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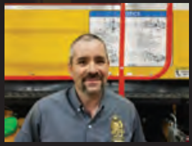

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Podcasts Arrive at *Airport Improvement*

My wife, Lisa, is hooked on podcasts. She used to listen to music; now she's into podcasts. Same for my kids. The episodes are educational as well as entertaining, and time whizzes by when listening to them.

Just a few years ago, not many people listened to podcasts. Now, they're one of the hottest communication vehicles in both consumer and business media. From my vantage point, podcasts were one of the biggest changes to serving up content in 2017.

The most popular podcast of the year, *This American Life*, reached about 2.5 million people every week. Another popular option, *Pod Save America*, started in early January and had 1.5 million listeners by the end of November. That's a force to be reckoned with—and a testament to the growing popularity of the medium.

A few months ago, an aviation podcast producer approached *Airport Improvement* about teaming up. Would we be interested in helping with distribution? Sure. While just about all of the content on our website is originally developed, I thought it worthwhile to consider what Runway.VC has to offer.


PAUL BOWERS, PUBLISHER

Fast-forward to today, and we now offer you one more way to access information about airport projects. Take a listen. You'll find the podcast tab in the upper right-hand portion of our homepage, www.airportimprovement.com.

It's our pleasure and honor to be a part of this great industry. We consider podcasts to be another way to connect airport professionals with one another and showcase the best our industry has to offer.

Cheers,

Paul

Minneapolis-St. Paul Int'l Leverages Technology & Advisory Panel to Expand Universal Access Far Beyond Legal Requirements

BY KEN WYSOCKY

FACTS&FIGURES

Project: Equitable Accessibility

Location: Minneapolis-St. Paul Int'l Airport

Program Elements: Video sign-language interpreting; tech-assisted navigation for sight-impaired visitors; flow-through elevators; wheelchair-accessible dining tables; all restroom sinks & stalls at accessible heights/dimensions; airport tours/prep sessions for passengers with special needs

Funding: General airport revenue

Facilities Design: Alliiance

Key Stakeholders: Travelers with Disabilities Advisory Committee; Open Doors Organization

Video Sign-Language Interpreting: Voiance Language Services

Cost to Airport: $2.49 per minute for service; iPads to provide connection

Navigation System for Sight-Impaired Visitors: Aira Tech Corp.

Key Benefits: Improving access; treating all passengers equitably; exceeding Americans with Disabilities Act mandates

Video-relay sign language interpreting for travelers who are deaf or hard-of-hearing. Camera-equipped glasses that facilitate real-time navigational cues for visually impaired passengers. Flow-through elevators and restrooms specifically designed for wheelchairs. Improved pictogram signage to communicate crucial wayfinding directions without written language.

If this sounds like a futuristic, pie-in-the-sky vision of airport accessibility, it's not. All of these measures and more already are in place at Minneapolis-St. Paul International (MSP), one of a growing number of airports that are going well above minimum standards required by the Americans with Disabilities Act (ADA).

"Our goal is to be the world's most accessible airport," says MSP Operations Director Phil Burke. "We want to create that brand, as well as get the message out that any airport can do this. It just takes commitment."

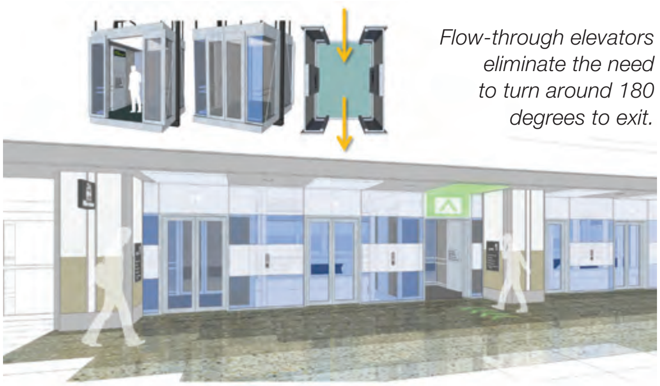

PHIL BURKE

Burke elaborates that MSP's goal is *equitable* access rather than equal access. Equitable facilities provide everyone with the same experience while equal facilities often mean separate, stand-alone accommodations and features just for travelers with impairments, he explains.

Wider restroom stalls are a classic example of MSP's approach. Instead of adding one or two wider stalls per restroom, the airport made all of its stalls wider. Similarly, it didn't install one shorter sink among a bank of standard-height fixtures; all sinks stand at a wheelchair-accessible height. "There's a difference between equal and equitable," Burke emphasizes.

Alliiance, the Minneapolis firm that designed the project, embraced and implemented that important nuance. One wider restroom stall or appropriate-height sink isn't sufficient if it's already in use when someone else needs it, explains Eric Peterson, an Alliiance principal and terminal planner/designer. "Providing equitable access everywhere eliminates that differential," he notes. "It's much better than making someone wait or making them travel farther into the terminal to find an available stall."

ERIC PETERSON



Flow-through elevators eliminate the need to turn around 180 degrees to exit.

Another good example is pass-through elevators, which allow users to enter on one side and exit through the opposite side. The two-door design eliminates the need to turn around to exit—a difficult maneuver to make from a wheelchair, especially when the elevator is packed with other travelers. "No one has to change their direction; everyone has the same experience," explains Peterson.

Valuable Advice

Airport officials and architects don't intentionally ignore the needs of travelers with impairments, emphasizes Peterson. Fully accommodating *everyone*, however, isn't always top-of-mind.

"Most architects try to serve the public well; it's part of our professional obligation," he says. "However, too many projects just focus on meeting minimum ADA standards. MSP has made a concerted effort to go above and beyond—to be organized about this and maximize equitable accessibility. That's a much more deliberate approach than just relying on the experience and good intentions of planners and designers."

The key to MSP's ongoing efforts is a structured approach, says Peterson. In 2014, the airport added a Travelers Advisory Committee to its existing Customer Service Action Council. The committee includes 26 airport staffers and frequent flyers who collaborate quarterly to improve the overall travel experience at MSP. For accessibility issues, the rubber meets the road via an adjunct Travelers with Disabilities Advisory Committee. Also created in 2014, it includes 28 members, primarily local residents with a variety of different disabilities who represent the needs of their wider communities.

The two advisory groups provide meaningful input regarding facility improvements, notes Burke. "The organizational structure is not that complicated," he adds. "Any airport can do it—and should be doing it."

Real-life perspectives from people with disabilities are invaluable to MSP's quest for equitable access. Burke points to new holdroom seating as a prime example. Chairs marked with the familiar wheelchair symbol used to be blue, while all other nearby chairs were black. Committee members asked airport officials to make the designated chairs black, too (but retain the wheelchair symbol), so users wouldn't feel different from everyone else.

"The takeaway from this is that we used to make assumptions based on good faith," Burke explains. "We thought it was a great idea to set those chairs apart; but input from the committee made us realize that there's no need to call special attention to them with color. It all goes back to providing the same experience for all our travelers."

Change Isn't Easy

Going above and beyond ADA compliance wasn't always smooth sailing, Burke acknowledges. "I understand that most people think it will cost more money, or that it could divert revenues to design facilities to a higher level than code requires," he comments. "But that's not the case at all. In fact, you can flip that around: If you design facilities to a more universal code, more people can use those facilities, and you can make more money."

He says that it's difficult to pinpoint the exact cost of MSP's above-and-beyond accessibility efforts, but the lion's share of expenditures for improvements have been minimal. Some—such as reprogramming electronic signage—cost nothing at all. For example, variable-message signs on the departures level used to flash two different messages: first a wheelchair symbol, then the words "Doors 2 and 4." When members of the advisory committee indicated it was unclear exactly what services were available at the doors, the airport added a third message: "Assistance available."

"We literally made the change on the fly during a TDAC (Travelers with Disabilities Advisory Committee) meeting," Burke says. "It was a great example of the airport listening to the disabled community."

Tables without central pedestals make dining areas more accessible for customer in wheelchairs.

As another example, Peterson cites the airport's decision to install new tables in dining areas. Although two-person tables supported by a central pedestal are standard in most airports, the pedestals prevent wheelchairs from rolling far enough under the table for comfortable use. The solution at MSP? Install two-and four-person tables supported by corner legs instead of central pedestals.

"Now, someone in a wheelchair can sit in every part of our food court facilities," Burke points out. "That's essentially a no-cost difference— just an awareness on the front end of designing that creates a more uniform experience for everybody."

Another subtle change involved shifting from escalators to elevators as the dominant means of vertical transportation. Elevators (especially pass-throughs) are more convenient and safer for mobility-challenged people than escalators. As such, Peterson says it simply make sense to design more elevators into facility plans.

"Typically, escalators are located in central areas, and elevators are way over in some corner," he explains. "If you have more elevators, centrally located and clearly marked, it's easier and more accessible for everybody."

In October, MSP opened a station that repairs and services mobility equipment such as wheelchairs and scooters. After testing the new concept, the concession was ready for customers during the busy Thanksgiving and winter holiday travel seasons. The station is run by Scootaround, which also provides replacement equipment and offers short-term rentals.

Video-based sign language interpreting is available at any airport information desk.

New Technology

While many accessibility programs center on mobility challenges, MSP broadened its efforts to address the needs posed by other disabilities, such as sight and hearing impairments. A good example is video-relay interpreting for visitors who use American Sign Language.

The ADA code requires TTY (TeleTYpewriter) devices at a limited number of pay phones for people who are deaf or hard-of-hearing, but the airport chose a more modern approach. Input from its advisory committee led MSP to deploy a video-based option from Voiance Language Services.

Here's how it works: Travelers can pick up an iPad at any information booth, and an assistant helps them connect on screen with an interpreter who is fluent in American Sign Language. "It turns into a three-way form of communication between the interpreter, the customer and the assistant who helped the customer log in. It's working out beautifully," reports Burke.

The airport pays $2.49 per minute for the service, with monthly bills amounting to a few hundred dollars. Multiple iPads are available at each of its 10 information booths, with coverage in both terminals.

In a similar vein, MSP is testing a tech-based solution to help vision-impaired customers navigate the airport. The system, developed by Aira Tech Corp., includes eyeglasses with cameras mounted on the frames. When a user dons the glasses, the camera transmits whatever the wearer is "seeing" to a remote assistant, who verbally narrates whatever route the airport visitor takes.

"The glasses and the camera literally become the eyes of the person who's blind," Burke explains. "They tell them that there's a bathroom on the right, for instance, or what airline gate they're passing by. It's like a virtual escort."

MSP also works to address the special needs of many other visitors, including those with cognitive and psychological challenges and height and size extremities. For many years, personnel have offered monthly tours and programs designed to familiarize travelers with autism (especially children) with the airport's layout and process. (For more details on the program, consult our Sept. 2014 issue.) In 2015, MSP expanded the program to include any traveler who wants to feel more comfortable with the airport experience. The goal is to reduce stress for customers by providing practice with typical procedures such as entering the terminal, checking in for a flight, going through a security checkpoint, boarding an aircraft and finding the right seat.

MSP's goal is to provide all customers with the same experience, regardless of disabilities or differences.

Gender-neutral restrooms are a welcome addition for transgender customers and families or caretakers assisting opposite-gender travelers. The airport also offers special facilities for pregnant and nursing mothers, the advanced elderly and guests with service animals. Moreover, plans are in place to add adult changing stations in 2018 or 2019.

Growing Enlightenment

As more airports raise their standards for accessibility, architecture and planning firms will need to follow suit. Peterson predicts that they'll find the process gratifying.

Work in Progress

ERIC LIPP

When spinal surgery forced Eric Lipp to use a wheelchair for two years, the experience provided an epiphany that prompted him to establish the Open Doors Organization, a nonprofit group dedicated to improving accessibility in travel and tourism for people with disabilities.

"I had to fly to Montgomery, Alabama, and it was a nightmare," recalls Lipp, who now uses a leg brace and cane, and occasionally rides an electric scooter for longer distances. "So I started Open Doors [in 2000] for a pretty self-serving reason…there was no advocacy group pushing for accessibility in the travel and tourism industries. Disabled people didn't have access to the keystones of travel—places like airports, hotels, cruise ships and restaurants, not to mention theaters, museums and so forth."

Airports that don't make facilities as accessible as possible do so at their own risk, he notes. Each year, approximately 6 million air travelers self-identify as having a disability, and they spend an average of $20 per person at airports. Conservatively, that amounts to $120 million a year. Lipp suspects the spending total may be even higher, because many people won't admit they have a disability when asked.

"I know of one big airline that's pushing 1,500 wheelchairs a day," he notes.

On an overall basis, Lipp describes the current state of airport accessibility as a work in progress. "That says it all: good, bad and indifferent," he explains. "We're not there yet, but people aren't saying 'no,' either."

Lipp refers to the biggest obstacles as the two M's: mindset and money. It's not that airport executives fail to care about accessibility; most simply lack a deep awareness of the issue, he explains. "My job is to touch someone at that executive level…so that it (accessibility) becomes a bigger initiative."

When awareness isn't an issue, funding often still is an impediment. But improvements don't have to be expensive, Lipp emphasizes. "Think about it: You substitute door levers for door knobs. How hard is that? Or make bathroom stalls longer and add some handrails, so they're all ambulatory-accessible. That doesn't cost all that much, and it's good for everybody."

Lipp highlights Minneapolis-St. Paul International (MSP) as a national leader in airport accessibility. He commends its attention to detail, right down to the mechanics of restroom doors. Instead of closing completely, they stop about a quarter-inch from the doorframe, so blind people can use their canes to discern if a stall is occupied. "That's just good design," he comments.

Between new construction and renovation efforts, opportunities to improve accessibility abound on many fronts. "Airports always seem to be planning new projects," he explains. "And when they do, they need to make sure there's a seat at the table for architects who understand good design."

Lipp also encourages airport executives to do some role-playing to better understand the need for improvements. Put on a blindfold when clearing the security checkpoint; or navigate the concourse in a wheelchair, for instance. "It's like secret-shopping your own airport," he explains. Moreover, he advises airports to form accessibility advisory committees, like the one created at MSP. (See Page 9 for more details.)

Looking ahead, Lipp says that growing consciousness bodes well for the future of improved accessibility at airports. "I see it spreading across the globe, not just in the United States; and that's very cool," he muses. "We're making this a reality."

"At Alliiance, we enjoy creating places where people can live their lives to the fullest," he relates. "Airport and travel are exciting things…and to be able to make a difference in travelers' lives is a strong motivator for us. Through working with MSP, our awareness has grown considerably; they have opened our eyes to the importance and power of equitable design.

"But the bigger message is what it takes in terms of commitment and internal structure for airports to make this happen," he adds. "It has to become a cultural thing for airports like MSP, as well as the planners and designers working with them."

