

# Airport Improvement



## Hi-Lite Airfield Services: THE NEXT CHAPTER

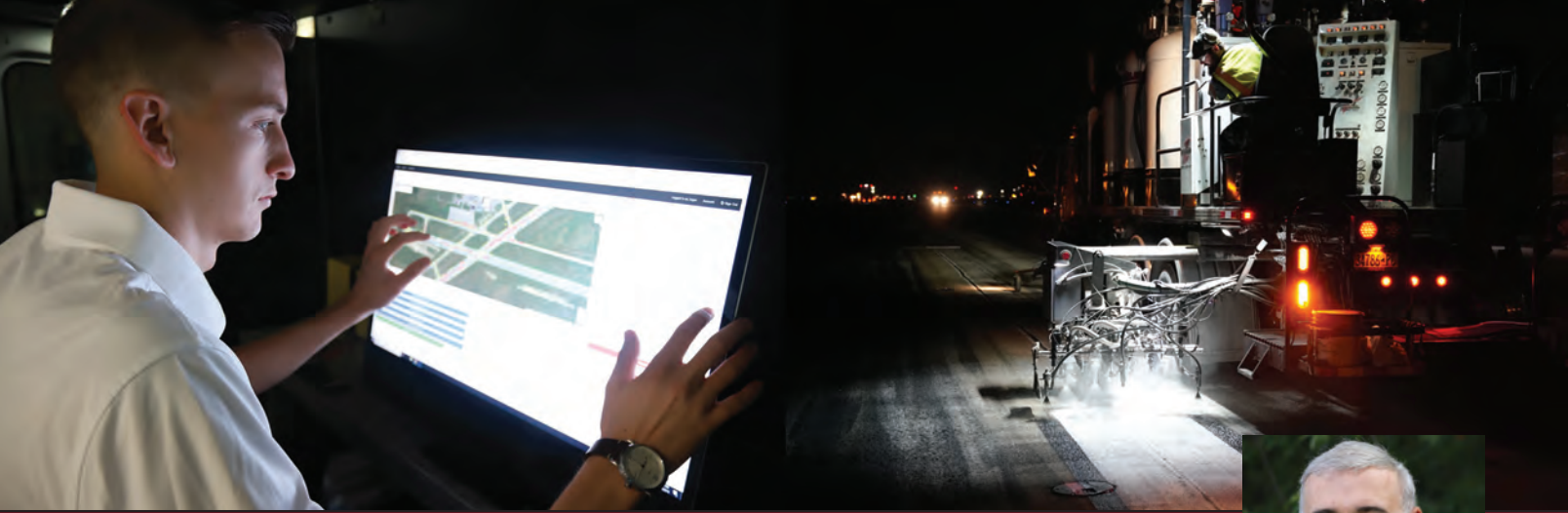


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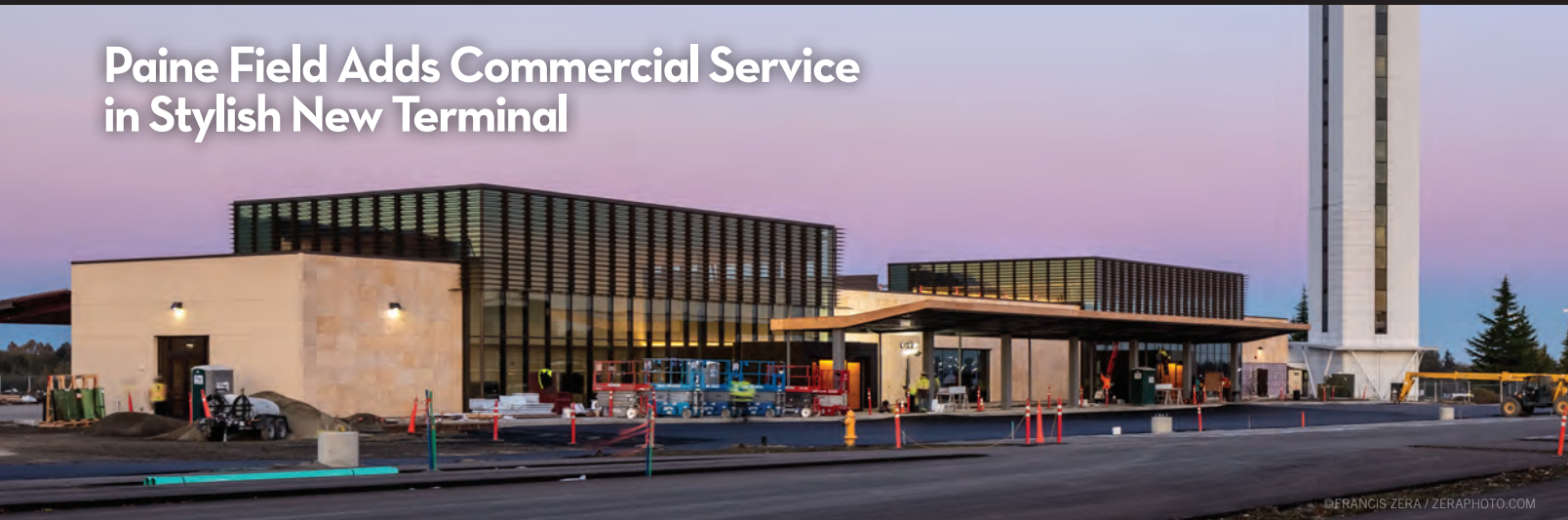


