience in mind, with a tall ceiling, wide walkway and lots of light." (See Page 63 for list of awards.)

Feedback from travelers about the tunnel's design and efficiency has been fantastic, he reports. An editorial in the *Toronto Star* described it as "clean and spacious" and dubbed the underground walkway a "win for travelers and the city." The review cheered the introduction of a "more reliable way to cross over to the airport," which it calls a "major urban asset." A separate article referred to the tunnel as a "sleek and speedy new option" for arriving passengers headed to the mainland.

Columnist Heather Mallick, however, was brutal in her evaluation. One of her objections to the design was its lack of literal, some would say cliché', Canadian references. "Why isn't the tunnel coated in red and white to reflect our flag? Why isn't it blasting maple leaves?" Mallick asked incredulously.

Just days before Mallick's scathing review ran in the *Star*, a senior principal from ZAS Architects, the architecture and interior design subcontractor for the project, explained the creative team's intentions to *The Globe and Mail*. "We wanted to keep the design through the tunnel really simple," said Paul Stevens. The splashes of yellows and blues used inside the structure are "notional gestures to the water above and the sun above that," he elaborated.

A series of 42 large Gridcast digital screens installed throughout the tunnel, city-side pavilion and island-side atrium provide advertising and travel-related content.

"From design to construction to final finishes, this tunnel exemplifies innovation and reflects the priorities of travelers," Lundy reflects. "Whether it be the number of moving walkways and escalators, the acoustics and shape of the tunnel's interior, or the state-of-the-art digital screens that create a visual experience as people move through the tunnel, every detail of the project was carefully thought out to ensure a tunnel that would not only deliver travelers to where they needed to go, but would also engage them along the way."

Arup's Senior Project Manager Ulrike Rennemueller says she is most proud of the pedestrian tunnel's engineering excellence. "I really love when I go to the tunnel and people walking by me say it feels like a natural extension of the airport," says Rennemueller. "Passengers say it's the way an airport should be, and it makes me really proud that people prefer walking over using the ferry."

ULRIKE RENNEMUELLER

Lundy reports that the tunnel had an immediate positive impact on the efficiency of traveler access when it opened last summer. And he fully expects the benefits to endure: "Over the long-term, it will continue to serve as an example of Toronto innovation at its best — something the whole city can be proud of."

3 Crucial Challenges for Airports, Aviation & the Economy

As I end almost two decades at Seattle-Tacoma International Airport — including 11 years at the helm — I reflect on three challenges that will shape the future of airports, aviation and the economy. The first is evolutionary and the second is redefining the U.S. airport system. But the third demands a revolution and, in fact, may be an existential threat to aviation.

Personal Technology

A few years ago, a keynote speaker at an Airports Council International annual meeting, smartphone in hand, implored his audience to consider how these tiny screens and the massive data they channel affect our industry. We must, he noted, design and build airports knowing that customers will navigate our terminals via their smartphones, not traditional signage or interacting with staff.

Technology is helping us provide better customer service and accelerate passenger throughput, thereby reducing the cost of accommodating passenger growth. The revolution in self-service passenger check-in demonstrates this. Traditionally, airports built ticket counters, but today, many passengers "process" themselves. Airlines introduced electronic check-in kiosks about 20 years ago; then, self-sufficient travelers began printing their boarding passes at home or the office. Now, smartphone apps allow passengers to check in from anywhere and display electronic boarding passes with a quick tap.

Google, Microsoft and others are "indoor mapping" airports so smartphone users can find their gates, a cup of coffee or restrooms with their handheld device. Airlines and some airports are similarly updating their apps. If Sea-Tac is any guide, airports cannot add Wi-Fi capacity or electronic beacons fast enough to support the acceleration of personal technology.

While this trend is fun and intellectually challenging, it is "only" evolutionary.