Burke, who recently teamed with Peterson to present a seminar on equitable accessibility at a SMART Airports and Regions conference, emphasizes that there are compelling business reasons for airports to make it a priority when planning new facilities or redesigning old ones. But he also recognizes that improving access is about more than costs and revenue. As he says, "At the end of the day, it's just the right thing to do."

Clinton Nat'l Focuses on Passenger Comfort in Latest Round of Terminal Improvements

BY VICTORIA SOUKUP

CLINTON NATIONAL AIRPORT

FACTS&FIGURES

Project: Concourse Improvements

Location: Bill & Hillary Clinton Airport–Little Rock, AR

Cost: $25 million

Primary Improvements: Free Wi-Fi, power in every seat, upgraded restrooms

Architect: Alliiance, in association with Polk Stanley Wilcox & Woods Group Architects

Seating: Vitra

Wi-Fi: Aruba

Customer Satisfaction Surveys: Phoenix Marketing Int'l

Boarding Bridges: JBT AeroTech

Data Supplier for Flight Info Display System: Com-Net

Parking Guidance System: Carlo Gavazzi

Revenue Control System: DESIGNA

IQ Technology for Waiting Lines: SITA

Carpeting: Shaw

Flight Info Display System: NEC; LG

Digital Antenna System: Verizon Wireless

Airline Podiums: Beard Breeding Millwork

Paging System: ComNet

Of Note: Individual projects follow a unified vision so changes executed over many years remain cohesive

PHOTO: KAREN E SEGRAVE

Ronald Mathieu believes in three things regarding infrastructure projects: listening to customers, doing it right the first time and preparing for the future. As executive director of Bill and Hillary Clinton National (LIT), Mathieu stayed true to each of those core principals while overseeing $25 million of recent enhancements throughout the concourse of the Little Rock, AR, airport.

RON MATHIEU

Specific improvements include free Wi-Fi throughout the terminal, power/charging outlets in every seat and upgraded restrooms. The changes are part of a decade-long effort to modernize facilities in incremental steps. The development strategy was designed to allow the airport time to strengthen its financial position in between investments and has helped LIT become one of the few airports in North America that is 100% debt-free.

"We understand that people have a choice," says Mathieu. "They can come to us, they can go to another airport or they can drive. We have to give our customers more reasons to not only fly, but more reasons to fly out of Little Rock. It's a competitive market, and we need to understand our customers' needs. It's important to not only meet the expectations of our customers, but to exceed those expectations every single day."

Passenger Amenities Take Priority

All of the improvements made in the past year were geared at providing more "creature comforts" for passengers, notes Mathieu. Previously, the airport concentrated on structural changes: expanding the ticketing lobby, moving baggage screening machines behind ticketing counters and expanding the security checkpoint. After nearly $70 million of improvements were completed in 2013, airport officials originally planned to stop and regain some financial footing before moving forward with additional improvements.

Then a weak economy took hold and passenger loads did not increase as expected. "We were planning to build a new concourse and baggage claim before our passenger count dropped, but decided to move forward with renovating our current concourse instead," explains Mathieu.

About the same time, the airport hired a marketing research firm to help gauge customer experiences and preferences. Phoenix Marketing International conducted weekly on-site passenger surveys and found LIT's satisfaction numbers to be in the mid-80s—a figure that concerned Mathieu. "Now, we have a 98% overall customer satisfaction level, whereas nationally, the average airport customer satisfaction level still sits in the mid-80s," he reports.

Having third-party personnel interview passengers rather than LIT employees secures "true feedback" and provides the airport ideas about what improvements are needed, he says. "What we learned in this process is that it doesn't matter what you think, it only matters what the customer thinks. At the end of the day, we serve the community."

Power to the People

Once Mathieu and his staff learned what customers were thinking, they knew how to proceed. No more cords on the floor or passengers battling over power outlets and USB charging stations at LIT. The airport installed more than 800 power-equipped MedaGate seats from Vitra. "We have power in every seat—not only USB, but also AC power," he comments. "And it's a smart USB, so it knows if it is a 2.5-amp phone or a 5-amp iPad that needs to be charged, and it adjusts automatically."


HENDRIK WOYWOD

The new seats are made of recyclable and die cast aluminum to support the airport's sustainability goals, and are arranged in five- and six-seat configurations throughout the terminal. "Typically, in the past, you had an arm rest and seat, and arm rest and seat," says Hendrik Woywod, a Vitra sales specialist. "Little Rock selected a slightly different configuration because they wanted to offer more space for their passengers. They have two dedicated arm rests per seat, and between the seats is a power arm with two regular power outlets and two USB chargers where customers can charge phones, tablets or laptops."

Because the power arms include Vitra's newest technology, they will accommodate connection upgrades down the road, Woywod notes. "The airport really planned for the future with this type of system." In addition, LIT maintenance staff can easily change the seating configurations with two allen wrench-type keys.

"They spent a little bit more money, but if demand changes due to gate reconfiguration, the airport can easily reconfigure the units themselves," Woywod explains. "That will save the airport a lot of money going forward. With just the two keys, they can put everything together and do it themselves. The beauty of the system is that there is no special knowledge required."

As currently configured, the new seats allow customers to "power up" their devices throughout the terminal. Improved connectivity due to a new Wi-Fi network and digital antenna system allows them to hop onto the Internet in a flash.

"I think we have the fastest Wi-Fi of any airport in the U.S. and internationally," Mathieu says, noting that LIT's new system operates at more than 200 megabytes per second. "And we do not subject our customers with having to see an ad or submit their email addresses and other information so they can get on the web. We simply ask them to accept the terms and conditions,

New seating includes smart USB connections that automatically adjust to the different amp needs of various devices.

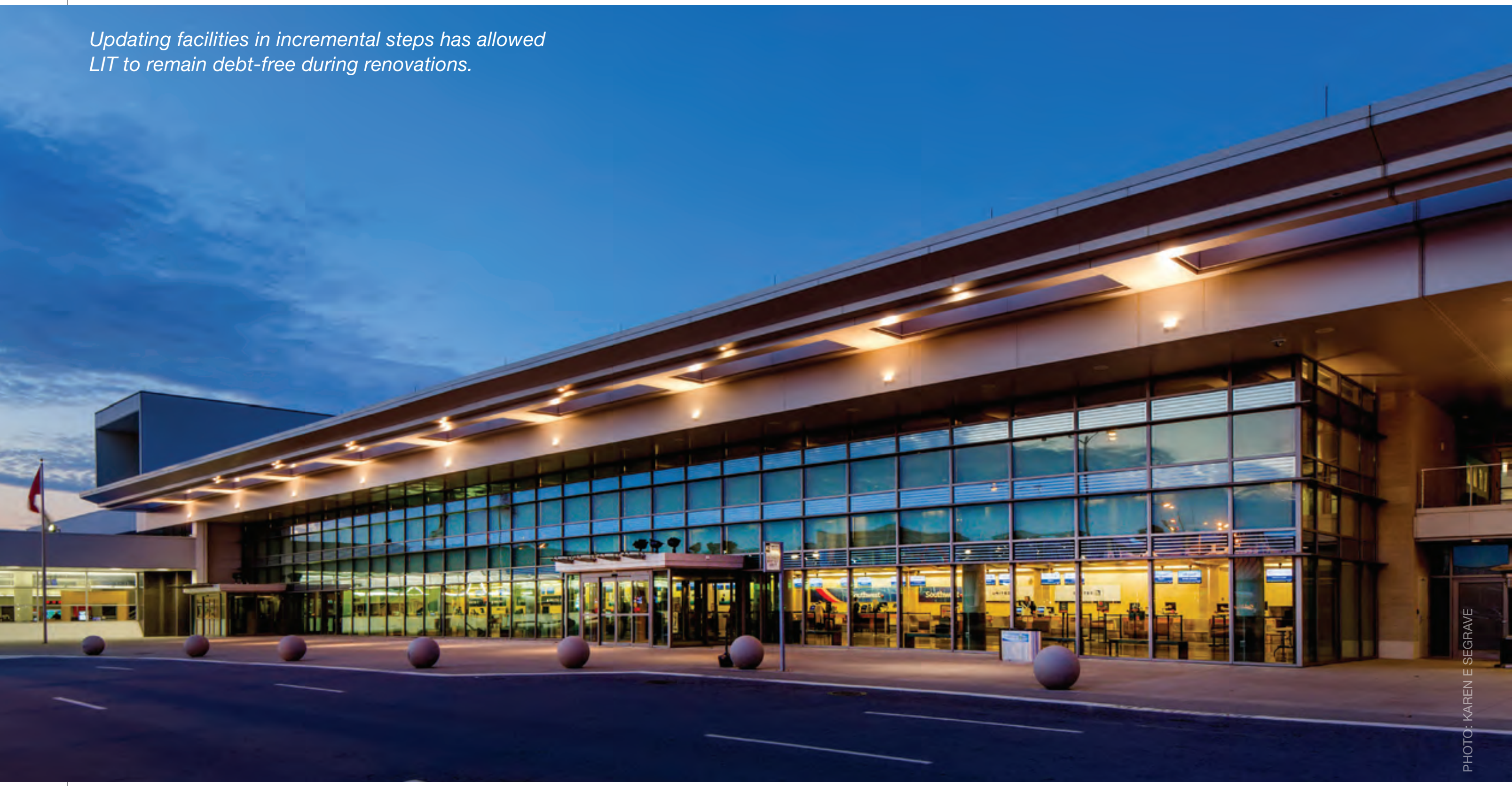
and 'boom,' they are on the web. It is a true enhancement for our customers."

Investing in Basics

Negative survey comments about restrooms inspired LIT to dramatically improve and expand its facilities—to the tune of $3.76 million. Designers upgraded 13 existing restrooms with brighter finishes, new lighting, additional stalls, hands-free fixtures and new air dryers. The airport also added two new restrooms, two additional family/companion restrooms and a mothers' nursing room.

ERIC PETERSON

Principals from Alliiance, the lead architecture/design firm for LIT's recent and decade-long program, emphasize the importance of this particular initiative. "Restrooms are important because they are one of the highest-ranking aspects that determine passenger satisfaction," says Eric Peterson, AIA. "If you can make them uplifting and easy to



Updating facilities in incremental steps has allowed LIT to remain debt-free during renovations.

clean, that can go a long way toward improving your passenger experience." Nice materials, good lighting and proper dimensions are other key factors, he adds.

In a project justification report, airport officials explain that the new restrooms and upgraded facilities will prove especially valuable during peak demand. The previous facilities, which were designed for traffic patterns from the early 1970s, were often overwhelmed when traffic was high, explains Mathieu.

The recent restroom upgrades also tie into the airport's overall focus on the future. The new and newly improved facilities will help accommodate passengers from the opposite side of the concourse when future construction will necessitate closing restrooms there.

Peterson attributes the success of individual projects such as restroom improvements to the airport's disciplined approach to working toward specific objectives established at the beginning of the overall program. "We helped the airport create a roadmap that could guide them," he relates. "So when incremental projects come about, there is a unified vision."

Sticking to the vision throughout the years has yielded success on a variety of fronts—from aesthetics and functionality to technological and financial, notes Peterson.

One key piece of the original plan was to replace all existing jet bridges. Previously, airlines had been responsible for their own boarding equipment, and the condition of bridges at LIT varied widely. "One airline didn't even have a jet bridge, and some customers were arriving in the rain and snow," says Mathieu. "We felt that reflected negatively on us, and we did not want that."

The airport has already replaced five bridges and plans to replace three more within the next couple years.

Other recent enhancements include new holdroom podiums for airline staff, larger flight information display system monitors and a new paging system. The airport also replaced flooring tile with carpeting to reduce noise from rolling suitcases and make the concourse quieter.

Looking ahead, LIT plans to begin concessions improvements early this year. New restaurants will be added, based on customer feedback. Chick-fil-A and Chili's are reportedly high on the list.

Maintaining the Vision

Peterson says that all of LIT's improvements—from previous structural work to more recent passenger experience enhancements—fit with its carefully orchestrated vision. "It was never a notion that all components of the project would be implemented all at once or even by a concrete end date," he relates. "If you just started to piece-meal improvements, it could look like a 'hodge podge.' The magic here was to develop an architectural language that could be implemented over time that would work with the existing structure and still provide a new level of quality and updated image."

Peterson credits Mathieu for having the foresight to fund LIT's long-term improvement program in a manner that didn't place undue financial burdens on the airport. "Ron helped deliver some really incredible improvements to the passenger experience," observes Peterson. "The commission and staff were great partners—they really bought into and fostered the idea of stepping back and understanding the full vision."

With five new boarding bridges in place, the airport plans to replace three more in the next few years.

For example, when Alliiance was first hired, the airport needed a new baggage screening facility as soon as possible. "The project could have been a 'hurry up, build it and we'll figure out the rest later' type of project," reflects Peterson. "Instead, the commission and staff paused to really understand the long-term vision plan. So we knew how the baggage screening facility would fit in and support the larger vision. It may have delayed the project a little bit, but it was absolutely the right thing to do. And it was great leadership from both the commission and staff to make that decision."

Mathieu says that whatever the future brings—perhaps a new concourse or international service—the most important thing is to ensure that LIT is financially healthy and listening to its customers.

"I focus on doing things once," Mathieu adds. "When we built the baggage screening facility, we built it with growth in mind. We have 1 million enplanements per year, and we can grow to 5 million without having to do anything. We must do all things with an eye on the future."

Not incurring debt to make improvements is another key objective. "You have to focus on the money first to make sure that is straightened out, and then turn around and deliver services and improvements to the customers," says Mathieu. "We will never get to a place called perfection, but we will hopefully obtain excellence along the way. You have to put yourself in the customer's experience, you have to listen to what they tell you. Just because you think the signage and restrooms are fine, doesn't mean that customers think that. Just because you think the speed of the Wi-Fi is fine doesn't mean the millennials think it is. At the end of the day, you need to blow their socks off."

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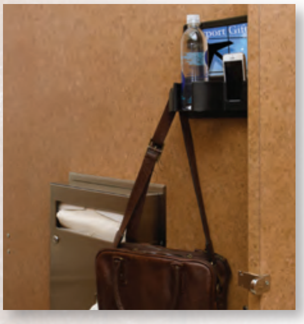

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Baltimore/Washington Int'l Boosts Morale With Onsite Gym, Healthy Food Options & More

BY JENNIFER BRADLEY

For more than 20 years, travelers, airport employees and the general public have enjoyed the 12.5-mile Hiker-Biker Trail that loops around the outside of Baltimore/Washington International Thurgood Marshall Airport (BWI). It even includes bike rentals for just $13 per day and passes through a park with a playground.

