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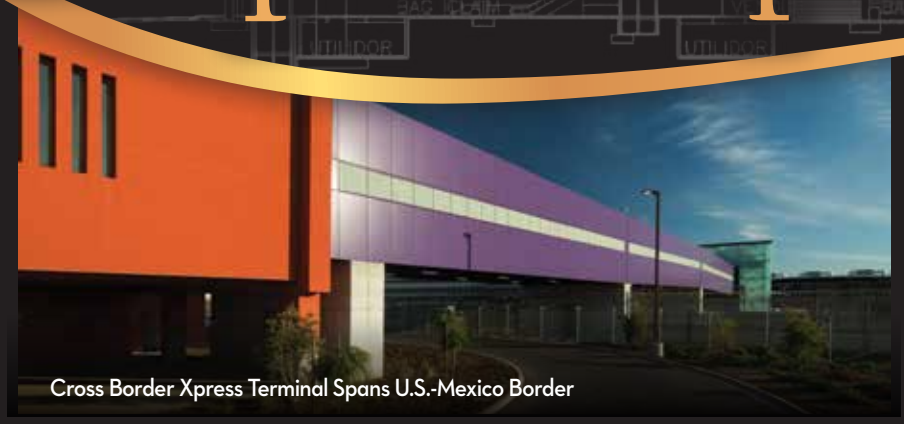


Cross Border Xpress Terminal Spans U.S.-Mexico Border

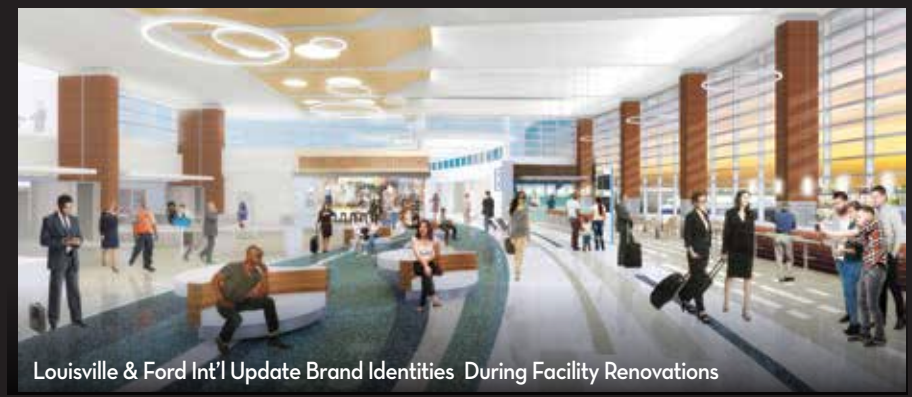
Blue Grass Airport Builds New Equipment Facility

SEE US AT THE INTERNATIONAL AVIATION SNOW SYMPOSIUM IN BUFFALO

New Sensors Optimize Airfield Deicing at Denver Int'l

Photograph provided courtesy of Denver International Airport.

AIRPORT STORIES INSIDE: ADQ I DEN I DTW I GRR I IND I JWN I LEX I LFT I MSP I PHL I SDF I SEA I TIJ



Louisville & Ford Int'l Update Brand Identities During Facility Renovations

Detroit Metro Rolls Out High -Tech Digital Directories

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Good Ideas to Pass Along

We've been getting a lot of press releases lately reporting individual airports' annual passenger counts. And the news is good! As an industry, it looks like 2015 could be the best year ever for passenger traffic here in North America. Not to be outdone, it's a great time to be one of the major airlines, too. Their profits may top $30 billion, roughly double what they earned in 2014.

Given the market conditions, you'd think it would be easy for airports to tap into funds necessary to build for the future, right? Not necessarily. The PFC has been stuck at the same cap for years, and there aren't enough AIP dollars for everyone. This leaves airports behind when it comes to funding projects needed to accommodate the passenger growth we've been experiencing.

So what's an airport to do? Not surprisingly, there isn't one easy answer. It all depends on each airport's particular circumstances. And that's why we bring you issue after issue filled with articles about how airports throughout North America are funding and executing successful projects.

In this edition, learn how Lafayette Regional Airport in Lafayette, LA, used a project-specific, short-term sales tax to fund a new terminal. (See Page 14.) The story details how airport and local leaders worked together to solve the project's funding shortfall. Just as important, airport officials were able to effectively communicate their vision to the key influencers and voters of Lafayette Parish. While this may not work for your airport, we're hoping the article inspires you to tap unique funding sources that will.

On another topic, I want to send a shout out to ACI-NA for a highly successful CEO Forum. Attendance was greater than in 2015, and the content was spot on.

Cheers,

Paul

Cross Border Xpress — Full-Service Terminal Minus the Aircraft

BY ROBERT NORDSTROM

As of December 9, 2015, travelers flying out of Tijuana's General Abelardo L. Rodriguez International Airport (TIJ) have a faster and easier way to access the Mexican airport from the U.S. side of the border. Instead of waiting in long lines of vehicles at the San Ysidro or Otay Mesa border crossings, airline passengers can now use the new Cross Border Xpress (CBX) terminal, which spans the U.S.-Mexico border.

Southbound passengers with airline boarding passes can park on the U.S. side of the CBX terminal in southern San Diego, and then use its pedestrian bridge to enter directly into TIJ's Mexico Immigration & Customs area. Conversely, northbound travelers landing at TIJ can pass through the 390-foot enclosed footbridge within two hours after landing and enter into a U.S. Customs & Border Protection (CBP) area on the U.S. side of CBX.

A one-way ticket for the bridge costs $12 and round trip $24. All told, the walk takes about five minutes.

The one-of-a-kind CBX is essentially a full-service airport terminal minus the aircraft. According to developers, it is the first and only U.S. airport terminal to connect directly into a similar foreign facility, and the only airport in the world that spans international borders.

The new 86,000-square-foot terminal offers nearly all of the amenities found in traditional airports: food and beverage concessions, duty-free shopping, airline ticket counters, free Wi-Fi, assistance for disabled guests, bilingual customer service,

short- and long-term parking, car rental, and easy access to ground transportation. "It's just the runway is located in Mexico," quips CBX Chief Commercial Officer Elizabeth Brown.

The unique concept, designed by architect of record Stantec Architecture, takes advantage of a unique geographical opportunity. "The Tijuana Airport terminal lies immediately across the U.S.-Mexico border," explains Stantec Executive Vice President Stanis Smith. "One can stand on the U.S. side and see the Tijuana terminal. Each year, millions of people drive across the border at one of two land crossings to take advantage of the cheap flights out of Tijuana. Our client, who purchased 55 acres of U.S. land in Otay Mesa immediately north of the border, had the visionary — at the time, some said crazy — idea of building a bridge across the border."

STANIS SMITH

FACTS&FIGURES

Project: Cross Border Xpress Terminal

Location: Otay Mesa, CA, with pedestrian bridge that connects to Tijuana Int'l Airport

Cost: $120 million

Terminal Size: 86,000 sq. ft.

Pedestrian Bridge: 390 ft. long; spans six-lane Mexican highway

Terminal Amenities: Airline ticket counters; food & beverage concessions; duty-free shopping; free Wi-Fi; assistance for disabled guests; bilingual customer service; short- and long-term parking; car rental; access to ground transportation; luggage porters

Owner & Operator: Otay Tijuana Venture

Prime Consultant & Architect of Record: Stantec Architecture

Associate Architect: Legorreta + Legorreta

General Contractor: Turner Construction

Construction Management: The Harrison Co.

U.S. Subcontractor: Hazard Construction

Mexican Subcontractor: Grumesa S.A. de C.V.

Parking & General Terminal Services: LAZ Parking

Of Note: First & only U.S. airport terminal to connect directly into a foreign country; only airport in the world that spans an international border

When the idea was proposed in 2008, it sounded very improbable, recalls Smith. But the project moved forward despite significant challenges, not the least of which was obtaining a U.S. presidential permit to build a new U.S. Customs & Border Protection facility. Eventually, all the necessary permits and permissions were secured from the United States and Mexico, and construction of the $120 million CBX began in spring 2014.

"We've done some digging, and as far as we know, this is the first greenfield U.S. Customs and Border Protection built in North America since the signing of the North American Free Trade Agreement in 1994," notes Smith.

Otay Tijuana Venture, a private investment group with U.S. and Mexican shareholders, developed CBX and currently operates it. TIJ's low-cost fares are expected to provide a steady stream of customers to the new facility, which is projected to serve about 2.4 million travelers annually. TIJ offers service to more than 30 destinations within Mexico and direct flights to Shanghai and Tokyo.

Airport Services

After crossing the pedestrian bridge with their luggage, southbound passengers with boarding passes proceed through Mexican Customs and check their luggage at TIJ. Northbound travelers retrieve their luggage at TIJ, and then proceed across the bridge to Customs on the U.S. side. The U.S. Customs facility inside CBX accepts travelers with SENTRI, Global Entry and I-94 credentials. Luggage porters are available to assist in both directions.


JARED SVENDSEN

When personnel from Otay Tijuana Venture approached LAZ Parking about managing the 900-stall parking operation at CBX, they soon realized that the company could also provide a number of other critical services. Outside the terminal, LAZ manages curb traffic and coordinates access of commercial vehicles, explains Jared Svendsen, LAZ's regional vice president. Inside the facility, the parking operator sells tickets for the pedestrian bridge and provides information concierge service at desks near airline counters. LAZ also provides wheelchair service and luggage porters for passengers traveling in both directions.

Brown enthusiastically refers to LAZ as the "face and brand" of the facility. "We depend on them to deliver very high quality customer service," she explains. "They are much more than parking management services, and we are really fortunate to have them here to provide critical services."

Excitement about the new facility is running high. "CBX will transform the border crossing experience for millions of travelers," states Carlos Laviada, an investor in the project. "We started the planning and approvals for the CBX over eight years ago, and it

A pedestrian bridge that spans the U.S.-Mexico border was built with six 75-ton steel sections.

The new enclosed skywalk helps ticketed travelers avoid long lines at roadway border crossings.

has garnered incredible support on both sides of the border. Inter-country travel for leisure and business is a critical economic driver for this entire region."

Mark Cafferty, chief executive officer of the San Diego Regional Economic Development Corporation, considers the CBX terminal a great example of private investment and development. He describes the facility as a "much-needed public infrastructure to facilitate safe, secure travel and trade."

California Cool, Mexico Modern

Contractors broke ground on the new CBX facility in May 2014. Workers built the skybridge that passes over Mexico's six-lane Via de la Juventud Ote Highway by using a crane to set six 75-ton steel sections into place. When joining the bridge to TIJ's recently renovated terminal, a 70-member team had only 9 inches of clearance.

The facility's design was a collaboration between Mexican architecture firm Legorreta + Legorreta and U.S.-based architect of record Stantec. Together, the firms blended architectural and aesthetic styles from Southern California and Mexico.

As prime consultant for the project, Stantec took the lead, providing most of the planning and engineering services. "It's a quirk of geography that made this project possible in the first place," reflects Smith. "The facility design provides for the easy and intuitive flow of travelers across the border in both directions, creating a celebratory 'gateway' experience for travelers at the beginning and end of their journeys."

Strong colors and simple forms give the building a characteristically Mexican flavor. "It's a very contemporary building — not nostalgic," he adds.

High-efficiency mechanical equipment installed throughout the facility exceeds California's Title 24 energy code by fully 25%, Smith reports. Furthermore, the new facility is expected to significantly decrease greenhouse gas emissions produced by cross-border vehicle traffic.

Legorreta + Legorreta was responsible for the aesthetic feel and the signature architectural forms of the structure. Notably, the project is one of the last commissioned works of the late Ricardo Legorreta, world-renowned and internationally acclaimed for his bold architectural and design references to Mexican culture.

The building's strong exterior façade features sangre de toro (bull's blood), a natural stone with shades of red and purple. Vibrant colors, subtly altered by changing sunlight patterns throughout the day, highlight the exterior's dramatic geometric shapes, describes Legorreta + Legorreta Project Manager Emmanuel Perez Eguiarte.

EMMANUEL PEREZ EGUIARTE

The terminal's stone gardens include agave and other desert plants. And an interior courtyard with a water feature serves as a gathering place where travelers and greeters can enjoy Southern California's hospitable weather. Entering the building, travelers encounter a high-ceilinged space with large orange circles of recessed lighting. The pedestrian bridge features window patterns that pay tribute to papel picado, a colorful Mexican folk art of intricately cut tissue paper used as decorations for important festivities.

Designing a facility to satisfy the demands of two national governments and a diverse group of private investors required extensive planning and deliberation, notes Eguiarte. "The many, many design discussions resulted in good solutions that only made the project better," he reflects.

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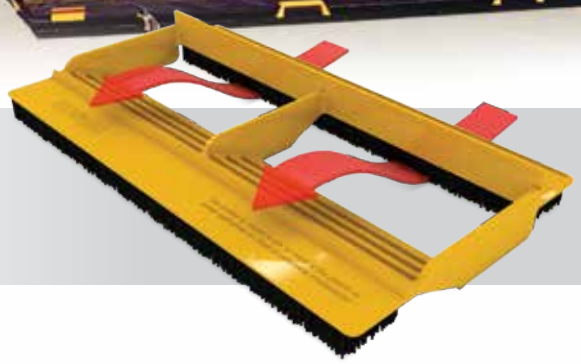

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Temporary Sales Tax Raises Funds for New Terminal at Lafayette Regional

BY MIKE SCHWANZ

FACTS&FIGURES

Project: New Terminal

Location: Lafayette (LA) Regional Airport

Projected Cost: $90 million

Funding: FAA ($20 million); State of LA ($13.5 million); airport capital fund ($12 million); estimated local contribution ($30 million); TIGER grants & various bonds (balance of needed funds)

Funding Mechanism for Local Costs: 1% parish sales tax

Duration of Tax: April 1 - Nov. 30, 2015

Tax Collected: $32,635,000

Anticipated Construction: 2018-2021

Key Challenge: Convincing tax-averse citizens to support measure

Primary Benefits: Improved facilities for airlines & passengers; support for economic growth throughout the region

Keys to Success: Tax was specifically limited to 8 months & designated for new terminal only; marketing campaign convinced voters why tax/terminal was needed

Raising money for major construction projects is typically a major challenge, but officials at Lafayette Regional (LFT) recently got the job done in short order with a short-term sales tax earmarked to help fund a new terminal.

STEVEN PICOU

"The (existing) terminal dates back to the 1950s, and we are the only commercial airport in the state without a new terminal or a recently renovated one," explains Executive Director Steven Picou. As Louisiana's fourth-busiest airport, LFT serves approximately 500,000 passengers per year.

"Estimates showed the cost of renovating the current terminal would be nearly 80 % of the cost of building a new one, so it made sense to us to simply build a new one," Picou adds.

With the project estimated to cost about $90 million, most of the money needed to build a new terminal will come from state and federal sources (see left for specific split). Beyond the $12 million LFT has in its capital fund for the project, officials estimated they needed at least $30 million more. To bridge that difference, the Lafayette Airport Commission proposed a 1-cent sales tax, to be collected for a finite period of eight months, from April 1, 2015 through November 30, 2015.

That left airport personnel with the daunting challenge of persuading tax-averse voters to support the fundraising measure. The commission opted for a hybrid approach of grassroots efforts and multimedia messaging to convince voters that a new terminal was critical to the future of the area's economy and growth of Lafayette Parish. With the vote set for early December 2014, the commission launched its campaign in February 2014. Target audiences included airport customers, business leaders, civic organizations, government officials and the public at large. Key elements included:

- **Educational brochures**
  Materials detailed the airport's current capacity challenges, its competitive disadvantages and what improvements a new terminal could provide. They also included the exact language voters would see on the ballot, which emphasized that the tax was limited to just eight months, with no option for extensions. The airport printed and distributed more than 40,000 educational brochures.

