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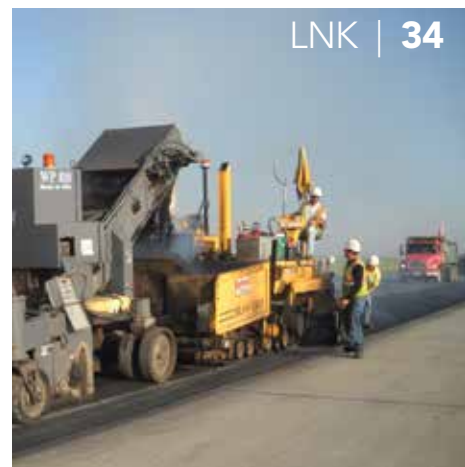
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No Airport is an Island

Events over the last few weeks have served as vivid reminders of how tightly our nation's airports are woven into the fabric of what happens nationally and locally. The challenge is how we approach, even embrace, our responses.

First on the docket is Ebola. At the beginning of the year, how many of us even knew about the disease or the havoc it can afflict? But now it's here, and we need to deal with it. Like it or not, airports are front and center in the fight. We were the entry point for infected patients arriving in the United States from Africa, and airports have the potential to fan the spread of the disease throughout North America. If Ebola is not contained, more airports may soon be asked to join screening efforts. The impact on travelers, how quickly they're processed and overall airport operations could be acute. This disease may be new to airports; but we have no choice but to become involved and take action.

Another unrelated reminder of how interconnected airports are with their communities came in the form of a press release from the Raleigh-Durham Airport Authority. It pledged

\$2.1 million to attract international air service and challenged community leaders to match it. I like it! In addition to offering financial support, the airport also has done its homework on why RDU deserves more international air service. It makes sense to engage state and local governments, chambers of commerce, convention and visitors bureaus, and local businesses. It's their citizens and members who are asking for new air service. Why should the airport be the only party with skin in the game? Great idea, RDU! And thank you for sharing your announcement.

Lastly, this issue marks our last of 2014. Despite Ebola, limited and uncertain funding and a whole host of other challenges, it's been a good year for airports. We're resilient and serve the public proudly. I look forward to working with all of you in 2015.

Cheers,

Paul



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Birmingham-Shuttlesworth Int'l Strips Terminal to

 Birmingham-Shuttlesworth International Airport (BHM) celebrated the \$201 million renovation of its terminal and concourses in August; but “renovation” doesn’t fully convey the magnitude of its transformation.

During the nearly four-year project, crews stripped BHM’s old 1970s terminal to its skeleton and completely reconstructed the facility — nearly doubling its size from 235,000 square feet to 455,000 square feet. The Alabama airport also gained a new concourse and Federal Inspection Station, consolidated security into a single checkpoint, added a new baggage screening system and much more.

“The old facility was in disrepair,” explains Alfonso Denson, president and chief executive officer of the Birmingham Airport Authority. “The infrastructure was no longer able to accommodate what we needed in order to offer the public and our stakeholders a first-class facility. Our only option was to strip everything down to the steel beams and rebuild. In the process,



Alfonso Denson

we were able to expand the footprint and add a lot of other great features to the facility.”

The airport authority’s overarching goal for the new terminal was to minimize operating costs and maximize efficiencies in order to extend the useful life of the facility for at least another 20 years *and* allow for future growth, Denson notes.

Budget & Funding First

Seeds for BHM’s Terminal Modernization Project were planted a decade ago, when the airport authority began strategizing about how to bring the 1970s terminal into the 21st century — and what kind of budget that would require. Discussions with the airlines and customer surveys helped establish strategic goals, and the airport authority began thinking about how the project would be funded.

It contracted KPS Group to design the facility, and later hired a joint venture of BLOC and Brasfield & Gorrie as construction manager at risk to help define costs.

“We wanted to do things right on the front end — define the costs before we started,” Denson recalls. “We lined up the federal



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factsfigures

Project: Terminal Reconstruction

Location: Birmingham-Shuttlesworth Int'l Airport

Cost: \$201.5 million

Funding: \$62 million passenger facility charge bonds; \$50 million airport bonds; \$41.8 million Airport Improvement Program grants; \$16.1 million passenger facility charges; \$14.3 million TSA; \$6.5 million FAA Voluntary Airport Low Emissions Program; \$10.8 million Birmingham Airport Authority

Architecture & Design: KPS Group

Construction Manager at Risk: Brasfield & Gorrie/BLOC (joint venture)

Program Manager: A.G. Gaston

Mechanical, Electrical, Plumbing & Fire Protection: KHAFA

Lighting Design: SSOE Engineering

Structural Engineering (new construction): MBA Engineers

Structural Engineering (renovations): LYBD Engineering

Civil Engineering & Airfield Electrical Engineering: Atkins

LEED Consultant, Commissioning: Interface Engineering

Geotechnical Testing: Terracon

Materials Testing: BECC

Stormwater Monitoring: Building & Earth

Code Consultant: Rolf Jensen & Assoc.

Surveying: Carr & Assoc.

Field Representative: Dorsey Architects & Assoc.

Baggage Handling & Security Screening Systems: Cage

Concessions Planning & Design Standards: Leighfischer

Schedules & Estimates: Hill Int'l

Airport Terminal Planning: Jacobsen Daniels Assoc.

Information Technology & Public Announcement System: L'Acquis Engineering

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Interiors: Margaret Jones Interiors

Passenger Boarding Bridges: ThyssenKrupp

Seating: Arconas

Living Wall: Green over Grey

Children's Play Areas: International Play Co.

Signage & Wayfinding: Jones Worley

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Bones & Rebuilds

By Robert Nordstrom

funding with TSA and FAA, got the passenger facility charge application approved. We made sure that the cost to the airlines would not be unreasonable (approximately \$50 million of the \$201 million total cost)."

Defining the budget clearly, and early in the process, proved strategic. "When we started the project, the challenges were not as great as they would have been if we hadn't done the front-end work," he reflects. "I'm proud to say we came in on schedule and budget."



Gary Plosser

Gray Plosser, principal and project director for KPS Group, notes that the airport authority wanted to be "very transparent" throughout the capital program. "They wanted the support and agreement of their prime

tenants and a project for which they could secure funding and financing," Plosser explains.

Staying Operational

Planners split the project into two phases. But before construction began, crews spent four months rearranging the facility to facilitate operations throughout the ensuing work. In addition to relocating and consolidating the airport's two security checkpoints, crews moved the ticketing lobby, boarding areas and five rental car companies.

The first phase of construction, which lasted 23 months, included demolition of the old air cargo facility, Concourse B and the north portion of the terminal. A new Concourse A was built, and Concourse B and the north portion of the terminal were reconstructed. Upon completion, the airport relocated five airlines

Wayfinding signs and flight information displays are now backlit with LED lighting.



Photo: ©Fred S. Gerlich Studio, Courtesy of KPS Group, Inc.



Photo: ©Fred S. Gerlich Studio, Courtesy of KPS Group, Inc.

and other tenants from the operational portion of the terminal and Concourse C into the new facilities in an overnight move.

Concourse C and the south half of the terminal were demolished and reconstructed during the 17-month second phase. The new building houses the airport authorities' administrative offices, two airlines and other tenants. Concourse C was shortened in the process, to avoid conflict with a future taxiway relocation, notes Plosser.

The physically active portion of the project — including preliminary reshuffling, demolition and reconstruction — was completed in 44 months.

The new configuration of the concourses required associated airside changes. Throughout construction, crews repaired and

adapted the apron to the new layout, which also prompted extensive storm sewer and utilities work.

The construction manager at risk approach allowed BHM to rely on just one contractor to manage the multiple facets of the project under a single contract, notes Brasfield & Gorrie Project Manager Jeff Hart.

"Our primary objective was to ensure daily airport operations during construction," Hart reports. "The project team conducted numerous planning sessions with airport representatives and subcontractors to ensure that construction did not impede airport operations."

Security was another top priority. "The airport provided guidelines ... and we scheduled daily coordination meetings to discuss tasks, plans and concerns," Hart elaborates. "In addition, each crew held safety meetings daily to discuss job hazards."

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Holdroom enhancements include children's play areas, new seating and free Wi-Fi access.



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During construction of concourses A and B, walls and fencing were used to separate construction areas from secure operational areas, adds KPS Group Project Manager Gary Kimbrell. "Although all workers had security badges, the construction site was unsecured, which gave contractors free access to the work site," he explains.



Gary Kimbrell

"The old terminal had two passenger security checkpoints," Plosser informs. "Consolidating passenger screening at one location was a huge improvement because TSA no longer had two separate locations, which was inefficient in terms of staffing and equipment use."

A new \$15 million inline baggage system, which allows all baggage screening to occur on the lower level instead of the departures level in the old terminal, is another marked improvement.

"The new screening system makes life much easier for TSA," notes Plosser.

Changes are proving popular with customers as well. In fact, improvements to passenger and baggage screening are some of the

Efficiencies & Amenities

Creating a single, centralized security checkpoint and connecting the three concourses on the airside of the new checkpoint were primary goals of the project.



congratulates the Birmingham Airport Authority on the grand opening of their remodeled and expanded facilities



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Living Wall is Literal Example of Facility's Green Features

Photo: ©Fred S. Gerlich Studio, Courtesy of KPS Group, Inc.

Equal parts art, interior landscaping and environmental statement, the living wall at Birmingham-Shuttlesworth International (BHM) is turning heads at the recently renovated Alabama airport. The verdant exhibit stands 14 feet tall and stretches 100 feet along a passenger walkway between concourses B and C.

In addition to adding visual color and texture, the vertical garden is engineered to improve the airport's indoor air quality by removing common pollutants. It also enhances acoustics by absorbing ambient noise.

The unique feature, designed by the Canadian company Green over Grey, features 60 different species of Alabama vegetation. Varieties include orchids, insect-eating plants and even a special pineapple hybrid, which will bear fruit for harvest.

Gaynell Hendricks, chairman of the Birmingham Airport Authority, considers the feature a picturesque way to convey BHM's

regional identity. "We feel that this beautiful, lush living wall is an example of our lush and beautiful state," Hendricks told local media.

A fabric quilt created by a local artist served as the pattern for the wall's design, which is formed by roughly 8,000 individual plants held in place by panels covered with recycled fabric. An automatic irrigation system delivers water and nutrients to the special soil-free system to minimize ongoing maintenance for airport personnel.

According to Green over Grey, BHM's living wall is the largest of its kind at any U.S. airport. The company also designed several similar installations at Edmonton International Airport in Alberta. One depicts cloud formations and air currents; others are based on paintings by Canadian artists.

Mike Weinmaster, chief designer for Green over Grey, hopes his creations will reintroduce airport visitors to nature and excite them about its wonders. ✈️



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most widely appreciated elements of the entire project, reports Plosser. "It makes travel much more convenient for the public."

Improved screening systems, however, exemplify the authority's broader primary objective: creating an environment that would improve passengers' overall travel experience. As such, designers introduced more daylight throughout the terminal and used a lighter, brighter color palette. The new layout eliminates steps and keeps travelers under cover when entering and exiting the terminal.

Concourses and holdrooms were designed to be much more comfortable, with greater seating capacity and variety. In addition, travelers now have free Wi-Fi access throughout the facility. Wayfinding signs and flight information displays, all of which are backlit with LED lighting, were also dramatically improved, Plosser adds.

Concessions were also overhauled, as airport officials considered the previous mix in the old terminal a big problem — particularly the food and beverage offerings. The new terminal's lineup combines local and national brands for both retail and food/beverage. Offerings include Jim 'N Nick's, Chick fil A, Ebony Newsstand, Alabama Sports Hall of Fame, Talladega Grill and Alabama Store.

In addition, the airport added family restrooms, private nursing rooms and a meditation room. A local children's museum sponsored the installation of a play area in each concourse.

Public restrooms were designed in two symmetrical halves, with porcelain tile walls for improved appearance and cleaning ease. In its old terminal, maintenance staff had to close entire restrooms for cleaning. Now, they can close half of the restroom for cleaning and leave the other half open for public use.

Designers specified terrazzo flooring throughout the terminal and concourses. Replacing the old terminal's tile flooring significantly improved acoustics, notes KPS Group's Kimbrell. "With the advent of roller luggage, the 'click, click, click' was very noisy. The new terminal is much quieter," he reports.

Going Green

As part of BHM's comprehensive sustainability program, its new facilities include a high-efficiency heating, ventilation and air conditioning system and a sunlight harvesting system designed to reduce the use of artificial light.

High-efficiency elevators, escalators and baggage conveyance are also part of the strategy. Rooftop tanks collect and store rainwater, which is then used to flush toilets.



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A cost-saving, sustainable aspect of this project included reuse of a PCC pavement and cement treated base, which was demolished and used to build up an area at the airport's north end.

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Photo: ©Fred S. Gerlich Studio, Courtesy of KPS Group, Inc.

A new \$15 million inline baggage system speeds screening.

“The airport actually sits in a flood plain,” Kimbrell explains. “By collecting the rainwater and reusing it, the airport essentially removed approximately five acres from the floodplain by reducing the amount of runoff that ends up in the stream running through the middle of the airport.”