RICKY SMITH

"It's being used at a higher rate today than when we first opened it," says Ricky Smith, the airport's chief executive officer. "As with the rest of the country, people here are becoming progressively more health- and fitness-conscious. Our passengers are just a microcosm of the larger society. They are looking for ways to engage in healthy activities when they have extra time at the airport."

In addition to its outdoor trail, BWI provides two indoor walking paths, an onsite gym and notably healthy food/beverage options. In fact, the Physicians Committee for Responsible Medicine named BWI the Healthiest U.S. Airport in 2014. Although the award focused on benefits for passengers, Smith notes that

FACTS&FIGURES

Project: Health & Fitness Amenities

Location: Baltimore/Washington Int'l Thurgood Marshall Airport

Concessions Developer: Fraport (formerly Airmall)

Outdoor Feature: 12.5-mile Hiker-Biker Trail

Indoor Options: ROAM Fitness Center; 2 American Heart Association Walking Paths, each 1K long

Gym User Fees: $25 for day pass, $100 per month, $350 per year; special staff discounts & corporate rates

Internal Achievement: 95% of food/beverage vendors offer healthy options such as protein smoothies, gluten-free pizza, turkey or vegan burgers, etc.

National Accolade: Healthiest U.S. Airport in 2014—Physician's Committee for Responsible Medicine the various offerings also create a healthier, happier workplace for employees.

Multiple Workout Options

The airport's two indoor walking trails are designated as American Heart Association Walking Paths. Each single-kilometer loop takes most users about 20 minutes to complete. One route is located on the upper level of the terminal's public side; the other is on secure side of concourses A and B. Signs on the walls mark the paths, and maps are available at the airport information desk.

"It's not unusual to see four or five Southwest Airlines employees walking up and down the concourse in a brisk way, getting in a walk," Smith reports.

Building on the popularity of its walking paths, BWI added an in-airport workout facility last February. ROAM Fitness offers passengers a new way to maintain their fitness routine while traveling and provides a popular employee perk. The 1,175-square-foot gym at BWI is the company's first location and has been a long time in the making. Ty Manegold, co-founder and president of ROAM, explains that the team formed four years ago with a vision to bring its new fitness option to airports around the world.

With the gym at BWI up and running, the company hopes to have 20 U.S. locations within five years. Its next targets are San Francisco International, Denver International and John F. Kennedy International. Overseas, Dublin Airport is at the top of its list. Plans to develop international locations focus on targeting airports with U.S. Customs and Border Protection Pre-Clearance Checkpoints.

ROAM designed its fee structure for wide appeal: one- to five-day passes for transient travelers and month-long or yearly memberships for frequent flyers and employees who are at the airport on a more regular basis. All users receive full access to the workout facility (cardio equipment, free weights, medicine and stability balls, yoga props, etc.) and a 15-minute shower with towel service. Annual members can reserve shower time 24 hours in advance. Bathrooms are outfitted with automated fixtures, flight information displays, Amazon Alexa dots and high-end toiletries such as Malin + Goetz bath products.

A new fitness center helps customers and employees maintain their workout routines at the airport.

TY MANEGOLD

Manegold explains that the team tried to think of any possible travel situation and prepare for it. Visitors can use complimentary Brooks running shoes and lululemon clothing; Wi-Fi provides easy access to their usual workout music or treadmill entertainment; and packaged health food and beverages provide pre-workout fuel and recovery nutrition. Visitors who bring their own workout clothes can even shrink-wrap them before leaving at no charge.

"Now the odors don't permeate the rest of your luggage, and we have free single-use Defunkify laundry detergent packets as well," he says. "We want this to be as seamless as possible."

Airport Sherpa, BWI's internal delivery service, helps eliminate a common obstacle for passengers without enough time to eat and exercise. Now, they can do both: Work out for 30 minutes at ROAM, order a salad and protein shake online, jump into shower and meet the food delivery person at their gate.

When launching its post-checkpoint gym concept, one of the first hurdles ROAM had to clear was convincing airports that a fitness center was worth the opportunity cost. In the end, airports began to see that a workout facility provides curb appeal and is a positive option for passengers and employees, says Manegold. It also leads to increased sales in other areas of the facility, he adds, noting that research shows happy travelers spend more money.

"We are bringing in individuals that normally go straight from Security to their gate and aren't making any transaction whatsoever," Manegold explains. "This picks up money that was left on the table and results in secondary transactions."

Fully 60% to 70% of the customers at the gym at BWI are departing travelers, and many are repeat visitors who come to the airport early to work out before they take off. Arriving travelers are less common but not unheard of, and some are red-eye travelers who just want a shower or a more private place to stretch.

The company offers discounted rates for airport and airline employees. "We think what we're doing not only benefits the passenger, but the greater airport community as a whole," says Manegold. "We want people to feel happy, healthy and like they used their free time efficiently."

Apparently, that idea is resonating. "We're seeing more and more employees beginning to make use of that facility and fit the workout into their flying schedule," reports Smith.

A trail that loops around the airport provides a free, outdoor workout option.

Healthy Concessions

Airport officials appreciate the balance that their concessions manager strikes between trendy health food items and traditional favorites that are often less nutritionally virtuous. Fraport (formerly Airmall) realizes that at the end of the day, its vendors need to make a profit by offering products that sell, Smith explains.

"You can go to Pie Five's and get a veggie pizza, or you can get one that might send you into cardiac arrest," he says with a laugh. "It just depends on your preference."

BRETT KELLY

Fraport has been the concessions developer/landlord at BWI since 2003, growing from a handful of vendors with a couple dozen units to 89 individual leaseholders operating 116 units. Brett Kelly, vice president of Airmall Maryland, attributes the growth to a number of factors: a targeted focus on local-, small- and minority-owned businesses; more choices for travelers; and more revenue for the airport. "More competition is good for everyone, most notably the passenger," notes Kelly. "The benefit to the passenger is most evident: More choices equals more satisfaction. We know through passenger feedback that this is one of the many considerations travelers take into account when choosing an airport. It's a win-win."

Fully 95% of the food/beverage vendors at BWI offer health-oriented options such as protein smoothies, gluten-free pizza and turkey or vegan burgers. Gachi House of Sushi receives glowing online reviews for its traditional items, plus extra compliments for its "frushi" (fruit sushi). "Passengers no longer have to give themselves a 'pass' on maintaining healthy habits just because they are traveling," explains Kelly. "BWI makes it a priority to help passengers and employees alike to stay committed to a health-conscious lifestyle."

Fraport's street pricing allows both groups of customers to buy with confidence and not worry about overpaying because they're at an airport, explains Kelly. Airmall was the first company to introduce the pricing model at U.S. airports, he adds.

"Passengers speak with their dollars," Kelly continues. "Sales per enplanement [at BWI] is at an all-time high near $11, and is in the top 10 percent in the nation and growing every year."

Smith is especially pleased with Fraport's work to help the airport offer diverse food options for all passengers. "They make sure that we have at least one dedicated health food option on the concourse and the others have something on the menu," he explains.

Employee Satisfaction Factor

"Don't lose sight of the fact that these health and fitness amenities are things employees can benefit from as well," advises Smith. "It will go a long way in helping establish the customer service personality you want in your workforce. Healthy people are happier people."

On that note, the Maryland Aviation Administration is developing a more structured wellness program that will include health incentive programs for BWI employees. Meanwhile, Smith reports that the airport's current exercise and healthy dining options have already made a noticeable impact engaging the employee base. Some of his office personnel use the ROAM Fitness center every morning.

Employees also help balance use of the facility throughout the day, notes Manegold. "It's really a blessing how it works out," he reflects. "When the airport and airline employees have time off to use it is usually when we don't have passengers in. It never feels like we're overbooking the facility and helps us hedge against the normal volatility of the ups and downs that concessionaires must deal with."

He compliments BWI for supporting its employees with healthy amenities that are more typical of large corporate campuses.

Advice From the Trenches

After working on health initiatives with a variety of airports, Kelly suggests looking close to home when adding healthy food/beverage options. Starting locally has allowed Fraport to expand programs organically and provide concepts that are in tune with an airport's specific mission and community, he explains.

Kelly also recommends expanding services by offering options like the ROAM Fitness center. "That has been one of the most beneficial partnerships we've made to serve the health-conscious passenger," Kelly relates. "But space-constrained airports can consider something as simple as stationary bikes in holdrooms or common areas."

Lastly, Kelly stresses the importance of engaging the airport audience for feedback, because consumers' definitions of "healthy" can vary considerably. With food trends ranging from paleo and vegan to Atkins and gluten-free, Kelly notes that customers look for different things and are willing to tell airports what they want. The ability to customize food items without compromising service is especially important in airport settings, he adds

Smith agrees, noting that BWI is currently trying to achieve two very different goals: make the airport easy to get through quickly, while also making it a destination where visitors want to linger. "We want to be ahead of the game, and offer those experiences here," he explains.

New Connector Facility Improves Access & Convenience at Los Angeles Int'l

BY JODI RICHARDS

Most terminal connectors are simple structures—enclosed hallways without much additional utility or aesthetic flourish. The five-level connector that opened at Los Angeles International Airport (LAX) in 2016 is an entirely different story. The new, modern facility that joins Terminal 4 and the Tom Bradley International Terminal includes a checked baggage inspection system, an interline baggage transfer facility, its own TSA passenger checkpoint and a public plaza with outdoor seating.

The $148.5 million project greatly improved the travel experience by allowing passengers to move more easily between the new International Terminal and the south side of the airport campus, notes Cynthia Guidry, deputy executive director for the Planning and Development Group of Los Angeles World Airports (LAWA). "While Terminals 4, 5, 6, 7 and 8 are connected through a series of tunnels and corridors, the connector to the Tom Bradley International Terminal (TBIT) completes the link that allows travel between all of those terminals and TBIT without having to clear TSA screening a second time," she explains.

Previously, passengers rode shuttles between terminals. Now, they walk or take automated people movers through an atrium with natural lighting. *The Los Angeles Daily News* estimates that the new terminal connector saves connecting passengers about 45 minutes. The quicker, easier access helps them make use of lounges, concessions and other amenities throughout the airport.


CYNTHIA GUIDRY

The new four-lane TSA checkpoint on the lower level is designed for passengers arriving on international flights who had contact with their baggage in Customs and need to be rescreened before reentering the secure side of the airport, Guidry explains. Passengers connecting from a domestic flight to an international flight are able to remain on the secure side and no longer need to be rescreened.

In addition to improving convenience and access for travelers, the multi-use connector also enhances operating efficiency for resident airlines. LAWA funded its $114 million portion of the project through a combination of passenger facility charges, TSA grants, LAX funds and airport revenue bonds. American Airlines, the dominant carrier in Terminal 4, paid $34.5 million for the design and installation of the checked baggage inspection system that is used by the carrier and its international code-share One World partners that arrive at the International Terminal to connect with domestic flights operated by American.

CAGE served as the main consultant for the baggage handling system, and Turner Construction designed and built the overall connector facility. Not surprisingly, the 104,170-square-foot project was a long-term initiative. Some of the buildings were initially conceptualized during the design of TBIT in 2009—specifically, the structures that would connect the new terminal with Terminal 4 to the south Terminal 3 to the north. Airport officials began collaborating with American Airlines in 2010 on a structure to connect TBIT to Terminal 4, and construction began in early 2014. While most of the connector debuted in fall 2016, the walkway on the top level opened to passengers in February 2016 and the remainder of the public space opened a few months later.

Los Angeles World Airports

FACTS&FIGURES

Project: Connector Facility

Location: Los Angeles Int'l Airport

Strategy: Improve customer experience by connecting Tom Bradley Int'l Terminal & Terminal 4 with each other & installing inline baggage handling system

Size of Connector: 104,170 sq. ft.; 5 levels

Primary Components: Checked baggage inspection system; south matrix interline baggage transfer facility; 4-lane passenger security checkpoint; public plaza with outdoor seating on upper level; South Terminals Passenger Bus Port for future use

Cost: $148.5 million

Funding: Los Angeles World Airports-$114 million; American Airlines-$34.5 million

Completed: Sept. 2016

Facility Design & Construction: Turner Construction Co.

Baggage Handling System Consultant: CAGE

Baggage Handling System Drives: SEW-EURODRIVE

Baggage Handling System Controls: Brock Solutions

Baggage Handling System Integrator: Daifuku Webb

Baggage Handling System Installation: Ludvik Electric

The new inline screening system includes five CTX-9800 machines.

A facility for passenger buses that will serve the South Terminals was constructed during the connector project, but is not yet in use. LAX will open the bus port as passenger traffic dictates.

Inline Baggage Screening

Removing bulky baggage screening equipment from the lobby of Terminal 4 and relocating it inside the connector created more space for airline operations. The energy-efficient components in the new handling system support LAWA's sustainability goals.

American Airlines began planning for an in-line checked baggage inspection system more than a decade ago, but was challenged by a lack of space, Guidry explains. When the connector project paved the way for a new baggage system, CAGE was selected to design, construct and commission it. The new multi-level handling system includes interline sortation at the ramp level and an inline screening subsystem on the concourse level. The system uses five CTX-9800 machines in the Checked Baggage Inspection System and Checked Baggage Resolution Area, and contains more than 450 conveyors.

Often, the design/layout of a new baggage handling system is restricted by existing terminal space. In this case, CAGE essentially had a green field site because the new system is located between two terminals. "We had a little bit more liberty to design a more optimal solution and space plan around that since the facility was new," explains Senior Vice President Greg Blunt. "That was advantageous for us."