# Airport Improvement™



**O'Hare Builds Central Deicing Facility to Improve Ground Flow**

**Paine Field Adds Commercial Service in Stylish New Terminal**



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## Imagine That!

*Airport Improvement* isn't built around offering themed issues every other month. Rather, we provide case studies of projects within pertinent categories that offer great examples of what airports and their partners have created. A collection of best practices, if you will.

That said, there *is* an element that connects many of the stories in this issue.

Imagine artwork that takes the form of an experiential space for customers. An "Interconnected," digitally coordinated morph of live airport data projected onto three displays.

Or imagine smart windows that automatically adjust their tint, based on the level of sunlight hitting the panes, to help the airport maintain the interior temperature.

Then imagine a P3 project that not only brings commercial service to an airport for the first time, but also treats all travelers to a facility that looks and feels like a private lounge reserved for first class passengers.

If that's not enough, imagine on-demand parking rate variability or a facial recognition boarding system that doesn't

require passengers to hand gate agents their passports or phones (loaded with electronic boarding passes).

Pretty cool stuff, right? All of these innovations are not the dreams of tomorrow, but the realities of today. These imaginative ideas, and more, are the basis of projects covered in this March/April issue.

When looking at this edition, I couldn't help but feel a little serendipity with our selection of stories. There was a certain *je ne sais quoi* that made the issue jell. These airports aren't simply "improving the passenger experience" (such an overused phrase!). There is true imagination behind their work. With the help of innovative consultants and suppliers, these operators are adding new products and processes to make their airports better, safer and more profitable. That takes strength and determination—and the guts to take risks.

Cheers!

*Paul*



PAUL BOWERS, PUBLISHER

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# Paine Field Adds Commercial Service in Stylish New Terminal

BY VICTORIA SOUKUP



After decades serving business and general aviation traffic, Paine Field-Snohomish County Airport (PAE) is adding scheduled passenger service out of a polished new terminal owned and operated by a private operator. The Everett, WA, airport will have 24 daily roundtrip flights to nine western U.S. markets when its schedule is in full swing this spring.

New service by Alaska Airlines and United Airlines is good news for travelers living in the northern Seattle metro area, who previously had to drive 50+ miles south to Seattle-Tacoma International Airport. But the new terminal provides passengers with much more than proximity. The \$40 million terminal features upscale finishes and VIP amenities such as concierge service, floor-to-ceiling fireplaces and individual, private restrooms.

The 30,000-square-foot facility was developed, financed and built via a public-private partnership (P3) between Snohomish County and Propeller Airports. Per the 30-year lease agreement, Propeller owns and operates the new terminal and adjacent

parking infrastructure. The private company manages public ground transportation such as taxis and ride share vehicles. The county will receive about \$500,000 per year for rent, plus 2.5% of gross revenue during the first five years and 5% thereafter. The lease includes options for two 10-year extensions; revenue projections were not released. Annual enplanements are estimated at 550,000.

Airport Director Arif R. Ghose notes that PAE had previous experience teaming with private companies to build infrastructure for aerospace tenants, but the recent terminal project was its first P3 venture to support passenger service. "With the explosion in population in the Puget Sound area and the demand increasing for more aviation options, this terminal allows Paine Field to meet that demand," explains Ghose. "People will now be able to fly out of Paine Field instead of having to go down to Sea-Tac."