- **Personal presentations by airport officials**
  Airport representatives met with more than 70 groups, including chambers of commerce, rotary clubs, governmental bodies, travel associations and economic organizations to explain the tax and terminal project. They also passed out brochures at downtown events and provided materials to local businesses for distribution to customers.

- **Artist renderings**
  Drawings and diagrams of what the new terminal could look like were displayed at the airport. Airport commissioners also showed them during their civic presentations to build excitement about the project.

- **Social media**
  LFT personnel created a website and Facebook page about the initiative, where voters could find information and give feedback.

- **Posters and yard signs**
  Promotional materials supporting the tax proposal and terminal were posted liberally and displayed by supportive local businesses.

- **Push cards**
  Palm-size summaries of the proposal, another staple of election campaigns, were provided to individuals and businesses. LFT personnel also distributed them to vehicles leaving the airport parking lot – roughly 20,000 per month.

- **Direct mail**
  The team developed a campaign summary and mailed it to every household in Lafayette Parish with registered voters.

Nearly 60% of voters in Lafayette Parish supported the temporary tax measure.

- **Paid advertising**
  Three television ads and three radio spots aired during the two weeks before the election. Newspaper and online ads were purchased to remind citizens to vote.

- **Media relations**
  Press releases sent to all local media inspired 19 front-page stories and another six articles inside local newspapers. They also prompted numerous requests for commission members to make television appearances and provide radio interviews.

Talking Points

Stressing to voters that the tax would disappear after eight months, no matter what, and that revenue it raised could only be used for a new terminal was crucial, Picou advises.

Campaign materials helped elicit support for a temporary tax to help build a new terminal.

"The airport commission pushed for total transparency," he emphasizes. "It was very important to them that the wording on the ballot be very specific — detailing what was being proposed, what (tax revenue) would be used for and that the tax had a specific period in which it would be collected — so there was no way any of those components could be changed after the vote."

The commission's pre-vote marketing campaign worked like a charm, he reports. There was no organized opposition to the proposal, and comments about the tax on social media were generally positive. On December 6, 2014, the citizens of Lafayette Parish overwhelmingly approved the tax proposal by a 16-point margin (58% voting for the measure and 42% against it). Many business organizations, government officials and news outlets publically endorsed the tax in the days leading up to the vote.

According to an audit conducted by the Lafayette Parish School Board earlier this year, the temporary sales tax collected $32,635,000. The results were good news for Picou, who had predicted the tax would generate between $30 million and $33 million.

Other key funding sources for LFT's new terminal will be the State of Louisiana ($13.5 million); FAA ($20 million); and the airport's capital fund ($12 million). Any remaining deficits will be paid for with TIGER grants from the Department of Transportation and various bonds.

Picou expects all necessary financing to be in place by early 2017. "We already have most of the money pledged to the project, so the major financial hurdles have been cleared," he reports.

Several other key tasks remain, though. "Our next big step this year is to select an architect and engineering consulting firm," notes Picou. The airport issued requests for proposals in December 2015, and the commission hopes to choose a consultant by June. "We expect it could take up to two years to develop and finalize all the detailed plans, so we hope to start construction sometime in 2018, with the project being done by 2021. Once we get going, construction projects down here proceed fairly quickly, since we don't have bad winters."

Picou is excited about the new amenities in store for LFT's passengers and airlines. "The new terminal will be a drastic upgrade," he relates. "We will have at least five gates, and perhaps as many as seven. They will be spaced farther apart, so passengers won't be crammed into one small space like we have now. The major airlines that use the airport (American, United and

Delta) will be able to use larger aircraft to accommodate the expected growth of passenger traffic. TSA checkpoints will be much more efficient, and all the concessions will be nicer and more passenger-friendly."

Besides the draw of a sparkling new terminal, the Bell Helicopter manufacturing plant that opened at the airport last August is also expected to boost LFT's traffic. With production goals of 150 to 200 helicopters per year, the facility is expected to bring in more passengers involved with the business. "We have a lot of businesspeople in the energy field who come through here, who want to use helicopters to get to oil fields," explains Picou. "That will be a real growth area for us in the future."

The airport hopes to begin construction of its new terminal in 2018.

Detroit Metro Rolls Out High

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WAYNE COUNTY AIRPORT AUTHORITY

FACTS&FIGURES

Project: Digital Directories

Location: Detroit Metropolitan Airport, McNamara Terminal

Prime Tenant: Delta Air Lines

Approx. Cost: $2 million (phase one)

Project Scope: Replacing 27 paper directories with 23 digital directories

New Equipment: 84-inch ultra-high-definition monitors in 22 locations; centerpiece unit includes 98-inch display with integrated boarding pass scanner

Display Manufacturer: LG

General Contractor & Prime Consultant: Arora Engineers

Ergonomic Planning: Gresham, Smith & Partners

Display Cabinetry: Harmon Sign

Graphic Design: Illium Associates

Software Implementation: Art of Contex

Technology Deployment Services: Infax

Temporary Directories: Creative Graphic Solutions

Electrical: Centerline Electric

Power Supply: Meanwell

LED Lighting: Sloan

Aluminum Extrusion for Cabinets: SignComp

Terrazzo Floor Patching: Michielutti Bros.

Of Note: 98-inch 4K monitor is said to be largest single wayfinding display with integrated boarding pass scanner in the world

Future Phases: New digital directories in North Terminal; installation of interactive kiosks in both terminals

As airports become increasingly complex environments to navigate, guests need more help from wayfinding aids. Detroit Metropolitan Airport (DTW) is doing its part to relieve travelers' stress by installing digital LG directories throughout its two terminals.

At a cost of approximately $2 million, the airport recently replaced 27 paper directories (8 single-sided; 19 double-sided) with 23 digital directories (3 single-sided; 20 double-sided) within its McNamara Terminal. During three more phases, DTW will replace print directories in its North Terminal and add interactive kiosks throughout both terminals.

Wayne County Airport Authority has three primary goals for the multi-year directory project: improve travelers' experience at DTW; update information while complementing the terminals' architecture and aesthetics; and make it faster and easier to change directory content.

The previous paper directories in McNamara consisted of static, backlit printed maps. To change them, crews had to open the glass case of each directory, and then mask or change information with pieces of tape.

"It literally took tens of man-hours to make a directory change," informs DTW's Program Manager Staci Saker. "Now, it takes about 15 to 20 minutes to plot it out on a map and push it into production."

The new showpiece of the project is a doubled-sided dynamic directory that is centrally located on the secure side of McNamara Terminal. When a passenger scans a boarding pass with the directory's 2D barcode reader, the unit displays the route to his or her gate and calculates how much time it will take to walk and ride there. The directory's 98-inch display is said to be the world's largest traveler wayfinding monitor with an integrated barcode reader.

McNamara's 22 other new directories display information statically and feature 84-inch ultra-high-definition 4K commercial monitors that are designed to run nonstop for up to five years. All of the monitor frames and cabinetry were custom built.


THOMAS NAUGHTON

"Our new digital directories are one more way our airport team continually strives to better serve our customers," says Thomas Naughton, the airport authority's chief executive officer. "These new displays not only help our travelers get to where they are going efficiently, they also help create better awareness of all the other amenities our airport has to offer."

-Tech Digital Directories

BY ROBERT NORDSTROM

Getting It Right the First Time

The project was more complex than merely swapping out directory displays, emphasizes Saker. Rather than taking a broad pull-and-replace approach, the airport authority required an initial ergonomics study during its initial request for proposals to help determine how and where travelers interact with the DTW's directories.

"We wanted to make sure we got it right the first time, which has been our message to our board and constituents from day one," explains Saker. "Initially, we thought we would just go in and replace all of our existing directories where they stood. Then we realized that might not be the smartest approach. We needed to provide information and tools at the right location, at the right time and via the appropriate vehicle, so travelers could make decisions specific to their location and situation within the airport."

The ergonomics study that was eventually conducted established the baseline and foundation for the multi-phase program that will eventually be used throughout both of DTW's terminals.

The airport authority hired Arora Engineers as general contractor and prime consultant for the project. Jason Shevrin, vice president of the company, reflects about DTW's strategy: "A lot of times we see digital signage, whether at an airport or other transportation hub, and think that it's a quick and easy fix — all you have to do is buy a display, hang it and show something on it. But it's really important to look at the environment through the customers' eyes as opposed to the stakeholders'. DTW approached this project in a smart and methodical way."


JASON SHEVRIN

In early spring 2015, Arora subcontractor Gresham, Smith & Partners initiated a study designed to maximize the effectiveness, ease of use, efficiency and safety of the airport's new directories. After months of research, the team created detailed circulation diagrams that analyzed movements of various passengers (departing, arriving, connecting) and relevant content for various locations. Based on its analysis, the consultant recommended locations and orientations for DTW's new digital displays.

"Whether it be wayfinding or interactive, our goal was to identify the information and technology that would enhance the customer's experience," Shevrin explains. The team also showed airport personnel where they would "get the most bang for their buck," he adds.

As with most large airport initiatives, numerous factions were consulted and opinions varied accordingly. The airport's technology services group, business development department and facilities team all weighed in on the plan, as did representatives from Delta Air Lines, McNamara Terminal's primary tenant and hub carrier.

"There were hurdles to overcome, but we worked collaboratively with all the stakeholders to determine what should go where," Shevrin recalls.


MANIK ARORA

Manik Arora, president and chief executive officer of Arora Engineers, highlights the teamwork that occurred and the results it facilitated: "I'm proud of the collaboration among our team, the airport authority and Delta Air Lines to execute a one-of-a-kind design/build/maintain project. The airport now has a high-tech solution to a challenging wayfinding problem, not to mention the largest digital directory screen of its kind to integrate with a 2D barcode reader."

Tight Deadline

Airport officials were determined to complete the first phase of display updates before last year's Thanksgiving holiday rush. While preliminary research and lengthy discussions with stakeholders proved to be time and money well spent, they also delayed the start of construction. Beginning in October 2015, crews, in effect, had less than two months to complete the project.

Before construction began, electricians disconnected the power supply. In the non-

The airport's new digital directories are much easier to update than its previous paper versions.

An ergonomics study helped optimize the content and placement of DTW's new directories.

public baggage makeup area, they were able to complete this preliminary step during the day.

Each directory location typically required three nights to finish, and contractors simultaneously worked on four directory locations. Planners scheduled work to ensure that no two adjacent directories were out of service at the same time. Before beginning at each location, Arora workers constructed a secure plywood barrier around the work site and hung temporary digital directories on the barriers. Then, they removed the existing directories inside the barriers and installed the new digital directories, cabinetry and refurbished support structures.


DAVE BRINK

Harmon Sign supplied custom aluminum extrusion cabinetry with routed LED backlit signage for the new monitors. "We felt that the existing support structures would need to be totally refinished to meet owner expectations," explains Harmon Account Executive Dave Brink. "We lobbied and, hats off to the Arora team, won approval to transport the structures to our plant, where we could repaint them in our spray booth and make them look like new."

Shevrin highlights tight coordination of subcontractors, constant onsite support and flexibility to change the schedule in progress as vital elements of the project. "We completed the work on the exact due date for completion," he reports. "We couldn't have done it without the team we put together."

Just the Beginning

With phase one completed, DTW is proceeding with the installation of interactive kiosk directories throughout the McNamara Terminal. The new touch-screen units will help travelers navigate their way through various airport services and options. Whether they are looking for flight information or trying to locate a club, restroom or specific food and beverage offering, guests will be able to find it on the new directories.

Immediate plans include four kiosks to enhance the customer service desks located before and after the security checkpoint. The ergonomics study identified 20 possible locations throughout both terminals, but the airport has not determined how many kiosks will ultimately be installed.

With kiosk installations in the McNamara Terminal scheduled to wrap up later this year, additional projects in the North Terminal are being evaluated. Installation of new directories will take priority, followed by kiosks. Initial plans anticipate work to occur in 2017 and beyond.

DTW officials view the ongoing directory and kiosk program as a platform to serve customers in other unique ways. "This is step one," explains Saker. "The research, design, artwork — all of that will be built out into our website as we focus on using new technologies to improve our customers' experience. For the interactive piece, we're looking at including information in eight languages. We want to eventually connect with customers through mobile apps and back to our website. We want all of this to have a consistent look and feel, and of course with accurate content."

Given the rapid pace of technological change, Shevrin encourages airports to remain open to innovations. "That means knowing what customers are doing at home as well as at the airport," he explains. "What do they expect once they get to the airport based on what they are doing at home? As consultants, that's an important question for us to ask and answer. For airports, it's important to align their technologies and services accordingly."

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New Runway Sensors at Denver Int'l Expected to Reduce Costs & Delays From Pavement Deicing

BY KEN WYSOCKY

Denver International Airport (DEN) has a new tool at its disposal for managing winter operations: in-pavement sensors that help predict when ice will form on runway and other airfield surfaces.

The system includes five clusters of sensors embedded in Runway 17L-35R, one of DEN's four north/south runways, and three more clusters in adjacent high-speed taxiways. The in-pavement sensors were installed as part of a $46.5 million runway resurfacing project.

The new system, which cost about $274,000, will help personnel monitor icing conditions more effectively and allow them to better manage the deicing agents they use on airfield pavements, explains Mike Carlson, DEN's assistant director of airside operations. By providing more accurate warnings about when icy conditions will develop, the system is expected to reduce airfield maintenance expenditures and minimize the number of runway closures required for pavement deicing.

MIKE CARLSON

Airport Surface Friction Tester (ASFT), a company based in icy Sweden, designed and manufactures the equipment.

DEN's new system came online in October, just as the local snow season began. As such, it's still too soon to determine how much the airport will save by reducing unnecessary applications of potassium acetate deicing solution.

"Based on discussions I've had at winter ops conferences with colleagues from other airports, they're seeing significant savings," Carlson reports. "At $4 to $5 a gallon for deicer, those numbers add up quickly. So this is definitely a better way to go. Our plan is to base our tactical decisions regarding liquid/chemical applications on information this system provides us."

Multiple Advantages

Safety and airfield efficiency were also key considerations. "If we don't have to get out on the runway to conduct a pavement friction assessment, we stay out of the way and are able to land that many more aircraft," Carlson explains. "In the long run, it saves airlines

FACTS&FIGURES

Project: Ice Warning System

Location: Denver Int'l Airport

Runway: 17L-35R (& associated taxiways)

Timeline: Installed during $46.5 million runway reconstruction

Funding: Airport Improvement Program grants; airport funds

Project Completed: Oct. 2015

Approx. Cost of Ice Warning System: $274,000

System Manufacturer: Airport Surface Friction Tester

Distributor: American Safety Technologies

Runway Contractor: Flatiron Construction

Electrical & Mechanical Component Installation: Sturgeon Electric

Liquid Deicer Used: 616,452 gallons of potassium acetate during 2014-2015 winter

Avg. Spent on Deicing Chemicals: $2.72 million/yr (during last 4 yrs)

Of Note: Active sensors determine the freezing point of runway precipitation (vs. simply the surface temperature of pavements)

Key Benefit: System is designed to reduce unnecessary application of deicing agents

Photograph provided courtesy of Denver International Airport

money, too, and helps them maintain their on-time performance as much as possible during a snow event. We can let the runway be until the surface temperature (of the runway) and the freezing point get close enough that we actually have to get out there and do some remediation."