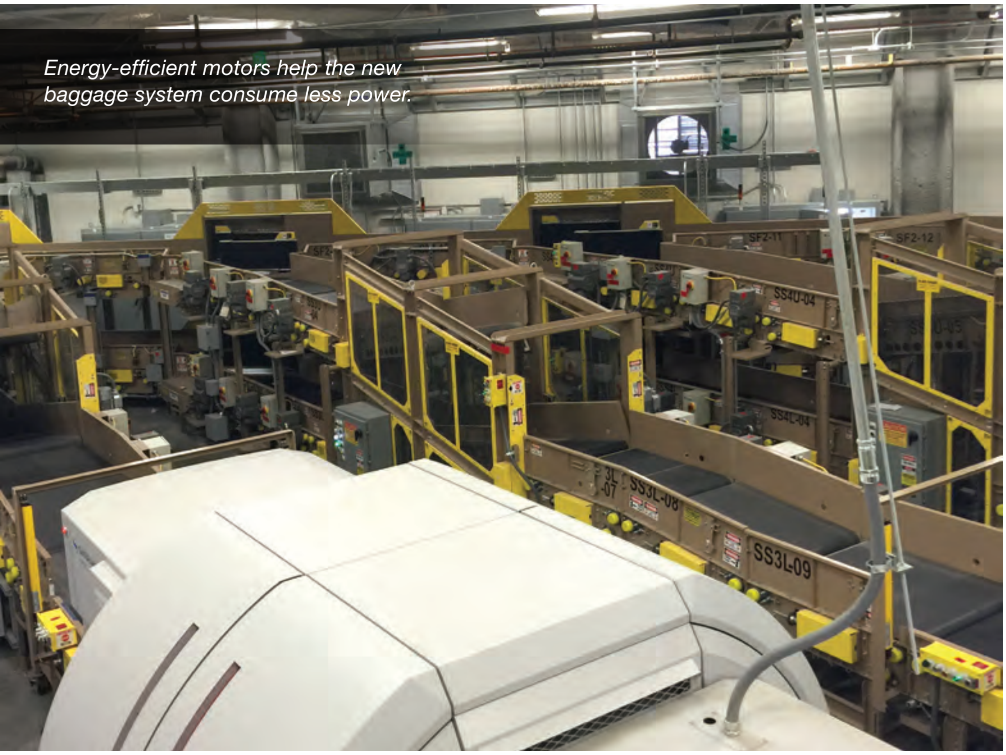
GREG BLUNT

MICHAEL STEWART

When designing the system, engineers balanced LAX's space constraints and energy-conservation goals with its current and future screening demands. The SEW-EURODRIVE motors they specified were key components. Movigear Mechatronic drives require less incoming power (reducing the full load amps by more than half) and decrease the energy needed for ongoing operation, says Michael Stewart, the firm's aviation industry manager. "Airports can virtually double the size of the bag system with their existing power station," he notes.

Compared to traditional options, Movigear motors are also more compact, produce less noise and require less space, which makes them easier to maintain, adds Stewart.

TSA personnel who work around the baggage handling system all day appreciate that the new drives create less noise and radiate less heat, as well as ergonomic advantages that are especially noticeable in


Energy-efficient motors help the new baggage system consume less power.

tight spaces such as the checked baggage inspection area.

Because the recent project at LAX was SEW-EURODRIVE's first installation of Movigear motors in the United States, the company built a test system to "debug some of the design concerns." The trial run also provided valuable training for electrical and mechanical contractors, as well as LAX personnel who now maintain the system.

In full operation since mid-2017, the new baggage handling system has been highly reliable, efficient and accurate at screening bags, reports Blunt. It's a flexible design that can accommodate expansion for future growth, he adds. If passenger traffic in Terminal 4 increases, the new system can handle up to 2,800 bags per hour.

Sustainability Standards

The TBIT-Terminal 4 connector is the first non-residential building constructed in the city of Los Angeles certified to L.A. Green Building Code Tier 2 standards. According to project officials, it exceeds stringent California Title 24 energy use requirements by more than 37%.

The facility's notable green features include:

- a "cool roof" designed to reflect almost 80% of the sun's energy;
- an energy-efficient baggage handling system that consumes 40% less power;
- a ventilation system in the baggage screening area that leverages natural breezes to help cool baggage equipment;
- renewable energy infrastructure, to facilitate future installation of a photovoltaic system and emerging technologies that will further reduce energy consumption;
- use of LAX's new Central Utility Plant, which provides heating and cooling at a more efficient rate than a standalone system;
- interior paints and finishes with low volatile organic compounds
- drought-resistant plants that are native to California; and
- LED lights in all public areas, with high-tech controls that sense daylight and minimize energy consumed for artificial lighting.

When building the new connector facility, contractors recycled fully 84% of the associated construction waste.

In addition to surpassing L.A.'s strict green building requirements, the window-lined facility features ample natural light and provides travelers with sweeping views of flight operations on the south side of the airfield, notes Guidry.

High-tech controls that sense natural daylight minimize the energy consumed for artificial lighting.

Between Two Terminals

The airport only had to close parts of TBIT and Terminal 4 when adding the connector. Both remained operational and open to passengers throughout the multi-year process.

Finding and relocating underground utilities at the construction site proved to be a challenge. LAX researched various technologies to facilitate the process, and crews ultimately used ground-penetrating radar and electro-magnetic pulse technology, a tool used by the U.S. military.

The project also involved the development and use of Building Information Modeling to support planning and proactively identify potential construction issues. The computerized system greatly assisted American and LAX during installation of the checked bag inspection system by clearly showing conflicts between utilities and the new baggage handling system, reports Guidry.

Coordinating with all stakeholders—Customs and Border Protection, TSA, airport security and others—before the design process led to successful discussions and problem-solving, she adds.

Transparent communication and close coordination, plus experienced onsite staff, were critical throughout the entire project, agrees Blunt.

With the TBIT-Terminal 4 connector proving its worth in operational efficiency and passenger convenience, airport officials are planning on joining TBIT with terminals 1, 2 and 3 on the north side of the airport. The new connector and a ground transportation link to the Metro rail system are key components of a $5 billion modernization project slated for completion by 2024.

O'Hare Int'l Continues to Expand Cargo Capacity With New Landside Warehouse

BY PAUL NOLAN

Wander through the new Northeast Cargo Facility at Chicago O'Hare Airport (ORD), and you never know what you'll see. It could be a multimillion-dollar racehorse, a 1950s Ferrari restored to impeccable condition, or something so unique it's hard to tell exactly what it is.

"The value of the cargo that goes through those facilities is enormous, and the range of specialized shipments that it can handle is staggering," says Ginger Evans, commissioner of the Chicago Department of Aviation.


GINGER EVANS

The 240,000 square feet of new warehouse space that opened last year builds on recent expansion that helped ORD become of one of the country's busiest global ports of entry. (See sidebar on next page for more details.) Chicago Mayor Rahm Emanuel joined Evans and other officials from the public and private sectors at a formal celebration in August to celebrate the new facility.

The $220 million project opened early in January 2017, and was Phase II of a three-phase northeast cargo development project. Phase I—a 540,000-square-foot facility—also opened ahead of schedule, in September 2016. Phase III, which will add approximately 135,000 square feet, is scheduled for completion in early 2020. All told, the final complex will include 915,000 square feet of warehouse space.

Umbilical Cord for Global Commerce

Evans explains that the new cargo facility is a direct response to strong demand for moving air cargo through ORD to markets around the world. The project is a cooperative effort between the city of Chicago and Aeroterm, a private real estate developer that specializes in airport industrial projects. Aeroterm is leasing the facility completed in Phase II to Swissport and Burak, two leading cargo handling companies. Cargolux leases some of the aircraft ramp. Tenants of the larger Phase I facility include DHL, Total Airport Services and Alliance Ground International. The city invested more than $62 million of airport funds to build a taxiway to support Phases I and II of the project.

Once Phase III is completed, officials say that ORD will boast the largest airside cargo development built at a U.S. international gateway airport in the last decade.

Chicago is one of the top U.S. destinations for air trade with China. Trade with Asian countries continues to grow each year as new capacity becomes available at ORD. Currently, the bustling airport serves more than two-dozen cargo carriers from Asia, Europe and the Americas.

CHICAGO CDA DEPARTMENT OF AVIATION

FACTS&FIGURES

Project: Landside Cargo Warehouse

Location: O'Hare Int'l Airport (Chicago)

Size: 240,000 sq. ft. (Phase 2 only)

Approx. Cost: $220 million (all 3 phases)

Owner: Aeroterm

Tenant Operators: Swissport; Burak; Cargolux

Construction: Completed in Jan. 2017

Special Feature: Ramps for 747-8s

More to Come: Facility is 2nd portion of 3-phase project that will ultimately include 915,000 sq. ft. of warehouse space; Phase 3 scheduled for completion in 2020

"Cargo is a huge aspect of Chicago's airport operations because of who we are as a city, our history and our location," Evans says. In fact, prior to decent developments, ORD was feeling some capacity constraints for freight traffic. "We were seeing people parking aircraft on a 45-degree angle, swapping positions and having to move planes more than once, and realized it was not an efficient operation, nor one that could grow," explains Evans. "It was clear the demand was there."

ORD's newest warehouse development includes a host of modern efficiencies. Swissport's 138,000-square-foot facility features an automated material handling system that company officials say is the first of its kind in the region. Electric moving equipment and special pallet platforms allow the system to simultaneously accommodate more than 120 unit load devices (each 10 feet long). The devices never even touch the ground, note company personnel.

The warehouse includes 35 truck docks, and adjacent aircraft parking features in-ground fueling and power units to shorten aircraft turnaround time.

Building the new cargo facility became possible when Scott Air Force Base relocated from the north side of ORD to southern Illinois during the late 1990s. Evans credits Mayor Emanuel for promoting the project and understanding how important shipping is for the economy of Chicago and the surrounding region.

The new facility has spurred a 15% annual increase in cargo volume two years in a row, and ORD is on pace to handle a record 1.8 million tons of cargo in 2017, she reports.

"The airport itself doesn't make that much money off cargo, but we like having the mix and diversity in our tenants," Evans comments. "Because of our strong manufacturing base and the growth in e-commerce, it's important to the regional economy that we provide access to the global market through our cargo facilities. That is our umbilical cord to the international economy. Globalization is here to stay. Our job is to keep up with it."

City officials say the project has already created 800 permanent jobs and hundreds of temporary jobs for construction and other services.

Larger Planes

Constructing a dedicated taxilane and adding ramps designed to accommodate 747-8 jumbo jet freighters were key components of the recent project. The new ramps provide 50% more cargo handling capacity. After Phase III is complete, the northeast cargo facility will have more than 900,000 square feet of warehousing and about 1.1 million square feet of apron pavement, including enough space for 13 wide-body aircraft to unload at any given time.

Erin Gruver, Aeroterm's chief development officer, notes that prior to the introduction of Boeing's more fuel-efficient 747-8, any 747 flying out of Asia had to refuel in Anchorage, AK. The ability to fly directly to Chicago is another factor that enhances the efficiency of shipping through ORD, he explains. According to estimates from the Chicagoland Chamber of Commerce, the average payload of each 747-8 is worth about $3 million.

ERIN GRUVER

O'Hare Cracks the Top 5

According to U.S. Census trade data statistics, O'Hare International Airport is the fourth-busiest global port of entry for total cargo entering and leaving the United States. Here's how the various facilities stack up, as measured by value of goods they handle.

1. Sea Port of Los Angeles: $274 billion
2. Texas/Mexico Land Border at Laredo: $200 billion
3. John F. Kennedy Airport (JFK): $187 billion
4. Chicago O'Hare International (ORD): $169 billion
5. Port of Newark: $163 billion

Source: 2016 U.S. Census Trade Data

Gruver notes that together, the new northeast cargo facility and the 491,000-square-foot freight facility Aeroterm completed at ORD in 2014 represent the largest investment the company has ever made in a single market.

More Expansion

Like passenger operations, cargo operations also benefit from the airfield modernization effort that has been underway at the airport since 2005. "When we're finished, we will have spent $5.5 billion to reconfigure O'Hare's runways," says Evans. "We're down to the last parts of that airport modernization program."

A key part of the program was an agreement reached with the airlines in January 2016 to build a second international runway that is 11,245 feet long. "It can handle the heavies, and it's close to the cargo facility. That further improves the efficiency of these operations," she adds.

The northeast cargo development follows a series of other initiatives by the Emanuel administration to invest in modernizing ORD. The city recently announced the establishment of new aeronautical real estate agreements that are expected to generate upwards of $40 million in annual revenue and ensure that the airport can continue investing in the growth of cargo and other operations.

"There is no better time to be investing in Chicago's cargo operations, which is why Aeroterm is proud to partner with the city of Chicago as the developer of this major infrastructure project," says Gruver. "Not only will our investments in state-of-the-art on-airport cargo warehousing support the rapid growth of cargo operations, but they will in turn improve efficiency of O'Hare's airfield and facilitate healthy economic growth for years to come."

The Chicago Department of Aviation is also working with its airline partners on a plan to redevelop terminals, expand capacity for passenger amenities and improve ORD's global connectivity. After that is completed, more physical expansion is likely.

"We're not done at O'Hare by any means," says Evans. "There are other underutilized parcels available. As soon as we get our terminal project agreed and underway in the next six months, we will turn our attention to those other opportunities, and they are significant—and not necessarily cargo-related. We will reevaluate where we are at relative to demand for office facilities and demand for technology facilities on the airport. We have that capability."

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About Aeroterm

With over 17 million square feet of property and development at more than 35 airports, Aeroterm is the leading owner and provider of capital, expertise, and facility related services to airports throughout North America. Specializing in the development, acquisition, financing, construction, leasing and management of airport properties, Aeroterm has more than 25 years of experience working with airports and tenants specializing in air cargo operations and other airport-related activities.

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Greenville-Spartanburg Int'l Dovetails Ramp Replacement With Terminal Rehab

BY MIKE SCHWANZ

GSP INTERNATIONAL AIRPORT
ROGER MILLIKEN FIELD

FACTS&FIGURES

Project: Apron & Trench Drain Reconstruction

Location: Greenville-Spartanburg (SC) Int'l Airport

Cost: $15 million

Construction: 2014-2017

Engineering: AVCON

Concrete Slab Mfg: Tindall Corp.

Trench Drain Installation: Hi-Way Paving

Apron Reconstruction: GLF Construction Corp.

Key Benefits: Reconstructed apron enhances operational efficiency; fewer water-related pavement issues due to new trench drain & underdrain systems

Of Note: Engineers replaced traditional metal trench drain with concrete drain for improved long-term performance; most of apron work occurred simultaneously with terminal renovations

Completely rebuilding a terminal is a massive undertaking in and of itself. But Greenville-Spartanburg International Airport (GSP) recently doubled down when it replaced the adjoining airside apron and trench drain system during its comprehensive five-year terminal renovation.

"The new terminal, which was opened this past spring, was desperately needed," explains Kevin Howell, the airport's vice president and chief operating officer. "It had not changed much since 1962, when the airport opened. In addition, our apron and trench drain were just as old, and they were deteriorating. So for us, it just made sense to undertake both projects at the same time."


KEVIN HOWELL

Ultimately, the strategy proved to be highly efficient for the South Carolina airport. During most of the apron construction, GSP shut down one gate at a time and coordinated schedules so work occurred simultaneously on both projects. One crew performed terminal renovations inside while another replaced the apron outside, near the same gate. "It took lots of communication between airlines, contractors and airport management," says Howell.

Fortunately, the five airlines that serve GSP were willing and able to move from gate to gate as both projects progressed. "Most of the aircraft that land here are narrow-body planes and regional jets, including 737s and Airbus 320s," he explains. "All could fit comfortably into each gate, and the bridges could accommodate all of them."

In 2017, GSP enplaned about 1.1 million passengers and averaged 50 nonstop departures per day. Cargo operations include flights for the on-airport FedEx facility and several other freight carriers.