BHM stresses sustainability in its daily operations by using “green” cleaning products and environmentally conscious landscaping practices. It also administers a recycling program for passengers and airport tenants alike.

Reducing the terminal’s influx of outside air by 50% to 70% was another one of the project’s environmental victories — but not an easy one.

“Air infiltration in airports is very challenging with all the loading bridges, doorways, people coming in and out,” explains Plosser. “The building envelope (at BHM) is one of the most efficient we have ever done in terms of its average R-value (a measure of thermal resistance/insulation efficiency). The roof is light reflecting, and the glass used throughout the terminal is very efficient thermally. All the glass is shaded with louvers or north



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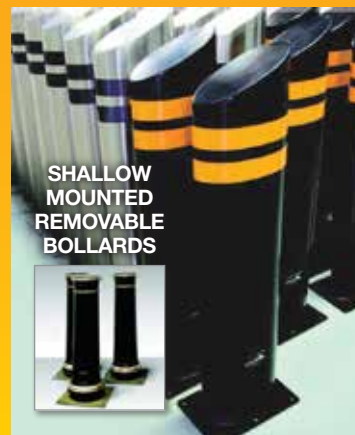
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Reconfiguring the concourses required changes airside as well.



Photo: ©Fred S. Gerlich Studio, Courtesy of KPS Group, Inc.



Photo: ©Fred S. Gerlich Studio, Courtesy of KPS Group, Inc.


facing. Light monitors were installed in the concourses, allowing the airport to operate concourses using virtually no artificial lighting during daytime hours if the sun is out.”


Given the numerous environmental features of its new facilities, the airport plans to apply for silver certification of Leadership in Energy and Environmental Design from the U.S. Green Building Council.

Prepping for the Future

BHM's new terminal has 19 gates, with room for four more when the need arises. Currently, the airport moves approximately 2.6 million passengers per year through its terminal; but the new facilities can “easily handle double that amount,” says Denson.

With the addition of the new Concourse A, the airport created space to add a Federal Inspection Station. The new Customs and Border Protection facility can process approximately 400 passengers per hour, with space available to expand and accommodate an additional 180 passengers per hour.

“We included the Federal Inspection Station in order to pursue international air traffic in the future,” Denson explains. “It doesn't guarantee anything; but it gives us the opportunity to begin marketing the airport for international traffic. That's part of our long-term strategy.” 

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Service Changes Lead to New Retail Development at Pittsburgh Int'l

By Victoria Soukup



factsfigures

- Project:** Retail Revamp
- Location:** Pittsburgh Int'l Airport
- Cost of Renovations:** \$10 million
- 2012 Concession Revenue:** \$56 million
- 2013 Concession Spending:** \$14.16/passenger
- Concession Developer:** AIRMALL USA
- General Contractor:** Shannon Construction
- Retail Additions:** 9 new stores, including int'l luxury brands
- Design:** Lami Grubb Architects
- Terrazzo Floor Design:** Clayton Merrell
- Floor Installation:** Roman Mosaic & Tile
- Of Note:** Renovations are expected to boost concession revenue 10% - 20%

A \$10 million revamp of the airside terminal at Pittsburgh International Airport (PIT) simultaneously addressed two issues: a major change in the nature of the airport's passenger traffic and the need to update its retail concessions.

Completed in July, the renovation opens up the terminal's 80,000-square-foot center core, adds high-end retail options and encourages foot traffic in areas previously hidden from view. PIT officials expect the changes to boost next year's concession revenues by 10% to 20%, based on projections from AIRMALL USA, the firm that manages and develops both retail and food/beverage operations for the airport.

"The change in passenger flow gave us an opportunity to redefine and redesign the passenger experience as travelers entered the airside core on their journey to the gate,"



James R. Gill

says James R. Gill, PIT's acting executive director. "It's a renovation that looks beautiful and focuses on customer service."

As before, passengers enter PIT's airside area from an escalator that deposits them in the center of the terminal — where they now find a host of new retail options. From there, passengers proceed to gates in four concourses, which are arranged in an "X" pattern.

With PIT consistently posting some of the highest per-passenger spending figures of all North American airports, the recent revamp was critical to retaining its enviable industry position. Last year, passengers spent an average of \$14.16 at PIT concessions. Overall concession revenue totaled \$56 million in 2012.

From Hub to O&D

For many years, PIT served as a key hub for US Airways. Eight out of 10 passengers landed at the A or B concourse; and 70% of those



Jay Kruisselbrink

passengers traveled between the two concourses to make connections. This meant that many visitors rarely ventured to other areas of the airport, and AIRMALL laid out its retail offerings accordingly, explains Jay Kruisselbrink, the company's senior vice president.

The approach worked well until US Airways "de-hubbed" PIT, and the airport transitioned to an origination and destination (O&D) facility. Gill estimates that fully 96% of the airport's passengers now start or finish their flights at PIT.

"That shift took passengers to all four concourses," notes Kruisselbrink. "Instead of the passenger traffic being limited to two concourses near where the majority of our retail was located, it was now spread out evenly among all four concourses. We needed to redo the retail program so that the most customers/passengers were exposed to the most shops."

The project that ensued in January 2013 is the most significant renovation since the airport opened more than two decades ago. Before the recently completed overhaul, PIT's center core only included an information desk and old, television-style Flight Information Display System monitors. During recent renovations,

the screens were upgraded to vertical, digital signs and moved to another area of the core along with the information desk. Nine specialty retail stores, including new high-end brands, were added, bringing PIT's overall concession lineup to 76 shops, restaurants, bars and other retail options.

Rerouting Retail Traffic

Lami Grubb Architects, a local Pittsburgh firm, designed the project. "The entire core area has been cleaned up and made into inviting retail space," reports Robert Grubb.



Robert Grubb

Grubb says that the new configuration "opens up" how the passengers view PIT's concession offerings by grabbing their attention as they exit the escalator and drawing them through the new retail area. "The stores on the back wall had been hidden by some of the stores that surrounded one side of the core," he explains. "We thought that inhibited people from seeing all of the stores, so they were taken out."

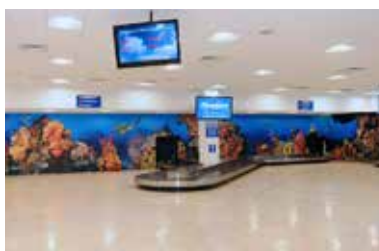
The project was divided into phases to minimize disrupting airport operations, and signage helped maintain passenger flow throughout renovations, Kruisselbrink notes. "We had a lot of barricades but (also) had great signage," he recalls. "There were



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Trading Tile for Terrazzo

Only one main element of Pittsburgh International's airside overhaul remains in process: a public art project made of terrazzo flooring. When the creation is complete, passengers will pass through a noticeably smoother, quieter and more decorative entryway to the airport's recently renovated retail area.

New terrazzo flooring will replace thousands of old quarry tiles that required more maintenance and made an annoying "clickety-clack" sound when luggage wheels rolled across them. "Having a beautiful floor that complements the design of the new storefronts, which are marvelous, enhances the entire airport experience and beautifies the airport," says James R. Gill, PIT's acting executive director.

The Allegheny County Airport Authority commissioned Clayton Merrell, an art professor at Carnegie Mellon University, to design the 69,000-square-foot project. Merrell's concept, *The Sky Beneath Our Feet*, depicts a bright blue sky with clouds, aircraft contrails and silhouettes of five Pittsburgh neighborhoods.

"This will physically transform the entire airside core of the airport into a giant sky," Merrell comments. "You will walk across one of the neighborhood profiles of these panoramic silhouettes as if you were stepping into the sky ... The image will be rendered in multiple shades of blue and there will be a variety of clouds layered all around to create a sense of scale and perspective."

Project planners selected terrazzo for its high quality and durability. Manufacturers create the material by mixing small pieces of quartz, granite, marble and/or glass with a binding agent to produce a resin-like material that is poured into a mold on the floor. Once it hardens, crews polish the terrazzo to create a smooth surface.

"After they decided to do a terrazzo floor, they decided they might as well do something great with colors and imagery," Merrell explains. "Basically it's like a giant painting, but it's an acre-and-a-half in size."

Installation will occur in phases spread throughout 14 months. Completion is slated for October 2015. ✈️

collages of retail and food and beverage as well as directional signs. The signs were key."

Retail tenants coordinated the opening and closing of stores, and fortuitous lease expiration dates helped facilitate some moves, adds Kruisselbrink.

The new retail core includes international luxury brands such as Italian-based Pinko, which chose PIT for its first U.S. location. Other stores include Furla, Lacoste, AJ Armani Jeans, Hugo Boss, Tumi, Spanish-based Desigual and Collezione-The Beauty Gallery.

Metalsmiths Sterling, a premium U.K.-inspired brand of handcrafted sterling silver jewelry, is another new addition. The store features more than 800 different pieces in diverse styles, with prices ranging from \$80 to \$2,650.

Demographic data about the airport's passengers prompted AIRMALL to include high-end retail options with international flair, explains Kruisselbrink. Surveys found that 34% of PIT travelers have an annual household income of more than \$80,000; and more than half of that group has an annual income of more than \$100,000. "That was a pretty good number, indicating we could be successful in bringing in an international higher-end specialty retail mix," he relates.

Lee Konidas, chief executive of Metalsmiths Sterling, considers PIT a unique airport because of its "X" configuration. "(We) recognized an opportunity to be in an airport that is in a transformation with upscaled airport shops and wanted to be included in that mix," he notes.

According to Gill, passengers are responding well to the airport's new offerings. "It's been great to have more of the brand-name, high-end retailers and products represented," he says. "One of the things we are really focusing on is customer service. This refurbishment gives the customer more opportunity to see some of these brands that are not necessarily available in their area, down the street or even in their local mall. So it enhances that part of the customer experience."

Increased concession revenues will subsequently make the airport more affordable for air carriers, he adds.

Grubb summarizes the changes and improvements in one word: modernization. "It is showing some new shapes and new patterns to the circulation in the airport and bringing in a new mix of retailers," he says. "They are all exciting things for Pittsburgh."

Like Grubb, airport officials are pleased with the project's overall results. Gill, however,



also has one regret. "I wish we could have done it sooner," he reflects. "As we changed from a hub airport to an O&D, the opportunity could probably have presented itself earlier, but we were spending time adjusting to our new dynamic. If we knew then what we know now, we probably would have done it earlier."

That said, he still considers the recent renovation a "great opportunity" to improve the airport's concession program and overall ambiance.

PIT celebrated the terminal's revamped retail lineup (and the Allegheny County Airport Authority's 15-year anniversary) in late September, with a fashion show and makeup demonstrations featuring products from its new high-end stores. ✈️

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Sea-Tac's Green Programs Run the Gamut From Food Donation to Flight Procedures

by Kathy Scott



factsfigures

Projects: Environmental & Sustainability Initiatives

Location: Seattle-Tacoma Int'l Airport

Focus: Cost-effective projects; tangible results

Sample Programs: Electric charging stations for ground service vehicles; pre-conditioned air for parked aircraft; food donation program; new flight paths for specially equipped aircraft; alternative-fuel rental car buses; off-aircraft trash & recycling; free charging for customers with electric vehicles

Results: Reduced carbon emissions 8% in 3 yrs

Recent Recognition: Level 2 Certification from Airports Council Int'l Airport Carbon Accreditation Program

 Airport officials who insist that environmental programs are a) too expensive; b) disruptive to operations; c) largely ineffective; or d) all of the above could learn a lot from Seattle-Tacoma International Airport (SEA). Last year, it handled 34.8 million passengers while maintaining more than a dozen green initiatives, and in the process further solidified its position as one of the industry's strongest environmental leaders.

In September, SEA became the first North American airport to earn certification from the Airports Council International (ACI) Airport Carbon Accreditation Program, an independent assessment of airports' efforts to measure, manage and reduce carbon dioxide emissions. The program was initially launched in Europe in 2009 and then spread to Asia-Pacific in November 2011 and North America this fall.

SEA's accreditation is formal recognition of the airport's success in reducing emissions via energy-efficient operations and the use of low-carbon electricity throughout the past three years. During that time, SEA has saved the same of amount of energy typically consumed

by 700 single-family homes per year. And from all indications, the airport is far from done.

"Next year, we expect to go even further in the certification as part of our Century Agenda goal to reduce aircraft-related emissions by 25% at Sea-Tac and 50% overall at the Port of Seattle," said Stephanie Bowman, co-president of the Port of Seattle Commission, in a printed statement.

No Stone Unturned

In addition to a history of environmental firsts, SEA has a wide range of noteworthy current projects. This year, for instance, it provided travelers with 48 electric vehicle charging stations — more than almost all other North American airports.

According to InsideEVs.com, the number of plug-in electric cars is on the rise in the United States. With new brands gaining acceptance and more than 87,000 units already sold this year, some planners predict that airports will need to incorporate charging stages as a practical move, regardless of their philosophical or business stance on environmental issues.



Switching from gas to electric power for ground service vehicles reduces the use of fossil fuel and decreases airfield emissions.