Jeanne Lindberg, business development director for the system's Canadian and U.S. distributor, notes that ASFT developed the sensors to help airfield crews spread less deicer, but still maintain extremely safe conditions. DEN is the first U.S. airport to use the system.

"Airports using this system in 15 countries around the world have reduced pavement deicer use by up to 30%," reports Lindberg. "So if an airport spends millions of dollars on deicer every year, that 30% reduction is definitely significant."

Lindberg points to Heathrow Airport as a specific example. According to its winter operations director, the London facility saved about $400,000 by applying less deicer in two storms alone.

New in-pavement sensors are designed to minimize the unnecessary application of deicing agents.

Carlson explains the potential savings for DEN this way: “If we know the surface won’t freeze until it reaches a lower temperature, then we won’t put down an additional layer of pavement chemicals when we go out to remove snow from a runway. It will save us money, and using less chemicals is better for the environment, too.”

Typically, DEN receives about 58 inches of snow per winter season (generally October through April). During the last four winter seasons, crews applied an average of 605,500 gallons of potassium acetate deicer. At an average cost of $4.50 per gallon, the airport spent approximately $2.72 million per season on deicing agents.

DEN spokesman Heath Montgomery notes that the four-season period cited includes an outlier winter that drove up costs. During the 2012-2013 season, the area received 20 more inches of snow than usual, and the airport used 925,669 gallons of pavement deicing chemicals.

Timing is Everything

The renovation of Runway 17L-35R provided DEN with the opportunity to replace its less-advanced ice monitoring

system without extra disruption to the fifth-busiest U.S. airport. In 2014, DEN served 53.4 million passengers.

Flatiron Construction won the $35.3 million contract to replace more than 2,000 deteriorating concrete slabs. DEN funded the project with airline fees and about $20 million from the FAA Airport Improvement Program.

The airport's previous system, which used passive sensors, reported only runway pavement temperatures. "Leading up to a storm, we'd watch the passive sensors and spread the liquid chemical when the pavement got close to 32 degrees, to lower the freezing point of the surface," Carlson explains. "Then, after that first application, we'd go out and put more chemicals down during snow removal operations. But we based that decision on just the surface temp alone."

The shortcoming of DEN's former system was that the freeze point of melting snow that is mixed with liquid chemicals often drops, which negates the need to spread more deicer. Prior to installing the new ice warning system, airfield personnel had to make maintenance decisions based on surface temperatures alone, because the sensors couldn't measure the freezing point of precipitation, Carlson explains.

"Most people think rain and sleet will freeze at 32 degrees," Lindberg adds. "But even if the surface temperature of the runway is below freezing, the actual freezing point of the precipitation may be lower than the surface temperature of the runway because of the pavement deicers. So at that point, the runway won't freeze as long as the freezing point (of the precipitation) is lower than the surface temperature of the runway."

Eventually, deicing agents become diluted by precipitation or get dispersed as airplanes land and takeoff. That's when the precipitation's freezing point will rise and approach the level of the surface temperature.

Differentials Make the Difference

DEN's new system includes two types of sensors: surface state sensors to measure the surface temperature of airfield pavements, and active freezing point sensors, which determine the freezing point of runway precipitation. Each of the eight clusters includes three active sensors and one passive sensor. The active sensors help determine the critical times when the freezing point of precipitation on the runway is close to the surface temperature, which is when more deicer is required, Lindberg relates.

Active sensors, above, are a crucial component of the airport's new ice warning system from ASFT.

"If the surface temperature is 29 degrees, for example, and the freezing point of the precipitation is 28, you know you're at high risk for the runway to freeze," she explains. "The time to really keep an eye on it is when there's about a five-degree difference."

How does the system determine that crucial temperature differential? The active sensors contain a peletier element, which lowers the temperature on the sensor until the precipitation on top of it freezes. This allows the system to provide a freezing-point reading. According to ASFT, the sensors obtain readings in about 20 to 40 seconds. The measurement devices are also very precise, adds Lindberg, noting that the active sensors are accurate to within plus or minus 0.4 of a degree.

DEN followed ASFT's recommendations and installed sensor clusters at the takeoff, midpoint and touchdown portions of the runway. Another was installed halfway between the takeoff area and midpoint, and one is stationed between the midpoint and touchdown area. All were embedded to be flush with the runway surface.

Each of the sensors is hardwired to one of four general processing units (GPUs), located alongside the runway. "The GPU analyzes the data and sends it wirelessly to a secure server, where approved airport personnel can view the data online," comments Lindberg.

The system is designed to automatically send email alerts based on the data it gathers, according to users' preferences. At DEN, snow ops personnel receive tiered messages: advisory emails when the difference between surface temperatures and the precipitation freezing point is 11 degrees, freeze watch alerts when the differential reaches seven degrees, and freeze warning alerts when it's four degrees. "You can create as many rules (for alerts) as you want, but those are the ones we're keying in on right now," Carlson notes.

In January, DEN personnel were still busy tweaking and familiarizing themselves with the new system — a process ASFT engineers assure them is normal. The manufacturer advised DEN officials that it typically takes a full snow season to get the system dialed in and calibrated correctly.

"We need to train ourselves to trust the numbers and base our tactical decisions on them," Carlson reflects. "Our goal is to build a data base, so that when we do significant rehabilitation of other runways in the future, we already have a case made for installing more of these sensors."

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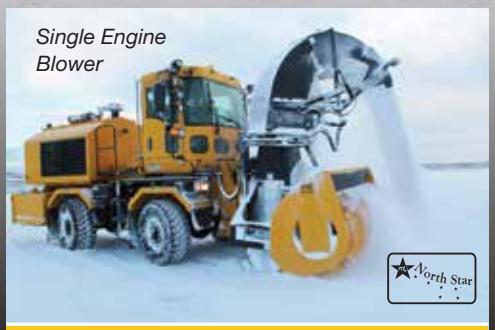

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Sea-Tac Int'l Makes More Room for Mega-Freighters

BY JODI RICHARDS

Port of Seattle
Seattle-Tacoma International Airport

FACTS&FIGURES

Project: Cargo Facility Expansion

Location: Seattle-Tacoma Int'l Airport

Total Cost: $23 million

Construction: Spring 2014 – early 2015

General Contractor: Gary Merlino Construction Co.

Electrical Contractor: Foy Group

Building Subcontractor: Jody Miller Construction

Fuel System Subcontractor: SE Pipeline Construction

Ground Power Units: Cavotec

Cargo Airlines: Asiana, Cargolux, China Airlines, EVA Air, FedEx, Korean Air, Singapore Airlines

Charters During Cherry Season: Atlas Air, China Cargo, Nippon Cargo, Polar Air

In June 2015, Seattle-Tacoma International Airport (SEA) completed a $23 million cargo expansion project designed to support the growing cargo demand the airport is experiencing and hopes to increase.


TOM GREEN

Two cargo areas north of the main terminal were expanded to accommodate simultaneous nose-loading of large aircraft like Boeing 747-8s. Because such aircraft have longer wingspans and fuselages, they require more ramp space to park, unload and load freight. Tom Green, senior manager of air cargo at SEA, says the facility enhancements will improve the efficiency of ground operations and make the airport's air cargo business more competitive.

While SEA is not typically considered a major player in cargo, Green notes that the Washington airport is growing in the sector, and recent investments will further its growth. "It was incumbent upon us on the cargo and freight side to point out our importance in the operation, but also to point out that capital improvement projects are necessary for the cargo side — even at a gateway airport that folks would say is primarily a passenger operation."

To his point, SEA served 42 million passengers last year. Cargo volume, however, is on the rise. In 2014, the airport's total cargo tonnage increased 11.8%, with a total of 327,240 metric tons. Notably, it logged a record 107,752 metric tons of international freight — an increase of 21.6%. And last year, SEA sustained that growth and increased another 1.7%. "Both years, that growth was propelled by growth on the international side," Green notes. More than half the cargo SEA manages (54.4% in 2015) is carried by freighter aircraft.

According to records from the Port of Seattle, $12.7 billion worth of airfreight is exported to domestic and international markets through SEA each year, and another $13.6 billion is imported. According to estimates, that volume brings about $22.7 billion in economic value to the state of Washington each year.

Currently, the biggest aircraft seem to hold the biggest potential for cargo growth at SEA. In 2014, the airport experienced a 10.4%

increase in frequency from the largest class of cargo aircraft, such as Boeing 747 freighters and Antonov 124s; and that growth continued in 2015 with another 7.6% increase. Last year, SEA handled 1,050 mega freighters. "For an airport of our size, that was a pretty momentous number of annual operations from that size freighter," notes Green.

SEA officials anticipate continued growth from the highest volume aircraft. "We believe the industry took note of our efforts to expand the parking areas and the fact that it just makes it easier to work here," he explains. "We think we made a sensible bet at a relatively minimal cost to preserve and grow that side of the business."

Facility Expansion

Planning for the $23 million expansion began in 2012, with approval secured in 2013 and groundbreaking in 2014. The Port of Seattle, which operates the airport, led the planning and design processes.

The team chose to expand the size of hardstands at both cargo areas (one midfield, another on the north side) to benefit all of SEA's large scheduled freight carriers. "We didn't want to concentrate them all in one place," Green explains.

In response to recent traffic trends at the airport, the expansion's primary goal was to better accommodate nose-loading operations by making the hardstands longer from nose to tail, with special attention to the space available in front, Green notes.

Prior to the expansion, SEA had only one freighter hardstand position capable of handling Group 6 aircraft like the Boeing 747-8F. With at least two existing customers flying larger equipment, Cargolux and Korean Air Cargo, airport officials knew that a single hardstand for such aircraft was not enough to grow cargo operations, Green explains.

In addition to its Group 6-capable hardstand, SEA also had other stands capable of handling aircraft as large as 747-400 freighters; but they just weren't deep enough for optimum efficiency. To nose-load cargo, operators had to park planes diagonally across more than one hardstand — even 400 series aircraft, notes Green. "In order to have a facility that would allow growth in the future, we needed to expand some of those freighter hardstands," he summarizes.

Previously, the hardstands allowed for about 50 feet off the nose. The new configuration includes more than twice as much space. "There's a lot of activity with very high-value cargo that's going on in a nose-load situation," Green states. "We were trying to create an environment where our operators don't face congestion and difficulty." The new, deeper spaces allow cargo operators to be more efficient and effective, he reports.

Both freighter and nose-loading operations are important for SEA, Green specifies. While belly cargo is where it's at for many

International cargo at SEA has increased more than 20% during the last two years.

airports, the mix of commodities and aircraft flying into SEA made it necessary for the airport to accommodate nose-loading.

Cherries are one of the airport's most important cargo commodities. In fact, airfreight volume typically peaks at SEA in July, due to seasonal exports of Pacific Northwest cherries. In 2014, the airport handled about 14,500 metric tons of the sweet, local product, which is considered a delicacy in Asia. During peak cherry season, it's not unusual for all of SEA's hardstands to be full with freighters, Green reports.

The new layout for both cargo areas includes ample room for loading and unloading aircraft, plus space for support vehicles, tugs and other equipment associated with the turn process. Previously, support activity would spill to both sides of the aircraft, impinging on the neighboring ramp where other airlines were working. "Through this project, we were able to push a lot of that operational and staging area toward the front of the aircraft," Green relates. The result is much more efficient cargo operations for everyone, he adds.

Cargo airlines at SEA include FedEx, Cargolux, Korean Air, Asiana, China Airlines, EVA Air and Singapore Airlines. During cherry season, charter flights from China Cargo, Nippon Cargo, Polar Air and Atlas Air are also common.

Finding Space

To prepare for the expansion of its northern cargo area, the airport had to remove one airside cargo building. "We have to take a systems approach to airfield planning and infrastructure," Green explains. "All the buildings in the world aren't going to help you with freighter business unless you have room to park those freighters."

Ultimately, aircraft parking positions took precedence, and buildings to accommodate operations were fit in and around them, he elaborates.

With a relatively constrained footprint in terms of available acreage, SEA had to expand cargo facilities where it made sense, with any space that could be spared. After reviewing multiple alternatives, officials chose to take out the one building they felt they could do without, Green explains.

In addition to physical expansion, the project modernized existing cargo facilities. The airport leveraged the construction process as an opportunity to install equipment such as nose wheel tethers and in-ground power units. Crews also updated lighting and extended the airport's in-ground fuel hydrant system in one area.

The recent addition of ground power allows freight carriers to power on-board electrical systems by plugging into the airport's new equipment rather than running aircraft auxiliary power units or diesel units on the ground. This helps SEA's carriers save money, because they will burn less fuel, notes Green. It also helps reduce noise and emissions at the airport. "The city of Seattle, Washington state and the Port of Seattle are all very committed to green design elements," he comments.

The extension of SEA's in-ground fuel hydrant system provides additional environmental benefits, because freighters can now fuel directly from the hydrant rather than from fuel tankers that burn fuel and create emissions. Reducing ground traffic on the airfield also increases safety, adds Green.

Select light pole stands were relocated to save energy and improve lighting conditions. Crews also added a new camera system to boost safety and security in cargo areas.

Associated improvements to security gates on and off the airfield were made to provide trucks with more efficient and secure access to the airfield. Gate changes were not part of the primary project's $23 million budget.

Construction & Coordination Challenges

Expansion of SEA's cargo areas did not take place in a bubble. It was carefully planned and phased around the peak cargo season and everyday passenger operations, specifies Green. The constrained nature of the airfield required precision, but also complicated the process. "We really didn't have the luxury to take too much of our parking inventory out of service and had to do it in pieces," he recalls.

Construction started with the northern hardstand in spring 2014. Crews demolished the previous cargo building, expanded the concrete and most of the associated infrastructure, and finished other improvements. Projects were scheduled and

Nearly $13 billion worth of airfreight flies out of SEA annually, and another $13.6 billion flies in.

completed so the area was back in operation before the busy summer cherry season began.

With the northern expansion complete, attention turned to the midfield cargo area in fall 2014 — after cherry season had ended. Although the midfield project took a little longer because winter rains interrupted concrete work, the entire project was completed in early 2015.

In addition to careful phasing, the project also required close coordination of its various elements, Green recalls. For instance, tying new elements into the fuel hydrant system required SEA to temporarily shut down one of its major fueling racks. Naturally, project planners timed the shutdown to minimize the impact on passenger and cargo airlines. Expediting the most disruptive work and communicating with everyone affected were also critical factors for a smooth transition, advises Green.

Expansion of SEA's cargo area also provided additional remain overnight (RON) parking, a valuable commodity for any West Coast airport. The new Group 6 hardstands are capable of accommodating double-stacked aircraft such as 737 RON passenger jets. Although airfield personnel need to manage traffic so parked aircraft don't impede active operations, the additional space is beneficial, says Green.

The recent expansion also provides a remote area for aircraft deicing, which is rarely needed at SEA. "Having larger areas of concrete makes that a more flexible and efficient process," notes Green.

More Changes Ahead

As the airport continues to update its master plan, further changes to the cargo landscape are inevitable, says Green. A future terminal expansion needed to meet passenger demand will likely impact cargo areas; but planners haven't yet determined the extent of the effect.

Based on current projects, SEA will reach 66 million passengers by 2034. "[Cargo is] going to be a smaller footprint on the airfield, so we will then need to plunge into relocating and rebuilding cargo building facilities," Green predicts. "We'll need to be much more efficient in how we provide cargo throughput buildings that are associated with these parking ramps. That's going to be our next challenge."