The airport selected AVCON to design and manage construction of its apron project, which it completed in three phases. Phase 1—replacing the trench drain—was started and finished in 2014; Phases 2 and 3—the complete reconstruction of GSP's concrete apron, lasted from 2015 through most of 2017.

Total cost for the airside improvements (not including the terminal) was about $15 million, including consulting and engineering fees.

FAA funded 90% of the project, and GSP paid for the rest out of its capital improvement budget. "We are very pleased we did not have to borrow any money to do these projects," says Howell.

Concrete vs. Steel

According to Howell, the first phase was the most complicated. During Phase 1, contractors removed more than 1,700 feet of existing cast-iron trench drain and replaced it with a new concrete drain. "The original trench drain contained metal grates over a concrete trench. The expansion and contraction of the grate on the concrete edges caused the drain to fail," he explains.

The airport had tried adding new metal grates in the 1980s, but they eventually eroded like their predecessors. Howell consequently turned to AVCON for an alternative solution. "While the metal grates were obviously failing and showing cracks, they did stay in place," says Robert Hambrecht, P.E., the firm's senior project manager. "The good news was that the trench *below* the drain was structurally adequate."

ROBERT HAMBRECHT

AVCON consequently recommended a different type of drain. Originally, engineers planned to use a large poured-in-place concrete slab with slots cut in the top—a design that has been successful on a previous project. Instead, they improved on the design by specifying precast concrete panels that were custom-designed and manufactured to match the existing concrete apron joint pattern.

Tindall, a company in nearby Spartanburg, manufactured the precast panels, labeled the position of each one, and delivered them to the jobsite in sequence. Hi-Way Construction installed a total of 144 panels on the prepared surface.

Apron Reconstruction

During Phases 2 and 3, crews replaced the apron's entire Portland Cement Concrete pavement, base and sub-base course. "We deepened the pavement section and added more concrete," says Howell.

The airport also opted to widen the apron by 9,000 square yards to allow more space between the two entrances for taxiing planes and ground service equipment. "This wider apron will be especially helpful during our busy times, and will ease congestion a bit," he says.

Phase 2, completed in 2016, included nearly 25,000 square yards of 17-inch P-501 Portland Cement Concrete pavement. Phase 3, completed in October 2017, included 29,000 square yards of 17-inch Portland Cement Concrete P-501 pavement.

Howell emphasizes that it was imperative for airport officials to communicate closely with the airlines about the construction schedule for each gate. "If the apron around Gate 1 was being torn up, it was a tight fit for planes using Gate 2 for arrivals and departures," he says. "We wanted to ensure both the pilots and construction crews looked out for each other."

GLF Construction used a rock crusher to convert the concrete removed from the old apron into material suitable for use in the base layers of the new apron. "It saved us money," Howell comments. "We did everything on airport property, on a remote piece of land. Old concrete was removed, placed on a flatbed truck and taken to the crushing site, where the crusher truck smashed the old concrete. Eventually, it was trucked back to the construction site to be used as the base for the new surface."

Crews took extra care not to negatively impact the concurrent terminal renovations. "We cut the old concrete pavement into 20-foot-by-25-foot panels," Howell says. "No jackhammers were used, to avoid noise and dust getting into the newly constructed terminal building."

The airport's high water table presented another challenge. "The soil underneath the apron pavement does not drain well," Hambrecht explains. "When you introduce water to this particular soil for long periods of time, it makes the soil lose bearing capacity. When the soil is less supportive, the pavement above is subject to increased stress and premature failure."

To counteract the challenging soil conditions, AVCON engineers designed a drain system under the pavement to prevent water from being trapped under the pavement. "The underdrain system is a network of 4-inch perforated PVC drainpipes located in the soil underneath the base course," says Hambrecht. "This network of pipes constantly drains the water out of the soil and outfalls into the storm water system."

New Paint

After the apron pavement cured properly, crews painted it based on the results of a gate utilization analysis. New aircraft lead-in lines include a variety of nose wheel markings to maximize the utility of each gate for various aircraft. Updated markings include ground service equipment hazard lines and engine ingestion zone markings for the 737-8s that a few airlines are beginning to use at GSP.

To date, the overall project has received accolades from airport staff and airline employees. "We are very pleased with the final product, and are confident our new apron and trench drain will hold up for many years to come," Howell concludes.

Manhole access points were installed every 300 feet to facilitate maintenance.

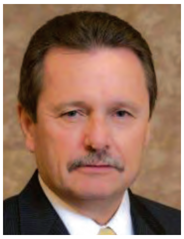
Philadelphia Int'l Transforms Terminal B With New Approach to Holdrooms & Concessions

BY KRISTIN VANDERHEY SHAW

Philadelphia isn't only about the Liberty Bell and other key pieces of U.S. history. It's also the site of a new and innovative approach to airport design and concessions. In October, Philadelphia International (PHL) cut the ribbon on a completely renovated Terminal B and formally marked the end of its $48 million stem-to-stern overhaul.

Some project officials describe the new concourse as one giant concessions area with boarding gates sprinkled throughout. Passengers use iPads secured to holdroom seating to order food and beverages, which vendor staff deliver to them gateside.

OTG, the airport's food/beverage provider, invested $32 million in the project, American Airlines paid for the new furniture and PHL funded the rest.



JAMES TYRRELL

"This development has been three or four years in the making," says PHL Chief Revenue Officer James Tyrrell. "We reviewed our concessions leases and found that we could coordinate an overhaul, and we started talking to MarketPlace [the airport's concessions developer/manager] about what we could do."

American Airlines was also interested in upgrading the terminal where it operates, and soon a conversation ensued about aligning the four organizations' goals.

"American was enthusiastic in their commitment to the airport," relates Paul McGinn, president of MarketPlace Development. "I think everyone had linear objectives, and all parties were willing to take risks and be creative."

Together, the four organizations devised a plan to transform the passenger experience at Terminal B. Key components were renovating all concessions and incorporating a more open layout in holdroom areas. American Airlines agreed to replace all holdroom seating and worked with OTG to redevelop the space and lighting. The new gateside areas have an outlet/charging station and iPad at every seat.

"Our goal was to create a terminal for the way passengers *want* to use the airport, not the ways they have been forced to use it in the past," explains McGinn.

The airport created an arrangement with American to pull holdroom space from the carrier's inventory and place it in MarketPlace's. OTG, in turn, subleased the space from MarketPlace and lead the redevelopment process. The key, explains McGinn, was to avoid adversely affecting revenues for airline leases and concessions. To achieve that goal, American continued to pay leases even though the airport took some of its holdrooms out of operation. Ultimately, the project was a balancing act between all parties, he explains.

Phase I, which includes a "hammerhead" with six gates at the end, is already complete. The rest of the project is scheduled to conclude in August 2018.

In-Seat Ordering

Airport officials were intent on extending the life of Terminal B with renovations rather than demolishing it and building new facilities. Management was familiar with how OTG had remodeled other airports and wanted to take its efforts even further at PHL.

"We loved what OTG was doing in terms of opening up the concessions to the holdrooms," explains Tyrrell. "It's no longer the norm to have a closed-in restaurant with three walls separating it from everything. The idea is to open it up, and OTG was really good at the walk-through concession areas at airports like LaGuardia, Houston and Minneapolis-St. Paul."

At PHL, the concessions operator installed 1,000 iPads throughout gate lounges and restaurant areas. Travelers use the devices to track their flights, browse the web, play games, and order food and beverages from airport vendors. The new system increases dwell time and passenger enjoyment, reports Tyrrell.

"Travelers can check their email, plug in and charge their phones," he explains. "It helps *all* of our customers, not concessions customers. It also allows more interaction between servers and customers, which increases overall satisfaction."

It's widely believed that airports can decrease the staff needed to serve areas equipped with electronic ordering devices, but Tyrrell notes that the jury is still out at PHL. "Servers don't have to take orders or deliver bills, which saves time," he says. "The customer can just go to the iPad and order, and it gives the passenger more control over

PHL PHILADELPHIA INTERNATIONAL AIRPORT

FACTS&FIGURES

Project: Terminal Upgrade

Location: Philadelphia Int'l Airport—Terminal B

Design Strategy: Sprinkle gate areas among concessions rather than vice versa; equip all gate lounge seating with outlets/charging stations & iPads to facilitate ordering from food/beverage vendors

Cost: $48 million

Funding: $32 million from OTG; American Airlines purchased new furniture; airport funded the rest

Construction: Completed in Oct. 2017; additional work scheduled through Aug. 2018

Concessions Developer/Manager: MarketPlace PHL (partnership between MarketPlace Development and LeJeune & Associates)

Food/Beverage Provider: OTG

Airline Partner: American Airlines

Architect: Daroff Design Inc. + DDI Architects

Lighting Designer: Tom Dixon

General Contractor: Michelle Robinson Design

Seating Designer/Supplier: OTG

the experience. The servers can then provide a more personal, relaxed environment. We don't reduce staff, we improve staff interaction with the customer."

Initially, Tyrrell was concerned about implementing an entirely cashless system (the iPads largely require customers to use credit cards to place orders). MarketPlace had managed a smaller, but similar iPad program at Washington National, and found that cashless concessions could, indeed, be a challenge. As a result, PHL installed machines that allow guests to purchase a pre-paid credit card with cash. Alternately, travelers can ask a manager to activate an iPad with cash.

New Lighting, Less Clutter

Over the last several years, PHL has transformed the airport with capital improvements to the tune of $900 million. During one initiative called "Touch Every Surface," crews refinished the terrazzo floors and replaced ceiling tiles throughout the 60,000-square-foot facility. The airport also installed a new $8 million heating and air conditioning system and a new roof for $5 million.

"Before we installed the new HVAC system, passengers went from the Arctic to the desert in terms of indoor climate," jokes Tyrrell. "And we also had a porous roof. It would have been devastating to have new restaurants with a roof overhead that leaked; so that had to be addressed first. The lighting was comprised of old fluorescent tubes, and the space was too dark; and the terrazzo flooring had taken a beating. We looked at everything."

The recently renovated gate areas feature the work of British lighting designer Tom Dixon, and the project is the largest installation he has ever designed. For natural light with a decorative twist, the airport opted for window mullions—vertical dividers with a 3-foot-by-3-foot pattern instead of the typical 12-inch-by-20-inch configuration used at most airports. It offers a cozier, more home-like feel, explains Tyrrell.

The project team also worked to reduce "visual noise" and free up space by removing extraneous trashcans and stanchions.

New Concessions

The terminal's new concessions lineup was designed to connect visitors to the city and surrounding region. OTG added eight local food/beverage operators in 15 different areas—and the menus stretch far beyond Philly cheesesteaks.

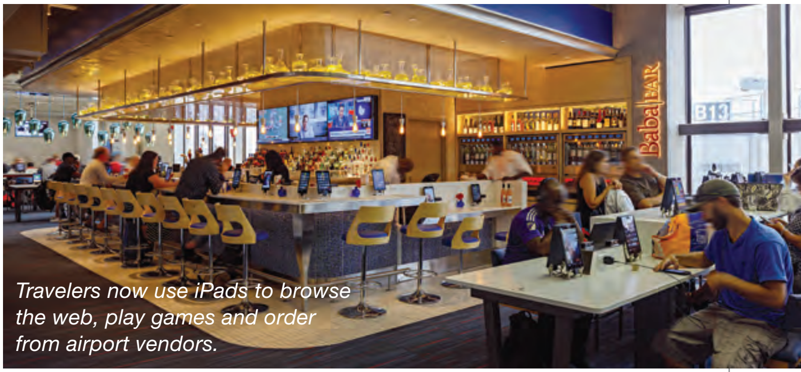

RICK BLATSTEIN

"This project was about creating a look and feel that is truly Philadelphia," explains Rick Blatstein, the company's founder and chief executive. "The airport is the first and last thing passengers see when they visit the city, and we wanted the new design to reflect the best of it."

CIBO Express Gourmet Market, OTG's award-winning concept that also operates at several other airports, changes its menu seasonally, according to the availability of locally sourced ingredients. The market highlights healthy items such as fresh sushi and organic, gluten-free, vegan, and kosher selections created by local chefs.

One of the company's secrets is bringing in fresh food every day. As a result, it uses the smallest freezers in airport concessions, says Blatstein. "It makes a difference," he emphasizes. "We have restaurants in airports, not airport restaurants."

At Independence Prime, Terminal B's new steak and chophouse, patrons are seated around an open kitchen and watch chefs prepare their food. Blatstein believes that cooking is a form of entertainment, and points to the current popularity of cooking shows as a testament to the concept. Toward that end, OTG tapped a Top Chef winner, local food truck darling and other notable chefs to up the cuisine in Terminal B.



Travelers now use iPads to browse the web, play games and order from airport vendors.

Positive Feedback

Blatstein credits PHL officials for their willingness to reimagine the terminal's gate lounges. "American has been outspoken in a positive way about improving customer service," he adds. "What's really nice is that all of us are working together."

As a Philadelphia native, Blatstein says he appreciated the opportunity to help reinvent his hometown airport. "I have a lot of family and friends in this area," he notes. "So far, the feedback has been wonderful."

In October, Philadelphia Mayor Jim Kenney cited PHL as an asset that could help the city win Amazon's second headquarters when he cut the ribbon on the newly renovated Terminal B. In November, the website *Eater* proclaimed that Terminal B has the best dining options at PHL. American Airlines received an email from one passenger who said she would gladly pay a premium to fly through PHL because of the positive experience she had in Terminal B.

While such feedback is music to McGinn's ears, he notes that PHL's new gate lounge and concessions strategy may not be right for other airports. As more customers flow through Terminal B, MarketPlace plans to keep an eye on growth and continue to update and improve concessions accordingly.

Lehigh Valley Int'l Adds Multi-Modal Transportation Center

BY BRIAN SALGADO

FACTS&FIGURES

Project: Multi-Modal Transportation Center

Location: Lehigh Valley (PA) Int'l Airport

Size: 5.2 acres (227,300 sq. ft.)

Approx. Cost: $5.5 million

Funding: PennDOT grant; Customer facility charge; Passenger facility charge

Construction: Dec. 2016-Aug. 2017

Architect: Gensler

Civil/Structural Design: Airport Design Consultants

Program Manager: Arora Engineers

General Contractor: Wilmer R. Schultz

Surveying & Permitting: McTish-Kunkel & Assoc.

Electrical: Wind Gap Electric

Site Work & Paving: Vollers

Civil & Structural Design: Airport Design Consultants

Key Benefit: Moving ground transportation operations closer to main terminal to improve customer experience.

Satisfying the wants and needs of all the stakeholders involved with a new multimodal hub can be as daunting as the actual construction of the facility itself. After years of negotiations, the design of the Multi-Modal Transportation Center at Lehigh Valley International Airport (ABE) finally hit all the right notes for airport officials and the rental car, bus and taxi operators that serve the new facility. With the $5.5 million project complete, residents and visitors in Allentown, PA, are set to benefit for years to come.

