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Airport Improvement



Fort Worth Alliance Airport Nears End of 25-year Runway Extension Project

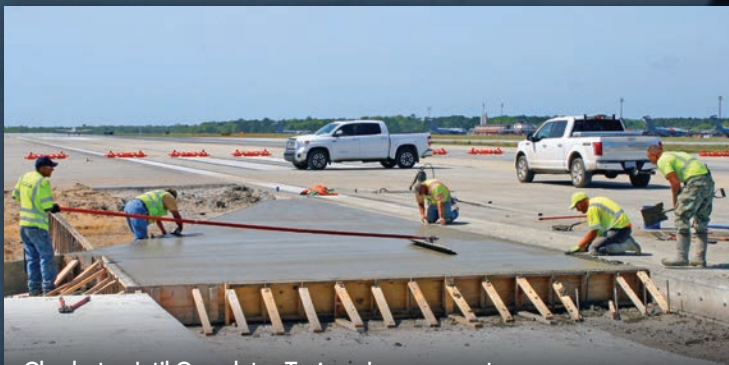


Traffic Growth Prompts Airfield Investments at Billy Bishop Airport

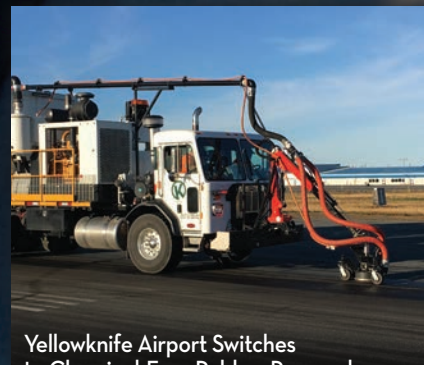
Atlanta Int'l Tackles Nation's Largest Ground Support Project



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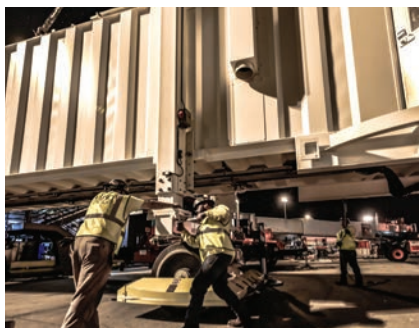


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- **Reduce** downtime

Gate

- **Ensure** safe operations
- **Decrease** disruptions
- **Increase** gate capacity



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AirportImprovement.com October 2017



Airports Front & Center

 There are certain truths involving airports and the customers they serve. Public scares involving health and safety often seem to position airports front and center. It may not always be warranted, but it's something we need to deal with.

Remember the West African Ebola epidemic of 2013-2016? When things were getting out of control and fear was rampant about the virus spreading to North America, our airports were on the front lines. There was a great deal of media coverage detailing procedures set up at certain airports to control and prevent the spread of the disease.

The same can be said for terrorism, starting predominantly with 9/11. Airports were first in line for news coverage and remedies to help keep us safe.

The natural disasters this September once again thrust airports to the forefront. Before hurricanes Harvey and Irma arrived, reporters flocked to airports for footage of people in ticketing lines and countless cancelled flights on the FIDS. Newscasters also kept the public abreast of airport damage and when the facilities would reopen.

In a somewhat curious way, it's comforting to know that our airports occupy such a critically central role—on a daily basis and especially during times of duress. Perhaps this year's hurricanes can serve as a reminder to elected officials that airports are crucial lifelines for the general public. Every day, airports facilitate the movement of goods and services to/from our communities. In order to be prepared, we need the resources necessary to handle this mammoth responsibility. Now's the time to make our case.

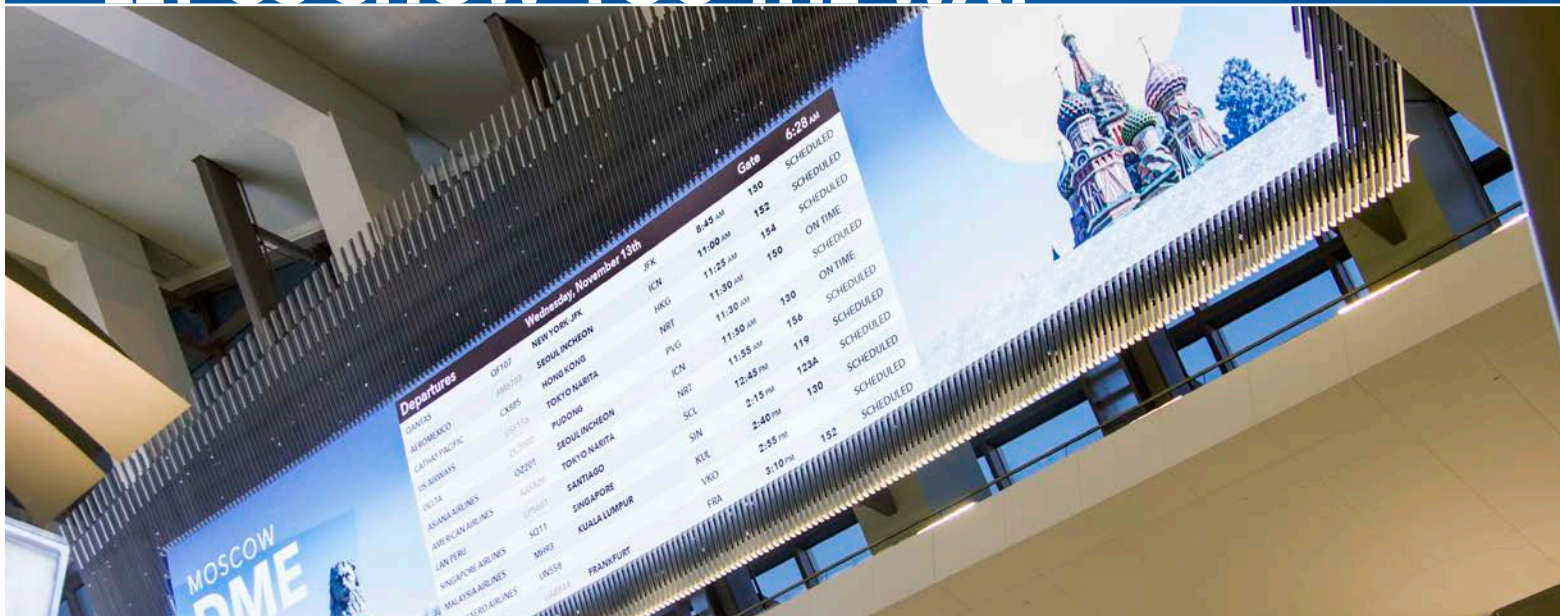


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It's all about connections

Atlanta Int'l Tackles Nation's Largest Ground Support Project

BY JENNIFER BRADLEY



When Hartsfield-Jackson Atlanta International Airport (ATL) was built, it was the largest airport construction project of the time. Today, the airport is continuing that legacy with the single largest ground support project in the history of the United States.

Atlanta's Department of Aviation began the \$175 million project in January 2015 and expects to complete it in February 2022. When complete, ATL will have 116 new passenger boarding bridges, new ancillary systems such as preconditioned air and 400Hz ground power, and code-compliant emergency egress pathways.



The landmark renovation project is designed to improve operations and the passenger experience. "We want the passenger to be exposed to an all-new interior, a new experience as they walk out of the aircraft," says Bob Liber, senior project manager for the Atlanta Department of Aviation. "The new bridges are doing that. They bring state-of-the-art technology to ATL operations and they are very aesthetically pleasing."

Six of ATL's concourses will undergo infrastructure improvements and receive modern equipment throughout the course of the project. Working collaboratively, AERO BridgeWorks, the project builder, and AERO Systems Engineering, the project designer, turn over a new gate each week. Two bridges are under construction at any given time, offset by one week. A gate closes every Sunday night, and a new gate re-opens every Friday afternoon, explains Jay Grantham, vice president of AERO BridgeWorks. During that period, installation crews set a new bridge, ground power, air conditioning, network systems, and related ancillary support systems, and also refurbish the associated vestibules.



JAY GRANTHAM

Throughout the seven-year project, crews will repeat the cycle more than 100 times.

Time for Change

"The air carriers and airport were spending more effort to maintain the passenger boarding bridges than they were worth," explains Shawn Craig, senior program manager with the Atlanta Airlines Terminal Corp. "The outdated equipment was causing downtime to the airlines and thus impacting the overall passenger experience."

Liber agrees, noting the airlines are happy to work alongside the airport on the replacement project, as the new bridges are being customized with each airline's standard finishes and preferred features. With more than \$1 million being spent per gate, the bridge renovation project is a critical element of the overall modernization efforts underway airport-wide.

In 2013, the airport and carriers surveyed the condition of the boarding bridges to prioritize those that were eligible, or close to eligible, for replacement under the FAA's 20-year rule. ATL's concourses D South and C South housed the oldest equipment, notes Craig. "Those operators were very happy to see the old equipment being retired," he notes. "It's most

FACTS&FIGURES

Project: New Passenger Boarding Bridges

Location: Hartsfield-Jackson Atlanta Int'l Airport

Owner: Atlanta Dept. of Aviation

Project Cost: \$175 million

Owner's Rep: Atlanta Airlines Terminal Corp.

Designer: AERO Systems Engineering

Contractor: AERO BridgeWorks

Bridge Manufacturer: JBT AeroTech

Project Scope: 116 bridges, 145 gates

Timeline: Jan 2015 - Feb. 2022, with 2 separate design/construction phases

Project Goals: Enhance operational efficiency; improve customer experience

Noteworthy Detail: Largest single ground support project in the U.S.



Assembling and installing the new boarding bridges requires precise scheduling and coordination.



fulfilling when you can walk up to a gate agent, regardless of air carrier, ask how the bridge is driving, and they simply smile.”

Technology & Training

The new bridges require a wide variety of building infrastructure and gate upgrades. Crews are upgrading networks, central plants, monitoring equipment and software, communications systems, air conditioning units and central plant controls. All existing bridge foundations had to be analyzed for structural adequacy for new loads and general conditions. Designs were made for modifications as necessary.

“When those bridges were installed, I don’t think pagers even existed; cellphones certainly didn’t,” muses Alan Barge, president of AERO Systems Engineering. “These modern fixed ground support systems can be monitored remotely and can send maintenance staff text message alerts when a fault occurs or equipment otherwise needs attention.”

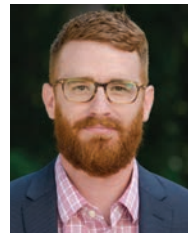


ALAN BARGE

The recently installed bridges include new features for ATL passengers, most notably air conditioning as they board and deplane. This is a huge enhancement, notes Barge. The pre-cool option allows ground support personnel to cool the bridge before it’s connected to the aircraft.

Liber is also excited about the pre-park and pre-position options. When set up properly, the new bridges almost dock themselves to the aircraft, he reports.

New monitoring capabilities allow staff to analyze the equipment’s performance statistics. “None of that existed on the 30-year-old bridges,” says Chris Britton, design manager for AERO Systems



CHRIS BRITTON

Engineering. The new monitoring capabilities are why networks throughout the airport had to be researched and replaced, he adds. The existing infrastructure was modified piece-by-piece during various projects over the last few decades, and the airport needed to get away from the “patchwork quilt” approach, explains Britton. This project provides an organized and modern network to seamlessly support and monitor the new gate equipment, he adds.

Before a new gate opens each week, AERO BridgeWorks performs a walk-through with all involved stakeholders on Wednesday. Once AERO BridgeWorks completes its work, the resident airline begins training with the bridge manufacturer, JBT AeroTech. Training materials run the gamut from printed syllabi

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and manuals to videos and hands-on demonstrations about use and maintenance.

Integrated Approach

Assembling the right team for this massive project followed the Tuckman Model of “forming, storming, norming and performing,” notes Craig. In addition to coordinating the design team, construction team, owners and operators, he focuses on satisfying individual objectives, while also keeping the project moving forward on schedule and within budget.

That said, Craig considers the project a true team effort that could not be completed without competent engineers and quality construction crews. “Once we started clicking, we’ve been turning over a new gate every week,” he reports. “Everyone has stepped up and pulled together as a team to figure out how to do this.”

“We did not have a single punch list item on the last couple gate turnovers,” adds Grantham. “This is a true testament to the effectiveness and teamwork on this project.”

Even though they operate as two separate entities, coordination has been natural for AERO Systems Engineering and AERO BridgeWorks because the team has collaborated on many design/

build projects over the years. Former projects include some of the nation’s most complex and time-sensitive projects, says Barge. “It’s our close relationship that allows us to very rapidly solve problems in the best interest of the owner, while moving the project forward, on schedule and on budget,” he says.

Collectively, these firms are known as the AERO Group. “Their knowledge, capabilities and focus on aviation fixed ground support systems allowed this project to be designed and construction commenced in record time,” notes Craig.

AERO Group has a construction office on site at ATL, and its headquarters is nearby, on the north side of the city.

Project leaders emphasize the need for every airline, operations manager and crewmember working on the renovations to know what gates are going to be closed, when they will close and when they will reopen. “To clearly communicate gate closures through an airport of Atlanta’s size could be a huge challenge,” Grantham remarks. “But working alongside airlines and stakeholders, the project team collaborated to develop a suitable schedule with consistent bridge deliveries that met everyone’s goals. The project schedule is sequenced around holiday and blackout periods to ensure airline operations and passenger experiences are not impacted.



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The schedule is routinely updated, distributed and posted throughout the airport so everyone has the same information.”

The variety of airline-distinct specifications for the new boarding bridges makes the airport’s integrated approach even more important. The design team needed to tailor each bridge for the particular equipment and configuration requirements of the resident airline—while also complying with the city of Atlanta’s expectations for the project. Everyone had to approve and agree within a nine-month Phase 1 design period, notes Britton.

The installation calendar is committed to paper two years in advance, and Craig can tell at any moment what gates are out of service and when they are turned back over for use. “That is key for us,” he emphasizes. “We saw this enormous project with many moving parts and it was complicated—116 gates over a few years. But we broke it down into manageable pieces and developed a comprehensive schedule, and that has made a major difference.”

The scheduling strategy is specifically designed to help the team proactively resolve field issues and airline requests. That is especially important for the ATL control tower, notes Barge. “With more than 2,500 flights a day, the control tower of the world’s busiest airport needs to know the status of every piece of equipment on the airfield,” he says. “The comprehensive schedule allows that.”

The Lowdown on Logistics

JBT AeroTech, which supplied the original boarding bridges to ATL in 1980, is proud to be the airport’s supplier once again. While the associated site work has been challenging, installing the new bridges in the same configuration as the previous equipment has saved the city time and costs, by minimizing foundation work, notes Garrett Macfarlane, a regional sales manager for the company.

Four full-time AERO BridgeWorks crews work on two gates for two shifts per day, every day. The amount of associated deliveries in and out of the already congested airside of the world’s busiest airport is noteworthy.



MIKE MADLOCK

AERO BridgeWorks President Mike Madlock explains some of the details: “Each passenger boarding bridge requires three tractor trailer loads to deliver. A crane is required, including separate trucks to carry the crane counterweights and miscellaneous material and equipment deliveries.