ARIF GHOSE



Construction of the two-gate facility began in mid-2017 and was completed in February. Some routes originally scheduled to begin in February were delayed until March due to the partial federal government shutdown. The full schedule for PAE's passenger terminal includes nonstop flights to Denver; Las Vegas; Phoenix; Portland, OR; and five California markets (see Facts & Figures on Page 9) for list of specific airports). Service is provided on Embraer E-175 aircraft.

### Full-Circle Development

The recent addition of scheduled passenger service brings PAE back to its original roots. Paine Field was constructed in the 1930s by the Works Progress Administration to offset the effects of the Great Depression and provide the Seattle region with a commercial airport. But when World War II began, the

Army Air Corps requisitioned the airfield to support the war effort. In the 1960s, the military relinquished control, and The Boeing Company moved in to develop and manufacture the iconic 747. Discussions about scheduled air service began in the mid-'70s, but as Boeing grew and other aerospace businesses came to the area, the airport ended up catering to industrial, business and general aviation traffic.

Enter Propeller Airports, a New York City-based firm that specializes in P3 airport projects. About four years ago, Propeller approached Snohomish County about constructing a terminal to bring in commercial air service. "Airlines had been expressing an interest in coming here and there was demand, but the county wanted to have minimal financial risk," explains Ghouse. "That's why we entertained the idea of working with Propeller. They were willing to put the money up and take the risk of building the terminal. There was no risk on the part of the airport for this project."

Why was PAE an attractive prospect for private investment? "Sea-Tac is at capacity, and the region was really in desperate need for another airport," relates Propeller CEO Brett Smith. "It was a very low-risk scenario for the airport. The proposal allowed Paine Field to get a terminal with no tax-supported dollars as well as receive the economic benefit of commercial service at the airport."



BRETT SMITH

From the outset, Smith wanted the terminal to be a "step above" other U.S. airports. "Our goal was to bring civility back to air travel," he explains, noting that he took inspiration from overseas facilities such as Zurich Airport. "We were doing it for the passenger experience. And as a private operator, we needed to show that the private sector can handle a project like this efficiently and get a superior product without having to spend taxpayer dollars."

## FACTS & FIGURES

**Project:** New Terminal; New Commercial Air Service

**Location:** Paine Field-Snohomish County (WA) Airport

**Size:** 30,000 sq. ft; 2 gates

**Cost:** \$40 million

**Designer, Builder & Operator:** Propeller Airports

**Est. Annual Enplanements:** 550,000

**Daily Roundtrips:** 24

**Non-Stop Destinations:** DEN, LAS, LAX, PDX, PHX, SAN, SFO, SJC, SNA

**Construction:** Mid-2017 to Jan. 2019

**Architect:** Fentress Architects

**General Contractor:** Fisher Construction Group

**Seating & Tables:** Vitra



**Baggage Handling:** Five Star Airport Alliance

**Parking:** Republic Parking System

**Glass Boarding Bridges:** JBT AeroTech

**Interior Design:** The Design Studio of Clive Lonstein

**Security Exit Doors:** dormakaba

**Common-Use Infrastructure:** Amadeus Air IT

**Hand Dryers:** Airblade; Airblade db, by Dyson

**Notable Amenities:** Floor-to-ceiling fireplaces; 20 individual restrooms (split equally between pre- & post-Security areas); living room-style seating; power/charging outlets in arm rests; valet parking; concierge service



**Upscale Furnishings, VIP Touches**

The check-in area includes polished concrete flooring, wooden acoustic ceiling panels imported from Switzerland and counters topped with Italian marble. Flight information is displayed on a 24-foot-long, 9-foot-tall replica of a vintage Solari board behind the sleek counters. “No one makes the split-flip boards anymore; so we worked with Amadeus Air IT to recreate one using software,” says Smith. “It looks like a real Solari board and even makes the same noise.”

After passengers clear the TSA checkpoint (which includes the availability of PreCheck screening), they enter an open room lined with windows that provide expansive views of the tarmac and surrounding Pacific Northwest landscape. The central area resembles a large lounge with small groups of living room-style furniture—modular sofas, chairs, coffee tables, lamps and cases that display historic aviation items. The terminal’s two gates are located on opposite sides of the room, separated from

*Fireplaces warm the look and feel of the gate areas.*



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the main central area by stand-alone floor-to-ceiling fireplaces. Individual lounge chairs are stationed near the windows facing the tarmac.