RYAN A. MEYER

"This project was about enhancing the customer experience by creating a central location for the multiple modes of transportation, which included buses, taxis and rental cars," says Ryan A. Meyer, director of Planning and Programming for the Lehigh-Northampton Airport Authority. "Once we came to a resolution on what was going to work best for everyone, we got the buy-in from the respective stakeholders and really pushed forward. That was the biggest challenge, but it was most rewarding to see how it all came together."

The new transportation hub has improved the customer experience for ABE passengers in many ways since its substantial completion in August 2017. Rental cars are now 700 feet closer to the terminal, covered walkways protect pedestrians from the elements, and safety was improved by eliminating passenger-vehicle conflict points.

The new center also doubled the airport's previous number of taxi stands to a total of 11 and added seven bus slips, with designated areas for the new services. Lehigh and Northampton Transportation Authority buses serve the airport with three local routes, and Trans-Bridge Lines connect airport passengers with Manhattan and New Jersey service.

The transportation hub is located on a site that previously housed a building originally constructed as a firehouse in 1965 and later

used as a maintenance facility. Because the building was located directly east of the main terminal, it impeded a clear sightline to the rental car operations. The area had grown into a bit of an eyesore, as stray trees and the abandoned firehouse structure were the first things disembarking passengers saw.

The new Multi-Modal Transportation Center, however, is much more aesthetically pleasing. Crews cleared away the trees, removed the firehouse and replaced them with covered walkways and canopies. The canopies are constructed of simple structural steel columns and beams, and include glass panels on one side to protect ABE customers from less-than-ideal weather conditions.

A new vestibule was added to the existing terminal building near the baggage claim area. Previously, the airport lost a lot of heat whenever passengers opened the door to enter or leave the terminal during Pennsylvania's cold winters. The vestibule creates a transitional space for waiting passengers and also helps mitigate heat loss and lower energy costs, explains Nicholas Ryan, vice president and Aviation Practice lead of Arora Engineers.

NICHOLAS RYAN

The airport authority funded the project with an existing customer facility charge associated with all rental car contracts, revenue from its passenger facility charge and a $1.75 million grant from the Pennsylvania Department of Transportation (PennDOT). Arora Project Construction Manager Tom Cook was charged with working with the agency. "This included becoming familiar with PennDOT forms and constant communication to PennDOT; so when invoicing happened, the backup would be there and in proper form, per PennDOT's requirements," Cook says.

TOM COOK

Design Goals

Architects from Gensler chose a material palette of steel and glass for the new facility to complement materials used on the existing terminal building.

To minimize conflict between automobile traffic and pedestrians on the compressed site during construction, the design team routed the pedestrian path around the perimeter of the bus drop off and parking areas for rental cars.

"This solution created an 'embrace' of the pedestrian walkway to the vehicular traffic in the center," explains Marvin Chavez, one of Gensler's designers. "It also maximized the visual sightlines to the new vestibule and helped improve wayfinding to the terminal building."

MARVIN CHAVEZ

Engineers had to address poor soil conditions and varying grades of elevation at the construction site.

Sink or Swim

The Lehigh Valley region of Pennsylvania is infamous for troublesome soil conditions that can lead to sinkholes, and the airport was not immune to the problem during its recent project.

To address this concern, Arora Engineers devised a plan to excavate an additional 5 feet for the facility's foundation. This allowed the construction team to lay down even more suitable soil than was called for in the initial plans, explain Ryan.

Although the sinkholes and discovery of poor soils led to some schedule delays, the project still reached substantial completion in summer 2017 after breaking ground in December 2016.

"We wanted to meet a target date of somewhere around July 4, and we were substantially complete at the end of July," Ryan reports. "Schedule-wise, we were fine."

Arora Engineers also had to address varying grades in the elevation at the jobsite. In order to make the area work with the design plan and meet conservation district permitting requirements, designers made sure the area drained well. The transportation center faced the ultimate test shortly before the ribbon-cutting ceremonies when Allentown was hit with heavy rain.

"It was good to see firsthand that the area was draining as designed," Ryan recalls.

Complex Job

Airport Design Consultants, the civil and structural designer of the center, has tackled larger projects than ABE's Multi-Modal Transportation Center, but its jobs don't usually require so many different disciplines. In addition to a sizable sitework component, the new center required building, architectural, structural, electrical and mechanical trades.

CEDRICK JOHNSON

"This wasn't necessarily huge in magnitude, but it was the scale of all the small pieces," says Cedrick Johnson, the company's president. "When you have a multidiscipline contract like this, you need to keep everyone engaged the entire time."

Kennedy Int'l Uses Cloud-based Technology to Manage Terminal Traffic

BY ROBERT NORDSTROM

FACTS&FIGURES

Project: Managing Passenger Traffic Inside the Terminal

Location: John F. Kennedy Int'l Airport, Terminal 4

Cloud-based Software: Operational Terminal Prediction

Software Provider: Beontra (a Leidos company)

Timeline: 6-month pilot program initiated Oct. 2015; full deployment Aug. 2016

Cost: One-time fee for implementation, customization, data integration & user training; annual fees for licensing & support

Operational Benefit: Improved deployment of resources & staffing based on real-time & predictive data

Unlike most aircraft traffic, pedestrian traffic inside the terminal is notoriously tricky to track and predict. It takes no time at all for congestion to build at ticket counters/bag drop areas or lines to form at security checkpoints. JFKIAT, the private company that operates Terminal 4 at John F. Kennedy International Airport (JFK), is leveraging technology to change this frustrating dynamic.

The company uses a cloud-based software system to monitor and forecast traffic inside the busy New York terminal. Armed with predictive data, operations personnel can position staff and resources proactively to prevent backups at traditional pinch points. It also shares information with resident airlines, TSA and Immigration to help keep traffic moving.


ROBERT PYRKA

Instead of using static, cumbersome spreadsheets and charts with traffic information for a generic day, the software analyzes data drawn from the airport operational database, airline schedule changes and other more dynamic online sources, explains Robert Pyrka, director of airline and capacity planning for the terminal. That information is then combined with data about early and late aircraft arrivals, how long


DARYL JAMESON

a busy environment such as Terminal 4. Each year, the terminal processes 21 million passengers and is currently home to 33 airlines.

The Beontra dashboard displays information for the current day as well as the next two. "Data is uploaded into a cloud-based software program and translated into a simple-to-use format," Jameson explains. "It gives us a better idea of the changing environment in real time."

Real-Time Eye on the Future

JFKIAT primarily uses the software to monitor and manage three key areas/processes: Immigration (Customs and Border Protection), the main checkpoint (TSA) and the security checkpoint for international travelers making a domestic connection. The tool predicts when passengers will show up at each processing point, based on arrival information and the associated walking distances and transaction times.

Pyrka cites the Immigration process as an example: "We know that 65 percent of passengers will use a kiosk and the remaining travelers will see an inspector. Perhaps 10% of those travelers will present an issue that needs to be resolved by an inspector. From travelers getting off the aircraft, walking to Immigration and moving through processing, all of those transaction times are pre-plotted into the program."

The software tells Operations personnel how many passengers are expected to enter the queue, how many will be processed, how many will remain to be processed and what their waiting times are expected to be. "With this information, we are able to determine the number of positions we need to open in order to process travelers on a particular flight within a pre-established

it takes passengers to move from one area of the terminal to another and the bottlenecks they might experience along the way. Results are displayed on a simple graph indicating precisely when wait times are likely to peak, he notes.

The software and service that pulls it all together is called Operational Terminal Prediction from Beontra, a Leidos company based in Germany. JFKIAT paid a one-time fee for implementation, software customization, data integration and training; and will pay ongoing annual fees for licensing and support. JFKIAT has invested approximately $190,000 annually for software and licensing.

Daryl Jameson, vice president of baggage and IT systems, notes that resource planning is especially critical in

60-minute period—from when the first person enters the hall to when the last passenger is processed," explains Pyrka.

The software bases its predictions on demand forecasting schedules, the terminal layout and current operations data. It begins examining passenger data one day in advance, and then amends its predictions as operational situations arise. Forecasts are drawn from passenger numbers and flight data enhanced with other data sources such as airline booking data and real-time wait-time data collected by queue measurement technologies. The resulting predictions are designed to serve as an early warning system, allowing terminal personnel to prevent potential bottlenecks and thus ensure a more pleasant traveler experience.

The airport's operational database updates flight information data for Beontra every five minutes. Every 15 minutes, the Operational Terminal Prediction (OTP) software generates a new calculation that takes into account, for example, early arrivals or flight delays and the number of travelers that must be moved to the next hour.

In short, it keeps stakeholders informed about when passengers are going to show up, how many there will be, and what operational areas could potentially be impacted.

"Some of our larger aircraft can hold up to 500 passengers," notes Susana Cunha, vice president of terminal operations. "If they arrive off schedule either early or late, that can affect operations throughout the terminal. The OTP tool allows us to take a proactive, as opposed to reactive, approach to unforeseen changes. Dashboards give us live data feeds that allow us to make changes and prevent bottlenecks."

SUSANA CUNHA

Although the software focuses primarily on TSA and Customs and Border Protection processes, it also has broader applications. "The tool gives us data that allows us to ensure all stakeholders are prepared for the number of enplaned and deplaned customers so that they can effectively plan ahead," explains Cunha. "Business partners include government agencies, retail vendors, security personnel, etc."

One Forecast, Multiple Users

JFKIAT has been using OTP software in Terminal 4 since August 2016. Before committing to the technology, the operator had Beontra run a six-month pilot program. Throughout the pilot, the company prepared schedule forecasts and capacity models for the terminal, then shared and discussed the results in a live environment with terminal management. FlightsStats data were used to integrate real-time information and allow operations management to accurately predict passenger flow throughout the terminal for the immediate hours ahead.

Beontra began the pilot by meeting with terminal management to establish “success criteria.” During the six-month period, Beontra’s product manager was onsite every six weeks to build the forecast and capacity model for the terminal.


JANA SKORNICKA

User training typically consists of four or more sessions lasting two to four days each, depending on the number of users, explains Beontra Sales Director Jana Skornicka. “The system can be used at a very high level for quick analysis, or it can provide airports with very detailed forecasts and reports, depending on the users’ requirements,” informs Skornicka. “’What-if’ capacity and resource planning are particularly important. For example, if the terminal initiates a construction project in a certain area, the system is able to show in a heartbeat how it will affect the rest of the terminal operations.

“With forecasting, it’s important to know what will be happening tomorrow, next week or next year; but it’s also critical to know what occurs on the day of operations. For example, if you will have two flights coming in 10 minutes late and two coming in five minutes early so that they all arrive at the same time, at JFK, that could mean 1,000 passengers arriving at a time they did not expect.”

By comparing forecast data with real-time data, operations managers can also improve future forecasts. Moreover, the operational dashboard on the computer screens provides users with what Skornicka calls one “forecast truth.” Working from the same data encourages joint decision making among all stakeholders, she explains.

“The overarching goal is to improve the travelers’ experience and make the facility their hub of choice,” Skornicka summarizes.


GERT-JAN DE GRAAFF

To that end, JFKIAT President and Chief Executive Gert-Jan de Graaff believes that success is at hand, and Beontra has helped the organization better utilize its resources. “The software allows us to manage our terminal operations more efficiently and provides a stress-free travel experience for passengers,” he reports. “A smooth and seamless airport environment is what our team strives to provide, and this technology helps us do that more effectively than before.”

Northwest Arkansas Regional Overcomes Perplexing Runway Issues Caused by Alkali-Silica Reaction

BY JODI RICHARDS

FACTS&FIGURES

Project: Runway Rehabilitation

Location: Northwest Arkansas Regional Airport

Cause of Damage: Alkali-silica reaction

Pavement Removed: 119,861 cu. yd.

Total Cost: $80 million

Primary Components: Construction of alternate landing surface; pavement removal/replacement; drainage improvements; repair & relocation of navaids & lighting

Pavement Evaluation: Jacobs

Engineering: Kimley-Horn

Environmental Detail: Materials removed from the damaged runway were used on subsequent paving projects such as parking lots & construction roads; airport earned nearly $108,000 recycling dowel bars & copper wiring

After four years making do with an alternate landing surface, Northwest Arkansas Regional Airport (XNA) is pleased to be operating with its primary runway back in business. Pronounced and accelerating damage caused by an alkali-silica reaction in the original pavement prompted XNA to close Runway 16-34 for a complete rehab in June 2012 and now the airport is addressing the same issue on the rest of its airfield.

Officials began noticing problems with the pavement in 1999, shortly after XNA was built. "We knew there was something a little off because on the soft cut, the pavement wouldn't break like it was supposed to," recalls Airport Director Kelly Johnson.

KELLY JOHNSON

Crews removed and replaced about 200 panels of concrete to address the issue, and everything seemed fine until 2004. That was when airport personnel realized that the soft cut lines on a section of the general aviation ramp were no longer lining up; so they painted bars across the joints to observe and measure the movement.

After multiple engineering evaluations and studies, the airport learned that an alkali-silica reaction in the concrete was causing the pavement to move and deteriorate. The $80 million project to fix the problem went beyond new runway pavement to include

An alkali-silica reaction in the original concrete later caused pronounced damage to the runway and other airfield pavement.

drainage improvements and the repair and relocation of lighting and navaids.

What Went Wrong

According to FAA AC 150/5380-6C, alkalis and certain silica materials in pavement sometimes react and form a gel that absorbs water. The associated growth in the pavement and internal stress cause expansion that can damage the concrete and adjacent structures. Moisture and heat accelerate the growth of the gel.

Over a period of years, it became apparent to airport staff that noticeable damage caused by the alkali-silica reaction was most obvious after a wet spring followed by extreme heat and humidity. In many areas on Taxiway B, the stress in the pavement was so extreme it displaced dowel bars in the concrete by up to 2 inches.

BARBARA BUSIEK

"It literally shears the pavement and forces the dowel bars out of their original location from when the taxiway was constructed," reports Barb Busiek, former director of construction and grant administration for the airport. "There were times when we would see the dowel bars on one side of the taxiway moving north, while the dowel bars on the other side were moving the opposite direction—bizarre!"

Overall, the alkali-silica reaction caused tremendous damage that ultimately led to foreign object debris (FOD) on the airfield. "It was a safety issue," Johnson comments. "As the pavement expands, it basically grows. It will crack corners, it will move pavement. It's the craziest thing I've ever seen."

To maintain safe operations while it tackled the vexing issue, the airport conducted FOD inspections four times per day. "We just stayed on top of it," recalls Johnson.