“Combining this with other ongoing ramp projects and airline operations, the airfield and security stations naturally become congested,” he continues. “Initially, it was a challenge to get everything delivered; but through experience and teamwork, the project has become very efficient.”

“Now, we take a bridge off Sunday night, and Monday night, the old bridge is removed from the site,” explains Craig. “Tuesday night the new bridge comes in, they stand it up and start wiring. What used to take a week is now accomplished in three days.”

Madlock has also witnessed the evolution. “In a nutshell, we had to develop a complete system on how to escort everything in and

out,” he comments. “We have dedicated escorts for that purpose. In today’s environment, you can’t simply drive onto the airfield with a delivery. Deliveries must be coordinated well in advance, and our dedicated escorts allow the construction crews to focus on construction while all deliveries are made without delays.”

Another logistical element has been upgrading emergency egress. Because building codes have changed since the terminal was constructed 30 years ago, improvements are being designed and built to bring the terminal current, explains Barge. Similar issues have arisen with the electrical infrastructure that supplies the new equipment—the new electrical loads required significant electrical infrastructure upgrades.

“And, we are operating in one of the most secure environments in the world,” advises Barge. “The design has to be right, the equipment has to be right, and the construction has to be right. There is simply no time for mistakes—it has to all be coordinated correctly, without impacting any of the ongoing operations at the world’s busiest airport.”

“It’s been quite a coordinated effort,” agrees Madlock.


Lessons Learned

What makes such a large project work? “Planning, planning, planning and more planning,” emphasizes Craig. “Outside of that, you have to assemble a team that understands the big picture from the beginning.”

The ability to readjust as needed is equally vital, he adds, explaining that no matter how much a team plans, there is always potential for problems. “Errors may occur, but it is most important to respond quickly and resolve the issue to avoid true operational or project impacts,” Grantham adds. “So far, the project has effectively overcome any bumps along the road, but everyone remains flexible and available for when the next unknown surfaces.”

Liber, who has been with ATL for 39 years, says that a pre-design phase is essential because it helps determine what airlines want—from the overall design to smaller details such as finishes and specific accessory equipment.

As work proceeds, the airport is also discovering that it needs to further research the replacement of additional air handling units, chillers and pumps. This will likely be a follow-up project that will be developed over the next year, notes Liber.

With 38 new gates turned over for operation by late August, the team at ATL has plenty of work ahead on its 116-bridge project. But it has a system in place that is working. “All in all, it’s been a really good project,” observes Liber. “AERO Group and JBT AeroTech have formed a very cohesive group, are very responsive to our needs, and do a great job. It is comforting to know the overall program schedule is two months ahead of our baseline schedule. All stakeholders are happy with the progress on the project, and we take great satisfaction in knowing that we are able to solve any issues in a timely fashion, while maintaining coordination with other numerous ongoing projects. Hartsfield-Jackson Atlanta International Airport will continue to pursue projects that progress, improve and enhance the customer experience at the world’s busiest airport.” 

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Fort Worth Alliance Airport Nears End of 25-year Runway Extension Project

FACTS&FIGURES

Project: Runway Extension

Location: Fort Worth (TX) Alliance Airport

Owner: City of Fort Worth

Operator: Alliance Air Services, a div. of Hillwood

Project Cost: \$275 million

Funding: FAA Airport Improvement Program; North Central Texas Council of Governments (regional transportation authority)

Project Scope: Extending 2 parallel 9,600-ft. runways to 11,000 ft. each; adding instrument approach system to 1 runway

Noteworthy Challenges: Relocating rail line & road; leveling site required 4 million cubic yards of fill

Timeline: Planning began in 1992; site prep started in 2003; runway construction proceeded in fall 2015; 1st runway completed in March 2017; 2nd runway slated to reopen in Feb. 2018

Prime Contractor: Lane Construction

Design Engineering: Jacobs Engineering

Geotechnical Engineering: Terracon

Electrical: EAS Contracting

Light Manufacturers: ADB; Siemens; Lumacurve Airfield Signs

Pavement Markings: Stripe-A-Zone

Signage: Lumacurve Airfield Signs



According to popular sentiment, it can be easier to move an entire airport rather than railroad tracks that run through or near it. But Fort Worth Alliance Airport (AFW) managed to move the tracks. And a state road as well.

The complex relocations were part of a 25-year effort to extend the industrial airport's two 9,600-foot parallel runways to 11,000 feet each. The ultimate goal? Accommodating fully loaded transoceanic cargo flights all year long.



CHRISTIAN CHILDS

"We are very happy to be finally looking at its completion. Alliance is an extremely dynamic airport in a very fast-growing area of the country. We want to see the airport and city of Fort Worth be successful, and the expansion will attract more and more users to the airport and to the city."

Nearly everyone involved with the project agrees on one thing: It wasn't easy. "This project has literally been going on since 1992," says Airport Manager Christian Childs, C.M.

AFW President Tom Harris, who has been part of the lengthy project since Day One, agrees wholeheartedly: "The complexities involved in the planning and execution of this project have made it one of the most complicated airport improvement projects to ever be undertaken by our team or by the FAA. I could not be more proud of our airport team, as well as the dozens of engineering, construction and planning partners that have worked so hard to make this expansion a reality."



TOM HARRIS

Crews finished work on Runway 16R-34L in March; the second runway, 16L-34R, is slated for completion in early 2018. Total project cost was \$275 million.

Airport-Driven Development

AFW is the centerpiece of AllianceTexas, a master-planned community about 10 miles from downtown Fort Worth that includes commercial, industrial and residential elements. Developed by Hillwood, a Perot

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BY VICTORIA SOUKUP

company, the 18,000-acre community is the brainchild of Ross Perot, Jr., chairman of The Perot Group.

From a transportation perspective, AllianceTexas seemingly has it all: one of the nation's largest intermodal yards, two Class 1 rail lines, state and interstate highway connections and AFW—the world's first industrial airport. The community is also home to 440 businesses ranging from small local companies to Fortune 500 giants such as Amazon and Wal-Mart. Collectively, the businesses of AllianceTexas employ about 44,000 people.

AFW was specifically designed as an industrial airport to serve the master-planned community. It is owned by the city of Fort Worth and operated by Alliance Air Services, a division of Hillwood, which also donated the airport land.

While the bulk of AFW's 125,000 annual operations are cargo-related, it also accommodates corporate, general aviation and training flights. The primary tenant/user, however, is FedEx, which maintains its Southwestern Regional Sort Hub at AFW.

The problem with the airport's original 9,600-foot runways was that fully loaded cargo aircraft had to sacrifice either fuel or payload to generate enough lift when taking off for transoceanic destinations during the hot summer months. Although seasonal, the airfield limitations eventually made AFW less attractive to cargo operators.

Childs explains that funding limitations and operational forecasts prompted developers to include 9,600-foot runways when the airport was originally designed. Soon after the airport opened in 1989, however, they proved inadequate.

"The short runway length in the really hot months of the year wasn't working," he relates. "We needed that additional runway length to accommodate our current users, as well as increasing our marketability to future customers."



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The airport is the centerpiece of the master-planned community.



Making Way for More Runway

By the early 1990s, discussions began in earnest about extending the runways to 11,000 feet. Protected wetlands to the south ruled out extension in that direction. The only option was to go north—right through a state road and railroad tracks operated by

Burlington Northern Santa Fe. “Those two pieces of infrastructure were in the path of the runway extension,” recalls Jeff Toner, managing principal for Jacobs Engineering Group, which served as program manager for the project. “They had to be moved before we could begin.”



JEFF TONER

Everyone involved knew that site preparations would be expensive, time-consuming and require a great deal of cooperation. In total, the project ultimately affected 64 landowners. Early in the planning stages it also became clear that FAA Airport Improvement Program grants would be limited, and the team settled in for a slow-moving project.

Preliminary field work started in 2003, and by mid-decade, crews were cleared to move the state road 4.5 miles northwest of the airport to prepare for the runway extension. Both the original and new highways remained open between 2007 and 2015. The old road was severed and closed two years ago when crews began runway construction.

About the same time, engineers devised plans to relocate and reroute the railroad tracks. “We had to acquire the right of way, relocate utilities and construct 12 miles of new rail line to offset the three miles of rail line we severed,” Childs notes.



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The long process included public hearings and noise studies. "It was very difficult," Childs recalls. "But Burlington Northern Santa Fe is a fantastic company—they had a long-standing relationship with our parent company, Hillwood; so that helped. In fact, AllianceTexas wouldn't be where it is today without BNSF."

The expensive rail line relocation was paid for with grant money from the North Central Texas Council of Governments (COG), a regional planning organization. "As you can imagine, the FAA isn't too interested in building railroads," Childs remarks. "But COG realized the value of the runway extension and the logistical advantage it would bring to the Alliance area and the entire region—not just for AFW or the city of Fort Worth."

Toner credits the financial support of the regional planning council for facilitating the runway extensions. "The rail relocation was a big piece of the project," says Toner, who has worked on the project since 2000. "Once we received that grant, we could actually begin moving forward."

Prepping & Paving

Airfield contractors wasted no time after site prep crews finished relocating the rail line in September 2015. "We literally went to work the next week on the runways," Childs recalls.

First up was Runway 16R-34L, which was completed in March 2017. In addition to extending the pavement, the airport also added an RNAV GPS instrument approach. Previously, pilots landing on 16R-34L were restricted to visual operations. "For us, it is a huge deal to have two parallel runways, each with at least one type of instrument approach," Childs comments.

Construction on Runway 16L-34R began in November 2016 and included a short-term closure this summer for configuration and lighting updates. It is scheduled to reopen in fall at 9,600 feet; then close again for extension work to continue from the north. "We will reopen with the enhanced approach capability for the Category 3 ILS to allow FedEx to do their holiday rush," Childs notes. "And then, immediately after the Christmas holidays, we will close the runway for 30 days to tie all new infrastructure into the existing, and restripe it as a new 11,000-foot runway."

Airport officials expect to reopen Runway 16L-34R in February 2018. At that point, AFW will be able to offer users two 11,000-foot runways with instrument landing systems.

A massive amount of fill was needed to level various areas due to the slope of the existing runways and property. In total, about 4 million cubic yards of dirt and embankment material was imported to the project site. To secure enough fill, prime

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After the railroad track and road were moved, the project still required extensive site prep.



contractor Lane Construction purchased 100 acres of property in a nearby town to use as a borrow pit and purchased additional material from a resident who owned the land next door.

An estimated 1.2 million cubic yards of material was imported for the runway work alone. “And that had to be brought in, placed and compacted in about 18 months,” notes Childs. In late August, trucks had already made nearly 80,000 trips from the excavating area to the airport.

Due to the large amount of fill needed, engineers were especially vigilant about compaction issues. “We were concerned with potential settlement of new embankment and underlying material to new embankment,” explains Jacobs Senior Project Manager Tex Schmidt. “We paid a lot of attention to that during the design process with our geotechnical engineers and completed weekly progress reviews.”



TEX SCHMIDT

In late August, geotechnical engineers from Terracon detected only 2 inches of settlement in areas where crews had placed up to 40 feet of embankment material. “We’re quite happy with the small amount of settlement we had, and we have a good level of confidence that this embankment is not going to move a whole lot over time,” reports Schmidt.

Marathon Mentality


Despite several extra site prep issues, key team members cite staggered funding as the project’s biggest hurdle. “The majority of

challenges were associated with phasing, because full funding was not available at the beginning of the project,” explains Brad Fox, project manager at Lane. “The project had to be built in a less-than-ideal sequence, which led to design and coordination issues. This was exacerbated by extremely wet weather, which had a substantial impact on the embankment schedule.”

Fox credits Jacobs and AFW for working with airport users and the FAA to find solutions that allowed the project to proceed with minimal impact on airfield operations.

“From the beginning, the challenge was getting enough funding in place to do all the work,” agrees Jacobs’ Toner. “That’s why the project took the time it did—we never had enough funding in place to do all of it.”

Due to the long duration, most of the personnel who began the project weren’t around for its end. And in at least one instance, a company involved in the project completely closed its doors. “There’s not a whole lot you can do when people change jobs and firms are acquired,” remarks Toner. “Those kinds of things happen and you just have to be flexible.”

The few people who were in place for the duration experienced a unique construction project. “For two decades, Fort Worth Alliance Airport has worked closely with several partners...on the intricate plans necessary to reroute rail lines and roadways to accommodate the expansion of our runways,” reflects AFW’s Harris. “It has been a privilege to be part of this project from the very beginning to watch, day-to-day, how it’s come together.” 

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Workshops by Florida Airports Council Provide In-Class & On-Field Lessons

BY NICOLE NELSON



FACTS&FIGURES

Project: Professional Development Workshops

Presented By: Florida Airports Council

Topics: Airfield markings, airfield preventative maintenance, electrical safety, etc.

Cost: Free to member airports & their project partners

Frequency: Approximately 6/year

Locations: Various venues at member airports

Noteworthy Detail: Workshops have a high-tech focus & hands-on format



Florida is not just filled with beaches and tourist attractions. Thanks to the Florida Airports Council, it's also brimming with free professional development opportunities for maintenance and airfield personnel.

In June, an informative workshop about airfield markings was presented at St. Petersburg-Clearwater International Airport. The month of August brought a daylong discussion about preventative airfield maintenance at Martin County Airport/Witham Field. And in September, a basic electrical safety course was delivered to a roomful of eager attendees in Tallahassee International Airport's Terminal Building.



ETHAN CROOP

Ethan Croop, vice chairman of the council's Facilities Committee, says that the workshops provide a forum for airports to work together to fulfill training and informational needs.

The events are carefully designed to provide top-notch training for maintenance and field workers, he adds.

Croop cites his employer, the Lee County Port Authority, as a prime example of an organization that can benefit from the curriculum.

"At Southwest Florida International Airport, our maintenance department consists of 103 people, the majority of whom are actually out in the field doing the work, whether in the terminal or in the airfield," he explains. "We really try to target good training opportunities for these folks with subject matter experts."

Technically Sound

As manager of Maintenance Programs for the Authority, Croop has an inherent understanding of the specialized information airfield employees are seeking. That's precisely the type of content the council presents for its members, he adds.

"I think our participants are drawn to the workshops for both the zero-cost and the fact that they can be very technical," Croop says, noting that other conferences tend to offer costly one-hour sessions geared at multiple levels of airports. "Our audience is generally not concerned with high-level management topics."

Workshops presented by the Florida Airports Council are more hands-on, focusing on topics such as best practices for applying

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and removing painted airfield markings, or the ins and outs of photometric testing. "We try to share this type of information through technically-oriented workshops," explains Croop. The events also allow attendees to hear what their peers are doing in the field and learn from each other's experiences.

Topics are chosen according to member interest and industry trends. To date, they have run the gamut, from highly specialized subjects such as chiller plan operations to overarching symposiums on airport equipment.



TIM NEUBERT

In August, Neubert Aero Corp. President Tim Neubert presented information about preventative airfield maintenance at a workshop his company helped sponsor. Neubert says he was attracted to the council's workshop concept because

attendees not only receive information in a classroom setting, they also have the opportunity to get their hands on equipment.

He also likes the size and interactive format of the workshops. The group at his session included 20 participants from nine airports and their business partners.