SEA officials expect to complete the current master plan update later this year.

The Port of Seattle Commission, which operates the airport and seaport, marked the Port's 100-year anniversary in 2011 by creating policy objectives for both entities. One of SEA's specific targets is to nearly triple its cargo tonnage by 2036. According to Green, the ambitious goal shows that the Port Commission recognizes the important role air cargo plays for industries in Seattle and throughout the state.

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FACTS&FIGURES

Project: Common-Use Passenger Lounge

Location: Minneapolis-St. Paul Int'l Airport

Lounge Operator: Manchester Airport Group

Build-Out Contractor: Jacobs

Food & Beverage Partner: HMSHost

Lounge Size: 5,000 sq. ft.

Capacity: 140 people

Entry Fees: $40 in advance for adults, $30 for children 6-12; $45 at the door

Amenities: Tended bar; hot & cold meals; all-day snacks; separate areas for working, socializing & eating; high-speed Wi-Fi

BY VICTORIA SOUKUP

Minneapolis-St. Paul Int'l Offers Passengers a New Place to Escape

With huge windows and plenty of open space, the mezzanine in Terminal 1 provides the best airfield views at Minneapolis-St. Paul International (MSP). And until recently, 5,000 square feet of the prime airport real estate was used for storage.

That's right, storage.

Late last year, however, MSP began leveraging its second-story asset to create a new "luxury amenity." It now leases the mezzanine space to MAG USA for an upscale common-use passenger lounge. MAG USA is the U.S. subsidiary of U.K.-based Manchester Airport Group, which owns and operates four British airports, including Manchester Airport and London Stansted Airport.

PHOEBE LARSON

Today, the room-formerly-known-as-storage-space is a newly appointed spot for weary travelers to rest, eat and recharge. "I think it makes us a much more attractive option," says airport spokesperson Phoebe Larson. Because MSP serves a great deal of business travelers, yet also accommodates many families, officials strive to offer amenities that appeal to everybody, she explains.

The lounge, which opened in mid-December, is designed to benefit orgination/destination and connecting passengers alike. While local travelers may come early to dine at the lounge before their flights, other passengers will benefit, too, notes Larson. "When you have a long layover and you're in an airport with more amenities, you are happier," she explains.

Although common-use lounges are popular overseas, particularly in Europe, only a handful of U.S. airports contain them. (See our March/April 2014 edition for coverage of Atlanta International's lounge. For insight about the Canadian market, consult our article about Winnipeg International in the March/April 2015 issue.)

MSP's Escape Lounge is open to any traveler on any airline for a daily rate of $40 pre-booked online or $45 at the door. As such, it offers an alternative to airline lounges that typically require annual subscriptions or the purchase of premium class flights. While Delta Air Lines has a large presence and lounge at MSP, the airport wanted a similar option for travelers flying on other carriers as well as Delta fliers who don't have a membership for the airline-specific lounge.

The Escape Lounge's daily fee includes high-speed Wi-Fi coverage, free use of iPads and printers, and quiet areas to read or relax. Complimentary drink options include premium coffees, Fiji water, sparkling waters, and select beers and wines. Breakfast, lunch and dinner are served, as well as snack foods throughout the day. Larger meals are available for an upcharge.

A tended bar, with select complimentary beer and wine, is a popular amenity.

MAG USA partnered with airport concessions veteran HMSHost to supply food and beverages for the lounge. A company chef reviews the menu regularly and sources everything for the kitchen from standard staples to aeroponic salads and herbs.


ROSEMARIE ANDOLINO

"Essentially, passengers can get a full meal at the Escape Lounge, along with local beers and excellent wine selections," says MAG USA Chief Executive Officer Rosemarie Andolino. "If you do the math, it's one of the best deals in the airport. All of the food is fresh and delicious, including an array of pastries for the sweet tooth. Guests can sit, relax, eat, and drink all they want in a quiet and comfortable environment with TVs and iPads, Wi-Fi access, magazines, and also keep an eye on the progress of their aircraft's departure on flight information displays."

To mitigate noise and distraction from the outside terminal, designers equipped the lounge with a sound-lock vestibule. With the number of passengers growing at U.S. airports, it can sometimes seem impossible to escape the cacophony of sounds within a terminal to make a phone call, have a quiet conversation or soothe a headache, note MAG personnel.

International Operator, Local Manager

In addition to MSP's new Escape Lounge, MAG also operates five similarly branded facilities in the U.K. airports it operates. Andolino joined the company last year, after serving as commissioner of the Chicago Department of Aviation, where she oversaw the management and operation of O'Hare and Midway International Airports.

Andolino reports that MAG USA invested $2 million in the Escape Lounge at MSP. The facility can accommodate up to 140 passengers, and personnel will monitor admission numbers closely to avoid overcrowding, she notes. While the company is considering membership and loyalty programs, executives plan to stick with the current daily entry model for now.

"Michael Henning, the new general manager at MSP's Escape Lounge, used to work at HMSHost and is from the local area; (so he) knows the community well," says Andolino. "He has great energy and years of hospitality and customer service experience. It's nice to have someone who truly understands travel and airports and hospitality working with us."

MAG partnered with HMSHost to provide food and beverages for the new lounge.

JOHN TROSINO

Engineering giant Jacobs designed the lounge with separate spaces for various uses. Some areas are designed to cocoon, some to reflect and some to socialize, explains the company's senior project designer, John Trosino.

Jacobs also translated what MAG had already developed in its U.K. lounges for the U.S. market. "We had to adjust some of the materials for the American market; but the MAG Escape brand is strong, and that made it easier," he notes.

Trosino predicts that customers will notice and appreciate the design team's finer touches and diversity of space. "We modulated the lighting from area to area," he details. "There is a hospitality-based illumination pattern throughout the lounge, which allows you to feel as if you are moving to very different areas."

Staffed and self-serve areas with food and drinks were designed for easy access, and furnishings were designed and organized to facilitate personal electronic devices, Trosino adds. "The Wi-Fi system is brilliant, which is a great relief," he emphasizes. "Guests can recharge any device anywhere in the lounge. There are USB plugs at every seating arrangement."

Above all, the Escape Lounge is aptly named, he notes: "It's a great place to escape from the hustle and bustle of the concourse and affords travelers more choices. There are a variety of spaces to eat or read or work, and those spaces are attuned to those behaviors. It's a nice range of possible options."

Enticing Passengers & Vendors

Project planners felt it was important to provide visibility into the lounge for potential customers, so they consequently highlighted the space's transparency. For tenant spaces directly on the concourse, designers often use a combination of patterned and clear glass to attract passengers inside; but they used almost all clear glass for the lounge's entryway and windows, explains Trosino.

The entrance for the new lounge is adjacent to a staircase and elevator, but the hallway leading to the entry door was originally less than 48 inches wide. "When I went to the airport for the very first time and looked at the space, I was concerned about that first impression," recalls Trosino. "You want potential guests and customers to see what they're getting. It needed a very public entry area; we wanted to ensure that the first impression was a good one."

Trosino and his team consequently lined the entire entry wall with mirrored panels to give it the illusion of a wider space. Signage, which is expected to be complete in March, will further help direct travelers' eyes up toward the second-story lounge.

"We're still getting the word out," says Larson. "We're trying to get people to understand that they can go up to the mezzanine, and we're expecting signage and branding to (help) get people up there."

The new common-use lounge is located next door to a 12,000-square-foot sports concession that opened last spring. The PGA Experience features golf-oriented retail and food/beverages, plus a putting green, computerized course simulators and other hands-on golf options. (See our September 2015 issue for more details.)

Both mezzanine-level options are part of a larger effort to expand concession offerings at MSP. The airport plans to add 50 new restaurants and retail stores this year alone, reports Larson. "We just signed a contract with a craft brewery, a tech store, a food truck food court and local bakeries," she details. "All of our construction should be wrapped up by 2017 to 2018. We're going to be a new airport."

In the meantime, enthusiasm is still running high about the new Escape Lounge. "Everyone at the airport and in the local community is excited, and the feedback from passengers has been really positive," reports Andolino. "It's a little slice of luxury, right there."

MAG plans to add a similar slice at Oakland International Airport, where it is partnering with Jacobs in building out a smaller Escape Lounge, which is scheduled to open later this year.

During February, MSP's Escape Lounge discounted its entry fees to $25 at the door and $20 when pre-booked online. If you mention reading about the facility in Airport Improvement *magazine, the lounge will extend its introductory prices through the end of March.*

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MAG USA

Electric Car-Sharing Service Makes U.S. Debut at Indianapolis Int'l

BY VICTORIA SOUKUP

Passengers at Indianapolis International (IND) will soon have a new and greener option for getting to and from the airport: an all-electric car-sharing program.

BlueIndy, which launched local service in September, is slated to open a 20-car station in the airport's parking garage later this month. The new facility will allow arriving passengers to pick up cars at the airport and drop them off at stations near their destinations. Departing passengers will be able to pick up vehicles at stations throughout the Indianapolis metro area and return them to the new station at IND.

While many U.S. cities have vehicle-sharing services (Zipcar, etc.), Indianapolis is the first to offer one with an all-electric fleet. As such, BlueIndy provides drivers with an option that produces no carbon emissions; and the airport plays an important role in the initiative.

MARIO RODRIGUEZ

"As a key economic driver in our city, IND is always excited to embrace and take part in innovative projects, especially when it benefits the communities we serve," explains Mario Rodriguez, executive director of the Indianapolis Airport Authority. "This exciting partnership with BlueIndy will allow us to provide a new transportation option to our customers while doing so in a sustainable and economical way."

The airport's partnership with BlueIndy is the latest in a string of other environmental accomplishments. IND was the first U.S. airport to win Leadership in Energy and Environmental Design certification for an entire terminal campus. And its solar array is considered to be the largest airport-based solar farm in the world. (That project recently won IND a 2015 sustainability award from the city.)

Building the new station at IND follows other startup investments for BlueIndy's French parent company, Bolloré Group. To date, the company has reportedly spent $40 million establishing service in Indianapolis. In late 2015, BlueIndy had 200 vehicles and more than 70 charging stations throughout the city. Officials expect to expand coverage to have 500 vehicles and 200 charging stations in place later this year.

SCOTT PRINCE

Bolloré Group selected Indianapolis as the first U.S. city for its Bluecar electric vehicle service because of the city's "EV vision" and ongoing efforts to make the community more attractive to live and work, explains BlueIndy General Manager Scott Prince. "We have more than 60,000 students in the Indianapolis area. And the students and millennials want programs such as BlueIndy," says Prince. "It helps transform the downtown to a place that can attract and retain talent and increases the overall value factor of making Indianapolis a great place to live and work."

Creating an airport station was a pivotal move for BlueIndy. "IND is a very forward-thinking airport," Prince comments, noting that the new ground transportation service provides airline travelers with a low-cost way to get anywhere in Marion County. "It was an obvious part of the equation."

Indianapolis Airport Authority

FACTS&FIGURES

Project: Charging/Parking Station for Electric Car-Sharing Program

Location: Indianapolis Int'l Airport Parking Garage

Car-Sharing Service: BlueIndy

Parent Company: Bolloré Group

Bolloré's Total Local Investment: >$40 million

Airport Station Capacity: 20 vehicles

Construction: 8-10 weeks

Electrical Contractor: Miller-Eads Co.

Unique Strategy: X-raying concrete to determine location of post-tension concrete rebar

Of Note: BlueIndy is first all-electric car-sharing service in the U.S.

Customers who rent BlueIndy's electric cars can purchase daily, weekly, monthly or yearly memberships online or at enrollment kiosks throughout the city. The enrollment kiosk at the airport is located on the 3rd floor of the parking garage, near the terminal entrance and the garage's self-service pay stations. The cost of BlueIndy memberships range from $9.99 per week to $19.99 per month; additional usage fees range from 20 to 35 cents per minute.

Powered by Lithium Metal Polymer batteries developed by Bolloré, BlueIndy vehicles have a range of up to 120 miles when fully charged. Each can accommodate four passengers, or users can fold down the back seats to carry large luggage or items such as golf clubs.

From Europe to Indy

"Based on our experience in Paris, Bordeaux and Lyon, we expect the average car-sharing transaction to be about 20 minutes," reports Cédric Bolloré, the company's vice president of Development. "Indianapolis will benefit from technology and processes proven in Paris for the last four years. Now Indy will be the model for North America."

CEDRIC BOLLORE

In Paris, the company's brand is known as Autolib' — and it's the largest electric vehicle-sharing program in the world.

At IND, the decision to locate BlueIndy vehicles on the 5th floor of the parking garage was a strategic move for the airport.

With car rental operations positioned on the first floor, and floors two through four designated for customer self-parking, authority officials had to consider and balance multiple interests. They wanted to remain sensitive to travelers by continuing to offer them convenient parking. And they certainly didn't want to hamper the operation of existing car rental companies and taxi operators that service the airport.

In addition to representing a new form of direct competition for rental agencies based at IND, BlueIndy is also an indirect competitor. Companies such as Hertz and Enterprise have entered the car-sharing sector in other markets; and Zipcar is a subsidiary of Avis Budget Group. Other car-sharing services such as Getaround and Turo are taking a page from the Uber playbook and connecting rental customers with private vehicle owners.

Looking Through Concrete

Adding facilities for BlueIndy at IND required ingenuity from Miller-Eads Co., the Indianapolis firm hired to install the new station. Although each of its four charging stations can accommodate five cars, the company designed and wired the electric system to provide up to 50 simultaneous charges.

"Being in a parking garage, there weren't a lot of places we could draw power from," explains Brian Rust, Miller-Eads' project manager. "The challenge was to go down to a main electrical room, which was on the first floor and more than 1,000 feet away. It was quite far to run additional conduit."

BRIAN RUST

Crews connected service from the first floor to the fourth floor, where they installed a new transformer and panel board. From there, they subsequently ran service to the new charging stations on the fifth floor.