Designers furnished the gate areas with seating and occasional tables from Vitra. “The bench seating has polished aluminum finishes, so it’s shiny and very elegant,” notes Hendrik Woywod, global key account manager for Vitra. “That’s what they were trying to achieve with this terminal—a very elegant looking interior and unique appearance.”



HENDRIK WOYWOD

Each of the 156 Vitra MedaGate bench seats has two dedicated armrests with built-in power outlets. As such, passengers don’t have to vie for positions to charge their electronics or contort themselves looking for outlets on the floor or under seats. “That’s really unique,” observes Woywod. “Most airports are looking for efficiency and maximum capacity at the gate. At Paine, it is the other way around—it’s all about improving the experience.”

Tables are also equipped with power/charging outlets, and free high-speed internet access is available throughout the facility.

Glass boarding bridges add style to the airside area.

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Instead of large restrooms with multiple stalls, the terminal features 20 private, individual restrooms that are all compliant with the Americans With Disabilities Act. Ten are located in the airside gate area; 10 are before the TSA checkpoint.

“The personal aesthetic is what I liked,” says Smith, who played a key role in the terminal design and interior selections. “It’s clean

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AS 6901	SAN JOSE	8:30P		BOARDING	A1	
AS 0321	SAN FRANCISCO	7:00P		BOARDING	A2	
UA 6814	DENVER	7:15P		BOARDING	A2A	
AS 0325	LOS ANGELES	8:30P		ON TIME	A1	
AS 0968	SAN JOSE	8:00P		ON TIME	A2	
UA 0379	SAN FRANCISCO	8:15P		ON TIME	A2A	
AS 7530	SANTA ANA	8:30P		ON TIME	A2A	
AS 6824	LOS ANGELES	9:00P		ON TIME	A2	
AS 2486	SAN DIEGO	9:30P		ON TIME	A1	
UA 0005	DENVER	9:45P		ON TIME	A2A	
AS 1986	SANTA ANA	10:00P		ON TIME	A2	
AS 1973	PHOENIX	10:30P		ON TIME	A1	
UA 6491	SAN FRANCISCO	10:45P		ON TIME	A2A	

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Flight information is displayed on a replica Solari board, complete with the distinctive flipping sound as entries are updated.

and timeless, and all of the finishes were really thought out.”

Ghouse likens the terminal's look to a high-class hotel. “It’s a beautiful building,” he remarks. “A major international airport has VIP lounges; but in this case, the entire terminal all 30,000 square feet—feels like a VIP lounge.”

Glass boarding bridges add to the upscale feel. “They are just beautiful,” Smith relates.

Concessions include an 18-seat restaurant and bar run by Beecher’s Handmade Cheese, a well-known local purveyor. Diners can eat at bistro-style tables or use tables in the main lounge area.

### Additional Amenities

True to its mission of providing a superior travel experience, PAE offers valet parking and concierge service. “If you are a regular user of valet parking, by the time you pull up to the front door of the airport, your license plate will be scanned and we’ll know who you are,” Smith says. “One of our parking attendants will greet you by name and ask when you are returning. Then,

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you will receive a text message with a ticket number so there's no paper stub to lose. And when you return, your car will be angle parked at Baggage Claim. Our goal is to get passengers from car to gate in 10 minutes or less, and from gate to car in five minutes or less."

Propeller also has future plans to provide concierge services—everything from securing local theatre tickets and restaurant reservations to having dirty laundry cleaned and pressed by the time a traveler returns.

Smith believes other U.S. terminals can provide similar amenities. "There's no reason all airports can't be this nice," he says. "Money generated at airports can support a project like this. You see this type of service all over the world. We want our customers to *want* to use this airport. By offering a facility that lowers their stress levels, gets them through Security quickly and gives them a comfortable place to wait for their flight, we can do that."

## Working Together

Both Smith and Ghouse note that a good working relationship has been essential to the P3's success. "It's been an exciting project to work on, and we both had to understand each other in terms of how we each operate," Ghouse says. "The ability to have two groups work together is critical to ensuring we're delivering a successful project."