"It gave attendees an opportunity to pose questions not only to the presenter but to each other because of the relaxed atmosphere," he notes. "Normally, in a classroom environment, you don't usually have participants talking to other participants because it would be rude. Attendees were able to do that in this environment, which added to the personal connection within the room."

Mindful Scheduling

Croop notes the workshops are designed with attendee convenience in mind. "Because we understand the constraints of airports in terms of time and out-of-county travel, we try to minimize the impact of that," he explains. "We have found that one-day workshops are fairly effective. We also try to find sponsors for breakfast and lunch, so there is no additional cost to participants. If somebody sees one of these training programs, it is really just their time and mileage to get there."

Neubert appreciated that the session he participated in was not a full-day workshop. "It was cleverly programed to be an early shotgun start, and then we finished up around lunchtime so that people who drove from across the state could still get back home," he observes.

Waterblasting Technologies hosted a continental breakfast that kicked off the event and gave participants a chance to get to know one another. Later, personnel from the company discussed and demonstrated rubber removal methods.

"I'm not sure that there's any other organization that is focused on helping the airports within their state like the Florida Airports Council is," says Dave Friday, vice president of Sales and Marketing for Waterblasting Technologies. "It is extremely valuable to have the events outside of an annual event throughout the year to provide



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more in-depth focus on a particular area and live physical demonstrations.”

Sightline President Donna Speidel, who presented at the airfield markings workshop in June, is similarly impressed with the council's series of professional development sessions. “Florida is the only (state airports council) that I know about that is so involved that they pull in their members throughout the course of the year to introduce them to these kinds of training.”




DONNA SPEIDEL

Speidel consolidated the “soup-to-nuts” material that typically takes her more than two days to deliver into a three-hour “nuts-and-bolts” presentation for the council's workshop. Speidel also focused on “how-to” information rather than the budget effects of various marking methods. Another notable difference—participants attending her abbreviated event did not have to pay registration fees.

“This is a good way for the Florida Airports Council to get its members involved and to add more value to its membership,” she remarks. “And it is also a way for the vendors who want to interact and sell to that membership to be in front of them and have them understand what we do.”

In total, the Florida Airports Council has members from all 22 of the state's commercial service airports, 80 publicly-owned general aviation airports and one spaceport. It also has more than 250 corporate, educational, affiliate and student members.

“It is very worthwhile, and I want to contribute to what the Florida Airports Council is trying to do for its members,” says Speidel. “I think it is very noble of them to be going to the lengths that they are.”

For more information about the council's workshop series, visit floridaairports.org. 

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San Francisco Int'l Uses Serial Runway Closures to Complete Airfield Upgrades

BY JODI RICHARDS

FACTS&FIGURES

Project: Runway Reconstruction & Airfield Enhancements

Location: San Francisco Int'l Airport

Project Scope: Repave Runway 28L; construct Taxiway F2; realign Taxiway S; upgrade associated electrical systems, lighting & pavement markings

Cost: \$43 million

Scheduling Strategy: Crews completed project during 7 weekend runway closures


Construction Timeline: March 31-June 5

Project Management: Golden Gate Constructors (joint venture of DeSilva Gates & Granite Rock)

Lighting: Eaton Crouse-Hinds

Electrical Contractor: Royal Electric

Noteworthy Detail: Airport staff developed mobile app that scans license plates & security badges to expedite flow in & out of jobsite

 Closing a runway for any amount of time is hardly a popular idea. However, San Francisco International Airport (SFO) recently found that a series of weekend closures was the best way to perform necessary upgrades at its busy airfield safely and efficiently.

The airport scheduled nine consecutive closures between March 31 and June 5, and ultimately completed the job in seven. Two closures were cancelled because rain and high winds precluded construction work; and the airport kept the runway open during Memorial Day weekend.

During the carefully coordinated closures, SFO repaved its second-longest runway, enhanced associated taxiways and updated various airfield systems. Together, the \$43 million enhancements will improve operational efficiency at the high-volume facility, says SFO Project Manager Daniel Lee.

Runway 28L was updated with a new asphalt surface layer and LED centerline lights. Crews also constructed a new secondary taxiway for departures on 28L, realigned an existing taxiway, and updated associated airfield electrical systems and pavement markings.



DANIEL LEE

Would You Rather?

When 28L was last resurfaced in 2008, SFO served roughly 37 million annual passengers. Last year, it served more than 53 million. "That change alone was a huge impact to trying to do construction while keeping the runway operational," Lee relates.

The airport, airlines, FAA and other stakeholders worked together to determine the best time to perform the work, he says.

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The airport received a top score from the FAA for the final pavement striping applied by its maintenance staff.

Crews performed some work, such as electrical upgrades, during overnight shifts, but paving required continuous daytime and nighttime hours. The series of weekend closures was carefully scheduled, coordinated and phased cooperatively with all stakeholders. “We were pushing our weekends and making sure that we utilized every single minute of our closures,” Lee recalls. Some weekends, crews installed 16,000 tons of asphalt (enough to cover 16 football fields) in a single 58-hour work period. Game plans for the closures were scheduled down to 15-minute increments to make sure everything was finished on time, says Lee.

Performing most of the work during weekend closures allowed contractor vehicles to avoid weekday traffic in and around the airport. They also sidestepped local weekday construction such as highway paving jobs.

Pavement, Lighting & Design Upgrades

To meet current FAA standards, project engineers upgraded the asphalt binder in the new pavement for Runway 28L to a more flexible grade. The change is also expected to help the pavement last longer and remain more resistant to rutting and cracking, particularly during cooler temperatures. “Even though our airport has relatively temperate weather, that flexibility in the binder helps maintain the life of the asphalt much better than what we had typically used in the past,” Lee explains.

Each of the associated taxiway enhancements was designed to provide important airfield improvements. Taxiway F2, the new secondary taxiway located about 550 feet from the end of the runway, is engineered to provide air traffic controllers with more flexibility to hold planes and make changes on the fly. Taxiway S was realigned to improve the geometry of the airfield and enable aircraft entering Runway 10R to use its full length.

In addition to paving, crews replaced about 43 miles of cable to refresh the airfield’s electrical system. They also added runway status lights and upgraded centerline lights with LED fixtures that are designed to be more energy efficient and easier to maintain.

Proactive Communication

Anticipating disruptions to flight schedules, SFO devised a plan to prepare customers for construction-related delays and cancellations.

Although overlay work can be performed at night, repeatedly mobilizing and demobilizing crews and equipment for only six- to eight-hour shifts would have been inefficient and likely resulted in poor quality pavement, explains Lee.

On the other hand, closing 28L for an extended period of uninterrupted time was also not a viable option. Together, 28L and 28R handle about 93% of SFO’s arrivals. Eliminating half of that capacity could have created a national air traffic nightmare—a scenario SFO was not willing to risk, he explains.

Project planners ultimately determined that a series of weekend closures would be the best option. The strategy has proved successful at SFO in the past, notes Lee. To increase the odds of having dry conditions that contractors need for paving, the airport scheduled construction at the tail end of March. Because the airport has its lightest traffic on Saturdays, the runway closures were scheduled from Friday evenings to mid-day on Mondays.

“Sundays and Mondays are also a busy time, but in order to get the most efficient product and the least amount of weekend closures, we had to take Sunday to complete the work,” Lee explains. “It was a challenge.”

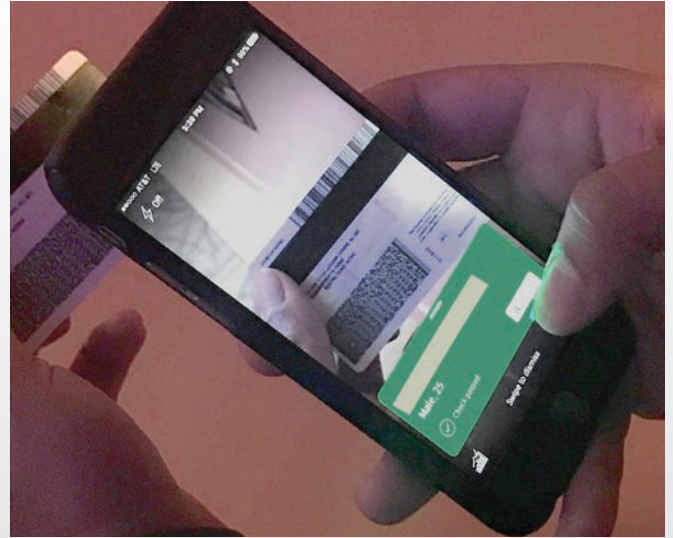
There's an App for That

During its recent \$43 million runway/taxiway project, San Francisco International Airport (SFO) used a mobile application that helps manage jobsite access by scanning license plates and security badges. Developed in-house by airport staff, the app expedited traffic entering and leaving the construction area while also maintaining airfield security.

Because the airport could not barricade off Runway 28L to make the work zone a landside project, it installed a construction gate to restrict the airside area to workers and equipment with pre-approved security clearance. Personnel from SFO's information technology and security teams worked with TSA to develop an app that would save time and resources verifying security credentials at the jobsite.

"In the past, we would hand write everybody's license and badge information," explains SFO Project Manager Daniel Lee. "That's really inefficient."

During one particularly busy weekend of construction, about 1,500 vehicles passed through the security checkpoint. "The mobile app really helped automate the process of getting



construction trucks on and off the airfield," reports Doug Yakel, SFO public information officer.

Following the app's success on the airfield, the airport is now using it on other major projects, including the Terminal 1 redevelopment program, which is slated for completion in 2024. ✈️

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ACC Conference & Expo 2017 - Table #9*

While the airlines collectively agreed on the series of weekend closures in advance, it was ultimately up to individual carriers how to adjust, or not adjust, their specific schedules.

"We knew that these weekend closures would reduce the arrival capacity of the airport and, without any schedule adjustments, it would likely lead to delays and cancellations," says Doug Yakel, SFO public information officer.

The airport consequently launched a preemptive communications plan in February, when the construction project was initially announced. Outreach efforts addressed passengers directly and through the airlines. The airport shared details about the project and related runway closures on its website and social media channels, but Yakel also felt that customers expect to hear such information from their specific airlines. "So our second approach was making sure that the airlines had the right information they needed," he says.

Because each closure was different as the project progressed, there were varying levels of delays and cancellations to address. And weather was another wildcard in play. "Some weekends were more impactful than others, and we wanted to really give that granular information to airlines so they knew what to expect and how to communicate with their customers," says Yakel.

Communication also figured prominently on the jobsite itself. With an extremely tight schedule, SFO relied heavily on partnerships and effective communication with contractors. "We have a partnering program that's really extensive," notes Lee. "Especially on a project like this, which is very fast-paced, we want to make sure that most of the decisions that need to be made can be done on the ground." ✈️

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As flight and passenger numbers increase, airports face a tough challenge to increase capacity while maintaining facilities in a condition that does not impair the safety, regularity and efficiency of air navigation. Following extensive research into flight safety, the FAA and Transport Canada have developed standards for airfield lighting photometrics and bolt torque to ensure pilots get the visual cues to navigate by and the airfield lights do not become FOD.

MALMS Navaid Inc. has developed a market leading range of MALMS™ (Mobile Airfield Light Monitoring Systems) products to help airports meet these standards. In the past three years several major North America airports have selected MALMS to support their systems of planned preventative maintenance to meet the requirements of FAA Advisory Circular AC 150/5340-26C and Transport Canada TP312.

Early adopters of MALMS photometric products such as Vancouver and Calgary, have now added MALMS Engineer and MALMS Cleaner solutions to enhance maintenance effectiveness, while Toronto Pearson International Airport purchased the MALMS Mobile Photometric and Workshop Photometric Bench Tester systems. At Toronto Pearson, Humberto Melo, Manager Airside Electrical, stated that “The Malms Photometric Bench Tester was purchased two years ago

to ensure all airfield lighting that is rebuilt by our maintenance associates is compliant to the national standards and can withstand the harsh conditions on our airfield. Toronto Pearson purchased the MALMS mobile trailer last year, which we are using on one of our five runways every two and a half weeks. The implementation of MALMS is proactively aiding our ability to detect corrective repairs and allowing for the planning of routine inspections and preventative maintenance on our airfield lighting. Additionally, this aligns with our Reliability Centred Maintenance practices (RCM) that provides a structured framework for analyzing the functions and potential failure modes for a physical light asset. We are continuously working together with MALMS Navaid Inc and are now working on a new project to integrate the MALMS Engineer package that can deliver a full functional airfield maintenance solution allowing complete audit trail of inspections and remedial actions.”

At Vancouver International Airport (YVR), Matthew Levesque, Manager Airside Operations, said, “MALMS has been in use at YVR for around five years and now with the addition of MALMS Engineer, we have an integrated maintenance solution. This system enables our Airside Safety Officers to check for any lighting faults on the MALMS tablets during their lighting inspections. More

recently, YVR completed the South Runway (08R-26L) rehabilitation project and using MALMS photometric equipment allowed the project team to check the newly installed lighting for compliance and ensure any faults were rectified before the runway was handed back to the airport. MALMS is the start and the end of our maintenance strategy when it comes to airfield lighting maintenance. You can't manage what you don't measure.”

In the US, Salt Lake City Airport took delivery of the MALMS Cleaner in 2017 after buying the MALMS Mobile and Photometric Bench Tester in 2015, to integrate the cleaning operations prior to doing infield photometric testing of their runway lights.

Other major US airports who have purchased MALMS include Raleigh Durham International Airport (RDU) who bought the MALMS Mobile, Photometric Bench Tester and Engineer systems to have an “integrated maintenance solution” so their engineers could log all photometric testing, lighting maintenance, inspections and torque management within one single database available via a web based MALMS Dashboard giving real time serviceability and maintenance data, including regular email updates on maintenance activities and new faults as and when recorded. RDU became the first airport in the US to use the new MALMS Airfield Torque wrench, a stand-alone electronic torque wrench

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with an integrated RFID reader. This allows the electrician to read the installed RFID tags, which will identify the location ID and the required torque settings. The data from the torqueing of the light is then stored within the wrench for updating to the Tablet once the maintenance task has been completed. Rickie Bell, Director of Fields Maintenance at RDU, says The RDU Airport Authority purchased the MALMS Engineer, MALMS Mobile, and MALMS Photometric Bench Tester to aid in keeping the airfield lighting performance up to FAA specifications.

The MALMS Engineer system has been a great help by allowing us to prevent airfield lights becoming FOD. It also provides the assurance that all our light fasteners are being inspected and maintained in compliance with airport regulations per FAA AC 150/5340-26B.

We currently use the MALMS Mobile system monthly to identify problems, develop maintenance strategies and produce work schedules and maintenance reports. We have found that it is easy to use and can be used by a single operator. The MALMS Photometric Bench Tester allows us to quickly and accurately measure the photometric performance of light fittings before they are installed on the airfield.

The three systems work together flawlessly and that was very important in our decision to purchase MALMS.

In June of this year, Denver International Airport took delivery of a MALMS Mobile system, where it will be used to test the airport's six runways.

Two further airports will join the MALMS family in September and October 2017 as Dallas Fort Worth (DFW) and Portland Airports will each take delivery of a MALMS Mobile and MALMS Photometric Bench Tester for the testing and maintenance of their runway lighting. At DFW, the airport will also take delivery of the MALMS Cleaner system to work alongside the MALMS Mobile system.