Photo Courtesy of Port of Seattle/Don Wilson

Beyond providing space in its passenger parking garage, SEA is also facilitating the transfer from gasoline to electric power on its ramp, for ground service equipment. Alaska Airlines has been making the switch, and SEA installed electric charging stations to provide electricity at very low rates. The crossover to electric is projected to save Alaska Airlines an estimated \$300,000 in fuel costs each year and reduce greenhouse emissions by 1,000 metric tons annually.

The \$31 million airside electrification project was funded by a partnership of the Department of Energy, Western Washington Clean Cities Coalition, the FAA's Voluntary Airport Low Emissions Program (VALE) and SEA. When fully operable, with 600 converted ground service equipment vehicles using the stations, the program is expected to save nearly 1 million gallons of fuel per year, \$2.8 million in fuel expenditures per year (assuming a price of \$3 per gallon) and 10,000 tons of greenhouse gases.

Elizabeth Leavitt, director of Aviation Planning and Environmental Programs at SEA, notes that developing strategies with tangible financial benefits has been one of the best motivators in getting airlines on board with the airport's green programs.



Elizabeth Leavitt

"We have stayed focused on cost-effective environmental projects," explains Leavitt. Over the past decade, she and her team have maintained a resolute focus on combatting inefficiencies while decreasing SEA's carbon footprint, noise pollution, output of greenhouse gases and solid waste disposal.

A food donation program, for instance, helps concessionaires send unpurchased pastries, sandwiches, salads and other airport mainstays to a local food bank instead of throwing them out. SEA installed two large refrigerators in a designated room within the main terminal and encourages restaurants and retail stores to place good-quality, non-expired food there at the end of each evening. At SEA's request, a local food bank picks up the donations and distributes them to those in need.

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The airport provides systems to encourage recycling by customers (top photo) and concessionaires (bottom photo).



Photo Courtesy of Port of Seattle/Don Wilson



Photo Courtesy of Port of Seattle/Don Wilson

By this time last year, airport businesses had donated more than 110,000 pounds of food to the community — roughly the same weight as one-third of an unloaded Boeing 777, noted local media.

Significant participation from concessions partners HMSHost and Hudson News has further bolstered the program. SEA tenants currently donate enough food items to provide more than 540 meals a week to the hungry.

Then & Now

A fuel hydrant system project was one of the first full-scale endeavors undertaken by Leavitt and her team, when SEA's environmental division was formed in 2005. By carrying fuel from the fuel farm to underground manifolds for delivery to each passenger aircraft gate, the system removed 16 fuel tanker trucks from the airfield, reduced petroleum use by 95,000 gallons and decreased annual carbon dioxide emissions by 1,000 tons.

More recently, SEA has partnered with FAA and Alaska Airlines on the Greener Skies Project, a program that is reducing fuel consumption and pollution through new flight procedures. The program allows specially equipped airplanes (those with required navigation performance) to descend more efficiently into SEA using computer-generated flight paths and advanced GPS technology.

According to FAA research, the program is saving airlines \$5 million per year through reduced flight time and fuel use. The new flight procedures were also found to reduce air and noise pollution for many, if not most, neighborhoods in the region. SEA's greenhouse gas emissions are consequently estimated to decrease by 15,600 tons per year.

Another initiative that continues to earn long-term benefits for SEA and its airlines is the airport's off-aircraft trash/recycling program. In 2010, SEA installed large-capacity compactors with computer devices that monitor trash levels and alert waste haulers when pick-up is needed. Placing an equal-size computer-equipped compactor for recyclables next to each trash unit was the airport's way of reminding service crews to recycle as much material as possible.

According to airport officials, the system's benefits far outweigh its price tag. By using large-capacity compactors (each with a capacity of 30 cubic yards) and leveraging computer technology to increase hauling efficiency, SEA provides airlines with cost-effective trash disposal and free recycling. Fewer hauling trips reduce ramp traffic, which, in turn, improves safety and decreases greenhouse gas emissions. Each year, the system helps airlines recycle approximately 200 tons of material — roughly 10% of SEA's overall airfield waste.

Leavitt credits her staff for its focused efforts to find funding for the numerous projects, and highlights the VALE program as one of SEA's most significant sources to date. VALE, for instance, helped the airport purchase pre-conditioned air units, which allow pilots to save fuel by turning off their secondary engines immediately after parking at the gate. Pre-conditioned air units continue to heat or cool passenger cabins after aircraft power down. (See our November/December 2012 issue for more details.)

Encore!

Despite SEA's lineup of environmental programs and initiatives, Leavitt notes that there could be more. That said, she is quick to emphasize that the key to "going green" is staying focused and true to a long-term vision.

The team at SEA consistently focuses on projects that will be supported by airlines and vendors, Leavitt specifies. Consequently, she often reminds airport personnel that although some green projects include up-front costs, many will create savings that last for years.

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“When we can identify projects that are good for the environment and good economically, we can work toward becoming a truly sustainable airport,” she explains.

Some in the industry link SEA's overall eco-success to the leadership of its managing director, Mark Reis, who earned a bachelor's degree in environmental studies at Western Washington University before proceeding to graduate school at Harvard University.

Others cite the strong culture of environmental stewardship within Washington, a state known for its robust agriculture and billion-dollar salmon industry. Operating in a region where so many livelihoods rely on the long-term health of the land and water may, indeed, help inspire SEA's environmental vigilance.

Whatever the motivation, it's hard to argue with SEA's record of action and results. 



Sea-Tac is the first airport in North America to be certified for reducing carbon emissions by an independent worldwide program. Sea-Tac Managing Director Mark Reis and Planning & Environmental Management Director Elizabeth Leavitt (center) accept the ACI-NA Airport Carbon Accreditation certificate from ACI-Europe Director General Olivier Jankovec (left) and ACI-NA President & CEO Kevin M. Burke (right).

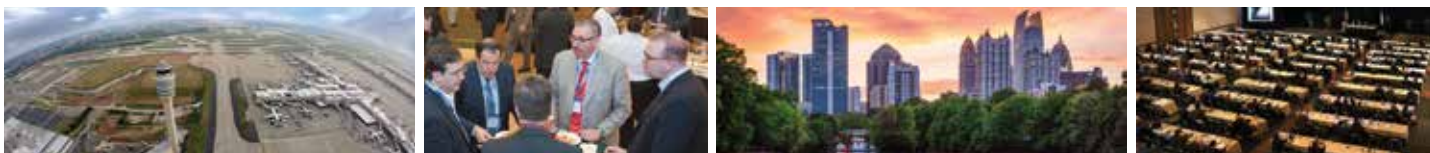
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Beacons Offer Bridge to Common Goal of Customer Service

By Jennifer Bradley

factsfigures



Beacon Technology

Project: Beacon Technology Pilot Projects

Location: Dallas/Fort Worth Int'l

Partner: American Airlines

Scope: 100+ beacons within Terminal D

Beacon Supplier: Bluvision

Technology: Apple's iBeacon



Location: Miami Int'l Airport

Scope: 246 beacons throughout entire facility

Beacon Supplier: Bluvision

Installed By: SITA

Shared Technology: SITA Common-Use Beacon Registry

Of Note: World's first complete & open beacon deployment



Beacon technology is nothing new, but the way it is being implemented at airports certainly is. Phil Easter, director of mobile apps at American Airlines, says that beacons build a bridge between the airport authority and the airlines by providing information that benefits both, and, most importantly, benefits their common customers, the passengers.

American is currently piloting a beacon mobile application at Dallas/Fort Worth International Airport (DFW). "It brings a lot of information together, but makes it simple to consume the information," says Easter.

The pilot is taking place in Terminal D, and includes more than 100 installed beacons. The beacon app alerts passengers when they have entered Terminal D and then again, when they are near their gates. "Terminals are massive, and people get turned around," Easter explains, noting that 65% of American's DFW customers go directly to their gates for that very reason.

Maurice Jenkins, Miami International Airport's (MIA) division director of information systems agrees that getting from Point A to Point B, and knowing ahead of time how long it will take, are two of the biggest challenges airport passengers face.



Maurice Jenkins

That's where the responsiveness of beacon technology really shines, notes Easter. "You can find your location within a second," he explains. "The beacons are easy to deploy, easy to integrate into apps; and based on what we're seeing, we think we'll have a successful rollout."

The airline plans to implement the app at other airports, but is testing multiple aspects at DFW first. "We want to make sure we have the technology, but most importantly, the user experience down in Dallas before we roll it out further," he explains.

The next location may be MIA. Jenkins reports that 246 beacons have been installed by SITA and are ready for applications.

Jenkins first learned about the potential of beacons in June, at the Air Transport IT Summit in Belgium. After listening to an extensive panel discussion and hearing about American's DFW pilot, he says MIA was on board to develop a proof-of-concept for beacons.

The Registry

All the beacons at MIA and DFW are listed on SITA's Common-Use Beacon Registry, a shared infrastructure for SITA members, which include almost all major airlines. Launched in July, the registry is still in its early stages and is open to revisions based on feedback from users, such as those in American's DFW trials, notes Jim Peters, SITA's chief technology officer.



Jim Peters

Peters describes the SITA registry as the Yellow Pages for beacons. He explains that all airport beacons will have the same universal identifier, but individual major and minor numbers, indicating concourses and specific locations. This allows any app developer to use the standard beacon IDs, as listed in the registry, to develop individual programs.

"The other alternative would be to have all airlines, all retailers and all facility maintenance people just put up their own beacons; but then you'd have major interference," he notes.

With 246 registered beacons, MIA is the first airport in the world to offer complete and open beacon deployment, note SITA officials. Jenkins highlights two significant factors about the distinction: first, the beacons are placed throughout the entire facility — at every gate, exit point, service area, etc. Second, the registry is not restricted; it is open to applications from developers.

Peters encourages airports considering beacons to contemplate such policy issues before installing them. Interference is a main concern, he explains. Loss of control concerning what data is being spread not to mention how, where and when it is spread are other important factors, he adds.

From the airport perspective, Jenkins acknowledges the long-term benefits of SITA's beacon registry — for passengers and airports alike. Overall, the new technology is a learning process for everyone, he adds.

"We hope that people come to embrace it, challenge themselves and develop apps," Jenkins comments. "We're excited to see what the results look like, so we can start measuring and reporting to the industry over the next year."

The Hardware

Bluivision (previously StickNFind) supplied the beacons installed at MIA and DFW. The beacons use Bluetooth technology to wirelessly emit a beacon identifier (unique to each device) that provides specific information an application is designed to provide, explains Jimmy Buchheim, the company's chief executive officer.

The signals can be set to respond at a wide variety of distances, he notes. For example, an airport might want a beacon to activate when passengers are within one foot of a TSA screening, so an application could trigger their electronic boarding passes to open automatically as they approach the checkpoint. Once the Beacon Registry identifiers are defined and the beacons are searching for those identifiers, a passenger's mobile device "wakes up" automatically, explains Buchheim.

American Airlines is using Apple's iBeacon technology for its pilot at DFW, but the app will support both iBeacon and Android beacon technologies when fully launched, notes Easter.

Return on Investment

Ken Buchanan, executive vice president of revenue management at DFW, reports that the beacons being tested in Terminal D have been good business. "The program is providing a positive and more personalized experience that will inspire passengers to come back to DFW Airport," he reports.

Despite the exciting potential of beacons for airports and airlines alike, Jenkins emphasizes the importance of passengers

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Miami Int'l has 246 registered beacons installed throughout its facility.



Internet of Things

Type the phrase “Internet of Things” into any search engine, and you’ll have pages and pages of information at your disposal. The concept has been discussed by tech professionals for a number of years, but is now making its way into mainstream conversations.

In the early days of the Internet, people manually entered the information that appeared on the World Wide Web. Today, sensors embedded in physical objects, linked through wired and wireless networks, use the same IP protocol as the Internet, and enormous amounts of information are sent through computers for analysis. Those links provide all types of data from ordinary things; and that’s what the “Internet of Things” refers to.

“All of a sudden, your elevator is a ‘thing’ ... and your baggage belt ... and your HVAC system,” says Jim Peters, chief technology officer at SITA.

“Beacons are the core of the Internet of Things,” adds Jimmy Buchheim, chief executive of beacon hardware provider Bluvision.

Buchheim predicts that the term “Internet of Things” soon will be as common as the Internet itself. Airports will be able to use information collected by default for a variety of defined purposes, from passenger movement analysis to the revision of business models.

Beacons, like those being tested at Miami International and Dallas-Fort Worth International Airport, are the connection that can lead airports directly into the Internet of Things.

opting to using them. “If a customer goes to DFW and doesn’t have the American Airlines app downloaded, there’s nothing we can do as far as beacons,” he explains. “The beacons have to be integrated within the application.”

Easter acknowledges that some passengers will be concerned about the “Big Brother” aspect of airports using beacons to track them. “That’s not the case,” he says. “For example, Starbucks can’t send you a notice to buy coffee unless you have their app and it’s part of that Beacon Registry.”

Buchheim offers an additional assurance by noting that beacons can detect motions of people but not individual characteristics. Conglomerated information, however, is beneficial to airports; it’s how MIA is hoping to see back-end deliverables from the beacon installation, he explains.