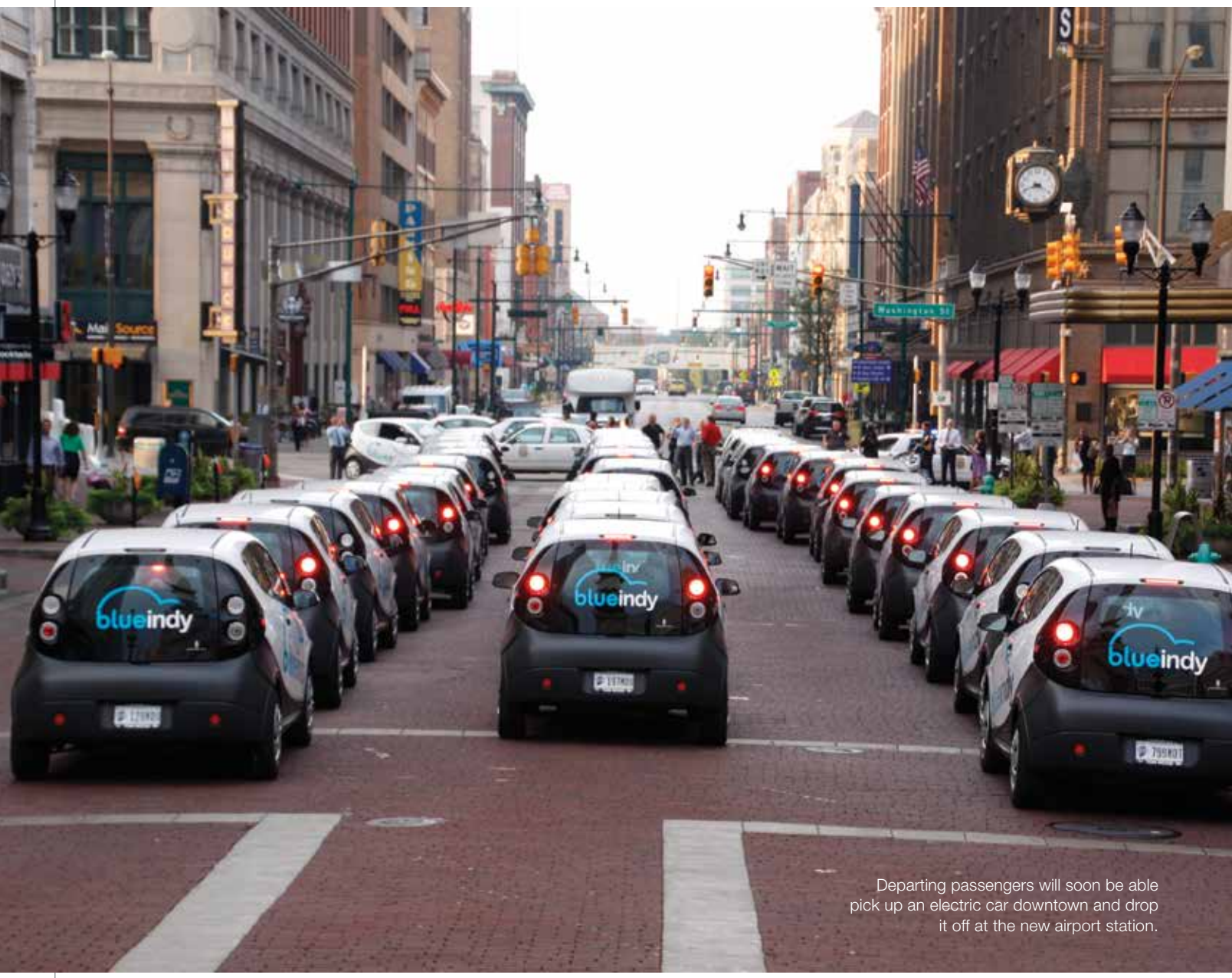
The installation also required workers to X-ray 1,500 square feet of the parking garage to ensure that vertical drilling did not strike post-tension concrete rebar embedded in the concrete. The company set aside a full week on the schedule for the vital precautionary measure.

"We ran the potential of hitting one of the cables, so we had to X-ray every little thing," Rust explains. It took crews anywhere from five to 20 minutes to X-ray a single 2-by-2-foot area, depending on how much rebar it contained.

To save money, the team employed a technique Bolloré used at one of its parking garages in Paris. Instead of drilling through concrete on the top floor, crews installed a 20-foot long, 3-foot wide metal trough to protect electrical cables.

"It's like a metal sidewalk that equipment

Airport officials safeguarded car rental operations and customer self-parking when adding a BlueIndy station at IND.



Departing passengers will soon be able pick up an electric car downtown and drop it off at the new airport station.

can sit on and cables can pass through underneath," Rust notes. "This way, we only have three or four holes that we have to core instead of almost 100 holes. It speeds up the process and keeps the costs lower, because otherwise we'd be spending hundreds of thousands of dollars X-raying the top floor concrete and coring it all."

Right at Home

In addition to being compatible with IND's other environmental initiatives, BlueIndy complements the city's long-term public transit strategy, which includes expanding bus service and adding more bicycle lanes. Electric vehicle service also dovetails with other green municipal efforts.

In 2008, former Mayor Gregory Ballard created the city's first Office of Sustainability. Four years later, he signed an executive order that made Indianapolis the first major U.S. city to commit to converting its entire fleet (except police vehicles) to electric or plug-in hybrid models.

GREGORY BALLARD

"Indianapolis is home to a growing tech sector, arts and cultural attractions, first-rate medical and educational institutions, and thriving neighborhoods," says Ballard, who did not run for reelection in November. "I've been delighted to welcome BlueIndy as a clean, affordable transit option to help connect visitors and residents with all that Indy has to offer."

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Louisville & Ford Int'l Update Brand Identities

FACTS&FIGURES

Project: Terminal Improvements; Branding/Marketing

Location: Louisville (KY) Int'l Airport

Terminal Renovations: $9.5 million

Funding: Airport authority

Expected Concessions Improvements: $8 million

Funding: Concessionaires

Design Architect: Alliiance

Associate Architect: Stengel Hill Architecture

Branding Consultant: Kolar Design

Retail Concessionaire: Paradies

Food & Beverage Concessionaire: HMSHost

Project: Terminal Improvements; Branding/Marketing

Location: Gerald R. Ford Int'l Airport (Grand Rapids, MI)

Main Terminal Renovations: $45 million

Concourse B Renovations: $12.3 million

Design Architect: Alliiance

Associate Architect/Engineer: TowerPinkster

Graphic Designer: Felder Communications Group

Concourse B General Contractor: Christman

Food & Beverage Concessionaire: HMSHost

Terminal renovation projects often provide shiny new flooring, fresh paint and updated fixtures. But they can also be an excellent opportunity to spruce up dated marketing strategies. Gerald R. Ford International and Louisville International are both seizing the chance to renovate their brand identities while remodeling their facilities.

Grand Changes

When Brian Ryks traveled to Grand Rapids, MI, to interview for the top spot at Gerald R. Ford International (GRR), his first impression of the airport was not overwhelmingly positive.

BRIAN RYKS

When Ryks stepped off a newish jet bridge in spring 2012, everything in the concourse was blue and gray. "There was really no color," he recalls. "Up and down the concourse it was very sterile looking." The bland first impression simply did not jive with updates he noticed in the airport's Grand Hall and other buildings he saw when exploring the region. Grand Rapids, particularly downtown, was vibrant and full of life, he notes.

Creating a sense of place at the airport through branding and marketing became one of Ryks' top priorities as chief executive at GRR. The airport's previous brand had been around for at least 30 years and was in dire need of an update, he explains.

Branding is important because it "introduces local flavor, differentiates our airport and helps to shape a positive travel experience," Ryks comments. Creating a new brand for GRR was a powerful opportunity to transform the airport and passenger experience, while also stimulating economic growth and promoting West Michigan, he adds.

"A strong brand is a key success factor in helping to drive customer preference," Ryks emphasizes.

For local residents, effective branding that reflects the quality of life and investments within Grand Rapids can create a sense of pride about the airport, notes Ryks. For passengers visiting the region, pleasing aesthetics, a quality concessions program and top-notch customer service all play a part in creating a positive first impression, he adds.

During Facility Renovations

BY JODI RICHARDS

Building the Brand


ERIC PETERSON

In 2013, GRR embarked on a $12.3 million project to renovate and expand its Concourse B and hired Minneapolis-based consulting firm Alliiance to lead the design efforts. “In large part, what we were doing was introducing character, theme and sense of place to the airport,” explains Alliiance principal Eric Peterson, AIA.

That mission closely aligned with Ryks’ vision of rebranding, and the two paths ultimately converged.

Local consulting firm Felder Communications Group assisted in the rebranding process by interviewing a variety of stakeholders about the goals, opportunities, strengths, challenges and tangible assets of the airport. Questions included: Who are we? Who do we serve? What distinguishes us from other airports? What is our personality? Why should customers choose us?

By sharing their opinions and knowledge, board members, airport leaders and community members assisted the design

team's discovery process. GRR's consulting team also reviewed consumer ratings and industry research. "The goal was to find our brand story and bring it to life," Ryks explains. "We knew we wanted to leverage our local DNA."

On the positive side, researchers heard that GRR is easy to navigate, with an expedited process from check-in through security and courteous staff. But a lack of concessions variety and unappealing ambiance in some areas of the airport emerged as negatives. Armed with feedback, the design team worked to leverage GRR's strengths and improve its weaknesses.

Ryks considers it important for the airport to complement and reflect the vibrant, lively and exciting things that occur in the region, because it is the first impression for visitors. "It's about allowing a customer to identify you with something," Ryks elaborates.

At GRR, that something is a canopy in front of the terminal that covers the roadway. In addition to being functional, it also reflects aviation through its airfoil shape and symbolically conjures the water and waves of nearby Lake Michigan. The canopy helps identify and reinforce the airport as an important aspect of the region, he explains.

Another way GRR communicates its brand is infusing local themes and flavors into concession offerings. Retail shops were rebranded into Grand Rapids Magazine Travel Stores, and the local craft brewing industry was added to the airport's food/beverage lineup.

Lighter colors throughout Concourse B and a terrazzo floor that communicates water themes help remind locals and visitors of the region's natural assets. Murals that illustrate Western Michigan's emblematic elements — including tulips, windmills and Lake Michigan beaches — line the concourse and immediately provide a sense of place, Ryks comments.

After the Concourse B renovation concluded in January 2015, retail revenue is up about 60%, and food/beverage receipts have increased about 40%. Airport executives attribute the impressive gains to dramatic improvements in offerings. Previously, the only bar area had just four bar stools and the sole restaurant had room for maybe 20 people, Ryks relates. Today, the concourse has many more food/beverage options and a common seating area that can accommodate more than 100 guests. The new Michigan Tap Room has 25 seats at its bar alone.

Next up for GRR is a $45 million project to create a "consistent experience throughout the entire facility," as Ryks describes it. Primary elements include expanding the Grand Hall, creating a consolidated security checkpoint and renovating Concourse A.

Creating Synergy

Synchronizing renovation projects and branding efforts can provide countless benefits, advises Peterson. Often, however, the marketing and/or public relations departments operate separately from the rest of an airport. "How you construct or renovate your airport — what you do — portrays a message about the airport," he says. "It's essentially an airport brand."

One airport's brand might be the wide breadth of flight service it provides, while another chooses to highlight its physical surroundings or how well staff members serve guests. "It's all the experiences that people have," explains Peterson. "The question is how purposeful you want to be in shaping what that brand is and communicating it."

A brand is more effective when it's reinforced from several directions, he adds. "If everybody is singing the same message and communicating the same feeling and it's authentic — which is important — then it's going to resonate and be very successful."

Print and television ads provide just one type of exposure with customers. Ads can be amplified, however, if the same message also lives in the airport and is successfully integrated into operations, explains Peterson. "It makes a unified, raised platform for everybody."

Spirited Momentum in Louisville

"Distilling Great Experiences, Setting Higher Standards" is the message Louisville International Airport (SDF) wants to impart to travelers. Officials plan to do so through a $9.5 million terminal enhancement program that kicked off in mid-January. The program is designed to update aging mechanicals, enhance the facility's aesthetics and create a stronger community presence.


CHARLES "SKIP" MILLER

SDF's last terminal remodeling occurred in 2006, and the roughly 35-year-old building needs to be "freshened up" again, explains Executive Director Charles "Skip" Miller. "The building itself as a basic structure is fine. It's in good shape and has good bones, as the architects would tell you."

While Louisville Regional Airport Authority has done an excellent job maintaining the facility, industry changes and time have taken their toll, he relates. "It's cosmetically, and from an image standpoint, that we need to do something," Miller specifies. The airport and community both see the current terminal project as a major opportunity to ensure that the image travelers receive when they come through the airport leaves a strong, positive impression.

When passengers deplane, officials want them to immediately know they're in Louisville, KY.

Like the team at GRR, personnel at SDF began the planning process for renovations and rebranding by reaching out to the local community. Roughly 20 individuals were assembled in working groups to explore the airport's facilities, its associated customer experience, current aviation trends and how they affect SDF. Participants included community business leaders who could share their experiences with customers.

According to Miller, "soup-to-nuts discussions" in the working groups helped shape and define the airport's $9.5 million project. Specific ideas provided by participants include adding more local food/beverage offerings and incorporating artwork in the terminal. The working groups also served as an important sounding board, he adds.

The roughly 10-month planning process also yielded the decision to hire Alliiance — not only to help design physical terminal improvements, but also to create and implement the airport's image and brand within the community. "We wanted a firm to approach this from both perspectives," Miller stresses.

Reaching out to business partners through the local working groups helped SDF hone in on the airport's brand, Miller reflects. "I think staff along with some well-intentioned architect could have sat back on our own and easily come up with colors of paint, terrazzo and built a specification to replace some of our escalators — that would have been the easy part. But that's not what the community or the airport authority wanted."

Stakeholders wanted more than updated facilities, he continues. Although it wasn't immediately clear what else they wanted, the working groups eventually defined it. "It took some time, effort and a lot of thoughtful discussion to find out what that *'it'* was," muses Miller.

Alliiance, in concert with Kolar Design, used interactive processes to guide the working groups through images, words and statements about the region. Together, they chose a select few that resonated the most with participants and are the "most provocative, true and long-lasting," explains Peterson.

"It was an interesting experience," Miller recalls. Three concepts eventually prevailed: beautiful contrasts, crafting quality experiences and bringing people together. Ultimately, the airport's story was summarized as: "Distilling Great Experiences, Setting Higher Standards."

Once the official motto was developed, Kolar translated it into a new logo and other graphic imagery, while Alliiance expressed the message in SDF's architecture.

Peterson notes that the brand an airport develops should become a filter or reference point to guide its design process. But it's not just an applique, he cautions. For a brand to be successful, it should be a "deeper, guiding principle that's truly connected to the region and to the other messages that the airport is putting out there. It all fits together," he explains.

After Alliiance began its design work, SDF reconvened the original working groups three more times. This allowed members to see how the airport and consulting firm were interpreting their suggestions and to "make sure we were all on the right track," says Miller.

Aesthetic Enhancements

Facility improvements, which will affect nearly all 185,000 square feet of public space in the terminal, include new terrazzo flooring and carpeting, fresh interior paint, upgrades in the area along the moving sidewalk in the landside/airside connector, four new core escalators connecting the lower-level baggage claim to the upper-level departure/ticketing areas, and new artwork and graphics.

In addition to subtly incorporating SDF's new brand, the design team also created areas where the message and associated imagery are more overt. For example, the corridor along the moving sidewalk will feature an architectural wrap showcasing four image compilations that depict experiences travelers may encounter while exploring the region, explains Bill Thiemann, managing director of creative services at Kolar. On a subliminal level, the graphics convey that the community is modern and forward-looking; but on a more literal level, it presents imagery from the community that shines a spotlight on regional stories, Peterson explains.


BILL THIEMANN

Airport executives expect the current construction program to wrap up later this year. The project is intended to be the first in a series, with each building on others to maintain the look and theme of the terminal while also retaining previous investments. "Airports spend a gazillion dollars in getting a certain finish and look, but don't have a plan going forward," quips Miller, determined not to follow the pattern. "To me, it's the missing piece every airport operator eventually faces after putting a lot of investment into facilities, because they will eventually get old and need freshening up."

Concessions Update

SDF is making a concerted effort to include retail and food/beverage spaces in its current program to create a more modern, unified appearance and message throughout the terminal. "A lot of airports go through a concessions program, then a terminal remodel, then another concessions program, and it never matches

up. And it looks just like what it is, which is a mismatch. We wanted something that does more than that," Miller relates.

Even though SDF's concession program has been "incredibly successful," authority officials want to make it even better, he explains. New contracts for both retail and food/beverage providers were issued in conjunction with the terminal project, and are expected to result in approximately $8 million in improvements. Airport officials anticipate that renovations will lead to greater retail performance and an even better customer experience.


DARRELL WATSON

Because the new branding and image plan was in place when the airport issued requests for proposals from concessionaires, the project team was able to include some design guidance to potential proposers, notes Darrell Watson, the airport's director of properties.