As a result MALMS Photometric products (mobile and workshop) are now the most highly regarded (sic) test systems in North America and the MALMS Cleaner and MALMS Engineer systems are allowing airports to further develop and enhance their existing maintenance system. Finally, the web based MALMS Dashboard allows operators and management to see the status of the airfield lighting by runway, runway service type and individual asset and provide accurate and reliable data with which to manage their airfield assets.

MALMS Navaid Inc will be exhibiting at the forth coming events in North America:

- CANEW Conference, Painters Lodge Hotel, Vancouver Island from 09/25 to 09/29
- IES Conference, Hyatt Regency, Dallas from 10/23 to 10/27

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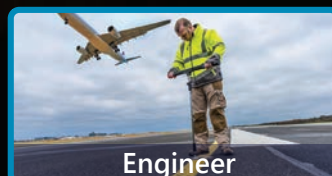
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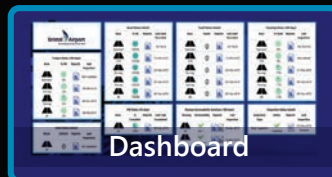
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Yellowknife Airport Switches to Chemical-Free Rubber Removal

BY MIKE SCHWANZ

FACTS&FIGURES

Project: Rubber Removal

Location: Yellowknife (NT) Airport

Scope: 2 runways (7,500-foot main runway; 5,000-foot secondary runway)

Cost: \$23,000

Project Duration: 2 days

Completed: Late July 2017

Friction Testing: Tradewinds Scientific

Contractor: Knelsen Sand & Gravel

Truck Manufacturer: Blasters

Chassis Manufacture: Stahl Peterbilt

Key Benefits: Chemical-free process; main & secondary runways remained open throughout the project



Repairing and maintaining runways without disrupting flight operations is a universal goal for airport operators.

This summer, Yellowknife Airport (YZF), in Canada's Northwest Territories, managed to strip the rubber residue from its main runway and secondary runway in two days—without causing any interruptions to service or using harsh chemicals.



RANDY STRAKER

Randy Straker, the airport's manager of Operations and Maintenance, highlights two key factors for the \$23,000 project: hiring the right contractor with specialized equipment, and

careful coordination between the work crews and control tower.

Every two years, the airport undergoes friction testing to help ensure that it is providing proper braking conditions for aircraft. Last fall, Tradewinds Scientific found that YZF's main runway (16-34) was showing significant rubber buildup and lower friction readings. "We knew we had to do something to fix that," Straker says.

Previously, the airport had an unsatisfactory experience with a company that used a chemical treatment. This time, it stressed two contract requirements: The project had to be done quickly and in an environmentally friendly manner.

As Straker was considering options for this year's rubber removal, Knelsen Sand & Gravel,

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from northern Alberta, approached him about the runway job. Knelsen is known for services such as road construction as well as concrete and aggregate production, but it is relatively new to airfield work. The company had recently purchased a truck specifically designed for runway jobs, and one of the senior managers thought it would work well for YZF. Straker had experienced positive results working with another Knelsen executive on other projects and decided to give the company a chance.

"We liked the fact that Knelsen's truck would be using high-pressure water instead of chemicals," he explains. "Better yet, they promised us they could remove rubber from both our main runway and our secondary runway (10-28) in only two days."

Turn time was a particularly important criterion for Straker. "We are a fairly busy airport, with 578,000 passengers in 2016, and 55,000 operations. That figure will likely rise in 2017," he explains. "Tourism is a big driver of the economy for the whole territory. The Japanese market has been big for us for many years, and the China

market has shown tremendous growth. Keeping the airport open is very important to the economy of the whole region."

Total cost for the project was approximately \$23,000. "Since the chemical operation two years ago cost us \$15,000, we thought that was very reasonable," Straker relates. The airport paid for the rubber removal from its annual Operations and Maintenance budget, so no political battles had to be waged for funding.

Custom Schedule & Equipment

The project occurred in late July, with both runways remaining open throughout the process. "Work was done mostly during quiet times throughout the day," Straker explains. "Our airport staff would communicate between the tower and the Knelsen work truck if a plane was approaching or taking off. The truck would then simply move off the runway, let the plane land or depart, and go back to work."

"We did the whole project in only two days," he reports. "Most of the work was done between 7 a.m. until 7 p.m. In all, I think it took only 22 hours."

The truck Knelsen used for the job was manufactured by Blasters, a company from Tampa, FL. Working with a local Peterbilt dealer, Blasters maximized the vehicle's run time, within allowable weights and lengths. The vehicle used at YZF was the first tri-drive unit the company manufactured.



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KELLY HINES

"When we first started talking to Randy Straker at YZF, he emphasized to us that he needed an environmentally safe truck that could do the work quickly, without disrupting planes landing and taking off," explains Kelly Hines, general manager of Knelsen's concrete division. "The L4012VTK Liquidator was the best vehicle to use to meet these requirements."

Knelsen's special vehicle includes a truck-mounted water blaster and vacuum recovery system that removes rubber deposits and pavement markings. The cleaning head assemblies can be mounted to the front of a truck for use by a single operator, or to a Kubota tractor, which requires dual operators to perform the job.

The system uses ultra-high-pressure water up to 40,000 psi, with flow rates up to 12 gallons per minute to clean the pavement with minimal damage to the substrate, explains Hines. Rubber

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residue, markings and other pavement debris is simultaneously vacuumed up into a hopper/tank. A "like new" surface profile is created when rubber is removed, which once again increases the friction values to meet or exceed the industry standards, he adds.

"One impressive feature of this vehicle is its robotic arm, which moves back and forth sweeping up debris," Hines says. "It has a cleaning path up to 20 inches. A handheld remote supplies infinite head positions, and the simple design allows for quick change of spray bar and shroud configurations. It also has a 24-inch reach outside of the truck bumper either side."

For the job at YZF, Knelsen used a three-man crew. "The truck can cover a 20-inch width at a time, so for Yellowknife's 7,500-foot runway, it did not take that long," Hines continues. "In our two-day time frame, we also were able to clean up the secondary runway and remove ghost paint lines from the apron."

Hines is optimistic about performing similar work for other airports. In recent months, Knelsen has used its custom vehicle at Vancouver International and Calgary International, and has projects for several other airports on the horizon. "We hope to expand our airport business in the coming months," Hines says. "We like working with airports. They are high-end clients, with highly skilled people. We anticipate this will be a nice, steady business for us."

YZF is an advocate for the maintenance method and contractor. "There was instant gratification for this project," Straker reflects. "You could tell the difference immediately once the work was done in late summer. In the last few weeks, pilots have given us a lot of positive feedback."

Ready for More

Keeping the main runway clean and maintaining good friction test results will be especially important as the airport anticipates continued growth. In addition to its current passenger and cargo service by carriers such as Air Canada Jazz, WestJet, Air Tindi and Buffalo Airways, Straker reports an increase in military and other traffic.

"Several U.S. Air Force planes have landed here in the last few months," he notes. "In addition, both American and Delta airlines have done site visits."

The big-name commercial carriers currently use polar routes, with YZF as a designated alternate airport. As such, Straker's crews have accommodated 777s and 747s for them in the past.

The airport also serves a steady stream of flights associated with two of the largest diamond mines in North America. The mining companies, which are located about 180 miles northeast of the airport, use specially configured 737s and Hercules C-140s to transport supplies and employees between YZF and their own gravel runway.

Whatever their individual missions, aircraft operators landing and taking off from YZF are bound to appreciate the airport's recently cleaned runways. ✈️

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Fort Lauderdale Int'l Uses Surface Optimization Tech to Increase Capacity Without Adding Gates

BY KRISTIN VANDERHEY SHAW



FACTS&FIGURES

Project: Collaborative Surface Optimization Initiative

Location: Fort Lauderdale-Hollywood International Airport

Technology Supplier: PASSUR Aerospace

Airline collaboration: JetBlue

Timeline: Initial roll-out Sept 2017 and airport wide roll-out by Q1 of 2018



South Florida is a hot tourist area, with air traffic increasing steadily for the last few years. To cope with overall passenger growth and seasonal swings, Fort Lauderdale-Hollywood International Airport (FLL) is leveraging information technology and automation.

In September, FLL rolled out a new collaborative surface optimization system to increase traffic flow and capacity. One major goal is reducing delays and congestion. Officials expect to deploy the new system airport-wide by the first quarter of 2018.

The company's technology partner is PASSUR Aerospace, a firm that specializes in business intelligence, predictive analytics and big data. Mike Nonnemacher, FLL's acting assistant director of aviation, saw PASSUR's predictive analytics in action at John F. Kennedy International a few years ago and had kept the company on his radar.



MIKE NONNEMACHER

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Home

FLL Terminal 4 Gate Allocation and Sequencing

1459L 1859Z

Arr Sched

Dep Sched

Gate Grid

Status Info

Legend:

Selected

Unloads at Hardstand

Assigned Arr In-Air (ETA)

Assigned Arr On-Ground (ATA)

Plane at Gate (AIBT)

Next Plane for Gate (ATA)

Tow w/EOBT

Departure at Gate (EOBT)

Departure w/EOBT

Flight Cancelled

Gate Closed

Arrival Schedule

REFRESH

Gates

AID	A/C Type	Tail	Gate/HS	RWY	ETA	ATA	AIBT	Load		G10	G11	G11A	G12	G13	G14	G14A	H5	H6	H7	H8	H9	H10
JBU174	320	N708JB	H6		1725									NKS279 1434						JBU2014 1443		
JBU1796	321	N907JB	H6		1726																	
NKS270	320	N633NK	H5		1735																	
NKS142	32B	N633NK	H10		1810																	
NKS525	32B	N613NK	G13		1819																	
NKS171	32B	N660NK	G12		1821																	
NKS236	32A	N640NK	H8		1821																	
NKS400	32A	N601NK	H9		1833																	
JBU1704	E90		H6		1907																	
NAX7045	789				1950																	
NKS425	32A	N630NK	G12																			
NKS523	32A	N675NK	G12																			
NKS609	319	N508NK	G11																			
SIL80	SF3																					
NKS240	32B	N672NK	H7																			
NKS212	319	N510NK	G14																			
NKS710	321	N588NK	G11																			
NKS1009	319	N531NK	G13																			
JBU1710	320		H6																			
NKS443	320	N616NK	G10																			
SIL94	SF3																					

Send



Joe Bertapelle, director of Strategic Airspace Programs for JetBlue. "You take sticks and bricks, combine the tarmac, congestion and the expansion of two major airlines, and you have to [consider] how to adjust."



Tech to the Rescue

Fueled by warm-weather tourism and two major cruise ports, FLL has been one of the fastest-growing airports in the country. Last year alone, it experienced an 8.4% increase in traffic, and there is no slowdown in sight. With more than 700 flights per day, the airport offers nonstop service to more than 75 U.S. cities and connections to more than 60 international destinations in 30 countries.

Nonnemacher has been with the Broward County airport for 30 years, and has seen the dramatic growth firsthand. When he started at FLL, passenger throughput was about 4 million; now, it's pushing 32 million. The airport is considered a low-cost option for passengers traveling to South Florida, he notes. Unlike its sister airport in Miami, FLL is mainly a destination airport rather than a hub—a dynamic that breeds its own set of challenges.

FLL officials know that passengers expect the airport to respond quickly and

effectively to mitigate major onboard delays and relieve congestion in the terminal caused by diversions, cancellations, weather events and other incidents that disrupt schedules. That's where its new surface optimization system comes in.

"Customers base their meetings, cruise ship appointments, ground transport, etc. on flight times," says Doug Hofsass, senior vice president of Global Airports & Business Aviation for PASSUR. "It's important we help manage expectations."



FLL's new system uses data mining and pattern recognition of historic records to predict specific, detailed operational outcomes, and then generates associated recommendations via specialized algorithms. As a result, it allows the airport and airlines to prioritize high-value flights, reduce the number of aircraft waiting to gate-in or take off, and sequences arrivals and departures to maximize gate efficiency and minimize taxi time, explains Hofsass. In addition, the airlines can coordinate with air traffic control, ground operations and fellow carriers to maximize the available gate, ramp, runway, and departure traffic control sequencing capacity.

Situations that reflect negatively on airports—extended tarmac delays,

As traffic continued to increase, the airport created a plan to maximize its gate and ramp space with technology rather than construction. Working with JetBlue and other airlines, the FLL team focused on putting data to work to solve traditional industry challenges and issues specific to South Florida's tourist-centric demographics.

"What we're trying to do is stay ahead of the power curve—the busy season—and seeing what we need to do with the tarmac and the gates at the airport," says

diversions, chronic taxi queues and schedule delays—are proactively mitigated and managed through surface management solutions, notes Hofsass.

Multi-faceted Cost Savings

Surface constraints and bottlenecks are costly in terms of fuel burn, emissions, schedule integrity and passenger satisfaction. In emergency situations, such as severe weather or a safety/security incident, the airport surface requires

maximum visibility and status updates from the airport operator to its key stakeholders. The solution FLL has chosen will provide critical situational awareness, visibility, alerts and decision support, says Hofsass. With this new tech tool in its arsenal, the airport can keep all stakeholders aware of the status of the operation and availability of key resources, he explains.

Hofsass notes that at one major U.S. hub, surface metering saved an estimated \$11 million in fuel costs, saved 14,800



hours of taxi time and reduced emissions by 48,000 tons.

“The surface metering technology we’re now implementing is one of the tools that will help us reduce the amount of congestion, by allowing aircraft to remain at gates and reduce taxi time to reduce idle time and taxiing,” says Nonnemacher. “Ultimately, it will help us operate more efficiently.”

Currently, gate assignments for arriving and departing aircraft are made and then held based on the scheduled times. But the schedule often changes due to weather, air traffic control instructions and other factors. Static gate plans can quickly become a major constraint and source of inefficiency. The new program being implemented at FLL allows for the fluid assignment of available gates based on real-time demand, priorities, conditions and capacity. It combines predictive analytics—such as highly accurate arrival times and predicted taxi-out times—with continuous updates from key stakeholders.

Bertapelle considers the new system a “very proactive approach” to FLL’s specific constraints and predicts that it will help the airport improve capacity and continue to grow. He is particularly enthused that FLL has pledged to train its own operations people to use the technology rather than relying solely on the airlines. “That’s way ahead of the power curve, and it’s a big step toward better collaboration,” he says.

Hofsass notes that the system allows FLL to manage more demand and growth at the fraction of the cost of capital investments. Adding gates and space takes time, but a collaborative decision-making system allows airports to assess and adjust quickly, he explains.

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Surface metering technology is helping the airport leverage its existing gate and ramp space.

ensure that all the pieces are working together. "It's not a tool you buy and it's done," he says. "It's very interconnected and player-dependent."

"The key to surface optimization is knowing what is [already] on the ground, what order [other aircraft] will be on the ground, and maximizing the gate space," adds Hofsass. "Our ultimate goal is [to have] no gate conflicts when an aircraft turns onto the apron."

Nonnemacher is optimistic about how the airport's new system will support that goal. "It's a creative alternative to traditional solutions for terminal constraints, and this is definitely the right move," he says. "At the end of the day, the surface metering will pay for itself multifold and the airlines will benefit. Any tool you can give your air traffic controllers that will enhance capacity and enhance safety is well worth it." 