Whether airports invest directly in beacons and then enroll in the registry, or have SITA install the beacons, costs are involved. “Someone needs to actually walk the airport with a beacon application that reveals where people have placed rogue beacons,” advises Peters. The devices also require batteries and monitoring to ensure they don’t get moved or taken.

With test projects still in their infancy, the biggest potential return on investment has yet to realized, but is highly anticipated. With a few additional sensors, beacons can be outfitted to gather data such as temperature, light, voice and motion. From controlling heating and air-conditioning in various parts of the terminal to monitoring movement within Baggage Claim, there are many ways beacons can increase efficiencies and, in turn, save airports time and money. If an elevator or escalator remains still for too long, maintenance personnel can be notified sooner rather than later, Buchheim explains.



“That was a trigger factor for me,” relates Jenkins, noting that MIA’s annual power bill exceeds \$20 million. “If we can use these beacons to also regulate temperature and reduce our carbon footprint and power consumption by let’s say 5, 10 or 15 percent, we have achieved a two-fold goal.”

Although there are many ways to use beacons, Easter encourages airports to initially focus on customer service and navigation applications. “If you lose sight of providing the simple-use cases, you may not be able to deliver on some of the more grandiose things down the road,” he advises.

Mobile device applications are becoming very personal, adds Easter, warning that passengers want to know what’s available at an airport but not be assaulted with a barrage of coupon offers. “As long as we put the customer first and ask if the beacons stay core to our customer tenets of providing service and enhancing the journey, let’s do that,” he concludes.

Jenkins agrees, noting that beacons can bring added value to airports and airlines alike, but collaboration is key to achieving the mutual benefits. He stresses that the ideal level of service for passengers should always be the end goal, and beacons can be an effective bridge to it. ✈️

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Huge Fabric-Roof Hangar Under Construction at Honolulu Int'l

By Kristin Vanderhey **Shaw**



factsfigures

Project: Maintenance/Cargo Hangar

Location: Honolulu Int'l Airport

Tenant: Hawaiian Airlines

Size: 280,000 sq. ft.

Cost: \$85 million

Construction: Began April 2013

Scheduled Completion: July 2015

Hangar Manufacturer: Rubb USA

Planner/Preliminary Architect: MCA Architects

Architect of Record: RIM Architects

General Contractor: DCK Pacific Construction

Other Facility Functions: Loading docks, support offices, customer service operations

Of Note: Hangar has a steel frame & fabric roof made of woven polyester mesh permeated on both sides with a PVC coating to create a tight-fitting shell

After years operating in cramped quarters, leasing space in other company's hangars and even working on aircraft outside in the rain, the maintenance staff of Hawaiian Airlines is looking forward to moving into more spacious facilities this summer.

The gargantuan 280,000-square-foot hangar currently under construction at Honolulu International Airport (HNL) will also house the airline's cargo operations and include smaller areas for support offices, customer service operations and loading docks. The facility's modular design includes a fabric roof to maximize natural sunlight and ventilation. Given the sunny, breezy island weather Oahu is known for, lights and air conditioning may be optional many days of the year.

The hangar project is part of HNL's modernization program. A new concourse on the mountain (Mauka) side of the airport

is the centerpiece of the initiative. According to plans, it will include six wide-body gates or 11 narrow-body gates. Another key element of the program is airside enhancements that will allow Terminal 2 to begin accommodating Group 5 aircraft.

"The airport's Modernization Program aims to accommodate current and future volume of air traffic, improve the operational efficiency, improve the passenger experience and enhance the safety and security requirements," says Caroline Sluyter, public information officer for Hawaii's Department of Transportation.

"Taxi lanes leading to the Mauka Concourse, which were not designed to accommodate simultaneous wide-body aircraft, are being widened. To make room for the taxi lane widening, existing support facilities, including the Hawaiian Airlines maintenance and cargo facility, needed to be relocated."

The hangar's steel framework was hot-dip galvanized and immersed in molten zinc to add strength and help the facility withstand environmental stresses.



With 50 aircraft in its current fleet, Hawaiian is planning to add three more A330s by the end of 2015. By the end of 2020, the airline expects to add 16 new narrow-body A321neo aircraft and build its total A330 inventory to 19 aircraft. Hawaiian plans to have six new A330-800neos starting in 2019.

The airline clearly needed a larger, improved maintenance facility, and the airport modernization program afforded the perfect opportunity to expand its on-site space to accommodate a larger fleet, explains Jim Landers, managing director of maintenance for Hawaiian Airlines. Landers serves as an airline representative on the modernization project by assessing the impacts to airline operations and coordinating mitigation plans.



Jim Landers

“A project of this magnitude requires commitment to extensive planning, forecasting, and assessment of the impact to the business, mitigating construction issues,” says Landers. “We spent a fair amount of time understanding the challenges so we would minimize the impact on our customers.”

Change of Plans

In 2009, HNL's modernization project was about a year behind schedule, and cost projections for completing the original design were running millions of dollars over budget. The State of Hawaii decided to go back to the drawing board, and Hawaiian Airlines stepped forward with an alternate idea for its hangar/cargo facility: a modular steel-framed hangar manufactured by Rubb USA.

Hawaiian Airlines contacted Rubb after seeing some of its other facilities, most notably the American Airlines hangar at Boston



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AS GREEN AS IT GETS

A translucent fabric roof will maximize the use of natural light inside Hawaiian Airlines' new maintenance/cargo facility.



Logan International. Rubb structures have a steel truss framework, with a fabric roof made of woven polyester mesh permeated on both sides with a PVC coating to create a tight-fitting shell. The steel structure is hot-dip galvanized to create buildings intended to withstand

great environmental pressures. The completed assemblies are immersed in a molten zinc bath to protect the inside and outside surfaces of the structure.

"This kind of structure lasts 25 years, which is comparable to something with a full metal roof, but at a cost advantage," says Gordon Collins, former director of marketing for



Gordon Collins

Rubb. "We used a translucent fabric, which allows for more natural light. On sunny days, lighting might not even be needed, which saves electricity. When the membrane needs to be replaced, it costs much less to replace (than a galvanized frame.)"

Collins compares Rubb's modular structures to giant Erector sets: "They can be easily dismantled and moved to a new site, which is an advantage over traditional construction."

Fabric roofs are particularly effective in Hawaii, where the marine environment is very corrosive for metal, he continues. "A fabric roof could have a longevity advantage, and the airline could see the long-term benefits from both budget and maintenance angles," he explains.

Another feature that Rubb officials hope their customers will never leverage: The

fabric roofs are designed to disintegrate in a fire and allow smoke and heat to dissipate through the opening, thus keeping the main structure intact and minimizing the chances of total loss.

Before deciding on a Rubb hangar, Hawaiian Airlines was able to study the company's work in detail, right at HNL. The company built an air cargo facility for United Airlines just a few parcels from Hawaiian's current maintenance building. The unique facility houses a variety of functions for United, including cargo, aircraft maintenance, parts warehousing, ground service equipment maintenance, cabin services, departmental offices, training classrooms, a credit union, dining room and locker facilities.

MCA Architects programmed and designed the building, and then a design-build team carried the project through construction. "When the project came to us, the budget the state had established was about \$75 million," recalls MCA principal Jack Miller. "The project had been previously budgeted at about \$100 million, including utility and site work. So there was a shortfall, and they needed to shore it up to the budget number. We were brought in because of our expertise designing maintenance facilities, but largely because we have a good deal of experience working with Rubb – they are



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very affordable and good in terms of scheduling the projects, and a hangar could be erected fairly quickly.”

After analyzing the financial and schedule specifics of United's experience, the team planning the Hawaiian Airlines hangar followed a similar game plan: a modular Rubb structure, with MCA as a key participant.

Making it Fit

Working together, HNL, Hawaiian Airlines, MCA and Rubb reviewed possible sizes, functions and locations for the new hangar. After considering several potential sites, the planning team selected a location on the west side of the airport.


Fitting the large facility on the tight footprint would have been challenge enough, but the building site was also constrained on all sides. In addition to a federal prison on the Mauka (mountain) side, Manuwai Canal on the Ewa (west) side and taxiways on both the Makai (ocean) and Diamond Head (east) sides, planners had to contend with a shallow water table in coral below, and limited airspace above.

Construction of the new hangar began in April 2013 and is scheduled to end in July 2015. As planned, the new facility will

consolidate Hawaiian Airlines' existing cargo operations, aircraft maintenance, loading docks, support offices and customer service operations into one integrated facility.

“Our old facility was built in 1962, and it was appropriate at the time; but we have simply outgrown it,” reflects Landers. “Moving into the (new) structure allows us to right-size our growth.”

With a 347-foot-long maintenance hangar and 190-foot-long air cargo area (both at a clear span width of 275 feet), the Hawaiian Airlines facility at HNL is Rubb's largest clear span structure to date. Given its modular structure, the new hangar can be easily expanded by adding trusses and replacing the fabric roof structure, note Rubb personnel.

“We have high expectations that the new facility that will enable us to meet our current and near-term maintenance needs,” says Landers. “We know the state of Hawaii is publicly committed to improving the airport system at HNL and across the state of Hawaii; and we view ourselves as an ardent supporter of these plans. The overall program and the new concourse will make a positive difference for our guests.” 

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New Cleaning Equipment Allows Minneapolis-St. Paul Int'l to Avoid Plumbing Project

By Robert Nordstrom



factsfigures

Project: Parking Garage Maintenance

Location: Minneapolis-St. Paul Int'l Airport

Regulatory Document: Nat'l Pollutant Discharge Elimination System agreement

Parking Structures: 4 garages at Terminal 1 (2 with 7 levels, 2 with nine levels); 2 garages at Terminal 2, each with 8 levels

Total Parking: Approx. 22,000 spaces

Surface Cleaning Equipment: Municipal Cleaning Vehicle, by Triverus

Equipment Supplier: M-B Companies

Equipment Fleet: 4 cleaning vehicles; 2 dual-service trailers

Approx. Cost: \$1 million (includes warranty, onsite setup & training)

Of Note: Equipment captures, filters & recycles cleaning water, allowing airport to release it into storm sewer system

Minneapolis-St. Paul International Airport (MSP) had a decision to make when the Metropolitan Airports Commission signed a new agreement with the Minnesota Pollution Control Agency in spring 2013. MSP essentially had two options: Overhaul the drainage system in its parking structures or change the way crews manage and discharge water runoff when cleaning them.

In the past, runoff from cleaning operations was discharged directly into the storm sewer system, which ultimately drains into Mississippi River tributaries, explains Paul Sichko, MSP's assistant director of operations. Rerouting drainage into the airport's sanitary sewer, however, would cost \$5 million to \$6 million; so Sichko looked for other alternatives.



Paul Sichko

He found an attractive option just a few months later, at a winter operations conference for hub airports presented by the American Association of Airport Executives.

By using cleaning equipment that captures pollutants and recycles the water used to clean garage floors, MSP could avoid the cost and operational disruptions of a plumbing project.

The specific equipment that caught Sichko's eye was the Municipal Cleaning Vehicle, manufactured by Triverus and supplied by M-B Companies. After further research, the airport purchased four cleaning vehicles and two support trailers (with spare parts) for about \$1 million — a fraction of what it would have cost to alter the drainage system for the parking garages. Even with expenses for ongoing equipment maintenance figured into the equation, the cost-benefit analysis tipped sharply against infrastructure change. The lead time needed to engineer, fund and install new parking ramp drainage systems was also a factor, recalls Sichko.

Preserving Revenues

MSP crews maintain six different parking structures, with approximately 22,000 parking spaces spread among 48 different levels.

The unit sprays 200 gallons of clean water at 2,000 psi and recovers about 190 gallons of contaminated water.



Further complicating matters, weather constraints make it difficult to clean the pavement floors from mid-October through the end of March.

"We have to maintain a very aggressive cleaning schedule," Sichko informs. "Previously, we would close a 500-space section for seven days; use high pressure hoses, scrubbers and agitators to clean the pavement; then flush the surface with water."

Using the new equipment, crews can clean the same 500-space area in two days. "If you multiply 500 spaces by a maximum (parking fee) of \$20 per day, that is \$10,000 in lost revenue," he explains. "Theoretically, by reducing the cleaning time to two days, we are realizing an additional \$50,000 in parking revenue."



Steve Karlin

The equipment MSP purchased uses surface cleaning technology Triverus originally developed to clean flight decks on aircraft carriers for the U.S. Navy, explains Steve Karlin, senior vice president for M-B Companies. The objective was to restore the proper coefficient of friction on flight deck surfaces while managing cleaning waste and preventing pollution. The company later adapted the technology for a commercial machine to clean pavement in civilian environments, including airports.

The resulting product is a 50-inch cleaning deck that attaches to the front end of a Bobcat Toolcat™ vehicle. The combination allows operators to maneuver close to walls and other structures within parking garages, and clean individual spaces between two parked cars. The cleaning unit sprays 200 gallons of clean water at 2,000 psi and recovers approximately 190 gallons of contaminated water in a rear-mounted tank. No detergents or chemicals are needed, notes Karlin.