Ultimately, Paradies secured the news/gift contract, and the food/beverage contract was awarded to HMSHost.

New concessions will include more regional businesses, brands and culture to provide a more local feel, explains Watson. On the food/beverage side, travelers will get a true taste of the area from Book & Bourbon Southern Kitchen, Bourbon Academy Tasting Room, Coals Artisan Pizza and The Comfy Cow. In total, HMSHost will invest more than $6 million in improvements.

Retail enhancements from Paradies totaling more than $2.3 million will also highlight local flavor via the Distillery District Marketplace, Kentucky Bourbon Trail and Winner's Circle. Current retailers — including Brighton, Churchill Downs, CNBC News Express, Finish Line and Louisville Slugger — will be upgraded under the new agreement as well.

Lessons Learned

Integrating a "sense of place" into airport architecture has been around for nearly two decades, but the processes that GRR and SDF are employing move the concept into a richer realm, says Peterson. By connecting with the community and airport stakeholders, the architecture and design can broaden to not only reflect the region but also the airport's brand and what it wants to communicate to guests, he explains.

Airports that want to express a stronger image and make bigger statements about their local communities need to invest time and effort in reaching out to local business partners, advises Miller. "This is not an Internet survey of the general public asking for their ideas," he specifies. "This is a question for people who are charged with managing facilities that are attributes to the community and provide that community experience."

While not all airports have the luxury of synchronizing their branding campaign with facility renovations, Peterson emphasizes that the two should still mesh strategically and philosophically. "But if they can (occur simultaneously), don't pass up the opportunity," he notes.

Developing an effective brand and meaningful sense of place does not have to drive up design costs, but it does require extra time, adds Peterson. "You're going to have richer opportunities if you've got more money to spend," he qualifies. "But if you know what your authentic message is, you can always come back and (make sure) the design is communicating that."

Philadelphia Int'l Develops Separate

PHL PHILADELPHIA INTERNATIONAL AIRPORT

FACTS&FIGURES

Project: Security Master Plan

Location: Philadelphia Int'l Airport

Implementation: 2011-2016

Timeframe: 5-year horizon, based on changing regulations, technology & staffing/personnel

Lead Consultant: Faith Group

General Recommendations: Improvements to overall security infrastructure, cargo areas, access control system, CCTV coverage, emergency operations center

Projects Underway: Access Control System Upgrades

Resident Consultant Project Manager: Arora Engineers

Electrical Contractors: Armour & Sons Electric; E.J. Electric

Between international turmoil, nationwide security challenges and the headlines that invariably follow, Philadelphia International Airport (PHL) is implementing an autonomous security master plan.

RENEE TUFTS

As security manager at PHL, Renee Tufts is accustomed to playing in the big leagues. If a security incident occurs at a small, rural airport, news may trickle around the nation or industry; but if a similar issue occurs at a large airport, the floodgates swing wide open, Tufts explains.

Seven major airports, including PHL, received unwelcome national coverage last spring when an Associated Press report noted that collectively, they accounted for more than half of the 268 perimeter breaches at 31 of the busiest U.S. airports from 2004 through 2014. The investigation for the report was reportedly prompted by the highly publicized 2014 incident when a teenage boy hopped the fence at San Jose International (SJC) and flew to Hawaii stowed away in an airliner's wheel well.

Notably, John F. Kennedy International, LaGuardia Airport, and Newark Liberty International (all run by the Port Authority of New York and New Jersey) along with Boston Logan International refused to provide data for the report.

In response to the coverage, Tufts noted that PHL, like all airports, constantly evaluates and addresses its vulnerabilities. SJC, for instance, raised its perimeter fence from 6 feet to 10 feet.

Reproach in the general media notwithstanding, airport insiders often turn to PHL for advice and guidance about security issues. Its installation of exit lane technology

Photo: Kenneth D. Aston Jr., Philadelphia Int'l Airport

Master Plan Strictly for Security

BY NICOLE NELSON

in June 2009 was considered to be cutting-edge, and the airport continues to stay at the forefront of new security challenges as they emerge. Recently, it has been broadly praised as an industry leader for creating a formalized master plan strictly for security.

Tufts recalls the process beginning about five years ago, with a top-down evaluation of the airport's security program by Mark Gale, PHL's chief executive at the time; Deputy Director of Aviation, Operations and Facilities Keith J. Brune; and herself.

"We did not have a roadmap that we could refer to in order to see if our technology was 'keeping up with the Joneses,' so we decided to document where we were and where we wanted to be," Tufts explains. "We wanted to see where we stood nationwide with benchmarking studies: What do we do that other airports do not do? What can we do better? And what do we do just fine?"

Creating a comprehensive plan that documents specific security needs allowed the team to secure funding for projects by folding them into the capital development planning process, she elaborates.

Picking a Partner

PHL engaged its on-call security contractor, Faith Group, as lead consultant for the security master plan project.

"I think every airport has done security planning in the past because they have to look forward," says Faith Varwig, principal of Faith Group. "But it is only in the past few years that there has really been a formalized process."

FAITH VARWIG

Creating a standalone master plan for security is definitely a trend that is catching on and growing, she adds. That said, Varwig cautions operators that security master plans have a much shorter shelf life than traditional airport-wide master plans or master plans for other specific areas such as environmental sustainability or terminal construction.

"(Security master planning) has to be refreshed on a regular basis because of regulatory changes and technology changes," Varwig explains. "The whole process is a little more challenging, because it is not so set. It is not easy to get your arms around security from a long-term standpoint. The best we can usually do is put a three-year to five-year roadmap out there, and those roadmaps need to be adjusted every year."

Faith Group began PHL's comprehensive security assessment and master plan design with a baseline study of existing conditions, with team members evaluating physical and electronic systems alike.

Photo: Kenneth D. Aston Jr., Philadelphia Int'l Airport

PHL's perimeter security improvements extend beyond the airfield to include access control, badging and other interior measures.

"We surveyed all the rooms – all the network and technical infrastructure that supports all the access control and CCTV (closed-circuit television) and other security elements that the airport utilizes on a daily basis," Varwig recalls. Next, the team benchmarked PHL in relation to other airports, researched current industry trends and factored in likely future regulatory requirements before brainstorming about ways to improve the airport's security posture.

Faith Group shared its findings with PHL executives in January 2015. General categories of recommendations included improving overall security infrastructure, updating cargo areas and critical infrastructure, upgrading the access control system, enhancing CCTV coverage and improving the emergency operations center.

"Now I have a complete review of where our strengths and weaknesses are," Tufts reflects. "We broke it up into three parts: our existing conditions, gap analysis and recommendations for a six-year roadmap."

Before the 2015 presentation, the airport's annual budget included $10.9 million of access control system improvements to be completed in multiple phases.

"Technology is ever-advancing and ever-changing," Tufts comments. "We wanted to make sure that we can get to the end of the pipeline; so we started with an upgrade to our access control system. That will bring us to the latest, greatest technology."

Kalpesh Trivedi, an employee of Arora Engineers since 2003, works with PHL's engineering department as a resident consultant project manager. Trivedi has been instrumental in ushering the security projects designed by Faith Group through the city procurement process and managing the associated implementation and construction.


KALPESH TRIVEDI

"At present, we are upgrading the 20-year-old access control system throughout the airport," Trivedi reports, noting that the entire program was broken into three stages. "We already completed Phase I and are in progress with Phase II. We just went through the procurement process and are about to award the contract to an electrical contractor to start Phase III."

Meanwhile, other elements of the plan have graduated from master planning to conceptual development, where they become identified capital improvement projects. A secure perimeter — both physical and procedural — has emerged as the airport's top focus, reports Tufts.

Perimeter security not only includes protecting planes and equipment on the airfield, but also the airport's access control systems, badging systems and other security programs, he specifies.

Photo: Kenneth D. Aston Jr., Philadelphia International Airport

Now & Later

Varwig currently sees a huge emphasis on perimeter security improvement throughout the industry, even though such initiatives are generally not federally funded projects. Most are funded through individual airport capital improvement programs, which are frequently fluid. As an airport's priorities change, work sequences are adjusted and projects flow into a new calendar year/annual capital improvement budget, she explains.

"It (perimeter security) is obviously something we recommended as part of our master plan for PHL; it just wasn't short-term," Varwig informs. "You have what needs to be in a bucket for the next couple years, and then what needs to be funded in the three- to five-year timeframe."

Beyond prioritizing projects, Varwig considers it vital to continue working closely with PHL to ensure that recommendations can be realistically deployed.

"You want to look under all the rocks. You want to try to get as many viewpoints as you can. It is hard to self-assess," Varwig reflects. "Working in a team environment with the client is the best approach to assuring that the final recommendations consider all the stakeholder requirements. It is about the full spectrum – policy, procedures, technology and staffing – and how you balance all of those things together to make a recommendation that makes sense."

Blue Grass Airport Builds New Equipment Storage/

FACTS&FIGURES

Project: Equipment Storage/Maintenance Facility

Location: Blue Grass Airport — Lexington, KY

Annual Passenger Volume: 1.2 million

Annual Operations: 29,000

Facility Size: 63,000 sq. ft.

Total Budget: $15.5 million

Design & Construction Administration: $2.1 million

Funding: FAA (89%); airport's capital improvement budget (11%)

Consulting Firm: WSP | Parsons Brinckerhoff

Portable Truck Lifts: Rotary

Key Benefits: More total space; increased efficiency for vehicle storage & maintenance; roomier office & sleeping quarters for staff; increased equipment storage

Getting a new facility approved, funded and built is typically a daunting task. But every now and then, things just seem to fall into place. That was the case for Mark Day, director of engineering and maintenance at Blue Grass Airport (LEX).


MARK DAY

After working out of an old, cramped building for years, Day and his crew recently rode the wave of progress at the Kentucky airport into a new facility that is twice the size of their previous space.

Building a new facility to store and maintain maintenance vehicles near the main runway was a preliminary step LEX needed to take before crews could begin taxiway enhancements detailed in the airport's 2013 master plan. The taxiway program was needed to bolster operational safety and improve the efficiency of aircraft movement, and the airport's existing Maintenance/Snow Removal Equipment Complex and Public Safety Building were literally standing in the way. In order to realign the airport's main taxiway from the terminal area to the primary runway, engineers had to relocate both facilities.

For Day, this was a boon. "Our staff was working out of an outdated, small maintenance building, and to meet future operational needs, the airport really needed a much larger, more efficient facility," he explains. "Relocating this facility was a priority, since the other steps in the master plan depended on our old maintenance facility being torn down, and a new one [being built] at a different site."

/Maintenance Facility

BY MIKE SCHWANZ

Planners located the new maintenance building on the south central portion of the property, approximately 1,000 feet from the main runway (R-22).

Since it was paramount to get this project done first, Day had no trouble securing funds for a new facility, which is rare at most airports. Fully 89% of the $15.5 million project was funded by the FAA, while the rest of the money came from the airport's capital improvement budget.

Once the budget was approved in mid-2013, Day and his staff started the planning process. "Prior to hiring a consulting firm, several members of my staff and I visited other airports to learn about best practices in some recently constructed maintenance buildings. That allowed us to take advantage of some lessons learned by others," Day notes.

Building Scope & Site Selection

Additional square footage quickly rose to the top of everyone's most wanted list. "We needed a much larger space than we had, and room to safely park and maneuver all of our snowplows, pickup trucks, mowers and other maintenance vehicles," explains Day. "We also needed a distinct garage area with lifts for vehicle maintenance."

During the programming phase of the project, LEX personnel detailed requirements for warehouse space and loading dock capabilities. They also outlined needs for offices and staff support areas such as kitchen facilities and sleeping quarters for crews during sustained snowstorms.

In fall 2013, Day and his staff began reviewing proposals from several engineering consulting firms. By late September, they selected WSP | Parsons Brinckerhoff as the primary consultant, which teamed with local partners such as Hanson Professional Services to tackle the work. WSP | Parsons Brinckerhoff provided project management, construction administration, architecture, mechanical/electrical/plumbing engineering, and quality oversight services. Collectively, the full team delivered the remaining services: civil engineering, geotechnical engineering, commissioning and material testing.

JENNIFER KUCHINSKI

One of WSP | Parsons Brinckerhoff's first major responsibilities was validating the location for the new building, which was specified in LEX's master plan. "We had to make sure it was in the best possible location on the property, with easy access to the airfield," relates Jennifer Kuchinski, senior project manager for the engineering consultant.

Moving the equipment building was an important precursor for taxiway enhancements.

The airport's topography — rolling hills with karst (limestone), underground caverns and sinkholes — made the job a challenging one. "Considering these subterranean features and their potential to drive costs skyward, our team located the most likely high point of rock using traditional soils borings, as well as geophysical mapping, to pick the bottom of our building platform," Kuchinski explains.

In early 2014, the firm worked with Day's staff to publicize bidding opportunities for the project to the contracting community. Companies from as far as Michigan responded, and a primary contractor was selected in May 2014. That is when the project experienced a slight snag. "Unfortunately, the project was delayed a few months waiting for the release of funds from the FAA," she informs. "We finally got the green light that fall, and started construction in November."

Once work began, a construction manager and inspection personnel from WSP | Parsons Brinckerhoff remained onsite throughout the process. "The airport had an engineer dedicated to overseeing the construction process as well, which streamlined decision-making and contributed significantly in keeping the project on schedule," notes Kuchinski, who also visited the site regularly.

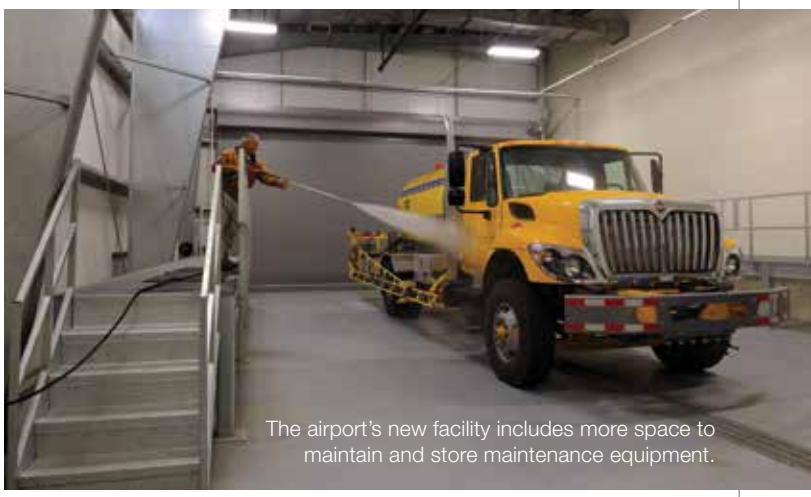
"We had some normal winter weather delays," she recalls, "but once the outside structure and roof were up and sealed, it went fairly quickly."

Crews finished construction in October 2015, which gave Day and his staff time to move in, get settled and perform maintenance on snow removal vehicles before winter began. “We are very pleased with the building, and it has made everything we do much more efficient,” he reports. “We can comfortably park all of our snow equipment, mowers, pickup trucks, and have two stationary lifts where we can raise all of our vehicles. Portable lifts are used to raise the biggest plows and the fire trucks.”

Other amenities include a vehicle wash bay, more office space, five dorm rooms with sleeping space for up to 12 people, and a fully equipped kitchen. Areas for specialty trades such as welding, carpentry and painting were relocated; and a smaller building adjacent to the main maintenance building is dedicated to storage.

“Our expanded loading dock has really helped,” Day comments. “We receive everything here for the whole airport: office supplies, restroom supplies, HVAC units, ceiling tiles — you name it. We now have enough storage space to accommodate the variety of materials that it takes to maintain the terminal and airfield.”