"Let's say that an aircraft coming in has 40 hot connections to other flights, cruise ships or other destinations," Hofsass relates. "The airport now has the ability to flag that as priority and bring it to a gate assignment faster. In the past, they have been able to do that on a case-by-case basis but not on a consistent, systematic basis."

The NextGen Factor

In addition to being a key player and visionary in FLL's collaborative surface optimization initiative, Bertapelle is also heavily involved with the NextGen rollout processes for JetBlue. Overall, he has been working with the collaborative decision-making processes for 25 years.

The key, he says, is making sure that data exchange is a mutual effort.

The process is part of FAA's System-Wide Information Management (SWIM) program, which was developed to better manage information over various channels. SWIM also controls the standardization and security of modern data.

"You have to give data to get data; it's a two-way street," says Bertapelle. "We measure accuracy of the data, and it's a fairly intense process. The airports weren't typically part of that process, outlined by a memorandum of agreement from the FAA. With this, we can share the information across the board."

PASSUR also operates its own surveillance network, including a proprietary sensor system installed at FLL. This provides additional data resources needed to create predictive analytics for arrivals and departures.

Bertapelle notes that it takes considerable coordination to set up such a system and

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Traffic Growth Prompts Airfield Investments at Billy Bishop Airport

BY JODI RICHARDS

FACTS&FIGURES

Project: Airfield Rehabilitation

Location: Billy Bishop Toronto City Airport

Airport Owner/Operator: PortsToronto

Terminal Owner/Operator: Nieuport Aviation Infrastructure Partners

Airfield Investment: \$36 million over 3 years

Planning, Design & Construction

Inspection: WSP Canada

General Contractor: Pave-It Limited

Electrical Contractor: TriStar Electric

Design & Construction of Ground Run-up

Enclosure: Blast Deflectors

Equipment & Material Barging: McKeil Marine

Quantity Surveying & Layout: J&R Surveys

Concrete: Belmont Concrete Finishing

Hydroseeding: Dol Hydroseeding

Pavement Markings & Removal:

MP Seasonal Services

Quality Assurance Testing: Peto MacCallum Ltd.

Perimeter Intrusion Detection System:

Solarbeam Int'l



Last year, Billy Bishop Toronto City Airport (YTZ) served 2.7 million travelers—quite a jump from just 25,000 passengers in 2005. PortsToronto, which owns and operates the Ontario airport, has invested in several upgrades to meet the growing demand. Improvement projects began on the landside and are now migrating to the airfield.

Located on Toronto Island, YTZ is predominately serviced by Porter Airlines and Air Canada. In 2015, the airport debuted an underwater pedestrian tunnel that dramatically improved access to the airport, which had largely relied on ferry service since opening in 1939. (See our Jan/Feb 2016 issue for more details.) In addition, a major enhancement program is underway to increase seating and retail/food service options throughout the terminal, and a U.S. preclearance facility is expected to open in 2018.

Last year, PortsToronto began a \$36 million, three-year airfield rehabilitation program to update aging elements such as pavement and lighting. Much of the infrastructure

was more than 30 years old, notes Executive Vice President Gene Cabral. "The program pretty well touches almost every piece of apron, taxiways and runways," he reports.

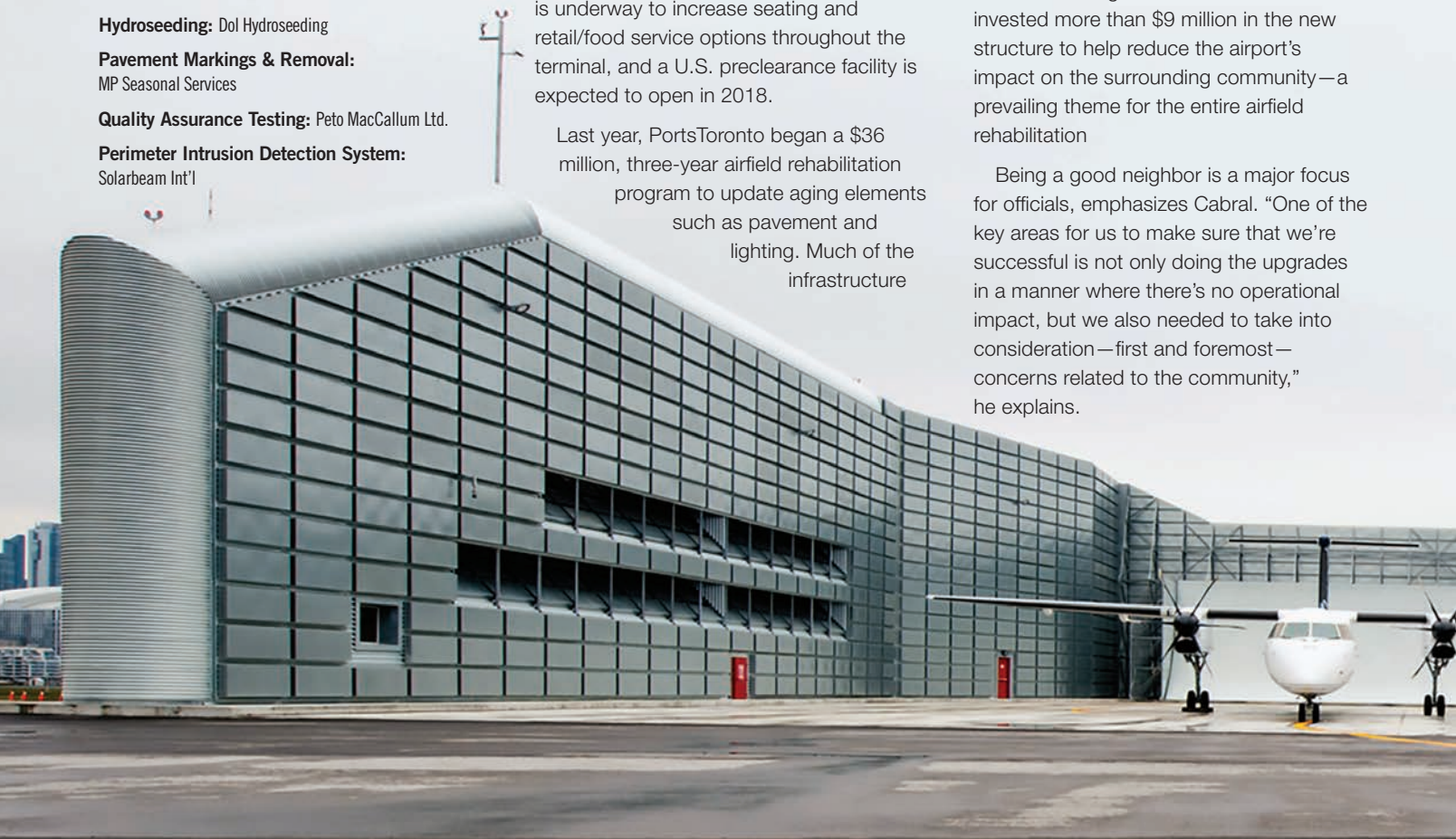


GENE CABRAL

In 2016, YTZ accommodated about 125,000 aircraft movements. About half were from commercial carriers.

Beyond much-needed pavement and lighting enhancements, the current airfield program also includes a ground run-up enclosure—an addition Cabral enthusiastically refers to as a "state-of-the-art noise management tool." PortsToronto invested more than \$9 million in the new structure to help reduce the airport's impact on the surrounding community—a prevailing theme for the entire airfield rehabilitation

Being a good neighbor is a major focus for officials, emphasizes Cabral. "One of the key areas for us to make sure that we're successful is not only doing the upgrades in a manner where there's no operational impact, but we also needed to take into consideration—first and foremost—concerns related to the community," he explains.



WSP Canada, lead consultant on the project, devised and executed jobsite strategies to help achieve the overriding goal. “Obviously, the airport is going to need construction work and those things get intrusive, but [PortsToronto] is really putting a lot of attention toward trying to be as unobtrusive as they can and trying to have a good relationship with the public and neighbors,” says Bojan Drakul, senior aviation project manager for the company.



BOJAN DRAKUL

Placing construction lights to point away from rather than at nearby residents is just one of the many measures taken. “All of our contractors took to heart the extreme sensitivity that we raised related to managing operational constraints and at the same time, concerns from the community,” notes Cabral.

Planning & Scheduling

The airport’s 2012 master plan identified the need for various airfield improvements. Planning with WSP began in 2015 and culminated with project contracts going out to market in early 2016.

Cabral notes that the three-year airfield program began with infrastructure items that were most critical from an aging

standpoint—namely YTZ’s main and longest runway, 08-26.

While it received some resurfacing enhancements in 2011, Runway 08-26 required a full-length and full-width rehabilitation. After the new pavement cured, crews added grooves that help accelerate the rate that water runs off the runway to improve aircraft braking performance. During paving operations, the project team had to carefully manage the design mix of the asphalt to ensure it could accommodate the grooves without hampering the overall performance of the pavement, notes Drakul.

Crews also installed new runway centerline lighting and replaced electrical infrastructure such as runway edge lights, approach slope indicators and aircraft guidance signs.

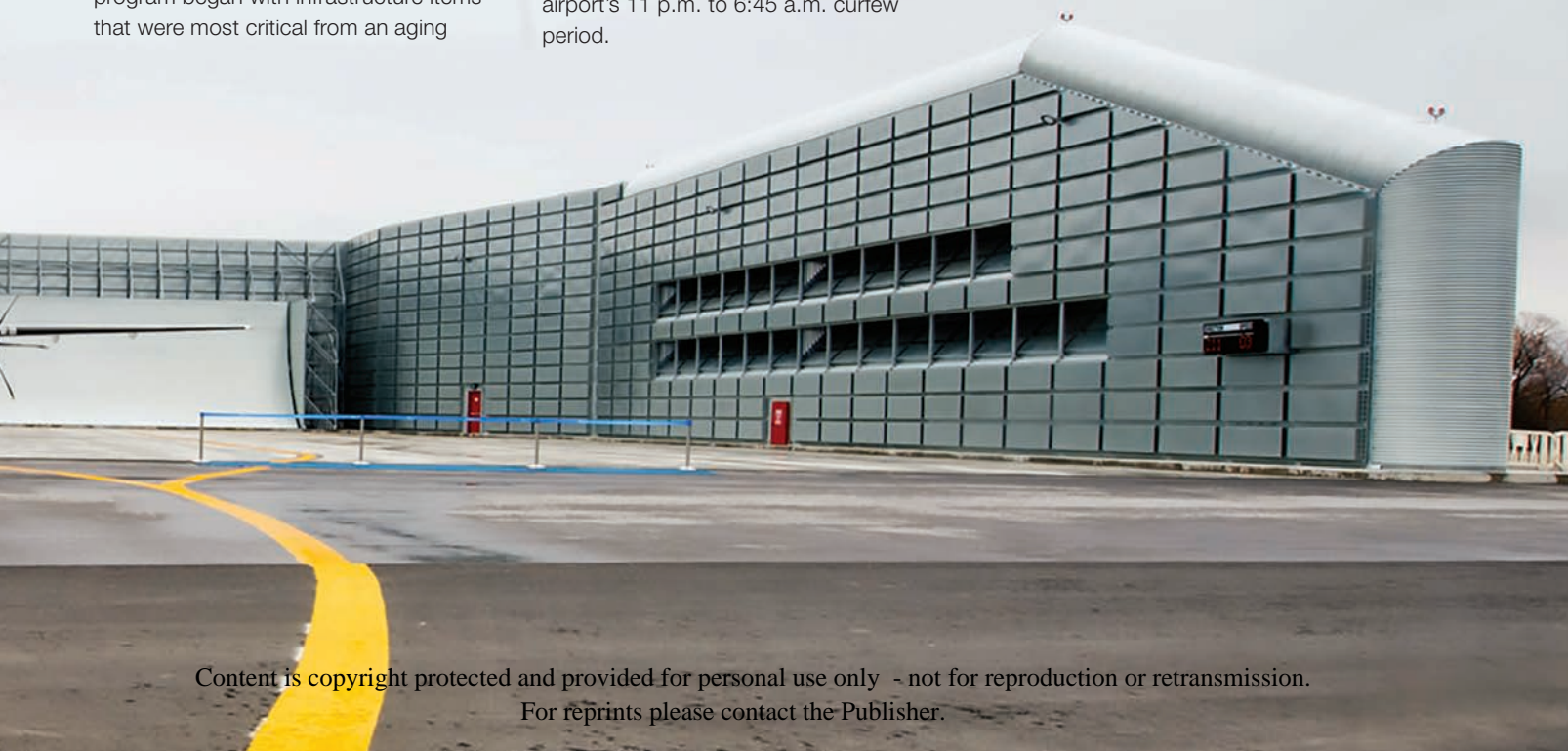
To keep YTZ operational during the runway project, resurfacing work was phased and scheduled over 100 nights. “We don’t have the luxury of a secondary runway that can handle the Q400,” says Cabral, referring to the Bombardier aircraft that dominates the airport’s flight schedules. Carefully crafted nightly schedules developed in conjunction with project contractors and engineers defined specific strips for crews to work on. Following the explicit game plans, crews succeeded in resurfacing the entire 3,988-foot runway during the airport’s 11 p.m. to 6:45 a.m. curfew period.

Naturally, attention to detail was critical. “We went through an extensive exercise of looking at what-if scenarios, especially on the overnight activities,” recalls Cabral. Project managers focused on having sufficient equipment and personnel on hand for each phase and providing detailed information regarding what workers would find beneath the pavement surface. “When you have a seven-hour window, you don’t want to be uncovering an area that you’re not able to repair sufficiently and get ready for operations in the morning,” he explains.

Crews completed the entire project with only one six-minute delay returning the runway back to service. “And it wasn’t even noticed by passengers—quite remarkable,” Cabral remarks.

Secondary Runway 06-24, predominately used by general aviation aircraft, had not been resurfaced since 1969. “We had asphalt that was getting to the end of life, and we had electrical systems that were well over 30 years old,” Cabral relates.

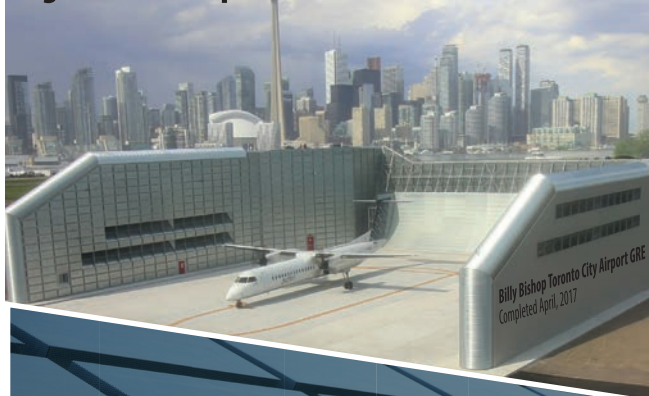
Improvements on 06-24 included reconstructing the center 30-meter width of the runway. Engineers also reduced its length to improve visibility at the intersection with Runway 08-26. In addition, the secondary runway received new electrical infrastructure, including





Designers specified exterior siding that would help the new structure blend with its surroundings.