Maintenance personnel then drive the vehicle to a dual-service trailer they towed to the area being cleaned. It filters out contaminants and returns gray water for additional cleaning in about eight minutes, estimates MSP Field Maintenance Manager

Lee Spangrud. "The contaminated sludge that remains is tested by our environmental personnel. Thus far, they have determined that the waste is not hazardous and we are able to dispose of it in our standard dump areas," reports Spangrud. "We lose a little water in the cleaning process, but most of it is reclaimed for reuse."



Lee Spangrud

Salt is one of the main elements the system removes from the cleaning water. "One of the main reasons we clean our parking decks is to remove the salt residue so it doesn't deteriorate the concrete," explains MSP Equipment Supervisor Chuck Kanuit.



Chuck Kanuit

Being able to remove such contaminants then discharge the cleaning water into storm sewers is a major advantage, notes Sichko.

The equipment's cleaning head and water storage module are designed to detach easily to free up the Toolcat™ for other jobs, but MSP doesn't currently plan to use the vehicles for anything other than cleaning pavements. "These vehicles are running continuously from April to the middle of October," reports Sichko. "During the winter we can (also) use them in other spaces. But they are flexible, and a smaller airport would find them very useful year-round."



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Making it Their Own

After their first full season with the new cleaning equipment, MSP maintenance, operations and environmental personnel are all pleased with its performance so far.

“Any new equipment purchase has to go through a shakedown cruise,” Sichko acknowledges. “There’s always a learning curve on how to operate and maintain it. We enjoy working with manufacturers and always appreciate their willingness to listen to the end user and to make adjustments and design changes.”

In this case, MSP personnel suggested a few modifications to the trailer. “Some hooks here, some clips there, a valve system that might work better — things like that,” explains Spangrud. “Our mechanics do a good job working with vendors. M-B and Triverus have been really good listening to us and implementing changes.”

The airport and its maintenance crews are similarly accustomed to making changes. “There was a change in regulations, but that’s routine for us,” reflects Sichko. 

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Lincoln Airport Synchs Ancillary Airfield Projects With Runway Rehab

By Dan Vnuk



factsfigures

Project: Runway Resurfacing

Location: Lincoln (NE) Airport

Cost: \$6 million

Funding: 90% FAA

Engineering Consultant: Alfred Benesch & Co.

Concrete Contractor: TCW Construction Inc.

Asphalt Contractor: Constructors Inc.

Runway Weather Info System: Boschung America

Runway Weather Info System Contractor: ABC Electric

Weather Sensors: Belfort

Runway Weather Info System Funding: \$2.3 million Airport Improvement Program grant

Of Note: Airport installed surface monitoring sensors & coordinated with local utilities to schedule their projects while main runway was closed for resurfacing

Lincoln Airport (LNK), located just off Cornhusker Highway in Nebraska, recently put the finishing touches on a \$6 million runway project — the first major rehabilitation of its 12,900-foot primary runway in about 20 years.

As local contractors resurfaced the asphalt and concrete on Runway 18-36, other crews were busy completing three unrelated projects elsewhere on the field. But before any of the work began, LNK had to re-bid its primary resurfacing project.

The first time the project was bid, the airport received only one proposal; and it was \$1.25 million higher than expected. After formally rejecting that bid, the Lincoln Airport Authority divided the project into two components — concrete and asphalt — and solicited separate responses for each portion. Several local firms were interested in the concrete work, but it was tougher to find companies for the asphalt part, explains Jon Large, the airport's deputy director of engineering.

Alfred Benesch & Co., the engineering consultant for the project, reached out to

asphalt companies in Omaha, just 50 miles east of the airport and the state's largest city, but still didn't find much interest in the project. Even when Benesch expanded the search to Iowa, Kansas, northwest Missouri and western Nebraska, LNK still received just one proposal.

"Although we only had one asphalt bid at the rebid, we did reduce the cost of the project significantly," reports Large.

Monitoring Mother Nature

With the resurfacing project scheduled to begin in early July, the airport also proceeded with another separate project: the installation of surface sensors on runways 18-36 and 14-32 and Taxiway D. In total, 12 sensors now gather data about LNK's surface conditions. The data they collect is combined with atmospheric data to produce detailed reports about current and forecasted operating conditions, explains Large.

Data collected by the recently installed sensors includes pavement temperature, subsurface temperature, surface moisture, surface ice and moisture melting temperature. Atmospheric data collected from another set of Belfort sensors includes wind speed, wind direction, air temperature, barometric



Jon Large

pressure, humidity and current precipitation. After system provider Boschung America processes the two data sets using a system of proprietary algorithms, it reports the results back to LNK via the Internet.

"With the information provided by the system, including alerts and warnings of predicted conditions, we can now make accurate and timely decisions about how to deploy our resources to deal with inclement weather conditions," says Large.

Access Granted

In a key example of cooperation between government entities, two local utilities adjusted their schedules to complete much-needed projects while LNK's primary runway was closed for resurfacing.

The Lincoln Wastewater System added more than 1,500 feet of trunk sewer main and refurbished 2,300 linear feet of aging 48-inch sewer main. "These were actually projects that Lincoln Wastewater had wanted to do two years ago, but delayed to take advantage of our runway closure and minimize disruptions to the airport," Large explains.

Conversely, Lincoln Electric Systems accelerated its plans to retire and rebuild a 1950s transmission line in order to synchronize schedules with LNK's runway work. In addition to decommissioning a 115-KV line, crews installed three sets of bores under Runway 18-36 and two parallel taxiways to provide pathways for replacement lines. Completing the preliminary work provides the electric utility with capacity to further grow its system in the future, notes Large.

New Leadership

Not long after the runway project was complete, David Haring was named LNK's new executive director. Haring assumed the position in September, when its former director, John Wood, retired after managing the airport for 18 years.



David Haring

Haring arrived in Lincoln (which was recently named one of the Top Ten Most Welcoming U.S. Cities) with 13 years of industry experience, most recently as director of aviation at Cheyenne Regional Airport in Wyoming.

"The reopening of the Runway 18-36 is the culmination of months of effort aimed at the long-term preservation of both safety and capacity at Lincoln Airport," Haring says. "The

hard work and cooperation exhibited by our engineers, the two general contractors and the local utility crews, coupled with the patience of our tenants and users, allowed the airport to open the runway both on time and on budget."

While acknowledging that all airport improvement projects include challenges, he praises the dedication of the team involved in LNK's runway renovation. "It assured that the airport's primary runway will continue to play a pivotal role in not only serving the needs of aviation consumers in Lincoln and the Midwest, but also those throughout the national airspace system for years to come," he comments.

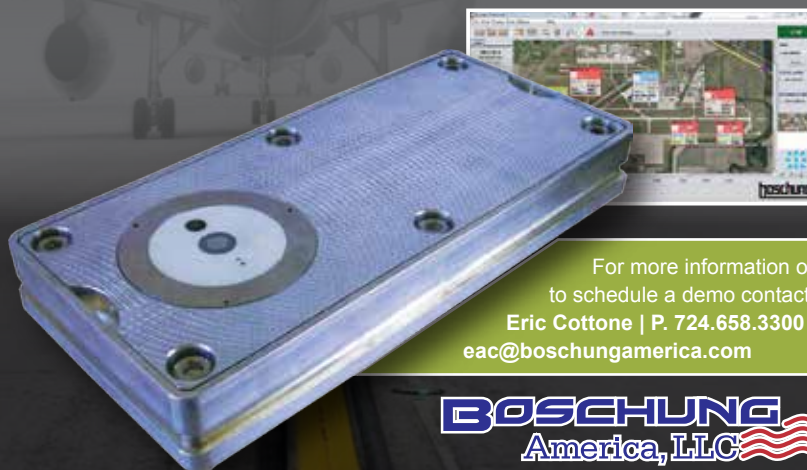
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A local contractor installed the asphalt for the project.



Weather and pavement sensors provide detailed information for maintenance and operations decisions. (Below)



Between its three runways, LNK serves an estimated 270,000 passengers per year. Commercial service includes daily flights to four major U.S. hubs by Delta and United Airlines. The airport also serves charter and general aviation customers and is the home base of the Nebraska Air National Guard.

“Over the last two decades, Lincoln Airport has continued to diversify its operational activities in an ongoing effort to achieve long-term economic viability,” he notes. “Traditional sources of revenue such as landing fees, passenger terminal fees and general aviation fees have continued to show steady levels of growth.”

Landside Projects

Haring highlights Air Park West as a particularly bright spot on LNK’s balance sheet. “The airport’s efforts to redevelop and enhance its industrial park have yielded exceptional results,” he reports. “Operational revenue attributed to the

industrial park grew in excess of 10% (this fiscal year alone — from \$5.24 million to \$5.84 million.”

Although most of the increases came from existing tenants and were prompted by airport-financed expansions, they are expected to continue. “While the overall growth comes at the cost of a similar amount of debt, the long-term fiscal ramifications of these activities will place the airport on solid financial footing years into the future,” Haring explains.

The industrial park did, however, recently welcome a new tenant. In mid-August, LNK held a groundbreaking ceremony for a \$9 million crime laboratory the airport authority is building for the Nebraska State Patrol. Project planners note that when it’s complete, the 28,000-square-foot facility will contain some of the most sophisticated forensic analysis equipment available for criminal investigation. ✈️

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Dallas/Fort Worth Int'l Partners With Transit Authority to Bring Light Rail Service to Airport

By Rebecca Kanable



factsfigures

Project: Light Rail Station

Location: Dallas/Fort Worth Int'l Airport

Cost: \$36 million

Location: Terminal A

Prime Design Consultant:

Jacobs Engineering Group

Project Management: Lea+Elliot

Architect: Corgan Associates

Structural Engineer: Walter P. Moore

Civil Engineer: Pacheco Koch Consulting Engineers

Mechanical/Electric/Plumbing: Multatech

Landscaping: Berkenbile Landscape Architects

Information Technology/Security:

Ross & Baruzzini

5-mile Rail Line Extension:

Dallas Area Rapid Transit

Est. Cost: \$189 million

Service Start: Aug. 2014 (4 months early)

Program Duration: 6 yrs

Recognition: Outstanding Achievement Award for Excellence in Environmental Document Preparation from Fed. Transit Administration

Key Benefits: Connects downtown Dallas to airport; provides new travel option for passengers & employees



New connections are being made since the August opening of a \$36 million light rail station at Dallas/Fort Worth International Airport (DFW).

The country's longest light rail system — 90 miles — is now connected with the world's third-busiest airport. DFW hosts 1,850 flights per day and provides nonstop service to 147 domestic and 55 international destinations.

In what local officials are calling a "true collaborative effort," Dallas Area Rapid Transit (DART) added five miles of rail to its North Texas public transit system, and DFW built the new station and 300 feet of infrastructure to make the connection.

After six years of partnering, planning and construction, the project finished early, and the new rail service began fully four months ahead of schedule. DFW finished the station and additional system infrastructure on time and within budget; and in September, DART estimated its costs to be \$7 million less than its control budget.

DFW's portion of the project was part of its \$2.7 billion Terminal Renewal and Improvement Program. Currently, the airport is three years into the 10-year initiative, which airport officials say will "redefine first class" for the global gateway.

With a regional mass transit rail system connecting to Terminal A, DFW is now a true intermodal airport, notes Perfecto Solis, vice president of airport development and engineering. "Not only do we move passengers and goods, we have a major highway system that runs through the airport," says Solis, noting that the new light rail connection gives the region another advantage in attracting global corporations.



Perfecto Solis



David Ehrlicher

David Ehrlicher, DART's assistant vice president of program delivery, notes that from an international perspective, it's common for passengers and companies to expect public transportation to the city center. "I think there's a tremendous amount of excitement right now (within North Texas)," says Ehrlicher. "Every one of the 13 cities in the DART member service area now has a way to connect to DFW."

With nearly 60,000 people working at DFW, many employees now have a new way to commute to work. "Public transit is an integral part of a real livable community, a vibrant community, a forward-thinking, growing community," Ehrlicher relates.

Solis reports good use of the light rail system by airport employees and credits a DART advertising campaign that promoted it.

The Dallas Convention & Visitors Bureau recognizes the new airport/down interconnectivity as a powerful selling point for business travelers, tourists and organizations looking for convention venues.

Station of Two Nations

Design expectations for DFW's light rail station were two-fold. The facility had to meet standard system-wide DART requirements, but it couldn't appear to be just another stop on the line. DFW officials were intent on the station contributing to the overall "passenger experience" by creating a sense of arrival at the airport. Jacobs, the architectural engineering firm hired for the job, brought unique qualifications to the project. It had not only designed numerous other DART stations, but had also served DFW since its original terminal was built 40 years ago.



Tony Loyd

Jacobs used several design elements to blend DART and DFW architecture, explains Tony Loyd, vice president and managing principal of the firm's global buildings division. Rather than specifying a metal roof for the station, designers opted for tensile fabric, which is a recurring element at various DFW entry points, such as vehicle plazas, curbside areas and now the light rail station. Five canopies shaped like bullhorns provide weather protection for passengers using the aboveground station.

Inside, architectural walls contain a subtle display of lines resembling the DFW logo. Flooring patterns created by pavers interspersed with terrazzo bands resemble similar patterns inside the terminals.