Ultimately, airport officials opted to replace the entire 8,800-foot-long, 150-foot-wide runway and its 25-foot-wide asphalt shoulders—nearly 120,000 cubic yards of material in all. Because the pavement bonded to the runway base, the cement-treated base and cement-treated permeable base also needed to be replaced.

In addition to installing new pavement, XNA also had to replace associated lighting, electrical and drainage systems. "The end of the runway would grow so much, it would push the asphalt up over 3 inches at the end of the concrete," Johnson explains. The movement was so severe that it broke conduit and took out threshold lights.

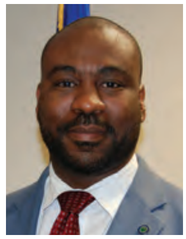
Interestingly, XNA's airfield was not the only project in the area affected by damaging alkali-silica reactions. A local highway constructed with the same aggregate mix, at about the same time the airport was built, is currently exhibiting similar problems in its barrier walls.

Best-Laid Plans

Busiek explains that no matter how careful engineers are in specifying the right pavement mix, the wrong combination of aggregates, sand and cementitious materials in the concrete can result in an unwanted reaction—and sometimes that reaction is not immediately apparent. Most experts in the field agree that it can take five to 10 years before any noticeable signs of alkali-silica reaction appear. Materials like class F fly ash and lithium can be used to mitigate the risk of a reaction, but there is no guarantee that it will help, adds Busiek.

She compares XNA's unexpected pavement issue to some human diagnoses: We can eat right, exercise and *not* smoke; but we still might get cancer. In fact, alkali-silica reaction is commonly referred to as "concrete cancer."

"At the time, everything we did was in accordance with mix design under FAA's guidance," notes Johnson. "We did everything right—it's just the materials at the time had this defective component that we were unaware of."


MICHAEL MEYERS

Michael Meyers, deputy manager for FAA's Airport Engineering Division, says that alkali-silica reactions happen occasionally throughout the industry but are occurring less frequently as the agency continues to conduct research and develop new preventive measures.

"It's important to follow FAA standards," stresses Meyers. "We have guidance and standards to follow, often with federal funding for the airport owner that is responsible for the construction and maintenance."

Cores from XNA's original pavement were tested and found to be only slightly reactive. "They weren't bad," reports Johnson. Storing the samples indoors, however, likely skewed the results.

Jacobs Engineering subsequently performed a pavement evaluation at the airport, followed by a summit with all parties involved, including many pavement industry experts. Core samples were taken from the runway, taxiways and ramps for petrographic analysis—a process that includes slicing the pavement into thin layers and examining it under a microscope.

Concrete petrographic analysis is used for many types of forensic testing, primarily the basic analysis of coarse and fine aggregate. Such analysis is not required, but it helps positively identify an alkali-silica reaction if an airport is unsure what is distressing its pavement. When the reaction has become destructive, the resulting gel and reactive rings of/around reactive particles can usually be seen by the naked eye, but microscope testing is still recommended for more definitive positive identification.

The next step at XNA was an in-depth analysis of all airfield pavement. The runway—which was the first pavement to be poured when the airport was originally built—appeared to be in the worst shape, recalls Johnson.

Soil composition was also considered, and geotechnical samples were taken to evaluate the integrity of the subgrade and look for expansive soils as a possible contributing factor. "In the original pavement evaluation there was speculation that we were experiencing water or subgrade issues," she recalls. "But that was not our problem."

Each part of the country has its own unique challenges when constructing airfield pavement, notes Busiek. "Airports in Louisiana have to build on gumbo, while those in the northeast are blessed with granite as their primary aggregate," she explains. "The midwest and southern states such as Arkansas, Texas, Arizona and New Mexico struggle with expansive soils, reactive aggregates and deleterious materials."

After specialists pinpointed the concrete mix as XNA's causal issue, the airport and project engineers worked closely with FAA personnel to come up with a different mix design that would be suitable for the new pavement.

"Now that we're smarter and know that there's a problem with the materials, we require additional testing," Johnson says. "FAA has come up with a new pavement specification…and we are hopeful it resolves the issue."

The airport also tightened its documentation standards. Quarry records must detail the location and content of each material, and they cannot be more than one year old. "A five-year-old quarry record may not represent the materials you're combining to make concrete in your batch plant," Busiek explains.

"Where they dug *then* might not have been reactive or have streaks of deleterious material, but where they're digging *today* might be totally reactive," Johnson adds.

To detect a possible alkali-silica reaction before pavement is installed, Busiek recommends testing each aggregate type in a concrete mix design individually and then checking them in combination as the ASTM C1260 and ASTM C1567 guidance recommends. The goal is to have less than 0.10% expansion in test samples at 28 days.

Finding & Funding the Solution

After performing a cost-benefit analysis, airport officials determined that it was necessary and prudent to rehabilitate XNA's deteriorating runway. They also opted to construct an alternate landing surface to keep the airport operational during reconstruction.

The process to secure funding for the crucial projects began in 2005 and lasted about 4½ years. "We had to convince the FAA we couldn't just close the runway," Johnson relates. At the time, XNA was 112th busiest airport in the United States.

Several strategies to accommodate ongoing flight operations were considered and dismissed before XNA committed to the idea of building an alternate landing surface. Moving all traffic to an existing taxiway was not possible because of building obstructions, recalls Busiek. Another suggestion was to fix the pavement during nighttime hours by replacing the damaged panels one at a time. That wasn't feasible either, due to the thickness of the pavement and limited 4½-hour overnight work window. "We'd barely get on the runway before we'd have to get off," she explains.

Instead, the airport chose to accelerate the timeline on a taxiway that was already identified in its master plan for future construction. The temporary solution was designated Alternate Landing Surface 17-35, and officials were mindful not to refer to it as a runway. "It was never intended as a runway," Johnson explains. "It was supposed to transition to a taxiway, and it will."

The project team designed ALS 17-35 accordingly: 100 feet wide, with 25-foot-wide asphalt shoulders that are 75% weight bearing. Although 50 feet narrower than XNA's runway, it was still capable of handling the airport's typical traffic, Johnson specifies. "We looked at the class of aircraft that would be landing and taking off, and [the 100-foot width] would affect somewhere between 15 to 20 charters a year at that point in time," she relates. "So it didn't make sense economically to build 150-foot width like the runway."

"We looked for all kinds of alternatives as opposed to building a whole 100-foot-wide piece of pavement," Johnson adds. "There just weren't any other options for us."

With the runway rehab complete, ALS 17-35 will soon operate as Taxiway A, according to the airport's original plans. Airport officials are also asking FAA to allow broader operations under special circumstances. "It doesn't make a lot of sense to leave it unused if we had an emergency," Johnson reasons. "We could have it available for any occurrence that might preclude the use of the runway."

Additional Issues

Much to the airport's chagrin, alkali-silica reactions affected all of its original pavement—the runway and main taxiway, commercial and general aviation ramps, and even some of the pavement installed in 2004 for a cargo ramp and taxiway. "Unfortunately, it was before we figured out what was going on; so those are also experiencing some of the same symptoms as we saw in the runway and taxiway," Johnson says.

According to Meyers, full-scale pavement replacement is typically the best solution. "Patch work here and there, or just minor repairs, can introduce contaminants that can further aggravate the issue with water and alkali," he explains.

The next replacement project for XNA will be on Taxiway B, at an estimated cost of $32 million. Ideally, the rehab will occur in 2018, notes Johnson. "It's starting to shear and come apart, particularly around the edges," she reports. The current plan is to replace affected pavement incrementally, beginning with the worst sections first.

As the airport finishes fixing the remaining airfield pavement, it's also working to mitigate any further damage and protect existing infrastructure. The commercial ramp, which will need to be replaced, extends to the foundation of the terminal; and the general aviation ramp abuts the fixed-base operator facility and hangars. As alkali-silica reactions have squeezed the pavement, maintenance workers have cut openings to release the pressure.

After Taxiway B is repaired, Johnson says XNA will be in "fair shape." Damage to the cargo ramp pavement does not seem to be as accelerated as damage to the runway and Taxiway B. "We're doing everything we can to keep it maintained and get as much life out of it as we can," she notes.

Despite all the effort involved with replacing the airport's primary runway, Johnson is still able to find a silver lining: XNA saved money on other projects by reusing 98% of the material removed from the damaged runway. Although the material wasn't suitable for the runway, it was appropriate for parking lots, construction roads and other landside projects. "We don't let [the recycled material] touch any new concrete or mix it with anything," Johnson emphasizes. "It has to be deeper than 10 feet under the pavement."

In addition, the airport received close to $108,000 for the dowel bars and copper wiring it recycled.

"The mountain of a runway is all gone," Johnson reflects. "We used every bit of it."

Houston Airport System Improves Incident Response With Mobile Command Center

BY RONNIE GARRETT

"Be prepared" isn't only the motto for Boy Scouts. The Houston Airport System follows the same philosophy for providing emergency services at George Bush Intercontinental Airport (IAH), William P. Hobby Airport (HOU) and Ellington Field (EFD). The timeless wisdom of its approach was demonstrated last June, when an F-16 crashed at EFD— a three-runway airport that serves a variety of military, NASA and general aviation operations.

Fortunately, the Texas Air National Guard member who was piloting the fighter jet ejected shortly before it crashed, and the airport had ready access to a mobile incident command center the Houston Airport System had put into service just months before. In short, EFD was prepared; and the $975,000 custom-designed vehicle improved the airport's response capabilities, inter-agency communication and overall public safety during the dramatic event. (EFD is located just 15 miles southeast of downtown Houston.)

"The command center was a very, very critical piece of our response in the F-16 crash," says Frank Ciaccio, emergency management coordinator of the Safety & Emergency Management Division for the three-airport system.

Having high-tech response capabilities was particularly important for this incident because the single-engine, supersonic aircraft was still "hot" when it crashed. "The engines were still operating," explains Ciaccio. "We had to form a one-mile perimeter around the aircraft; and because of the fuel on board, we needed to watch that fuel."

The vehicle's on-board cameras allowed personnel to do so from a safe distance. "We used the cameras to zoom in on the aircraft until the beacons went out. We watched it for about six hours," he recalls.

The mobile command center is also used in a pre-emptive manner. The city fire department dispatched emergency response crews from it during Wings Over Houston, an annual airshow at EFD, and the vehicle served as a unified command post for local police and fire units at Houston's Fourth of July celebration.

Notably, the $975,000 vehicle was purchased entirely with airport system funds.

Dual-Purpose Purchase

"Most airports have access to a [shared] incident command vehicle," says Ciaccio. "But what makes this vehicle unique is that it is Houston Airport System's own stand-alone incident command vehicle."

Before the system purchased its new rig, it owned a Winnebago-style vehicle previously operated by the Houston Fire Department.

HOUSTON AIRPORTS

FACTS&FIGURES

Project: Mobile Incident Command Center

Location: Stationed at George Bush Intercontinental Airport; also serves William P. Hobby Airport & Ellington Field

Cost: $975,000

Funding: Houston Airport System

Primary Benefit: Improves public safety & emergency response by providing on-site command center for airport & local agencies

Project Partner: Motorola Solutions

Vehicle Components: Freightliner chassis; Motorola MCC 7100 dispatch consoles; ASTRO 25 land-mobile radio equipment; WAVE push-to-talk technology; smartboards; video cameras

"[The old vehicle] was no longer capable of doing what we needed it to do," Ciaccio explains.

System officials initially considered refurbishing the aged vehicle, but changed their minds after learning that it would have to be completely gutted and modernized with new technology. The difference in price between refurbishing and buying new was less than $100,000, and officials determined that it wasn't prudent to invest that much money in a vehicle that had long since passed its useful life.

"The lifespan of a command vehicle is about five to six years; and this one was already over 10 years old," Ciaccio notes. "Plus, we wanted a vehicle that was more than an emergency response unit…If the airport communications center went down due to a power failure, for example, we wanted the vehicle to act as a mobile communications system. But even with updates, the existing vehicle wasn't going to be able to do that."

Officials consequently consulted Motorola, the system's technology partner for more than a decade. "We looked at designing, developing and engineering a vehicle…that could be used for anything from a plane crash to a hurricane event, but also act as backup to our airport communications center (ACC)," Ciaccio says. "We use Motorola in several of our key components through the airport system, and that's why we wanted to go with them. They know our computer and communications systems, our electronic systems in the ACC, and that's why it made for a great partnership."

The mobile command center is loaded with video, radio, satellite and internet technologies to enhance communications.

George Ebelt, senior account manager of Motorola Solutions, explains that the company and airport system worked together to custom-design a command vehicle that expanded the airports' response capabilities with state-of-the-art video and land-mobile radio technology. The resulting 40-foot mobile command center has room for 12 people and includes a 48-foot boom with a high-definition camera that links to four external cameras. The unit is also equipped with Wi-Fi, cellular and satellite connections; emergency radio communication equipment; and backup generators to supply its own power.

The high-tech vehicle connects with the airport system's communications network and emergency operations center database. Plus, its onboard communications system allows onsite personnel to upload video instantly to the National Transportation Safety Board and/or FBI. They can also readily share information with state and local agencies such as police and fire departments.

"This is a huge benefit," emphasizes Ciaccio. "One of the limitations we had before is that everyone involved could not communicate during an emergency. We had people on different channels and frequencies. With this vehicle, everyone can come together in a more unified command."

The vehicle's modern communication systems proved especially valuable during the June incident at EFD, he notes.

Onsite Tech

Mobile command vehicles are essentially field dispatch centers, and as such, must be equipped with the technology needed to perform many crucial functions, says Ebelt. The vehicle used by Houston's airports has a Motorola Solutions MCC 7100 dispatch console, which provides satellite communications for Internet and network access. It also has a conference room for strategic planning purposes, and is equipped with Motorola's ASTRO 25 LMR (land-mobile radio) equipment to communicate with first responders and emergency response personnel.

By partnering with Motorola, Houston Airport System was able to incorporate the company's intelligence-led policing technologies, which enable the unit to access the system's video resources. The vehicle also provides a remote standalone dispatch center via a connection to Harris County's band-class public safety LTE system. Other notable features include a Motorola Solutions WAVE Push-to-Talk application for secure communications with emergency responders across any network or device, and smartboards to transfer information from working sessions to designated personnel not on the scene.

One side of the vehicle contains three crucial monitors known as the Incident Command System. "We can have an operations person, a logistics person and a planner together with monitors in front of them managing the incident," explains Ciaccio.

The other side of the vehicle has four monitors that help dispatchers communicate with first-responder teams and other state and city agencies.

"The 10 radios in the command center are patched into the Texas Department of Public Safety, the state police, and we are in the process of tapping into the Houston Police Department and Houston Fire Department," he says. "We can also tap into the

Harris County Sheriff's Office. If there is no Internet or Wi-Fi, we can use satellite to operate everything, even the phones."