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runway edge lighting and aircraft guidance signage to allow nighttime operations.

Decommissioning one of YTZ's three runways, Runway 15-33, was another important part of the rehab project. The north-south runway was used less than 1% of the time and would have been costly to reconstruct and maintain, explains Cabral. Runway 15-33 was consequently converted to Taxiway E, providing access to Runway 06-24, the new ground run-up enclosure and the south side of the airfield.

Asphalt from the decommissioned runway was recycled to help construct a perimeter service road that will provide maintenance crews easier access around the airfield. Other elements of this phase included overflow aircraft parking positions and new electrical infrastructure, edge lighting and aircraft guidance signs for the new taxiway.

Looking ahead to the 2018 construction season, PortsToronto plans to expand the airport's main terminal apron southward to provide additional space for aircraft and service vehicle movement behind the terminal gates. Two taxiways will be rehabbed as well.

Noise Management

The project team is going to great lengths to consider all aspects of construction noise—from the loudest equipment roar to the beep-beep-beep of vehicle backup alarms, notes Drakul. Truck routes are carefully planned to minimize the need for backing up because beeper noise can be more intrusive than the steady hum of heavy equipment, he explains.

Grooving the main runway was a particularly noisy project that unfortunately had to be completed at night, Cabral notes. To minimize the impact on the surrounding community, the team scheduled grooving work for early April—right after the spring thaw, but before weather was warm enough to encourage neighbors to open their windows and occupy their balconies.

As an urban airport in the heart of Canada's largest city, noise is a pervasive issue for YTZ. Some residents live just a few hundred meters from the busy airport. "About five years ago, 50% of our noise complaints were associated with aircraft engine run-ups," reports Cabral. "They can be very intrusive, especially if they are done in the early morning or late at night."

Results from noise studies encouraged the airport to consider various mitigation measures, and PortsToronto ultimately invested \$9 million to design and build a ground run-up enclosure.

Blast Deflectors constructed the new three-sided structure on the southwest side of the airfield while crews completed other projects elsewhere. YTZ's new ground run-up enclosure is designed to allow users to perform ground run-ups in a safe location without disturbing the local community.

Each ground run-up enclosure that Blast Deflectors builds is unique, notes company president Don Bergin. Designs are based on specific acoustic objectives, aerodynamic requirements and airport budgets.



DON BERGIN

The new enclosure at YTZ includes one wall that is 14 meters tall, another that is 11 meters tall, and a third wall that transitions from 14 meters to 11 meters. "The taller side of the facility is on the city side, and the shorter side of the facility is away from the city where there are fewer noise sensitive receivers," notes Bergin.

The interior walls of the steel-framed facility are lined with 1,726 of the company's Noiseblotter acoustic panels. "Certain materials effectively block the transmission of sound but may create acoustic reflection that could, potentially, create a new noise problem in a different area," Bergin explains. "We've developed an acoustic panel specifically for the low frequency sound created by aircraft engines that both blocks the transmission of noise and absorbs the sound to reduce reflection."

YTZ's ground run-up enclosure is designed to allow aircraft engines to run at maximum power settings without incurring damage from turbulent or unstable air. This is accomplished through aerodynamic features such as louvered vents on all three sides of the facility. The acoustically treated vents allow air—especially in crosswind and tailwind conditions—to smoothly pass through the walls during run-ups.

The facility was sized to accommodate Bombardier Dash 8 Q400s, a mainstay aircraft at YTZ. The structure is wide enough for mechanics or pilots to taxi aircraft in and out in a U-turn pattern, thus eliminating the need to use tugs.

Aesthetics were also important, notes Bergin. "PortsToronto didn't want a utilitarian looking structure—which a facility like this can oftentimes be," he relates. To avoid detracting from the airport's design and island locale, the company clad the exterior in siding specifically selected to blend with the surroundings.

YTZ is proud of the new ground run-up enclosure, as it is only the second Canadian airport of its kind to add such a facility. "We were looking to achieve considerable noise reduction associated with run-ups, and that's exactly what happened earlier this year when we put it into place," he explains. "I don't want to jinx myself, but the reality is that noise complaints have been dramatically reduced by the ground run-up enclosure."

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In fact, the airport has received compliments from community members who notice and appreciate the reduction in noise. "A run-up that would have been highly exposed to the surrounding city is now behind an enclosed facility that basically dampens the noise," Cabral relates.

Ferry-Free Project

Because of its island location, YTZ previously relied on the local ferry to transport supplies and workers for construction projects. For the current airfield improvement program, now in its final year, the project team implemented barge operations to prevent congesting the ferries, particularly with overnight traffic.

The new delivery strategy has been a significant game-changer, reports Cabral.

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Because PortsToronto operates the port on Lake Ontario as well as the airport, the project was able to leverage lake access through the harbor. The barging operation allows the construction team to transport materials and employees from a cruise ship terminal in the Port of Toronto to a temporary dock on the east side of the airport. The new transport method greatly reduces the impact of construction traffic for local residents and airport travelers, and has received huge compliments from the community, reports Cabral. "Doing three years of construction in a mixed-use environment—bringing nightly the volumes of trucks we experienced through the community—would have been quite intrusive," he reflects.

During peak construction in summer 2016, the project required up to 45 loads of asphalt per night. "Those trucks would have been rumbling through the streets and community," he comments. The contractor further minimized truck movements by staging and stockpiling material at the 210-acre airport.

Bringing equipment and material through the marine terminal has helped tremendously with operational efficiency and eliminating traffic from the surrounding neighborhood, agrees Drakul.

The project contractor also used a water truck to reduce construction dust and created a spray down area on the south side of the airport, where crews hosed down construction equipment before it entered apron or runway areas.

Mid-Project Adjustments

Remaining flexible has also been key to the project, Cabral says. Original plans called for the main runway to be completed in the first year, and work on the secondary runway (06-24) to occur the second year. However, planners determined that closing Runway 06-24 for the summer of 2016 so work could proceed concurrently with the Runway 08-26 rehab would optimize the resources and equipment that contractors already had on site. "That allowed us to advance the schedule so we didn't have two years in a row with a runway being out of service," Cabral adds.

Flexibility was also critical when dealing with forces outside the airport's control—like weather. This spring, Lake Ontario experienced record high water levels, and roughly half of some areas on the island were submerged. Naturally, this prompted

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Crews resurfaced the entire runway during the airport's overnight curfew period.



adjustments in the airport's project schedule.

Fortunately, much of the infrastructure at YTZ, including taxiways and runways, is elevated; so the

high water levels did not cause too much concern. Some pumping was necessary during heavy rains, and crews working on the overflow parking apron for general aviation aircraft had to wait for water levels to recede.

Workers placing electrical conduit were also affected. "As soon as you get in a half-meter underground, you're already having water," Drakul relates. Because of that, crews spent time pumping water out of the excavations, which impacted the construction schedule.

High water levels also interfered with barging operations. The ramps used to transfer equipment and supplies on and off the barge had to be adjusted to cope with the high water. "It was a pretty difficult situation," he recalls. "If the water level kept rising, we probably would have had to stop some of the work. But luckily, we were able to adjust and keep going."

Community Outreach

Communication has been an important cornerstone throughout the project, notes Cabral. As part of its contract, WSP worked closely with the

PortsToronto communications team to create a detailed website for photos, information and progress reports about the project. Now, it posts detailed updates so neighbors know what to expect in the coming week.

Drakul updates the site with new information after weekly construction team meetings.

"A website is an excellent tool to communicate exactly what is going on," he says. "It makes people aware of your plans and then addresses concerns and reassures them that as an airport, you're trying to do the best you can to minimize the impacts on the community."

Community members can also sign up to receive emails about the project.

In addition to the website and email updates, PortsToronto holds outreach events for airport stakeholders and the community. "There are so many small elements," reflects Cabral. "With two years of the program under our belt, we're getting ready for the third year, and we've put ourselves in a great position for this airport to continue to succeed." ✈️

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Highest-Elevation Airport in U.S. Adds New

FACTS&FIGURES

Project: Deicing Pad Installation

Location: Telluride (CO) Regional Airport

Pad Size: 36,000 sq. ft.

Capacity: 2 aircraft

Cost: \$7 million

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

Main Components: Retaining wall; deicing pad & glycol collection system

Timeline: April 2015 to October 2016

Local Challenges: Small project site with unstable geological conditions; high-altitude location; community aesthetics regulations

Deicing Pad Design: Kimley-Horn

Deicing Pad Construction: Concrete Works of Colorado

Retaining Wall Design: Terracon Consultants

Retaining Wall Construction: Hayward Baker

Glycol Collection System Design: Burns & McDonnell

Collection System Construction: Telluride Gravel

Cast Iron Grate Mfg: ABT

Problem: Former deicing pad/operations blocked taxiway traffic

Key Benefits: New pad improves safety & traffic flow; reclaims aircraft parking spaces

After overcoming space constraints, geological challenges and complications associated with high altitude, Telluride Regional Airport (TEX) in Colorado is thrilled to have a new \$7 million deicing pad ready to boost operational efficiency again this winter.

Before the 36,000-square-foot pad was finished last fall, crews deiced aircraft on a concrete parking apron just north of the airport's only runway. "It was right off a taxiway exit connector, so deicing operations could potentially block traffic from exiting the runway on our A taxiway," explains Airport Director Kenny Maenpa. "It was not an ideal situation."



KENNY MAENPA

Unfortunately, the airport also lacked an ideal location to add a deicing pad. Located atop Deep Creek Mesa, TEX has a small 542-acre footprint with rolling terrain on both sides of its 7,111-foot runway. "We're pretty limited in terms of flat space," Maenpa comments. And perched at 9,070 feet in Colorado's San Juan Mountains, TEX is the highest-elevation commercial airport in the United States.

The airport's solution: carve out space from a shale hillside on the north side of the runway, near its eastern end. The strategy added considerable cost to the project because it required the construction of a 500-foot-long retaining wall reinforced with devices called soil nails. But given the prevailing space constraints, the improved site proved to be the most logical place to build the new pad. In the end, the pad accounted for only \$2.8 million of the total \$7 million project cost.

Mountains of Site Challenges

Several other factors also made the project more complicated and expensive than most deicing pad installations. "At altitude, temperatures are low, the construction season is short (typically mid-June through mid-September) and the availability of materials isn't good," says Bob Jones, a project manager for Kimley-Horn, the civil-engineering firm that designed the deicing pad and supervised its construction.



BOB JONES

"Procurement and transportation of materials is more difficult," adds Jones, noting that the nearest asphalt supplier was about 90 minutes away.

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Deicing Pad

BY KEN WYSOCKY

It's also tough to find general contractors that are willing to work on remote, high-altitude jobs. Moreover, the airport is only open from 6 a.m. to 9 p.m., and construction is not allowed during the night or on Sundays. The restricted work hours are in deference to local homeowners, some of whom live less than one mile from the airport grounds.

To attract a viable number of contractors to the project, the airport opted to forego using a general contractor and split the project into three smaller phases: earthwork and construction of the hillside retaining wall; deicing pad construction/lighting; and installation of a deicing fluid collection system. "Having specialty contractors bid (without a general contractor involved) provides a cleaner way to get a truer, more cost-effective bid," Jones explains. The approach also encouraged broader bid participation, facilitated more streamlined communications, provided the airport better control over the project and resulted in faster construction timelines, he adds.

Local ordinances that govern the aesthetics of constructed elements such as retaining walls added yet another challenge. "There are homes on the south side of the airport that have a view of the airport, and those residents didn't want to see a concrete retaining wall," Maenpa notes. "They wanted something to blend into the surrounding environment."

Terracon Consultants, the geotechnical firm that designed the retaining wall, included a "hanging garden" to make the wall more attractive to the airport's neighbors. About 1,000 wire baskets filled with soil and grass hang from the wall to camouflage its exterior surface, explains Brittany Dalton, a geotechnical engineer.

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Crews add a Shotcrete face to the critical retaining wall.

So far, the arid climate and short growing seasons in Telluride have made growing the grass difficult; but the airport's longtime consultant is working to solve that problem.

Unstable Terrain

The retaining wall, which stands about 40 feet tall and cost \$3.2 million, was a central component of the project. Don Clark, a senior principal/senior consultant at Terracon, explains that several site conditions prompted the need for the wall. For starters, the airport sits on a mesa with a geological fault line running through its center. In addition, the west end of the airport grounds is composed of sandstone, and the east end contains so-called Mancos shale, a weak bedrock formation.

In short, the airport's terrain is rife with unstable geological conditions. TEX officials have dealt with such issues in the past, including a runway embankment failure and 6-foot settlement in the runway. As a result, the runway was completely rebuilt in 2010, followed by a landslide stabilization project on the southeast runway embankment.

"The site poses another unique geotechnical challenge," Clark adds. "Because it's at a high elevation, the airport gets all kinds of



BRITTANY DALTON



DON CLARK

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snow (about 175 inches per year). When all that snow melts, it creates seasonally high groundwater conditions. When combined with the unique bedrock formations, these factors represent some very unique challenges to do design and construction work—especially with the shale, which creates stability issues.”

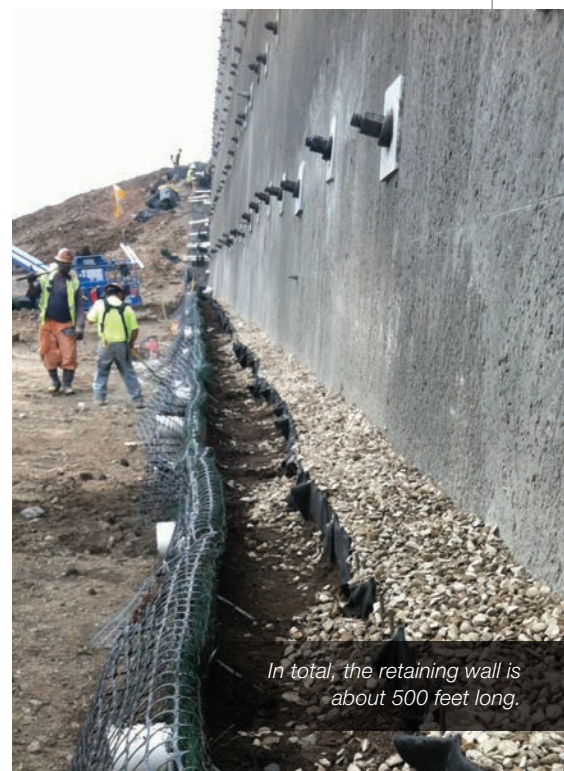
Given the space constraints, a typical retaining wall—which is built with footings, then backfilled—wouldn’t work in the area designated for the deicing pad. Instead, crews had to construct the wall from the top down to stay within the site limits. To do so, workers first excavated the hill in 5-foot-deep sections, called lifts or benches. Then they installed rows of soil nail anchors after each bench excavation to stabilize the shale hillside.

A soil nail is a long, tension-resistant steel bar that’s fixed in place with cement grout. Nail lengths vary from project to project; the key is inserting them past any potential failure zones, as identified by geotechnical analysis. To install the nails, crews first drill 8-inch-diameter holes at a 15-degree downward angle. Then they insert the steel rods and fill the holes with cement grout. The nails reinforce the surrounding soil and also bear the load of a reinforced Shotcrete facing that is applied to the wall after the nails are installed.