Interior and exterior landscaping was used to buffer the concrete of the station, airport and nearby parking structure, adds Loyd. Drought-tolerant species were selected for minimal maintenance. Specific selections include roses, crepe myrtle trees and landscape grasses.

A partially covered walkway protects passengers during their 400-foot walk from the train station to the airport. The structure includes seating for pedestrians to stop along the way and is much more "architecturally aesthetic" than the abandoned automated people mover guideway it replaced, notes Loyd.

DFW officials are pleased with the overall design. "I think we found a nice balance," says Solis.

Connecting with Terminals & Other Stations

DART riders enter the airport at Terminal A, where they find American Airlines' ticketing and baggage check areas, TSA security checkpoints and the airport's Skylink automated people-mover system, which links all five of DFW's terminals on the secure side of the airport.

Passengers taking American Airlines flights from other terminals can check their bags at Terminal A, and then take Skylink to their terminals. Passengers with just carry-on luggage can use multi-airline kiosks at Terminal A to check in, and then take Skylink to the other terminals. Passengers not flying with American Airlines who need to check bags take a Terminal Link shuttle bus to terminals D and E.

Skylink and Terminal Link are both free services.

From the airport, DART's Orange Line continues to the Belt Line Station, with service to downtown Dallas and other regional destinations. DART purchased 23 additional super light rail vehicles to support the Orange Line in the Irving corridor and the Blue Line expansion in the Rowlett corridor. On average, 14 cars operate on the Orange Line each weekday.

The first Orange Line train arrives at DFW Airport Station at 3:50 a.m., and the last train leaves the airport at 1:12 a.m. on weekdays and 12:12 a.m. on weekends. Service is available every



Photo: © Thomas McConnell, Courtesy of Jacobs

7½ to 15 minutes during rush hours, every 20 minutes during the midday and on weekends, and every 30 minutes late at night.

Exemplary Partnership

Solis highlights the cooperation that was necessary to bring light rail service to DFW. “Usually, when you bring two government entities together, there are more problems than there are solutions,” he reflects. “This was a shining example of how two entities can work together as a unified team.”

DART and DFW worked so well together that he suspects observers were probably hard-pressed to distinguish who was from which organization.

The cooperation started at the top, adds Ehrlicher: “The executive directors were committed to working together to make this project a success. There was definitely interest in customer convenience.”

For example: Locating the station farther north and bussing passengers to the airport would have saved costs, but would not have been as convenient for customers, he explains.

Both executives emphasize how the teams worked together throughout the six-year project.

Solis, for example, was asked to help select the design-build entity for DART, and various airport officials participated in design reviews.

Solis credits the project management group, led by Lea+Elliott, for DFW finishing its portion of the program on schedule and within budget. It was important for the station to be completed six months before DART began laying new track, he notes.

Scott Kutchins, senior associate with Lea+Elliott, considered it part of his job as a program management team leader to have everyone “pulling in the right direction.” Kutchins and Solis both used their previous experience from DFW’s Skylink project to

break down the DART project and coordinate all the work it would entail. They developed a matrix that identified which entity would be responsible for each element from a design, construction, financial, operations and maintenance perspective. A demarcation point was created for construction teams to use as a guide for who built what.



Scott Kutchins

“What we found to be most effective was to include every item for the project, as if we were building the project on paper,” Kutchins recalls. The detailed analysis helped eliminate “scope gap,” he notes.

“We then developed milestones for turnover between the two

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Photo: © Thomas McConnell, Courtesy of Jacobs

With the new DART station fully operable, airport officials are working to develop a rail link with Fort Worth.

teams in the field, and the milestones were included in the DART design-build documents,” Kutchins continues. “In the end, what probably helped us succeed the most was letting parties work items out in the field without major interference from the project offices.”

It also helped that he and his project manager, Will Watkins, worked as consultants to DART prior to working for DFW. Kutchins, in fact, was a member of the program management team for the DART starter system from 1992 to 1997. “We understand how a light rail system has to be constructed and commissioned,” he explains. “We tried to make sure we were getting our work done in a manner that kept DFW out ahead of DART.”

In addition to the station, DFW designed and built some of the infrastructure that extends 300 feet north of the station; and DART continued the project from there. The light rail guideway exits the station to the north between a service road and International Parkway, crosses the service road on a bridge and proceeds east along the perimeter of the airport. As it runs along DFW’s border, the guideway passes between taxiways to the south and a state highway to the north before it connects to the existing Belt Line Station on the eastern edge of the airport.

Constructability Challenges

Building a light rail station and guideway on an active airport required finesse and expertise, notes Solis.

Because DFW has five decentralized terminals, each with its own landside and airside, planners considered a centralized landside DART station. But routing guideway through the central terminal area would have required significant changes to airport infrastructure; and a location on the north side of the airport was ultimately selected instead.

It, however, also had drawbacks. The north side location required the station to be built between the airport’s major roadway systems (International Parkway and a service road) and

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on top of a main utilities spine. Loyd likens putting the facility in place to feeding a slice of bread going into a toaster. "That's how tight it was between the two existing roadways," he emphasizes.

More specifically, designers and crews fit a 59-foot, 6-inch wide station into a 60-foot space.

As expected, on-site logistics were a challenge and retaining walls crucial in the extremely confined workspace. "Trades were stacked vertically, and there was generally only one way to enter and exit the site," recalls Kutchins. "We had heavy construction in and around and underneath an active taxiway system, which was maybe 350 feet away."


Adding to the mix, DFW was also renovating Terminal A, building a 7,700-space parking structure and making roadway changes while constructing the new train station. "There were a lot of unique challenges associated with the delivery of the station itself, but nothing we couldn't overcome," summarizes Kutchins.

Future Connections

With its new DART station fully operable, DFW is formally linked to Dallas via public transit. Now, the airport is working to establish a similar link to Fort Worth, the other major component of

its catchment area. Toward that end, airport officials continue to meet with the Fort Worth Transportation Authority about bringing a TEX Rail commuter route from downtown Fort Worth into the airport's north entrance.

Located midway between both cities, DFW serves two separate constituencies. By establishing connections to both Dallas and Fort Worth, it could ultimately become a unifying mechanism. "We all believe we have a stake in bringing mass transit rail to the North Texas region," says Solis, referring to DFW and officials from both cities. "And we have a responsibility to make sure it's done correctly, efficiently and for the best cost possible."

While 65% of DFW's 63 million annual passengers connect through the airport, more and more of its originating and destination passengers are from the Dallas/Fort Worth area, reports Solis. "As the traffic grows at DFW, as demand grows for airport facilities and usage of the airport, I think you're going to find that the DART system and the Fort Worth system are going to move a lot of those passengers," he predicts. 

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New Emergency Training Center Opens Soon at Outagamie Regional

By Mike Schwanz



In today's post-9/11 world, demand for extensive and realistic emergency responder training has never been higher. A new \$35 million facility at Outagamie County Regional Airport (ATW) in Appleton, WI, will help meet that need.

Scheduled to open in January, the Public Safety Training Center will operate as a division of Fox Valley Technical College, with both classroom and hands-on venues for law enforcement, fire and emergency medical service (EMS) students and practitioners.

"No other facility in the Midwest — and perhaps the entire country — will provide the variety and depth of training of this facility," says Jeremy Hansen, associate dean of the technical college.



Jeremy Hansen

The center will be staffed by 14 full-time instructors and 480 adjunct instructors, most with specialized areas of expertise. Organizations that use the facility also can bring in their own instructors, if preferred. Prices vary widely, depending on the venue(s). Rates range from \$90 per hour to \$250 per hour, depending on what services are needed. Additional fees may be added for consumables such as ammunition, gasoline, propane, foam, etc. There is no extra charge

to use the facility if a Public Safety Training Center instructor is used.

Outdoor Options

According to Hansen, an extensive outdoor training area will be the heart of the 75-acre facility. "Our outdoor training stations make us unique, and offer real-world training for any category of emergency responders," he emphasizes.

Key venues include:

- **Four outdoor firing ranges, designed for standard pistol rounds as well as .223- and 308-caliber ammunition**

Each range accommodates six shooters and is completely enclosed with precast concrete panels and overhead baffles to prevent rounds from escaping. Shooters using the two 50-yard ranges can move up and down range rather than being limited to a fixed firing line. The 100-yard and 300-yard ranges allow medium- and long-range rifle training from fixed shooting positions. Large side doors enable users to bring a vehicle into the range for training.

- **Emergency vehicle operations course with a 5/8-mile pursuit track, 210,000-square-foot skid pad and a similar-size skills pad**

The course is designed to teach standard safe driving techniques for police, fire and emergency medical vehicles as well as



**Outagamie County
Regional Airport**

ATW

Appleton Wisconsin

factsfigures

Project: New Public Safety Training Center

Location: Outagamie County (WI) Regional Airport

Cost: \$35 million

Funding: Public referendum, approved by 2:1 margin

Approx. Size: 75 acres

Scheduled Opening: Jan. 2015

Operated By: Fox Valley Technical College

Key Benefits: New training venue for industry; increased traffic for airport; boost to regional economy

emergency maneuvers, skids and off-road recovers, pursuit driving and other special operations. The pursuit track includes corner/smooth curves, divided highway sections, a simulated construction area, recovery zone and staging area. The skills pad is specially designed for training serpentine, straight line backing and other special maneuvers. The skid pad includes an irrigation system to flood it.

- **A simulated village with a variety of residential and commercial buildings**

Dubbed "River City," the mock community includes one-and two-story homes, a branch bank, hotel/motel with bar, and gas station/convenience store for diverse training scenarios. Additional buildings will be constructed in coming years, notes Hansen.

"These structures can be used for crime scene investigations, search and rescue for firefighters, and mock medical emergencies," he says.

The village is designed for simultaneous use by multiple groups and various disciplines. While police use one house to practice clearing a building, a separate group of investigators can be processing a crime scene in a staged meth lab or growing operation next door. Meanwhile, EMS students could be responding to a choreographed medical situation at the hotel.

- **A decommissioned Boeing 727, half configured for cargo, the other half for passengers**

"With this setup, the plane can offer specific training for air marshals and EMS crews in the passenger section, while explosives and narcotics can be planted (in the cargo bay) to train firefighters and drug-sniffing dogs," Hansen says. "We expect this plane to be one of our most popular training venues."

FedEx donated the former cargo aircraft to Fox Valley Technical College to support its training venture. After the plane landed at ATW, a large Case IH Steiger tug towed it to the new center.

Aircraft rescue firefighting (ARFF) personnel can use the non-burnable prop to practice tactical approaches and water and foam application. Future plans include building an FAA-approved live-burn ARFF simulator on another parcel of airport property.

- **A house with 16 separate areas for practicing forcible entry procedures**

With nearly 5,000 square feet of space, the house includes 16 distinct rooms and hallways, with various windows and doors that can be breached. "Authorities can practice clearing a room, ramming a door open or using paintball weapons for mock firefights," Hansen explains. Flash bangs and simulated smoke add to the realism of the training.

- **A train derailment training venue located on the outskirts of the simulated village**

The scene includes 150 feet of track, a railroad crossing and three general

service tank cars. One of the cars sits upright; two are positioned as if they had been involved in an accident. The cars will be piped to leak water and high-pressure air, simulating a hazardous material release.

Space is available for additional track and cars, and the venue can be piped for propane to allow live-burn training, notes Hansen.

- **A fire training burn building/tower with residential and commercial portions**

A total of eight burnable rooms are scattered throughout the structure, including three in the tower portion. Areas include two- and six-story apartment buildings, a two-story residential home with an attached garage that contains a vehicle and a commercial structure with a flat roof and parapet. The tower also includes a six-story elevator shaft with an elevator stuck between floors.

- **Two fire investigation burn pods**

Each pod contains two 12-foot-square rooms, which can be constructed to mimic bedrooms, living rooms, kitchens, etc. "We will create a fire, put it out, and then let the arson team in to see if they can find the cause," notes Hansen.

- **A 20-foot-deep drafting pond/water rescue venue**

The 240-foot by 300-foot training area allows divers to practice rescue and recovery tactics using two 20-foot-square platforms. One contains a submerged car; the other will eventually house a small plane.

At first glance, an underwater aircraft rescue prop may seem impractical. But Hansen explains its utility: "Every summer, the Experimental Aircraft Association has its annual convention here, and suddenly we get 10,000 small private planes from all over the world descending upon nearby Oshkosh. With so many aircraft, it is not uncommon for one of them to crash into Lake Winnebago, a large but fairly shallow lake with a maximum depth of only 22 feet. Sooner or later, local rescue units will be needed for search and rescue missions."



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The pond can also be used during winter for ice water rescues, and for practicing booming to contain a hazardous material spill.

Indoor Facilities

The center's 96,000-square-foot main building includes:

- **15 classrooms, each with capacity for 40 students**

One classroom configured for EMS training includes the box of an ambulance mounted on a pneumatic table. "It moves up and down, side to side, just as though it is driving down the road," Hansen relates.

The ambulance box was put in place before the building's steel support structure was erected, and the facility was constructed around it, he notes.