The vehicle also has cameras on all sides and a 45-foot mast that personnel inside the vehicle can guide to obtain a 360-degree view of the surrounding area.

"In the back portion of the vehicle, there is a secure room where we can do interviews or high-level planning," adds Ciaccio. Diagrams and notes from the smartboards can be uploaded directly to the National Transportation Safety Board, FBI and other agencies in a similar manner as video.

Finally, there is a weather station inside the vehicle that enables personnel to monitor wind, rain, temperatures and other factors that might impact the incident response.

Driver Training

The mobile command center is housed at IAH and driven to the other system airports as needed.

"It is classified as an emergency vehicle, so it has lights, sirens and is a marked vehicle," Ciaccio says. "Because it is classified as an emergency vehicle, we would have no problem getting it to Hobby Airport or Ellington Airport if we had to. We had a real-life test with the F-16 crash, and it took us under 40 minutes to get there—and that would be the farthest we would ever have to go with it."

Because the command center is a Class B emergency vehicle, all potential drivers had to train and earn the associated certification. Houston Airport System sent six members of its emergency response team to a one-day classroom training session, followed by field training with the Houston Fire Department. Employees had to pass driving tests and a written exam with the Department of Public Safety to receive certification. These employees are now certified to drive the vehicle to incident scenes, set it up and troubleshoot problems onsite.

The vehicle's high-tech features and capabilities required broader training for other employees as well. Motorola provided training to select personnel, who then trained others at the airports. "We get additional training as upgrades come out, and we had Motorola's IT folks on call the first six months we had the vehicle in case we needed them for anything," notes Ciaccio.

He and Ebelt describe the training needed as minimal. "Motorola Solutions integrates several technologies into one platform, making it very intuitive and easy to use," Ebelt says. "We leverage video assets into one central command center, for example, for secure access based on roles and responsibilities."

The airport system and Motorola both foresee working together on future projects. Ebelt notes that continuing the partnership will improve connectivity between the system's current and future technologies. "In addition to ASTRO 25 LMR (land-mobile radio) technologies, we support WAVE PTT (push-to-talk) for seamless communications and a distributed antenna system that enhances cellular and mission-critical radio frequencies," he says.

Moreover, Ebelt predicts that Motorola's work in Houston will also benefit airports across the country, as the company continues to enhance its site-specific, intelligence-led policing systems.

Merritt Island Airport Builds Seagrass Island, Restores Saltwater Marsh to Add New Runway Safety Area

BY THOMAS J. SMITH

FACTS&FIGURES

Project: New Runway Safety Area

Location: Merritt Island (FL) Airport

Owner: Titusville-Cocoa Airport Authority

Associated Environmental Mitigation Projects: Removing sunken boats from adjacent aquatic preserve; protecting shoreline around airfield; creating seagrass island in the most eroded area near runway; restoring local wetlands

Total Cost: $4.8 million

Funding: 90% FAA; 5% state; 5% airport

Engineer: Michael Baker Int'l

General Contractors: Welsh Construction for runway safety area, shoreline stabilization & seagrass Island; Sterling Enterprises for salt marsh

Aquatic Restoration: Sea & Shoreline; Michael Baker Int'l

Accolades: 2016 Florida Airports Council J. Bryan Cooper Environmental Excellence for General Aviation Airports Award; 2017 Florida Institute of Consulting Engineers Excellence Honor Award; 2017 FAA Southern Region General Aviation Safety Award; 2017 *Engineering News Record* Southeastern Region Airport Project of the Year Award

In the course of meeting FAA design standards for runway safety areas, Merritt Island Airport (COI) upgraded its previous grass safety zone and completed four associated environmental mitigation projects in 2016. Apparently, management's above-and-beyond philosophy also extends to construction administration, as crews finished the $4.8 million initiative $700,000 under budget and one month ahead of schedule.

The general aviation airport's location and airfield configuration did *not* make it easy. Situated on Florida's east coast near Cocoa Beach and Port Canaveral, COI's sole runway juts out into a nationally protected waterway. Previously, a grassy area about 60 feet long served as the safety zone at the end of Runway 29; but erosion had eaten away at it and the margins around the north side of the runway safety area throughout the years. Between 1988 and 2014, the airport had 34 aircraft roll off the 3,601-foot runway and into the surrounding Banana River Aquatic Preserve.

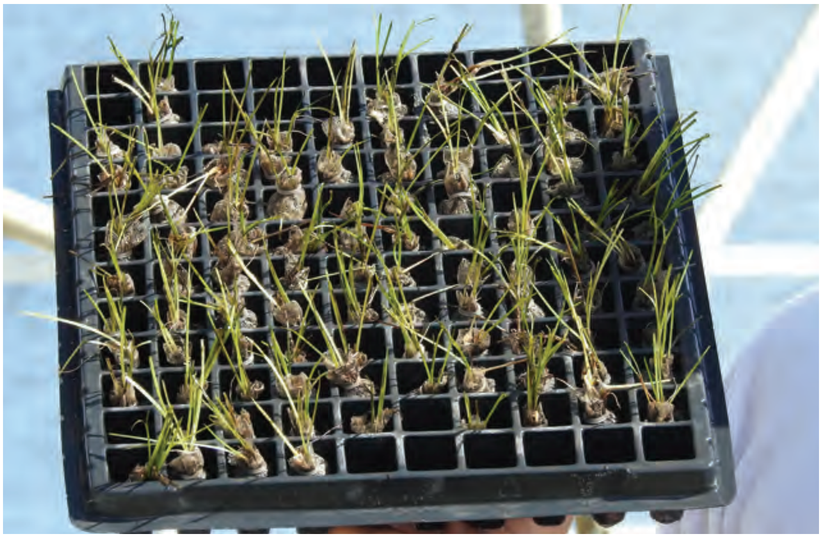
That streak, plus the volume and nature of its traffic, inspired COI to build a 240-foot long runway safety area, per FAA standards for larger, busier airfields. A high concentration of the 110,000 annual operations is for flight instruction, and all traffic uses the same, single runway.


MICHAEL POWELL

"It was the airport authority itself that pursued this additional safety project," says Michael Powell, the authority's chief executive officer. "We wanted to ensure that we had the safest environment possible for our valued tenants and public."

Small Airport, Big Project

Airport officials worked for about two years to secure FAA approval and funding for the project. "It is a very large project for an airport that is so small; so it took a while to get the funding," Powell relates.



Seagrass from the fill area was saved and tended by aquatic restoration specialists until it was ready to be replanted elsewhere.

During the review process, the FAA asked the airport to complete its on-going 20-year master plan before finalizing the request. In the end, the federal agency funded 90% of the project, and the airport and state split the remaining costs equally. While the airport authority is ultimately part of Brevard County, COI is self-sustaining, notes Powell.

Constructing the new safety area required the airport to fill in 185 feet of the nearby aquatic preserve—a change that required an environmental assessment and multiple federal and state permits. By working the process in advance, the project team obtained approval for its designs and permits by August 2015, three months ahead of schedule. Overall, more than 10 local, state and federal agencies reviewed the project.

Powell notes that the airport board set the tone early by making it clear that the project should not just meet federal and state environmental requirements, it should be a model. "We are a community asset, and we need to stay focused on what the good folks in the surrounding community want and how we can best serve and improve the environment," he explains. "We always try to be a good neighbor."

MARIBEN ANDERSEN

The Jacksonville office of Michael Baker International (COI's engineer of record) designed the runway improvements and associated remediation projects. Mariben Andersen, the firm's environmental manager for the projects, notes that the engineering team undertook sustainability measures not required in the permits, per the authority's marching orders. "The extra effort was the right thing to do as stewards of the environment," says Andersen.

State and federal laws required that any environmental damage caused by fill needed for the new runway safety area had to be mitigated within the local watershed. After collaborating about possible mitigation projects with the Brevard County Department of Natural Resources, St. Johns River Water Management District, Florida Department of Environmental Protection and U.S. Army Corp of Engineers, the COI team mapped out a list of specific initiatives:

- removing four sunken boats from the aquatic preserve;
- protecting the eroding shoreline around the airfield;
- creating a seagrass island in the most eroded area along the runway; and
- restoring wetlands near the airport.

Extending the Field

To create a foundation for the new runway safety area, project designers determined that contractors would have to fill about one-half acre of the estuary. About 15,000 cubic yards of fill was used to create the extension and make it level with the runway. Crews pounded steel piles into the river bottom to create a barrier so the zone could be dewatered.

Work was performed at night to avoid interfering with airport operations, notes Andersen. Contractors also built a construction access road, so heavy construction equipment would not cross the runway.

Before the site was dewatered, an aquatic restoration company harvested seagrass from the area so it could be replanted later on a newly created seagrass island. "It made no sense to bury the seagrass," Andersen notes. After the area was dewatered, crews also removed 12 inches of mud containing seagrass roots to subsequently place on top of the new island.

Project designers stabilized the runway's shoreline and new safety area with 37,000 square feet of articulated concrete block. Open blocks strung together with cables create a flexible mat that moves with the waves, Andersen explains. Saltwater grasses were planted in the open blocks, and now the area looks like a solid grass shoreline.

Engineers recommended the articulated block system after computer modeling projected that it would protect the shoreline against erosion for 75 years. They also tested large rocks deployed as riprap, but that design only yielded an estimated 50-year lifecycle. In addition, open crevices between the rocks would have supported mangroves, which could have become a maintenance and obstruction issue.

Since it was completed in April 2016, the system has been tested by two hurricanes— Matthew in fall 2016 and Irma last September. In both cases, the articulated block wall worked without any loss of the improved shoreline, and airport operations resumed the next day.

Seagrass Island & Marsh Restoration

Crews filled a deep hole in the estuary along the runway's north shoreline to create a shallow one-acre area for the new seagrass island. Aquatic restoration specialists from Sea and Shoreline harvested the seagrasses from the fill area and grew them at the company's facility in Ruskin until the seedlings were large enough to be transplanted.

They encased the seedlings in circular wire cages to protect the tender plants until their roots were well established and to prevent manatees, turtles and pinfish from eating or uprooting the new plants, explains Andersen.

The seagrass mitigation island is now the only new portion of the lagoon where the seagrasses are thick, and the area is now rich with aquatic life such as crabs and conchs, she reports.

Another key environmental project occurred south of the airport, where crews helped restore balance to a 23.6-acre saltwater marsh along the Banana River. A berm created as part of a local mosquito control program had isolated the marsh from the nearby river, causing it to become a predominantly freshwater marsh that was consequently invaded by non-native plants. The airport sponsored efforts to clear away and mulch the invasive tree species and replace them with native Florida plants. It also installed a new system of pipes that allows personnel to flush or dry out the marsh at the appropriate times in the mosquito lifecycle to help control the population.

Before any of the work could begin, the airport authority had to purchase the property from an out-of-state owner. Because it used federal funds to do so, COI is responsible for monitoring and maintaining the improvements for five years, notes Powell. The newly improved area is adjacent to similar marshes already owned by the county.

Educational Opportunity

In addition to its four mitigation projects, the airport also launched an outreach effort by partnering with the biology program at Florida Institute of Technology, in Melbourne, FL. Since March 2016, graduate and undergraduate marine biology students under the leadership of Professor Jon Shenker have been sampling the seagrass mitigation area and mosquito saltwater marsh. Every six months, students monitor the health of the seagrasses and sample fish in the area.

Crews created a new seagrass island with plants harvested from the area that needed to be filled to support the new runway safety area.

Andersen notes that this partnership and the additional monitoring it provides are more examples of COI going beyond the requirements outlined in its permits.

Crowdsourcing + Collaboration = Better Airport Research

MIKE SALAMONE

Mike Salamone, manager of the Airport Cooperative Research Program (ACRP), has guided the investment of more than $126 million into research that has created a rich library of more than 400 publications. ACRP is sponsored by the FAA and managed by the Transportation Research Board of the National Academies of Sciences, Engineering and Medicine. Program oversight and governance are provided by representatives of airport operating agencies and other industry stakeholders appointed to the ACRP Oversight Committee by the Secretary of Transportation.

In the spirit of continuous improvement and service to the industry, the Airport Cooperative Research Program (ACRP) recently modernized its process for generating research projects. The old process of airport practitioners submitting research ideas, or "problem statements," on paper was no longer efficient; so we used technology to improve it.

Our new system, IdeaHub, is an online platform that crowdsources the industry's ideas and creativity to generate high-quality problem statements. Launched in November 2017, it makes submitting and developing ideas efficient, transparent, highly engaging and even fun!

Unlike the old system, IdeaHub includes a feedback mechanism for submitters, a systematic method for capturing ideas that have merit but need improvement, and a way for industry stakeholders to strengthen ideas through discussion and collaboration. Custom built for ACRP, our new system provides a clear, user-friendly space where industry members can post ideas and collaborate with like-minded practitioners to grow their ideas into quality problem statements. Like other social media platforms, IdeaHub is easy-to-use and intuitive. Members can scroll through posts, vote ideas up/down, and comment on each other's work. Having multiple sets of eyes from across the industry looking at and commenting on ideas will strengthen them and enhance their relevance before they are submitted for evaluation and possible funding.

IdeaHub makes tracking an idea through the problem statement development process easier and allows users to engage to any extent they choose. For example, you can simply submit an idea, or usher it through the entire process. Users can participate through a variety of roles:

- **Idea Owners** commit to developing a small team and collaborating with others to refine ideas by providing additional information as necessary. If an idea creator chooses not to "own" his/her idea, other participants may adopt and subsequently "own" it. Owners ultimately submit finalized ideas as official problem statements to ACRP for project consideration.

- **Idea Teams** work with Idea Owners to flesh out and fine-tune ideas, making them the best they can be.

- **Idea Mentors** are volunteers who are trained in the elements of high-quality problem statements and the key criteria ACRP uses to evaluate them. As subject matter experts, these mentors know the research topics in depth and can greatly enhance ideas and help them become most useful and valuable to the airport industry.
- **Topic Moderators** are individuals with expertise in specific topic areas who help identify gaps in potential statements before they are officially submitted and offer guidance to Idea Teams for strengthening the quality of their statements. They work behind the scenes, answer questions from team members and guide users interested in adopting "unowned" ideas. Moderators receive technical training about working within the IdeaHub platform and are a resource for the entire user community.

Other benefits of the new system include improved and transparent recordkeeping: The platform maintains an electronic record of all discussion surrounding an idea. Because records are kept for all problem statements, users can retrieve statements not selected for funding to reconsider in future years.

Ultimately, IdeaHub will help serve airports for years to come by encouraging industry participation in the flow and development of new ideas to improve airports and ultimately serve and respond to the industry's unmet needs.

To access ACRP's new online platform, visit http://IdeaHub.TRB.org.