In all, the project required 662 soil anchors, located about 5 feet apart and drilled up to 55 feet deep. “You’re basically cutting out the benches and stabilizing things as you go,” Clark explains. “Off the top of my head, it’s the first time I can recall building this kind of retaining wall at an airport.”

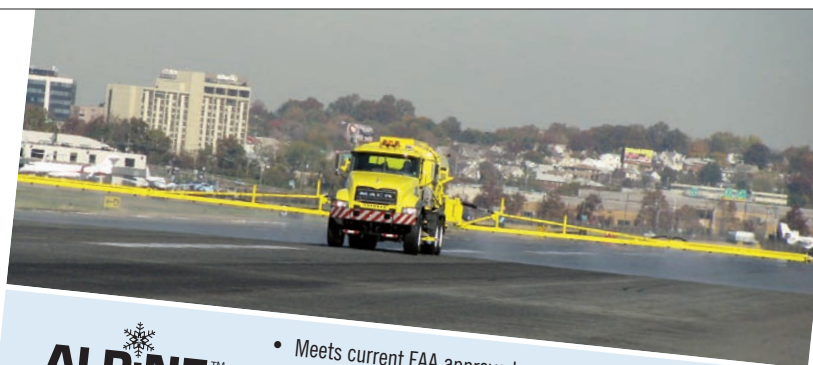
A Fluid Situation

To prevent deicing fluid from draining into stormwater sewer lines, the project included a \$230,000 collection system designed by Burns & McDonnell. During aircraft deicing



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Engineers specified soil nails fixed in place with cement grout to help stabilize the shale hillside.

operations, excess fluid drains into a 460-foot-long trench drain that is covered with a slotted cast-iron grate. The fluids collect in a 12,000-gallon, underground fiberglass tank

The drain system includes a manually operated on/off valve that prevents melted snow and rain from entering the tank. Crews open the valve during deicing procedures and close it when they're finished. "We don't want any rain getting into that glycol holding tank," Jones notes. An above-ground gauge indicates how full the tank is, and a glycol recycling company periodically pumps out the collected fluids.

Overall, 90% of the project was funded by the FAA, and the airport and Colorado Division of Aeronautics split the balance.

"Building the deicing pad was a huge bonus for us, because we no longer lose valuable space for aircraft parking, which is limited here," Maenpa says. "It basically freed up parking for up to four more aircraft, depending on their size."

With about 12,000 annual operations, TEX often has 40 to 60 aircraft land on busy days; so every available space is important.

"It's so nice to have a deicing pad where we can safely deice aircraft and not block any traffic," adds Maenpa. "It's not a very sexy project, but deicing is a very important function at an airport like ours." ✈️

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Bult Field Puts Drone Technology to the Test for Wildlife Management

BY RONNIE GARRETT



FACTS&FIGURES

facts&figures

Project: Drones to Disperse & Deter Wildlife

Location: Bult Field (Monee, IL)

Consultant: Hanson Professional Services

Timeline: Test program began fall 2016

Frequency of Drone Missions: At least weekly

Key Benefit: Keeping wildlife off active airfield areas & out of aircraft flightpaths



“Why did the chicken cross the road?” is always good for some giggles on the schoolyard. But it’s no laughing matter when a deer, coyote or goose crosses a runway or flightpath to get to the other side. In the most serious cases, it can be a matter of life or death.

Bult Field (C56), a corporate/general aviation airport in northeastern Illinois, is protecting the pilots and aircraft that use its 5,000-foot runway by deploying drones to keep wildlife away from the airfield. The tech-forward

program is a follow-up/complementary measure to a wildlife assessment conducted by the U.S. Department of Agriculture and the Illinois Department of Transportation-Division of Aeronautics, which owns and operates the airport.

“We are always looking for ways to improve safety, enhance operational efficiency and improve the pilot experience at Bult Field and other airports,” says William Viste, project coordinator, Illinois Aeronautics Division. “UAS (unmanned aircraft systems), or drones,

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can limit the need for staff to traverse certain terrain and hard-to-reach areas. Airports can reach over several hundred acres, so drones provide a unique and cost-effective way to assess areas of this size. In addition, specialized sensors, such as thermal imaging, can produce information that is not as easily gathered from the ground.”

The Ascent of Drones

For many airports, drones are nothing more than an airfield hazard or nuisance.

At Bult Field, they are literally taking wildlife management to new heights. Specifically, unmanned aircraft are helping drive deer, coyotes and foxes off active airport areas and birds such as raptors, gulls, geese and starlings out of aircraft flightpaths.

The airport has partnered on the project with Hanson Professional Services, an aviation engineering and planning consulting firm also based in Illinois, since last fall. Hanson focused on finding a way to use drones for wildlife management that didn’t add to the full plate already in front

of airport managers. In addition to handling leases and rents, airfield maintenance and aircraft fueling, managers at some small airports also have to jump in vehicles to chase animals off the runways, notes Rodger H. Anderson, an environmental specialist with Hanson.

“We used high-tech GPS technology to set up a preflight situation where the unmanned



RODGER H. ANDERSON

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AirportImprovement.com October 2017



Infrared technology allows the drones to capture thermal images of wildlife, such as this deer.

aircraft systems will fly a course we programmed into it," he explains. The drones consequently fly the same course every time, and GPS technology largely automates the flights. The drones are also equipped with infrared technology to detect thermal images of wildlife near the airfield. The infrared technology helps the project team determine exactly what type of animal is out there by its size and how it moves or runs.

"It allows the airport manager to monitor and identify any immediate hazards that might become an obstacle to an aircraft upon landing or take off," says Anderson. "And we're actually able to zero in on that deer, coyote or bird, and use ultra-high frequency noise that humans cannot hear to encourage them to leave the area."

In order to program the drone flightpaths, Hanson inspected and analyzed Bult's airport operations areas to identify locations where aircraft could potentially run over an animal or ingest it into their engines. Hanson



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personnel also focused on the approach and departure areas off the ends of the runways. "These areas combined become a critical zone, and that critical zone becomes the perimeter that the UAS is programmed to fly," Anderson says. "Every airport has its own course that the UAS would fly based on how it's set up."

At Bult Field, drone flights typically take place once a week, but are more frequent during seasons when animals are more likely to aggregate, become more assertive in their movements or grow in numbers. "Right now, most airports function with UAS or other means of wildlife control on an as-needed basis," says Anderson.

"UAS provide airport managers with a non-lethal means of controlling wildlife," he adds, noting that in general, wildlife management often puts them between a rock and hard place for public relations. "While safety is of utmost importance on the airfield, the last thing an airport manager wants is the nightly news reporting that the airport lethally removed 15 deer because they got inside the fence."

Detection, Deterrence & More

Beyond using drones to drive wildlife away from the airfield, Bult also uses the technology to identify movement patterns, nesting/bedding areas and other elements that are not as easy to see from the ground, particularly in areas that are difficult to reach on foot.

Aerial mapping secured by drones shows where animals are aggregating, where their trails and gathering areas are, and when they are moving through those areas, explains Anderson. "This information is put into a GIS database so that we can start to see patterns and predict from year to year what can be expected," he says. For example, the project team might learn that red-winged blackbirds gather in one particular area of the airport during late spring and early winter. Or, it could discover that in the summertime, birds run through an end of the runway and geese nest in a field near the taxiway.

"We can focus our attention in those areas at those times," Anderson remarks. "We could bring the UAS out once a week, or in large airports, daily. Then it becomes more than just monitoring and immediate threat detection and moves into deterrence."

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As the technology evolves, Viste foresees even more applications for unmanned aircraft at airports. "Drones can be valuable tools in many capacities from survey/mapping, infrastructure inspections, emergency response and visual assessments," he says. "However, operators must remain mindful of the FAA rules and regulations governing UAS use, particularly when operating on or near airports. Operational safety is always the primary concern, so UAS pilots and support crews must be properly trained to understand the high level of aviation skill and knowledge to operate safely and efficiently."

Hanson brings in FAA-certified pilots to perform all of its drone flights. The pilots also have spotters to help them monitor other aircraft in the area. "The pilot makes sure the UAS operates where it should, and the spotter makes sure the airspace is clear," comments Anderson. "And sometimes, there are others involved who, via radio communication, let the operator know when animals are in proximity and need to be pushed away."

Adding to the Toolbox

Viste emphasizes that drones are just one element in Bult's overall wildlife management strategy. The airport focuses on training staff to recognize which particular method is appropriate in various circumstances, he adds.

Anderson, who has studied animal behavior and worked as an environmental specialist with Hanson for about 20 years, notes that airports have been attuned to wildlife management long before the famed U.S. Airways flight piloted by "Sully" Sullenberger propelled the topic of bird strikes into the mainstream. Ever since, FAA has stepped up its efforts help airports become more uniform in how they manage wildlife, he notes.

The methods being used have consequently evolved—especially in the Midwest, observes Anderson. "In Illinois, for example, there is quite a bit of agricultural land and wildlife preserves surrounding the airports, where the wildlife flourish," he explains. "The animals see no boundaries between that land and the airport itself."

These airports work with environmental specialists such as Anderson to manage stormwater and ponds, move agricultural crops farther away from active airport areas, maintain grassy fields, install fencing and implement noise deterrents to keep animals off taxiways or runways when aircraft are landing or taking off. Unmanned aircraft are simply a new high-tech tool used for the same purpose.


Like other methods, drones should not be overused, he cautions. "There comes a time when animals just do not respond to deterrents or keep coming back," explains Anderson. "And at those times, more extreme methods may be necessary for safety reasons."

With its drone operations, Hanson strives to find the "sweet spot," where animals do not grow accustomed to unmanned aircraft and the high-frequency noise they deliver. "We think it's effective because of the airborne trajectory it's coming from," explains Anderson. "It moves, and they don't understand that so far.

"We have seen a different response by the same wildlife when they see a van or truck coming into the areas with the lights on and the horn honking," he adds. "They just kind of flutter up and land 50 yards away."

When vehicles do not work, airport workers add screamers and bangers, which are essentially bottle rockets and other fireworks. "But some animals get used to these as well," Anderson adds. When pyrotechnics fail, airports often bring in canine teams to harass the animals and scare them away. "But canines can sometimes get confused and cross runways or become an issue with oncoming aircraft," he notes.

In contrast, drones are controlled by operators on the ground, who can quickly set them down or avoid active airspace when needed. If an operator somehow loses communication with Hanson's device, it has redundancy built in to slowly set itself down, out of harm's way.

Given these advantages, Hanson considers drones to be the best new wildlife management tool in an airport's toolbox, notes Anderson. 



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CHARLESTON
INTERNATIONAL AIRPORT

FACTS&FIGURES

Project: Taxiway Improvements

Location: Charleston (SC) Int'l Airport

Construction: Jan. 2016-June 2017

Project Scope: Reconstructing 3 taxiways; upgrading drainage; installing new LED lights & signs

Original Budget: \$24 million (\$20.9 million for construction; \$2.3 million for construction administration; \$450,000 for design)

Final Cost: \$19.8 million

Funding: FAA Airport Improvement Program grants \$17.82 million; Charleston County Aviation Authority \$1.98 million

Engineering Consultant: ADC Engineering Specialists

General Contractor: Allega Cement Contractors

Subcontractors: Antigo Construction; Bames & Powell Electrical; Dan-Kel Concrete Core Drilling & Sawing; Gel Engineering; Hi-Lite Airfield Services; Sanders Bros. Construction Co.; United Survey; Heritage Hauling; Herndon; New Age Protection

Key Benefits: Preparing airport for continued growth in passenger traffic; supporting runway reconstruction completed by U.S. Air Force

Of Note: Project finished under budget & early despite weather delays from Hurricane Matthew; engineering students from The Citadel toured project site to supplement classroom curriculum

Charleston Int'l Completes Taxiway Improvements

As a joint-use airport, Charleston International (CHS) serves a diverse mix of traffic. On any given day, the South Carolina airfield accommodates a variety of commercial airliners and U.S. Air Force aircraft, including mammoth C-17 transporters. It also has enough general aviation traffic to support two fixed-base operators and is home to Boeing's only final assembly plant for the 787 Dreamliner outside of Everett, WA. The unique blend of traffic at CHS is evident whenever a new Dreamliner taxis by the main terminal for a test flight or ground evaluation, and passengers in the boarding lounges buzz with excitement.

An official joint-use agreement not only details civilian and military operations at CHS, it also outlines the maintenance of its airfield pavements. The Department of Defense owns and maintains the two runways (9,000 feet and 7,000 feet); and the Charleston County Aviation Authority is responsible for the taxiways and apron areas throughout the airport.

In June, the Authority finished a major taxiway improvement program that dovetails with the runway reconstruction the U.S. Air Force completed three years ago. Originally budgeted for \$24 million, the taxiway project was completed for \$19.8 million.

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BY DAN VNUK

“Although the taxiways looked fine visually, we had to take action because we detected increased spalling and cracking,” explains Hernan Peña, the Authority’s vice president of Engineering. “We knew something had to be done sooner rather than later.”



HERNAN PEÑA

The airport consequently reconstructed three taxiways, installing new pavement, improving drainage and upgrading signs and lighting with new LED fixtures. The project also aligned the hammerhead (i.e., taxiways A and A1) to join Runway 3-21 at a 90-degree angle.

Each of the renovated taxiways includes a 6-inch lean concrete base topped with 17 inches of new concrete. Taxiway A alone is more than one mile long and 75 feet wide, with additional 30-foot asphalt shoulders on both sides.

Peña explains that the aging taxiway pavement needed to be replaced to ensure that the state’s busiest airport is prepared for continued growth in passenger traffic. In 2016, the airport served more than 3.7 million passengers during its busiest year on record. CHS officials anticipate reaching the 4 million mark by the end of this year.

Many of the taxiways have been around since the airport terminal was built 32 years ago, notes Peña. “While still sound due to outstanding maintenance, it was time to replace them to ensure many more years of service,” he explains.

Coping With Traffic & Weather

The project team cites detailed planning and an abundance of communication as key factors in completing the taxiway renovations ahead of schedule and under budget by more than \$4 million.

Construction began in January 2016 and ended in April of this year—partially overlapping with the \$200 million top-to-bottom terminal redevelopment project completed last October. During planning, CHS officials emphasized the importance of completing the taxiway work without disrupting the airport’s 130 daily commercial flights and other operations by the Air Force and Boeing.

The airport’s engineering firm of record, ADC Engineering Specialists, designed and oversaw all construction administration and worked with the project contractor, Anthony Allega Cement Contractors. “We were very fortunate to have an excellent contractor—one of the best that I’ve seen,” says Peña, reporting that crews were focused and efficient, working with hardly any delays. “As a result, they were able to bring the project in under budget, which was a benefit to all.”

Throughout the 17 months of construction, airport officials shut taxiways down in phases so the project could proceed without disrupting airfield activity. Rerouting ground traffic to other taxiways allowed crews to work during the day, rather than restricting them to after-hour and overnight shifts, explains Britton Corbin, the airport’s Engineering director.