- **40-station computer lab that can be separated into two rooms**
- **Banquet-style multipurpose room that can hold up to 224 people**
- **Kitchen facilities that can serve meals for large groups**
- **Forensics laboratory with analysis equipment and fume hoods**
- **Two 10-lane firing ranges**

Both are fully baffled, allowing shooters to practice their marksmanship at various distances up to 75 feet. Like the center's

outdoor ranges, the indoor facilities can handle any standard pistol round as well as .223- and 308-caliber ammunition.

- **Two 1,600-square-foot defensive and arrest tactics (DAAT) rooms**
- **1,500-square-foot fitness room with weight machines and cardio equipment**
- **Jail training area that includes a sally port with observation window, booking counter, cells, interrogation room and interview room**
- **Fire training area with six-bay apparatus room for fire engines, ladder trucks, technical rescue vehicles, wildland firefighting vehicles and equipment, ambulance and other equipment**

Close Collaboration with Airport

Building the new training facility on airport property required a great deal of coordination between Fox Valley Technical College and ATW, notes Airport Director Abe Weber. Planning for the center began in October 2005.



Abe Weber

Because the facility is located in a low-elevation area previously used for farming, the land required extensive site preparation. "We first had to remove the original cropland and plant endophyte fescue grasses, which waterfowl

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don't like. We have to mow continuously to reduce nesting areas," Weber explains. "We also had to reconstruct a perimeter fence, from 10 to 12 feet high, to keep out wild animals."

The ponds were another issue. "We had to work closely with the state Fish and Wildlife Service to make sure no wildlife is attracted to our ponds," he continues. "We try to prevent any vegetation growing near them that might attract wildlife."

With site preparations complete and the new Public Safety Training Center ready for customers, Weber foresees potential traffic growth for ATW. "We think that in a few years, we will be getting more and more training groups from around the country flying in here for classes," he explains, noting that the airport already offers direct flights to Chicago, Atlanta, Detroit, Minneapolis and Phoenix.

Weber does not expect activity at the center to alarm passengers at the airport, even though training exercises will entail flashing lights, sirens and even controlled fires. "So far, that has not been an issue," he reports. "Our lease with them spells out in detail what they will be doing, and it should not affect passengers at all."


Hansen agrees with Weber about the center's potential, but acknowledges that growth will take time. "At first, we expect emergency responders from our local area to utilize it, and then groups from around the Upper Midwest," Hansen predicts.



A Boeing 727, donated by FedEx, is expected to be one of the center's most popular training venues. Half is configured like a cargo aircraft; the other half has passenger seats.

"Eventually, we hope to get people from other parts of the country. There are many hotels and restaurants only a mile or two away."

The proximity of Pierce Manufacturing, one of the largest fire truck manufacturers in the United States, is expected to be a parallel draw for groups training at the new center.

If the facility takes off as expected, the airport has another 35 acres available for possible expansion, notes Hansen. But for now, he and his staff eagerly await the center's official opening in January. 

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2015 Events on Approach



| Event | Destination | Date |
|---|------------------|-----------------|
| Risk Management Conference | San Diego, CA | January 14 – 16 |
| Customer Service Seminar | Reno, NV | January 27 – 29 |
| AirCargo Conference | New Orleans, LA | March 1 – 3 |
| ACI-NA/AAAE Washington Legislative Conference | Washington, D.C. | March 3 |
| Business Information Technology Conference | Vancouver, BC | March 22 – 25 |
| Environmental Affairs Conference | Vancouver, BC | March 22 – 25 |
| Public Safety & Security Spring Conference | Vancouver, BC | March 22 – 25 |
| Operations & Technical Affairs Conference | Vancouver, BC | March 22 – 25 |
| CAC Annual Conference | Vancouver, BC | March 25 – 27 |
| Business of Airports | Phoenix, AZ | April 20 – 22 |

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Terminal Redevelopment Readies Providenciales Int'l for More Island Visitors

By Jodi Richards



factsfigures

Project: Terminal Redevelopment

Location: Providenciales (Turks & Caicos) Int'l Airport

Phase I: Airside Improvements

Primary Elements: Runway extension; apron expansion

Cost: \$40 million

Consultant/Project Manager: Pryde Schropp McComb

Engineering Design/Project Mgt/Contract

Admin & Site Supervision: WSP Group

Construction Manger: Dexter Construction

Subcontractors: Cove Construction; CBMS

Phase II: Landside Improvements

Primary Elements: Terminal expansion; roadway & parking upgrades; landscaping

Cost: \$10 million

General Contractor: Dolmen Construction

Architect: RBS Architects

Engineer: Engineering Design Services

Shared-Use Passenger Processing/FIDS/GIDS/CUSS Technology: Air-Transport IT Services

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Every year, more than one million tourists visit the Turks and Caicos Islands, a collection of 40 islands and cays (only eight of which are inhabited) located about 550 miles southeast of Miami. With most visitors flying into Providenciales International Airport (PLS), the facility has been working hard to keep pace with the rapidly growing needs of the popular vacation destination. By the end of the year, PLS will complete a two-phase, \$50 million expansion and renovation project designed to do just that; but longer-term provisions are also in the works.

"After many years of planning and several challenges faced, we finally were able to obtain the necessary approvals to extend the existing terminal to accommodate existing capacity and short-term growth," explains John T. Smith, chief executive officer of the Turks and Caicos Islands Airports Authority (TCIAA). "Provisions remain for the construction of a separate, much larger terminal as a part of the master plan."

Lavern Skippings, terminal and marketing manager at PLS, explains that TCIAA is a statutory body established in 2006, following

the split of the Civil Aviation Department into the Civil Aviation Authority and Airports Authority. Previously, the government shared ownership of PLS with a private entity, but now fully owns the airport after buying out the private entity.



Lavern Skippings

The expansion/renovation project nearing completion at PLS was necessitated by years of growth in international traffic and forecasts for continued traffic increases, notes Skippings. PLS currently has direct flights to 19 airports and serves approximately 500,000 passengers annually. More routes are expected in 2015, she adds.

In addition to running PLS and managing its current redevelopment, TCIAA oversees operations at airports on Grand Turk, North Caicos, South Caicos, Salt Cay and Pine Cay.

Landside & Airside

The \$50 million expansion and renovation of PLS is self-financed by TCIAA with secured financing through a private lender, notes Skippings.

Phase I, completed in July 2011 at a cost of \$40 million, addressed airside needs. In addition to extending the runway from about



John Smith

7,600 feet to 9,200 feet, the airport added 240-meter safety areas at both ends, per ICAO standards. With the extension complete, PLS can now accommodate 777s.

The aircraft parking apron was also expanded during Phase I and now totals 70,000 square meters. The new west apron is designed to support the maximum weight bearing of larger aircraft, including Boeing 747-400s and 777-300ERs. Construction of the concrete apron included an 8-inch stabilized base poured on a leveled and compacted sub-base surface; it was finished with 14 inches of poured concrete panels reinforced with steel.

Phase II of the project focuses on landside redevelopment and rehabilitation, with a budget of \$10 million. It began in March 2013 and is slated for completion by the end of 2014. Exterior aspects include a new parking lot that will accommodate more than 300 vehicles (up from the previous capacity of 125) and a new road traffic circulation system.

The parking lot expansion and renovation were especially important to increase customer convenience, Skippings advises. Turks and Caicos locals drive both U.S. and Japanese vehicles; but the airport's previous parking lot only had one entry, with the ticket machine on the left-hand side. Drivers of Japanese vehicles had to exit their cars and walk around the unit to collect a ticket, she explains. Since the renovation project, the parking facility features two parking machines, to accommodate drivers on the left or right. "The process is faster now, because you just drive up to the side of the machine that works for you," Skippings explains.

Extensive improvements were also made to the terminal itself, which nearly doubled in size to 92,321 square feet. Enhancements include an expanded departure lounge with seating for 700 people; a bigger 8,230-square-foot immigration hall; new self-service check-in kiosks; an expanded landside canopy (now 9,519 square feet); and a new 3,090-square-foot security checkpoint. Additionally, the baggage hall was expanded to 9,000 square feet, and the airport added two new luggage carousels.

The upgraded terminal now features a 12,900-square-foot open-air check-in area that is twice the size of the previous enclosed space. The change will save energy, as the area no longer requires air conditioning, Skippings notes.

A curved roof was installed on both ends of the terminal to add dimension and unique landside appeal. The new design feature is made of glulam (glued laminated timber), an environmentally friendly structural product made of several layers of dimensioned timber bonded together with moisture-resistant structural adhesives.

Designed for Crowds

The recently expanded domestic area at PLS can accommodate an entire flight-load of passengers post-security — something that was not possible before renovations, Skippings relates. Additionally, there is now a separate area for domestic passengers to collect their luggage and exit the terminal. The airport also

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increased its volume of check-in counters and added self-serve kiosks to process more travelers.

Previously, airport visitors without boarding passes could access the domestic area to meet arriving passengers. But since the renovation and expansion, only ticketed passengers are allowed to enter the secured domestic area.

The departure area has been expanded and divided into three segments: the sky terrace lounge and departure areas on the upper and lower levels. The sky terrace is a canopy-covered, open-air area for passengers to watch flights land and depart.

Concessions options within the departures area have been expanded to better serve passengers, Skippings reports. On the duty-free retail side, passengers will find two jewelry stores, a liquor store and two souvenir shops — including one that features cartoon characters designed especially for Turks and Caicos. All the retailers are island locals, notes Skippings. Dining options were doubled and now include a grab-and-go option.

The upper-level departures area will soon feature a spa that offers fast, but relaxing services, she reports.

On the arrivals side, the Customs area has been fully renovated and expanded. Additionally, PLS added five processing desks to its Immigration hall, for a new total of 18.

Planning & Phasing

Building materials that might often be discarded were kept in service during Phase II. Wood from the overhangs in the old terminal, for instance, was recycled in the new terminal. “Considering \$10 million really isn’t a lot of money, we had to try and find a way to be able to do all of this within the budget,” Skippings explains. “If we could reuse a door or repurpose wood, we did our best to do so.”

Transporting construction materials onto the island is a standard challenge, but bad weather increased the usual degree of difficulty in the early portion of the airport’s landside projects. Hurricane Cristobal, which hit the Turks and Caicos Islands in August 2014, interrupted shipping operations and material delivery. While PLS was forced to close for two days, the airport’s drainage system spared it from the flooding many parts of the islands suffered, recalls Skippings.

“Bit by bit and piece by piece” was the theme for opening the new areas of the terminal, she adds. Each portion of construction was phased to minimize the impact on passengers and airlines, while also sticking to the project’s tight budget and timeline. In the arrivals area, temporary walls were constructed to allow crews to work, and later demolished when the space was ready for use.

Much of the construction was performed at night, and the airport constructed a passenger tunnel to facilitate work that had to be completed during the day. The air-conditioned tunnel allowed passengers to walk freely and safely while construction and underground work progressed on the other side, she explains.

“We had to find a balance between ‘I have these months to do it; I have a tight timeline’ and ‘I can’t work in the day with passengers there; I can’t work with flights on the ground.’ So this is what we needed to do,” says Skippings.

Phasing was also critical to the roadway expansion. Because the road to the terminal couldn’t be fully closed, the new surface was built in segments, using quick-dry reinforced concrete.

Weekly meetings among contractors and executives have allowed the overall project to remain on task, Skippings relates.

As the airports authority's chief executive, Smith often thanks PLS passengers and project stakeholders for their understanding during construction and renovations. "Without the support of the board of directors, executive team and staff, this task would have been even more challenging," he reflects.

Technology Leap

Upgrading to common-use technology involved a number of different elements. Air-Transport IT Services (AirIT) deployed its Extended Airline System Environment (EASE™) shared-use passenger processing system in 22 ticket counter positions, five gate positions and three baggage service office locations, reports Chris Keller, the company's president and chief operating officer.

PLS also added AirIT's Flight Information and Advertising Display System (FIDS/ADS) products, and will employ the firm's Intelligent Display System technology, which provides dynamic gate and ticket counter signage, including flight/gate/baggage information display systems (FIDS/GIDS/BIDS), with room for advertising content.

Additionally, PLS purchased 15 common-use self-service (CUSS) kiosks to help shift some passengers from ticket counter lines; and Skippings reports that the airport may purchase 33 more in the future. CUSS kiosks provide more flexibility and allow faster passenger processing, explains Keller.

Switching to shared-use technology early in the project made it much easier to shift passengers and airlines as individual areas came online, reports Skippings.

Previously, American Airlines had only two desks at PLS. Now, American can process passengers at up to five check-in desks if other desks aren't already occupied by other airlines. Delta Airlines went from two to potentially six available positions, Keller adds.

PLS also uses AirIT's Local Departure Control product, which is designed to allow charter carriers to provide passengers with the same experience as a commercial operator — including seat assignment and boarding passes. "There's a large difference in their seasonal/non-seasonal air traffic," Keller notes. "They can accommodate 30% to 50% more passengers or carriers with the shared-use system."


The flexibility of shared-use technology will be especially beneficial to PLS as it continues to grow, adds Keller. While airport officials work to develop new air service, they can let airlines know that PLS has infrastructure



Chris Keller

in place for them and all they need to bring is aircraft and passengers, he relates.