If he had to do it all over again, Day would make only one minor change: “I think we did a lot of things right, but I wish we had used 3-D modeling during the design process. This would have helped us better determine how spaces came together, and how rooms were oriented.”



The airport’s new facility includes more space to maintain and store maintenance equipment.

Thankful to have the turmoil of planning, constructing and moving into a new building behind him, Day looks forward to the new facility meeting the airport’s needs for at least 20 years.

Kodiak Airport Builds Into Gulf of Alaska to Add Runway Safety Areas

BY VICTORIA SOUKUP

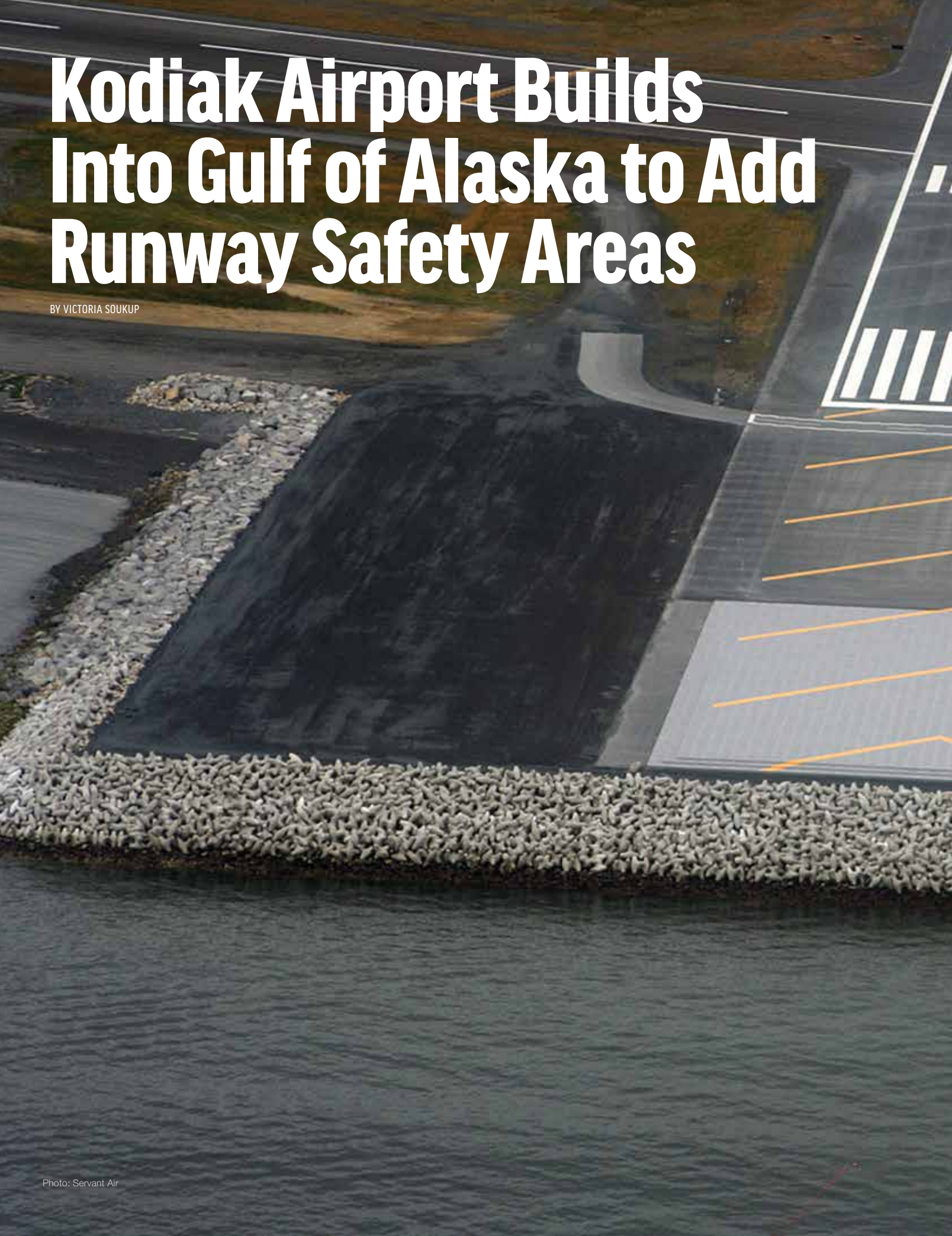


Photo: Servant Air

Kodiak Benny Benson State Airport (ADQ) faced a quandary when devising plans to meet the federal mandate for runway safety areas: There simply wasn't enough land at the island-bound Alaskan facility to add them. So planners got creative and built into the ocean.

Contractors moved an estimated 1.1 million tons of rock to fill a portion of the Gulf of Alaska in order to create enough surface area for an engineered material arresting system (EMAS) on one runway and to lengthen another runway to allow for an EMAS bed on its other end.

The $59 million project, which took 18 months to complete, was paid for by the FAA and Alaska Department of Transportation and Public Facilities. Construction ended in October 2015, in time to satisfy the end-of-year federal requirement.

FACTS&FIGURES

Project: Runway Safety Areas

Location: Kodiak (AK) Benny Benson State Airport

Cost: $59 million

Funding: FAA, Alaska Dept. of Transportation & Public Facilities

Unique Challenge/Strategy: Build extension into Gulf of Alaska

Rock Moved: 1.1 million tons

Environmental Impact Study: Mead & Hunt

Project Manager: Kiewit Infrastructure West Co.

Engineered Material Arresting Systems: Zodiac Arresting Systems (Zodiac Aerospace)

Prime Consultant: HDR Inc.

Concrete Armor Units: Core-loc, by Concrete Technology Corp.


ROBERT GREENE

"The successful completion of the project gives us an overshoot, so if a plane is landing on the runway and can't stop, the [runway safety area] will now stop it without damaging the aircraft or causing injury to passengers," explains Robert M. Greene, superintendent of the Kodiak Aleutian district agency that manages the airport. "Departing aircraft are also aided by this," he adds. "If there is a problem on takeoff and the pilots can't get airborne, they can keep the plane on the ground and stop it without significant damage."

Although 90% of the airport's traffic is general aviation, ADQ is also served by two commercial carriers: Alaska Airlines and Ravn Alaska, a regional airline. The U.S. Coast Guard operates C-130 aircraft at the airport as well.

The ends of runways 26 and 1 were extended about 600 feet into the water, where the average depth at high tide ranges from 13 to 15 feet. EMAS beds were then installed on the end of Runway 26 and at the 19 end of Runway 1-19.

The project presented significant logistical challenges for Kiewit Infrastructure West, the firm that managed the project, because materials and equipment had to be transported via barge to the remote island, often in inclement weather.


DUSTIN LEHMAN

"When any big storms came in, the barges would get delayed," recalls Kiewit Infrastructure West Project Manager Dustin Lehman. "And we got a lot of rain in Kodiak."

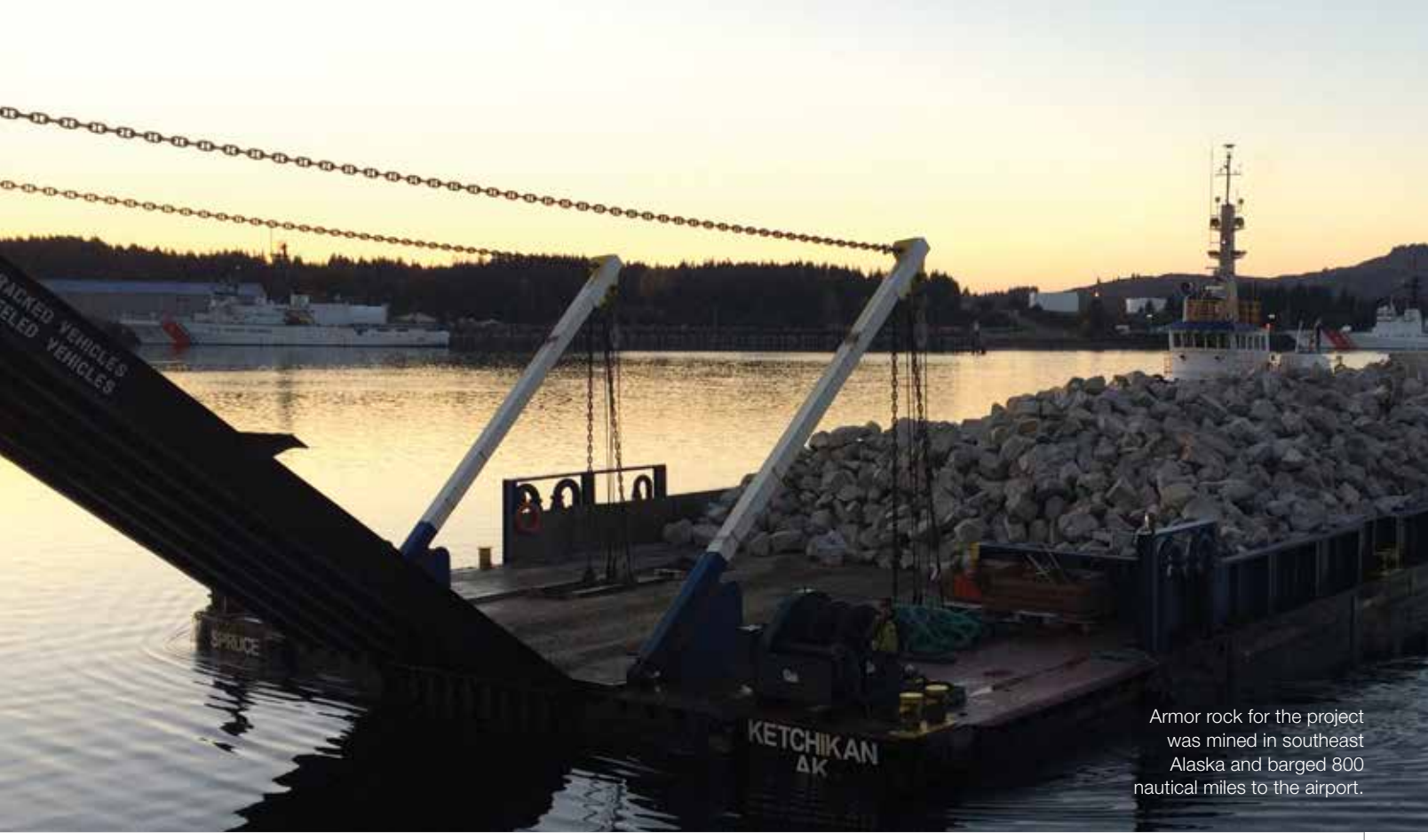
Imported Fill

The Kiewit team drilled and blasted rock from a nearby quarry, then trucked the material about four miles to the airport. Drilling and blasting were limited to daytime hours to minimize noise, and hauling and filling work was completed at night to minimize disruptions to airfield operations.

About 20 trucks, each capable of carrying 25 tons, were used for the process. Some had to be barged in from Anchorage. "You could see progress every day because we were hauling between 8,000 and 12,000 tons of rock a day," relates Lehman.

Natural armor stones, each weighing about 12,000 pounds, were positioned to prevent the fill from shifting after it was installed. Core-loc engineered units, which provide substantially more support because they lock together, were also used at the end of Runway 26 to provide additional protection from sea current and wave action, Lehman explains.

Procuring the armor rock was an effort in itself. Kiewit mined the large rocks from the Wrangell Harbor Quarry in southeast



Armor rock for the project was mined in southeast Alaska and barged 800 nautical miles to the airport.

Alaska and then barged the pieces 800 nautical miles across the Gulf of Alaska to Kodiak.

Environmental factors restricted when certain phases could be completed. The Alaska Department of Transportation, which oversaw the project, prohibited in-water work between April 1 and July 15 to protect local aquatic species.


MERLE SENA

"We were working in an area directly adjacent to the mouth of the Buskin River, which is a critical salmon habitat," notes Merle Sena, project engineer for the state transportation department. "We were also filling into Women's Bay, which is home to several species of protected wildlife — killer whales, sea lions, seals, otters and bald eagles."

After all the rock was in place, crews added a layer of aggregate to cap the surface. Electrical infrastructure was installed for runway lighting, edge lighting, taxi lights and signage. Then, the area was paved to runway specifications to allow for the EMAS installation.

Location, Location, Location

Zodiac Arresting Systems, which fabricated the EMAS blocks and supervised their installation, was also affected by challenges inherent to the ADQ jobsite. "It was a dramatic project and it was a pretty good logistical challenge to get the pieces of our system shipped to the island," recalls Hugh K. DeLong III, the company's EMAS airport civil engineering officer. "We had a combination of trucking, rail and barges going up the protected passageway out of Seattle to get to Kodiak."


HUGH K. DELONG III

Although Zodiac had previous experience designing EMAS beds for installation over water, the project at ADQ was the first built over an ocean. "HDR, our prime engineering team, had to deal with and resist some real heavy-duty forces out there," notes DeLong. "Part of the challenge was dealing with the close proximity to winter wave action from storms."

Contractors dealt with rainy, windy weather throughout the project.

The EMAS bed on Runway 19, which sits about 35 feet from the end of the runway, includes about 2,100 blocks and is designed to provide at least 40 knots of stopping power for aircraft. The EMAS bed on Runway 26 sits about 250 feet from the end of the runway, contains about 2,300 blocks and provides 70 knots of stopping power.

"EMAS is always at the end of the available space; so if you overrun, the aircraft can get stopped before you go into the EMAS," DeLong explains. "There can be substantial economies for this because you're not damaging an EMAS system and you're probably not damaging the aircraft either. With Runway 26, we set the bed back further so the airplane has an opportunity after passing the end of the runway to decelerate itself before getting into a true emergency condition where [pilots] have to rely upon the arrestor to get stopped."

Kiewit crews installed both EMAS beds in about three weeks.

Having managed other projects for the Alaska Department of Transportation, Sena knew that weather would play a considerable role throughout the project. "Kodiak is notorious for lots of rain and lots of wind," he comments. "Being on the southeastern coastline of an island in the Gulf of Alaska means we see strong storms and significant tides. It was a constant challenge to maintain

our shoreline protection measures to ensure our fill material did not get washed away during times of heavy storm surge or extreme tides. And we were always working with all affected parties so that we could adjust our operations to minimize any impact on U.S. Coast Guard operations, the air carriers and the traveling public."

Just in Case

During more than 25 years at the airport, Greene recalls two instances when he wished ADQ had runway safety areas in place.

In the first case, a Boeing 737 did not slow fast enough, so the pilot ran the aircraft into the snow to stop it. "After that incident, I realized that if the plane would have gone off into the ocean, the aircraft would probably have been destroyed and someone would have been hurt," Greene relates.

The second involved a 737 that lost an engine during takeoff. "The pilot knew he didn't have time to stop because the plane would have gone off the runway and into the ocean," Greene explains. "So they chose to take it airborne, turned it around and then made an emergency landing—all of which could have turned out bad."

With ADQ's recent project complete, pilots now have more options at their disposal, he reflects. "If there is a problem and they can't get airborne, they can keep it on the ground and stop without damaging the aircraft."

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CASE IH AGRICULTURE

John C. Tune Airport™

John C. Tune Airport Rebuilds Runway & Terminal in 2 Months

BY THOMAS J. SMITH

Photo: Aerial Innovations of TN & KY

FACTS&FIGURES

Projects: Terminal Renovation; Airfield Improvements

Location: John C. Tune Airport (Nashville, TN)

AIRFIELD IMPROVEMENTS

Primary Scope: Runway extension; runway safety area; Engineered Material Arresting System

Secondary Elements: Taxiway & apron updates; new LED runway & taxiway edge lights; new hangar floors

Total Cost: $29 million

Funding: FAA Airport Improvement Program grant; state aviation grant; airport authority funds

Runway Extension: 500 ft.