BRITTON CORBIN

Although contractors lost about a week of construction time to Hurricane Matthew, they still managed to complete the project about one month ahead of schedule. “Communication really was

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Citadel cadets taking a transportation engineering course relished the opportunity to tour an active airfield jobsite.



the key in the project," Corbin reflects. "We had participation from all our partners. Everybody knew what was going to happen and when it would happen. This allowed us to work efficiently, respond to any issues and adjust schedules quickly and as needed."

Onsite Engineering Lesson

It's not often that a construction site qualifies as a field trip, but that's just what the CHS taxiway improvement project was for cadets from The Citadel, which is located just 10 miles from the airport.

Last fall, 11 juniors enrolled in a transportation engineering course at the esteemed military college were invited to see how the principles and construction techniques they were studying on campus are applied at an active construction site. They also toured the air traffic control facility to further broaden their exposure to airport operations.

Support for the tours radiated from the very top of the airport's organizational chart. "At the start, we thought this could be an interesting out-of-the-classroom experience that the cadets could learn something from," says Paul Campbell, executive director and chief executive officer of the Charleston County Aviation Authority. "Pouring a concrete taxiway is unlike constructing any building, roadway or transportation network. The pavement must be capable of withstanding the weight of fully loaded commercial airliners, military aircraft and the Boeing Dreamliner and Dreamliners."



PAUL CAMPBELL

Peña and Corbin, both Citadel alumni, personally supported the initiative to bring cadets to the CHS jobsite. Phil Strobe, a senior engineering specialist with ADC and another Citadel graduate, also facilitated. During the tour, they provided direct insight about taxiway pavement, deployment of heavy equipment, and quality

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control of construction materials, and also discussed the roles of engineering design and construction supervision.

While Campbell is a proud Clemson Tiger, he is confident that having Citadel Bulldogs on hand made the event more meaningful for the cadets. "I am an engineer and a big believer in letting students learn what the real world is like," he says. "They experienced firsthand what it's like to work as a team with professionals from a variety of construction and engineering fields. Who knows, maybe someday, some of those cadets will come to work at the airport or work for one of the contractors."

One cadet who is considering an aviation career track in the Army described the tours at CHS as eye opening. Another who was hoping to land a summer internship with Boeing said he looked forward to the field trip for weeks.

Citadel cadets and recent graduates have secured several of the 10-week airport management internships CHS has offered for the last three years.

For the Long Haul

Beyond its impact as a valuable teaching tool, the recent taxiway project at CHS is expected to deliver lasting effects to the airport and surrounding area.

Although crews lost about a week of construction time to Hurricane Matthew, they still completed the project about one month ahead of schedule.



The new concrete taxiways have an anticipated lifespan of 20 years, but Peña predicts that they could last longer with continued outstanding preventive maintenance. On a broader basis, he notes that investing in the airfield infrastructure supports continued growth and development of the region's commerce, travel, tourism and trade.

Although there was no grand unveiling when the project was done, the airport's commercial and military users were happy to return to their usual taxi routes. ✈️

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Vancouver Int'l Relights Apron With Dimmable LED



FACTS&FIGURES

Project: Apron Lighting Upgrades

Location: Vancouver (BC) Int'l Airport

Product Installed: Dimmable, all-LED lighting system

Approx. Cost: \$2.5 million (\$1.97 million U.S.)

Funding: Airport's Sustaining & Innovation Projects Fund

Installation: Nov. 2016-Jan. 2017

Lighting Design & Manufacturer: Musco Lighting

Installation: Continental Power

Warranty: 10 years (parts & labor)

Of Note: Largest LED apron lighting installation in Canada; adaptive dimming system bases light operation on gate usage; projected to save 715,000 kw/year, the equivalent of powering 72 residential households



Earlier this year, Vancouver International Airport (YVR) flipped the switch on its new all-LED apron lighting system, the largest apron LED installation in Canada. The approximately \$2.5 million (\$1.97 million U.S.) lighting system also features an adaptive dimming system based on gate usage, a first among North American airports.

Both features are designed to increase operating efficiency and decrease energy use at the facility in southwestern British Columbia. YVR has taken a proactive approach to energy savings for a number of years, reports Don Ehrenholz, the airport's vice president of engineering and environment.

Several years back, airport officials set aggressive energy savings targets for the facility, aiming to keep energy usage flat during a period of significant growth. When LED technology evolved to include higher wattage fixtures, YVR officials thought it time to begin considering ways to save energy in airside areas, Ehrenholz adds.



DON EHRENHOLZ

Shine On

When considering new apron lighting, the airport's overarching objectives included saving energy, reducing maintenance costs, providing better lighting on the apron and in the work areas around aircraft, and reducing light spill and glare that might affect pilots and air traffic control personnel.

As an early adopter of LED lighting for apron areas, management took a methodical and cautious approach when evaluating product options. "There were a lot of products and a lot of claims out there," reflects Ehrenholz. "Our in-house engineering staff looked at the specifications for the various products and chose three for a pilot test."

YVR installed each product on two light poles respectively, and then conducted a yearlong evaluation throughout 2015 to determine which product produced the desired energy savings and required light quality. In addition to energy savings, evaluators also focused on light quality during aircraft loading, unloading and fueling operations.

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wingtip to wingtip, we are now able to direct light into the areas we wish to light and cut off light from areas that might cause distractions, and ultimately safety concerns."

The airport's new LED system was retrofitted onto 62 light poles, each 90 feet tall, throughout the apron. Electrical components installed at the bottom of the poles allow maintenance personnel to replace fuses and change drivers from ground level, DeJong adds.

Crews replaced the apron's metal halide fixtures with 450 LED light fixtures over the course of several months in late 2016 and early 2017. The new fixtures have a projected lifespan of 100,000 hours (25 years). In addition, they brighten immediately—unlike YVR's previous metal halide fixtures that took time to warm up if lights were mistakenly turned off.

And they are dimmable. YVR wanted to have the ability to control light levels at gates based on operational needs, says DeJong. To that end, Musco installed a wireless control system that connects with the YVR's aircraft management information system to determine whether a gate is occupied or empty.

"The lights will dim automatically 30 minutes after an aircraft leaves the apron area," Ehrenholz explains. "An aircraft shows

System BY ROBERT NORDSTROM

Maintenance was another consideration, Ehrenholz adds. "A typical metal halide fixture has a life span of about 8,000 hours before the bulbs have to be replaced," he notes. "Every year and a half to two years, our maintenance crews were out there in man lifts, sometimes not in the best weather, replacing these gigantic light bulbs."

Musco Lighting, the firm that won the contract to design the system and produce the product, performed a complete apron site assessment and designed the lights accordingly. For instance, the company built custom crossbars and adjusted the aim according to the specific light pole on which they would be installed.

"Glare control was crucial on this project," explains Musco Sales Manager Adam DeJong. "The challenge was to precisely aim light away from the pole to illuminate the back of the aircraft without creating glare for pilots and air traffic control. Our fixtures incorporate custom optics around the LED and visors to precisely light the intended areas, while hiding the light source, thus eliminating glare from viewers at a distance."

The ability to aim light into specific areas was especially important, emphasizes Ehrenholz. "You don't want light shining in areas that might interfere with other aircraft operations, for example, taxiing," he says. "The LED fixtures distribute the light more evenly and make everything appear brighter and crisper. From the tail of the plane to the nose, from



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up and the lights turn on. After ground crews finish loading or unloading, the aircraft pulls away and crews clean up, the lights turn off. The system saves energy and is very simple to operate. Our operations people have less to worry about because the system works automatically.”



New LED fixtures have made a dramatic difference on the apron.

Big Savings & Investment Incentives

During the past decade, YVR has partnered with BC Hydro to develop Power Smart projects to save energy throughout the airport. “Whether in the terminal or some other airport facility, we measure the amount of energy being consumed, then determine how we might retrofit with LED fixtures,” Ehrenholz explains. “In some instances, we’ve had to invent fixtures or have manufacturers create a fixture that we can pilot on a trial basis. BC Hydro calculates savings and offers a rebate to help offset capital costs. Typically, we’ve gotten back approximately one-third of our capital costs.”

According to energy use data gleaned during the pilot program, the new system is projected to save 715,000 kw/year. “That’s equivalent to powering 72 residential households,” Ehrenholz enthusiastically proclaims.

Janet Fraser, senior vice president of corporate affairs for BC Hydro, applauds YVR for its “continuous commitment to demonstrating leadership in strategic energy management through innovative and collaborative projects and partnerships....We are pleased that the incentives we provided have contributed to a successful project that will enable YVR to save energy, operate efficiently and increase safety at its facility.”

Feedback about the new lights from pilots, air traffic controllers and ground crews has been overwhelmingly positive, Ehrenholz reports. “Everyone is ecstatic. Our ground handlers are particularly happy because the light clarity is so much better.”

It goes without saying that Ehrenholz is an enthusiastic advocate for LED technology. The following story speaks volumes about his stance: A few years ago, YVR officials were getting a lot of complaints about the paint and carpeting in the Customs Hall. When crews replaced the existing light fixtures with LED fixtures in just a few nights, passengers couldn’t believe that the airport painted and replaced all the carpeting that quickly. Actually, YVR had only changed the lighting. ✈️



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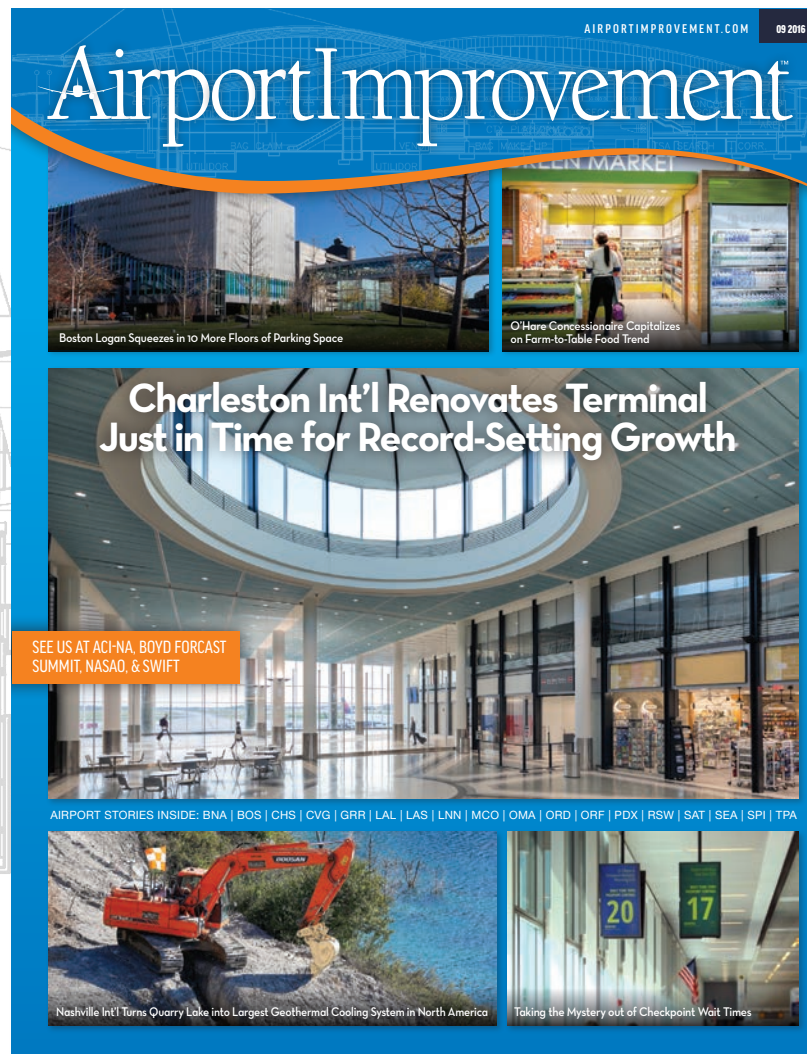
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Putting the Design-Build Delivery Method to Work for Airfield Pavement Projects



Aversion to the Design-Build construction methodology may be related to one of the most costly phrases in design and construction: "This is how we have always done it." Most of us in the airport industry cringe to varying degrees when we hear those words; but as humans, we are all creatures of habit and naturally tend to resist the unknown or unfamiliar. We mitigate risk, personally and professionally, by sticking with the "tried and true," even though we know in our hearts that innovation and efficiency are not often found in routine process and procedure. It is this avoidance, in conjunction with a general lack of experiential understanding, that influences many to miss prime opportunities to deploy the Design-Build methodology.

Owners, engineers, and contractors alike often associate Design-Build construction exclusively with complex projects such as new terminals, terminal expansions or other comprehensive facility improvements. In doing so, we potentially fail to realize the tangible benefits that the method can afford for other projects. This is not to suggest that the Design-Build method is well-suited for any and all capital projects, but typically, it fails to make the shortlist when teams consider how best to bring airfield projects from vision to reality.

Design-Build procurement is nothing new to the architectural/engineering/construction industry at large, having gained much traction in many market sectors during the past 15 years through varied U.S. government procurement systems. Generally, however, it still lags well behind the historical mainstay of government construction contracting—Design-Bid-Build. There are, of course, countless cases over the years where the Design-



TIM FREDLUND, P.E.

Tim Fredlund, P.E., is a principal with Pond & Co. who has worked in the design and construction sector for more than 20 years. As the company's Aerospace/Aviation program manager, he directly serves the needs of commercial, general aviation and Department of Defense airport clients around the globe.

Build method has delivered success for airport owners and their design-construction teams. But as with the national industry trend, these projects are a minute minority.

As it relates to airports, part of this, again, is founded in perception—the idea that Design-Build project delivery is more complicated and therefore less viable for the wide range of airfield pavement projects. There are also unwarranted beliefs that airfield Design-Build projects would somehow fail to meet the criteria for FAA Airport Improvement Program funding, and that airfield projects could not possibly benefit from the many advantages of implementing of a Design-Build approach.

These advantages, which are applicable across all project types, include potential for accelerated procurement/construction completion and advancement of innovation in construction techniques. Other common benefits include time and cost savings through a combination of expedited mobilization, reduced claims and increased contractor responsibility toward delivering the defined project scope. In essence, a well-partnered and well-executed Design-Build project has the potential to save airports time and money, both of which are finite, critical resources when it comes to project delivery.

The judicious use of limited resources goes a step further, though, in that many contractors see this opportunity to save

time as a means to improve their bottom lines, therefore producing mutually beneficial relationships. In addition, closely linking design professionals and construction contractors can result in fewer design and construction issues, mitigate schedule-busters and keep all parties on track for partnered success.

There are potential challenges to the Design-Build process as well, including a contractual disconnect between the project owner and its design professional, as well as increased urgency in the submittal review process. Both aspects can compound the uncertainty that owners may have about embracing the concept of a contractor-led project delivery process.

These challenges notwithstanding, the rewards for attempting a Design-Build delivery far outweigh the risks. Additionally, there is plenty of guidance about the process available within the industry, including research from the Innovative Pavement Research Foundation and Transportation Research Board. Established pathways for AIP-compliant implementation are outlined by the FAA in the *AIP Handbook* and its 2009 draft advisory circular on Design-Build for airfields.

The Design-Build project delivery approach merits further consideration by more airports. Uncertainty and unfamiliarity are best overcome by education, experience and for some, a leap of faith into the relative unknown. ✈️

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