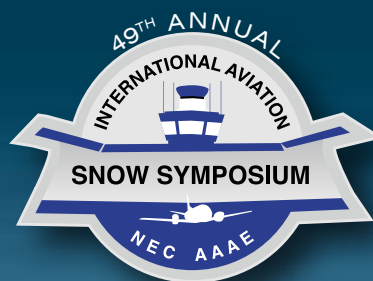
Between the addition of new passenger processing systems, tunnels inside the terminal, and work crews at every turn, Skippings contends that building a new facility would have been a lot easier than renovating the airport's existing one. "You don't have the balancing act of keeping everything going while building something new," she reasons.

If traffic at PLS continues to increase as forecasters predict, Skippings may get the chance to test that theory. 

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O'Hare Recycles Old Roofing Shingles into New Runway Pavement

By Thomas J. Smith

factsfigures

Project: New Runway, with Recycled Content in Asphalt

Location: Chicago O'Hare Int'l Airport

Runway: 10R-28L

Engineer: O'Hare Runway Designers, LLC

Lead Firm: Epstein

General Contractors: Turner-Acura-Lindahl Tri-Venture

Paving Contractor: Plote Construction

Total Project Cost: \$500 million

Paving, Lighting & Signage Portion: \$82 million

Estimated Commissioning: Oct. 2015

Project: New Taxiways, with Recycled Content in Asphalt

Taxiways: K & L

Engineer: Epstein

General Contractors: Joint venture of Walsh & Terrell

Paving Contractor: K-Five

Total Project Cost: \$47.5 million

Paving Portion: \$18 million

Estimated Completion: Oct. 2015

Of Note: Pavement bid specifications required the use of recycled roof shingles in the warm-mix asphalt for sub-layers; first project certified by the FAA to use the environmentally conscious asphalt blend



More than 6,000 old roofs are now part of the airfield at Chicago O'Hare International Airport (ORD).

As part of its on-going O'Hare Modernization Program, the airport is incorporating recycled asphalt roofing shingles into the sub-layers of its recently constructed Runway 10R-28L and taxiways K and L. The project makes ORD the first U.S. airport to be certified by the FAA to use recycled roof shingles in its asphalt.

The Chicago Department of Aviation now plans to use the recycled-content material for all future runway and taxiway projects at both O'Hare and Midway International Airport.

When preparations began in 2003 for the \$8 billion ORD re-build, re-using old roofing shingles was not part of the plan. But cost savings and the opportunity to reduce the use of virgin oil earned the practice a spot on the airport's airfield agenda.



Rosemarie Andolino

"In Chicago, it is now expected that we will go the extra mile and pioneer these efforts in environmental sustainability," notes Rosemarie Andolino, commissioner of the Chicago

Department of Aviation. "Our contractors and team members are constantly looking for new initiatives and evaluating them to see how we can bring them to the airport market."

Roads to Runways

Although the state of Illinois has been using recycled asphalt shingles in its road and highway pavement for several years, the concept is new to the airport industry. ORD eased into the new practice by using the environmentally conscious asphalt in roadway, shoulder and apron paving projects. The Chicago Department of Aviation then worked with its engineers, contractors and the University of Illinois to obtain the necessary modification of standards from the FAA to permit the use of the material into asphalt mixes for runways and taxiways.

"When you make a change to something that has always been that way for years, you want to ensure it meets all the safety requirements," Andolino explains, noting the heavy stress that fast-moving aircraft place on airfield pavement.

The product used at ORD is categorized as a "warm-mix" asphalt, because it is produced and applied at lower temperatures — and consequently requires less fuel and produces

Crews from Plote Construction lay down asphalt sub-layers on ORD's new Runway 10R-28L.

lower plant emissions — than traditional hot-mix products. Warm-mix asphalt is also considered to be safer for crews to handle, and stretches the paving season, because it can be applied in cooler weather.

“In the field of environmental issues, the trust we have built over the last 10 years with the FAA is there,” says Andolino. “They know we will not move forward with something that jeopardizes safety, and they know we want to be aggressive to ensure that we are creating the most environmentally sustainable airport.”

Financial & Performance Implications

The use of asphalt with recycled material reduces the need for liquid asphalt by 2% to 3%. Project officials estimate that using it will save ORD \$1.65 per ton on the Runway 10R-28L and taxiway projects, for a total of \$665,000.

About 7,000 tons of recycled shingles will be part of the 287,888 tons of asphalt that will be applied in the sub-layers of the 7,500-foot runway. Another 2,500 tons of the material will be part of the 105,000 tons of asphalt going into the base layers of the two taxiways. According to project participants, it takes about 100 residential roofs to produce 150 tons of the finished recycled material.

ORD's new runway and taxiways are scheduled to be operational next October.

The primary contractor for Runway 10R-28L is Turner-Acura-Lindahl Tri-Venture; Plote Construction is the paving contractor.

While the overall runway project is estimated to cost \$500 million, the tab for paving, lighting and signage is expected to be \$82 million. Walsh and Terrell formed a joint venture for the \$47.5 million taxiway project and K-Five is the paving contractor.

Applying the warm-mix asphalt with recycled roofing shingles is no different than applying a traditional mixture, reports Rocco Danna, K-Five's manager for the taxiway project.

Plote's research and development manager, Greg Rohlf Sr., notes that his firm has been using recycled asphalt in its mixes for seven years with very good results. In addition to containing asphalt, the shingles also contain cotton or fiberglass fibers. Pavement with recycled shingles is “better and more durable” than pavement made solely of “virgin” materials, because of the extra fibers, Rohlf explains.

Prior to the runway project at ORD, Plote tested the material by repaving portions of I-90 with a mix containing recycled shingles and comparing it to a portion of I-55 repaved with a traditional mix. Test results showed that the shingle product was “as good or better than the virgin product,” Rohlf reports. This allowed the state to set specifications that encourage more recycling and save taxpayers money, he adds.

The formula each paving contractor uses for its mix is tied to the certified recycled materials obtained from processor(s), Rohlf explains. Plote tests samples of its warm-mix asphalt every day, he adds.

Before its current project, the company had paved many other runways and taxiways at ORD. Rohlf estimates that Plote now uses asphalt with recycled shingles in about 70% of its projects.

K-Five had previously completed five runway and taxiway projects as part of ORD's modernization program. It now incorporates the recycled material in 99% of its current projects, Danna reports.

Flatwork Pioneer

When the O'Hare Modernization Program was in the planning stage, project leaders turned to U.S. Green Building Council standards; but the Leadership in Energy and Environmental Design guidelines only cover buildings and facilities, not flatwork like ORD's large airfield initiative. This prompted ORD to create its own industry-specific guide for sustainable design and construction, which it now makes available to other airports.

Managing the movement of dirt has been a key factor during the construction of Runway 10R-28L and other airfield projects. (Throughout the long-term modernization program, ORD will build four new runways, extend two others and add several miles of associated taxiways.)

The goal is to move dirt once or create stockpiles for future use, notes Andolino. So far during the modernization program, airport contractors have moved 28 million cubic yards of soil — enough to fill Chicago's iconic Willis Tower (formerly known as the Sears Tower) 12 times. Following ORD's Balanced Earthwork Plan, crews have avoided 700,000 truck haul trips and helped save more than \$150 million by handling dirt in a more strategic

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and environmentally responsible manner. The new practices have also decreased overall construction time and enabled a massive stormwater detention basin to open a year ahead of schedule, she adds.

“By keeping all that dirt work onsite, we have been able to reduce the number of trucks that traverse the neighborhoods around the airport,” Andolino elaborates. “This helps the people with less aggravations (and) fewer roadway repairs; it helps the planet, because we are reducing carbon dioxide emissions and reducing landfill dumping; and it helps us profit, because going green can actually save money.”

The airport has saved another \$5 million via the on-site recycling of old pavement and building materials into re-useable aggregate for asphalt and concrete pavement.



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Turning Shingles into Blacktop

In the Chicago area, a network of companies is helping breathe new life into residential renovation debris by recycling asphalt roofing shingles into materials paving contractors can incorporate into their asphalt mixes. To further encourage the re-use of “tear-off” shingles, Illinois now bans the disposal of old shingles in a landfill if there is a certified recycler nearby.

In most cases, it is cheaper to take a dumpster of old shingles to a recycling center than to a landfill, says Brian Lansu, vice president of US RAS Association-Midwest, a trade group that promotes the use of the old shingles.

EPA-certified recycling centers sort and clean shingles removed by roofing contractors so the materials contain only 1.5% debris. Processors then clean the shingles further, so only 0.5% debris remains. Next, processors use a two-step process to grind the materials into a granular form, with pieces no larger than 3/8-inch to meet Illinois highway standards.

According to Lansu, the recycled material is sold to paving contractors for about \$40 to \$50 per ton; and using recycled roofing shingles reduces the amount of new asphalt cement – oil – needed for asphalt mix by about 5%. Depending upon the price of oil, contractors could pay \$500 to \$800 a ton for “virgin” oil product, he adds.

Lansu cautions paving contractors to adjust the grade of oil in their formulas to keep mixtures flexible. Recycled materials will make asphalt “stiffer” without such adjustment, he explains.

Contractors that recently paved Runway 10R-28L and associated taxiways at O'Hare International Airport used materials from Southwind RAS and Falcon Green Resources. (C&D of Wisconsin is another processor that serves the Chicago area.)

Currently, demand for recycled materials outstrips the supply produced by the three processors; but more recycling centers are opening in untapped areas of the state to fill the gap, reports Lansu.

The airport opted to use a warm-mix blend of asphalt that includes recycled roofing shingles.

ORD's bidding specifications require contractors to use ultra-low sulfur diesel fuel and construction equipment that meets Tier 2 emissions standards. Contrary to some predictions, the requirements did not increase project costs and were "the right thing to do," notes Andolino.

Other Green Projects

With a variety of environmental projects already up and running, ORD anticipates using geothermal technology to heat and cool its new south control tower. It also continues to explore the use of solar energy, especially as the technology improves.

In November, Chicago again hosted Airports Going Green, an annual conference that presents the best practices in airport sustainability. Andolino describes the international event as a "think tank of ideas."

"We are always keeping our eyes and ears open, watching what is happening in road construction, rail construction or at other airports," she relates. "We are going to keep evaluating opportunities and the options with new technologies and procedures."

ORD's existing green projects run the gamut — from a mandatory recycling program for concessionaires and charging stations for electric vehicles to on-airport beehives and weed-munching goats.

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Photo: Chicago Dept. of Aviation



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The “10 Commandments” of Consolidated Rental Car Center Design



Over the last 15 years, consolidated rental car facilities have become a new feature at airports large and small across the country. Well-conceived versions bring real value to rental car customers, airports and rental car companies alike.

Successful facilities have many of the following elements in common:

1. A layout that fosters customer service with short walking distances, few or no vertical transitions, intuitive wayfinding, easy opportunities to shop competitive rental companies and careful management of multiple traffic flows. In addition, the building itself should be memorable, so it's easy for customers to locate when they return to the airport
2. Operational efficiency for cars, buses, customers and company personnel. With thousands of rental transactions and vehicle quick-turns occurring every day, even slight compromises on operational requirements can create enormous costs. Conversely, saving just 30 seconds on each process can generate substantial savings. The best rental car facilities identify and eliminate choke points and areas of excess capacity to create uninterrupted flow.
3. A “win/win” business agreement that weaves together the needs and goals of the airport with those of its individual rental car companies. To be successful, the contract must benefit both groups.
4. A clear understanding of why the facility is being built is critical. Bear in mind that many travelers assume that a consolidated facility will compromise customer service; and many rental car companies will oppose sharing a facility with direct competitors. The motivating factor must be recognized and communicated — even if it is the airport's need to decrease curb congestion or repurpose terminal space currently occupied by rental car counters.
5. A superior facility will both anticipate and accommodate changes in the way rental car companies serve their customers. Despite recent evolutions, the market will change more over time.
6. Ensuring all tenants equitable access to customers is one of the trickiest challenges. As with retail and food/beverage spots inside the terminal, some locations within a consolidated rental car center are more advantageous than others. Rental car companies are fierce competitors, yet airports need them to cooperate in the creation and operation of consolidated facilities. Phoenix Sky Harbor addressed this issue by providing each rental company the same opportunity to bid for its preferred space. In doing so, the airport acknowledged that the allocation of space, retail frontage and facility resources could be driven by more than a simple linear distribution based on market share. The design produced by TranSystems reflected that philosophy and included incubator space for new entrants into the local market.
7. Cost control during the design and construction of a new facility is vital to minimizing price increases for rental customers.
8. Attention to a market's unique schedule can help optimize everything from project planning and construction scheduling to the availability for peak customer use.
9. Strategic specifications for lighting, finish materials, interior space configurations, vertical clearance, signage, security and turnover help emphasize the retail nature of a consolidated rental car center.
10. As part of the airport campus, a rental car facility should convey a sense of place about the local community via its architectural design, color palette, artwork, etc.

Through careful attention to these elements, an airport, its rental car partners and their customers can all enjoy the benefits of a consolidated rental car facility. 



Jeffrey Jarvis

Jeffrey Jarvis, AIA, is an architect and principal for TranSystems. Throughout his 32 years in the industry, he has been involved in numerous consolidated rental car facility projects at airports throughout the United States.

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