Industry Structure

The North American airline industry is healthier than it has been in decades, although some will decry the reasons: burgeoning ancillary fees, corporate consolidation and the "hollowing-out" of airline route structures. Faced with financially healthy foreign carriers, open skies regimes and longer-range aircraft, domestic airlines are growing their major hubs and focusing on their most lucrative customers — at the expense of smaller airports. As service at small airports stagnates or shrinks, it is more difficult for their communities to attract or retain companies competing in our increasingly global economy.

Federal programs established decades ago to mitigate the impact of airlines' market choices on smaller communities are not keeping up with this growing challenge. Congress must recognize that its laissez faire attitude toward airline industry business models has consequences not only for airports but also for many communities and states.

Climate Change

As I write this, world leaders are at the United Nations meeting on climate change in Paris, and the *International New York Times'* headline states: *'Future of Life' at Stake in Talks.* There is optimism that an agreement will be reached that will reduce the growth in Earth's atmospheric temperature to just 6° C, but this is two degrees above what scientists believe is the upper limit to prevent catastrophic impacts.

Aviation is a consequential contributor to greenhouse gases and, thus, climate change. While some argue that aircraft emissions are a relatively small part of the problem, one can make the same argument about almost every source of greenhouse gases. As Earth gets closer to the climatic "point of no return," the aviation industry will have to migrate to biofuels.

Almost every major airline has already undertaken "demonstration" flights powered by alternative fuels. Certification challenges continue, and research on new sources of biofuels — seed crops, woody biomass and municipal solid waste — is underway. Several airlines are close to procuring commercial quantities of biofuels.

These are important early steps, but this work must accelerate. Despite 75% of the American public supporting an enforceable treaty regarding climate change, Congress continues to deny the problem exists. When our politicians finally act, the aviation industry will need to act quickly. Without a fast response, our industry may never look the same.

While airport executives and governing bodies can and are managing the first of these three challenges, they cannot unilaterally control the second or third. However, successfully pushing for action on these vital issues will determine the future of commercial aviation.

MARK REIS

Mark Reis, managing director of Seattle-Tacoma Int'l Airport, has worked for the Port of Seattle since 1988 and was the chair of Airports Council International – North America from 2013 to 2014. In recent years, he has also served on the boards of the Seattle Convention and Visitors Bureau, Woodland Park Zoo and Aviation High School of the Highline School District.

Protecting and Preserving New & Existing Airfield Pavements

D.S. Brown has over 50 years of experience of supplying the highest quality joint sealants and concrete repair materials to airports worldwide.

Delpatch™ Elastomeric Concrete

Primary Applications:

Partial Depth Spall Repair
Airfield Lighting Retrofit

- *Permanent*
- *Safe*
- *Flexible*
- *Durable*
- *Easy*
- *Fast*
- *Chemical Resistant*
- *Cost Effective*

Please contact the D.S. Brown Company to learn why you too, should rely on Delpatch™ Elastomeric Concrete.

Delastic® Preformed Pavement Seals

- *Meets FAA P604 ASTM D 2628 & CRD-C 548*
- *Longest Lasting Joint Seal*
- *Jet Fuel Resistant*
- *Keeps FOD and Moisture out of the joints*
- *Reduces Faulting*
- *Reduces Joint Spalling*

For over 50 years, our most discerning customers have realized the superior performance of Delastic® Preformed Pavement Seals.

D.S. BROWN®
A GIBRALTAR INDUSTRIES COMPANY

www.dsbrown.com | 419-257-3561

Get a grip!

MOVIGEAR®

DRC Electronic Motor

To reduce costs, you usually look at staffing and operating efficiencies first. But, do you have a handle on wasted energy? Independent research proves that the MOVIGEAR® from SEW-EURODRIVE can reduce your startup and operating costs by 20-30%. In fact, some installations actually yield 50% or more!

MOVIGEAR® combines the gearing, permanent magnet motor (IE4), and electronics into a single hygienic unit. Or, if you prefer using your existing gear units, the DRC Electronic motor (IE4) is the solution. MOVIGEAR® or DRC…either way, you save.

SEW EURODRIVE

seweurodrive.com / 864-439-7537

— Driving the World —