Runway Safety Area: 1,000 ft.

Engineered Material Arresting System: 186 ft. x 120 ft.

Design Engineers: Atkins

Contractors: Jones Brothers; Civil Constructors

Paving Subcontractor: LoJac Enterprises

Engineered Material Arresting System: Zodiac Arresting Systems

LED Taxiway Lights: Astronics

LED Runway Lights: Airport Lighting

TERMINAL RENOVATION

Scope: Rebuilding Original Terminal

Cost: $1 million

Funding: State; airport authority

Design: Feltus Hawkins Design

Contractor: Baron Construction

Project Elements: New restrooms, conference room, monument signage, coffee bar & customer service area

The Metropolitan Nashville Airport Authority gave contractors 60 days to rebuild the runway and terminal at John C. Tune Airport (JWN), and collectively, they rose to the challenge. In order to provide numerous crews with around-the-clock access to multiple worksites, JWN officials closed the airport from June 1 to July 30, 2015.

During the $29 million airfield portion of the project, workers extended the general aviation airport's sole runway, and added a runway safety area on the north end and an Engineered Material Arresting System (EMAS) bed on the south end.


ROBERT RAMSEY

Federal mandates helped prioritize the various projects. "The big drive was not the extension, but the runway safety requirements," explains Robert Ramsey, the airport authority's chief engineer. The 500-foot runway extension was added later during planning, when the overall project scope expanded to include the taxiway. The runway extension increased the total cost of the project by $500,000 to $1 million, he notes.

The airport completely renovated its customer service areas.

While one contractor worked on airfield improvements, another gutted JWN's original 1980s era terminal. Crews then outfitted the empty shell with new restrooms, a conference room, coffee bar and updated customer service area for a total cost of $1 million. New monument signage was also added outside.

Although construction occurred last summer, initial planning for JWN's projects began in 2011. An environmental assessment conducted by engineer of record Atkins determined that a traditional 1,000-foot runway safety zone was not feasible on the south end, due to the Cumberland River and a park at the end of the site. To the north, the land-locked airport is constrained by a bluff. The FAA's preferred option was to install an EMAS bed on the south end, informs David Schilling, Atkins' AVP - senior project manager, Aviation Services.

In addition to satisfying new safety area requirements, engineers changed the profile of the runway to meet current FAA standards. Crews milled the old pavement and blended it with fresh crushed aggregates before applying the mix in layers to create the appropriate grade. Some areas required an additional 3 feet of material.

During the project, crews also rebuilt the airport's taxiway, refurbished one-third of the apron and updated 28 hangars with new concrete floors. Ten

Projects included $29 million of airfield improvements and a $1 million terminal renovation.

Photo: Aerial Innovations of TN & KY

miles of new cabling was installed to support more than 150 new LED edge lights for the runway and taxiway.

60 Means 60

Ramsey compares scheduling JWN's airside and landside projects during a 60-day closure to pulling off a Band-Aid quickly to minimize the associated pain. The only alternative to a total closure raised during early planning sessions was to use the taxiway as a runway during airfield reconstruction. Ultimately, that was not a viable option, because the taxiway was too far from runway standards, he explains. Using the taxiway as a runway would have also stretched out the work for about nine months, with associated operational implications.

As planning progressed, bid specifications for the various projects noted that the 60-day runway closure was not negotiable. Furthermore, contractors were told to bid anticipating around-the-clock construction during the 60 days, adds Ramsey.

In the end, contractors typically worked 18-hour days, although weather delays necessitated some 24-hour stints near the end of the project. Major airfield elements included a 500-foot extension to the airport's original 5,500-foot runway; installation of a 1,000-foot runway safety zone on the north end; and construction of a 186-foot by 120-foot EMAS bed on the south end.

Runway and taxiway construction were bid a full year prior to the actual work, so contractors could participate in the project planning process, obtain materials and line up necessary equipment. Planners drafted a detailed game plan that sequenced every step of the projects, notes Schilling.

Before officials closed the runway and the "flag dropped" for construction to begin on June 1, crews had already moved 750,000 yards of soil and rocks and staged concrete blocks for construction of the EMAS bed.

To stay on top of the work once it began, the team held weekly executive meetings with principals from all of the contractors. "There was a lot of involvement and accountability," Ramsey recalls. "If you were not on schedule, we asked, 'What can we all do to get the project back on schedule?'."

He recalls one snag developing before the runway reopened, when the electrical airfield contractor fell behind. The prime contractor "stressed the importance" of airfield lighting to

the overall project and, ultimately, hired an additional company to assist the original electrical contractor.

After the runway was completed on July 30, crews began rebuilding the taxiway, which was completed in December.

Economic Implications

As the primary airport for corporate traffic in the region, flight volume at JWN has grown as Nashville has grown, Ramsey reports. In 2014, the airport handled approximately 72,000 flights. During JWN's 60-day closure, flights were diverted to Nashville International Airport and other general aviation facilities in the region.

The recent 500-foot runway extension will enable flights into JWN from as far as Houston and Denver without intermediary fueling stops. Currently, the airport has four executive hangars and 125 T hangars; but JWN's master plan includes building seven to eight new hangars every other year for the next 10 years.

Ramsey characterizes the airport's current traffic as a "good mix" of corporate and general aviation traffic. Musicians and executives from health care companies and various other businesses are primary corporate clients.

Healthcare and the auto industry are now the primary drivers of the local private economy, he explains. Several hospital groups, Nissan North America and the U.S. headquarters of Bridgestone tires all have headquarters in Nashville.

"During football season, you cannot find a space on the ramp — especially for Vanderbilt's home games," he adds.

FAA's Airport Improvement Program funded 90% of the $27 million runway and taxiway projects, and the state and airport authority each contributed 5%. Ramsey notes that the airport was able to use in-kind material donations for its matching funds by securing excess fill dirt from contractors throughout the region.

A state aviation grant funded 90% of the $1 million apron upgrade; and the airport authority provided the 10% balance.

The $1 million terminal renovation project was funded by state grants (60%) and the airport authority (40%). The authority tapped JWN revenues and obtained a loan from Nashville International Airport to pay for its portion of the project. JWN anticipates repaying the loan with revenue from increased fuel sales and tenant rents.

Photos: Aerial Innovations of TN & KY

FAA Tests Green Pavement Materials

BY DAN VNUK

Federal Aviation Administration

FACTS&FIGURES

Project: Airfield Pavement Research

Location: FAA National Airport Pavement & Materials Research Center

Part of: William J. Hughes Technical Center — Egg Harbor Township, NJ

Facility Cost: $3.8 million

Construction: Aug. 2013 - May 2015

Building Contractor: Eagle Construction

Key Elements: 6 pavement test strips, each 300 ft. long (4 outdoors; 2 indoors)

Key Equipment: Remote-controlled heavy vehicle simulator by Dynatest U.S.

Simulator Size: 130 ft. long, 16 ft. wide, 14 ft. tall; 240,000 lbs.

Simulator Cost: $4.2 million

Key Benefits: Facilitates testing of environmentally friendly airport pavement materials & related products such as airfield markings, rumble strips, etc.

Research that may lead to more widespread use of "green" runway pavement materials is underway at the FAA National Airport Pavement & Materials Research Center, in Egg Harbor Township, NJ. Engineers at the new facility use a custom-designed heavy vehicle simulator to test asphalt and other pavement materials at high tire pressures and temperatures.

The pavement-specific complex is part of the William J. Hughes Technical Center, which conducts research on a variety of other aviation topics, including air traffic control, communications, navigation, airports, aircraft safety and security. The Technical Center is the primary facility supporting the NextGen system.

Until recently, the FAA had not recommended the use of environmentally friendly pavement materials for airfield projects, because research regarding the effects of aircraft tire pressure and heavy gear loads on them had been limited. Thanks to current efforts at the agency's new facility, the use of green materials and pavement products that can be modified to enhance durability, workability and strength may become more common in the future.

Real-World Testing

There are two main ways to ensure that a product or component functions as it was designed and built to perform: destructive and non-destructive testing. Engineering labs often opt for computer-simulated (non-destructive) tests due to their lower costs, time requirements and other constraints. But they can only show how a product is *intended* to perform during actual use.

Products with critical health and safety implications, however, require destructive testing. Cars with crash dummies as passengers get smashed, critical devices are set on fire or exploded, and testers run engines and motors at full throttle until they fail. Determining how much pressure runways can withstand and still be within safe limits is one of tasks engineers perform at the new FAA center.

Construction of the test facility began in August 2013 and was completed in May 2015 at a total cost of $3.8 million.

An integral component is a $4.2 million vehicle simulator that was designed specifically for testing airfield pavement and was delivered to the center in November 2013. The multi-wheeled testing vehicle is 130 feet long, 16 feet wide, 14 feet tall, and weighs 240,000 pounds. Despite its size, no drivers or researchers ride in or on it. Engineers operate the large equipment via remote controls.

"The heavy vehicle simulator has an automated heating system that allows engineers to replicate and analyze the damage that heavy commercial jets can cause to the top asphalt layer during summer months," explains the FAA's Navneet Garg, Ph.D. "The vehicle was designed to simulate heavy commercial aircraft wheel loads and tire pressures, and can show how repetitive aircraft operations affect pavement performance."

FAA engineers operate the simulator on a variety of "real-world" surfaces, including four outdoor pavement strips, each 300 feet long. Two indoor areas of the same size allow for testing in a more controlled environment.

Using the remote-controlled vehicle, engineers can simulate 20 years of aircraft traffic in just a few weeks, Garg notes.

FAA engineers also use the simulator to test the performance of airfield paint markings and rumble strips.

FAA engineers use a $4.2 million heavy vehicle simulator to test how repetitive aircraft operations will affect pavement performance.

Greener Future

Previously, a lack of research regarding environmentally friendly airport pavement materials prevented the FAA from recommending their use; but change is in the works. "The FAA is seeking ways to expand the use of green materials, along with materials that can be modified to enhance pavement durability, workability and strength," says Garg. "This will help airport operators save money by lowering the costs of initial construction, maintenance and repairs, and will provide a longer pavement life."

Extensive testing is required, given the rigorous conditions airfield pavements must endure. "On new generation aircraft like the Boeing 787 and Airbus 350, tire pressures can range from 220 to 250 psi (pounds per square inch), while runway pavement temperatures can reach 140 to 150 degrees Fahrenheit as far north as New York City," explains Garg. "The FAA's specially designed vehicle simulator has an automated heating system that allows engineers to replicate and analyze the damage that heavy commercial jets can cause to the top asphalt layer when runways are hot. The vehicle simulates the behavior and weight of aircraft tires, so that researchers can learn and can show how repetitive aircraft operations affect pavement."

For testing purposes, engineers use a single- or dual-wheel load module that extends down from the carriage to apply the desired amount of load against the runway test pavement. The data obtained from taxi tests will be used to develop standards and specifications for using various technologies such as warm mix asphalt, stone matrix asphalt and recycled asphalt pavement on airfield surfaces.

Research indicates that a fully loaded airplane can cause the most damage while taxiing from the gate to the end of a runway for takeoff. Wide-body jets such A380s can exert between 55,000 and 65,000 pounds of weight per wheel on airfield pavement.

"The heavy vehicle simulator uses hydraulic actuators that allow FAA lab engineers to accurately apply 'real-world' forces and pressures in tests that produce very precise results, thereby saving time and money," says Jeffery Gagnon, manager of the FAA's Airport Pavements Research and Development Team.

"New airport runways are occasionally being built," he comments. "But old ones are being completely rebuilt or overlaid for many good reasons beyond wear-and-tear — including the availability of new materials and changes in aircraft landing gear design, wheel loading and traffic levels."

Avoiding Winter Woes

CARLTON BRALEY

Carlton Braley is the assistant airport director of Operations and Facilities at Manchester-Boston Regional Airport and has presided as its "Snow Boss" for 21 winter seasons. Currently, he oversees operations, safety, security, maintenance and emergency preparedness for the airport.

Braley is chairman of the International Aviation Snow Symposium Academic Committee and helped develop the Aviation Snow Academy. He is also certified by the state of New Hampshire as a fire officer and public manager.

Few news reports grab my attention more than regulatory action within the industry. When I heard about airports being fined for activities related to winter operations, my first inclination was to find out what happened so my airport could avoid the same consequences. Then I began to worry whether our industry is somehow failing in this area.

By following the news coverage and speaking with operators at facilities that had experienced similar fines, I learned that airports were being cited for not responding properly to unsafe winter conditions. The specifics ranged from unsatisfactory braking surfaces and not adequately clearing snow and ice from operating areas to insufficient staffing and failure to notify pilots about unsafe ground conditions. There was one common factor: not complying with regulations.

We all know that regulations created and enforced by the FAA Office of Airports come in several different forms, and we need to comply with *all* of them — not just to remain compliant, but to ensure safe operations.

FAR 139.313 requires certificated airports to prepare, maintain and execute a snow and ice control plan authorized by the FAA, according to the methods and procedures described in Advisory Circulars. Grant Assurance #19, Operations and Maintenance, requires airports to always operate in a safe and serviceable condition — including the need to notify pilots of any conditions outside normal operations.

A solid Airport Certification Manual (ACM) helps demonstrate that a facility is complying with FAA regulations. Specific responses for winter weather should be detailed in a Snow and Ice Control Plan (SICP), within the ACM. Airports that do not follow an approved SICP risk fines and other repercussions.

What We Did

Upon hearing the conditions that led to fines at other facilities, personnel at my airport reviewed our SICP. We asked ourselves many questions: Did the SICP need to be updated? Had airfield conditions changed since the plan was written and approved? Did we have the proper resources in place to meet response procedures? Were we accurately reporting airfield conditions in a timely manner? Most importantly, we asked ourselves if we were sufficiently staffed with properly trained personnel.

Like many other facilities, my airport hires seasonal and temporary personnel for winter operations. Historically, we advertised for these positions in October and filled them by the first of December. Lately, we have had to begin the hiring process in August to ensure that we have enough properly trained personnel. In addition to Department of Homeland Security criminal background checks, we also require a state driver history, pre-employment drug and alcohol screening, physical ability assessments by a doctor, security training and Aircraft Operation Area driver training.

What You Can Do

Training is available to help airports remain in compliance — and, more importantly, safe — during winter operations. The International Aviation Snow Symposium (IASS), presented by the Northeast Chapter of the American Association of Airport Executives (AAAE), is at the heart of this training. The event includes general sessions and break out discussions that specifically address winter operation topics such as condition reporting and runway braking co-efficiencies. One of the most popular sessions is "Lessons Learned," where attendees learn from other airports' success and mistakes.

The basic academic curriculum for winter operations written by the IASS committee includes training about Advisory Circulars, weather forecasting, snow and ice control equipment, sand and chemical use, various human factors and communications. An advance program provides management-level training about Advisory Circulars, ACMs, SICPs, funding/procurement procedures and human resource management. It also addresses the financial impacts and available reimbursements for winter operations.

Stay Safe

Historically, U.S. operators are aware of their obligations and have done an outstanding job keeping airports safe and operational during all types of weather. The facilities that were recently fined for infractions have already adjusted their plans, boosted training and improved operations. By doing so, they continue to improve the overall safety of winter air travel.

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