Smith emphasizes the importance of engaging the local community in P3 airport projects. "First of all, the private entity

must have the financial backing to take a project from concept to operation in an efficient manner that is in line with the goals of the community. A lot of people are nervous that something like this will cost jobs. It is actually quite the opposite. We've added 10 to 15 employees, and no one lost their job."

Smith recommends involving local businesses and contractors whenever possible. "That's what I love about this project. You can see the pride generated by the people working on the terminal. It's evident they put a lot more effort into their work knowing that their relatives will be traveling through it."

Airport officials say that Propeller and its contractor companies expect to employ up to 300 people to support commercial operations. PAE plans to add 29 employees in operations, maintenance and police/fire services to ensure the airport can safely and securely support commercial flights, says Ghouse.

In addition to supporting new commercial service, the terminal project is also expected to generate related economic development.

"We have 200 aerospace companies alone here in Snohomish County, and 70 tenants at the airport," Ghouse explains. "There's a lot of business traffic coming up this way. In order to encourage more business growth, a lot of companies are looking for air traffic service they can connect to. This project will attract more business on this side of the county, because travel options will now be more convenient for them. And at the end of the day, it's all about jobs." 

*The terminal operator's goal is to get passengers from car to gate in 10 minutes or less.*





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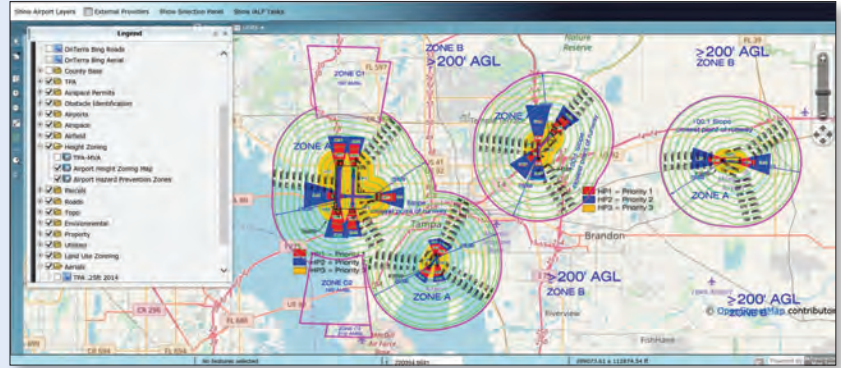
Every on-airport project needs to be submitted, reviewed and approved by the FAA prior to it being built by the airport. This review process can be timely based on several factors. What if the FAA criteria review process could be done at the airport level prior to FAA submission so that an airport would be reasonably assured of FAA approval? The interactive Airport Layout Plan (IALP) program is the solution for airports. The iALP utilizes Computer Aided Design (CAD), imagery, Geographic Information System (GIS), and Airport Layout Plan (ALP) data as a base for linked analytical planning tools. These tools provide proven analytics based on FAA criteria and standards to provide airport staff the accurate answers in reviewing airport development projects.

### THE IALP ADVANTAGE:

The FAA's Airports GIS data development process as defined in FAA Advisory Circulars (AC's) along with other existing data can be the foundation for the iALP, just as they are for the databases that will one day support the FAA's future eALP. After the data is collected and transferred to the FAA through the Airports GIS portal, Airports do not typically have any process and/or tools to utilize the data for analysis and/or a system to keep it updated. Therefore, at the airport level, the cost of data collection will never be fully justified in terms of benefits derived from the data collected, rather the sole justification is to meet the mandate expressed in the ACs. From an airport perspective, much of the value of the data is lost. There are currently no FAA automated utilities available at the airport level to produce the Airport Layout Plan set as it is defined today by the current Advisory Circular and neither used by non-airport planning agencies and community leaders for their purposes. The iALP allows airport staff to easily manage the ongoing conformity with the new FAA ALP data requirements at the airport level while providing the added benefit of other project development analytical utilities the system provides. The system uses either the traditional ALP base mapping or the FAA Airports GIS data to conduct airport specific airspace (Part 77, TERPS, One Engine Inoperative (OEI), height/hazard zoning) surface analyses, automated control tower line of sight studies and can track development proposals submitted for FAA review that can be linked to the maintenance of the ALP. The iALP tool significantly enhances the efficiency and economy of staff in the conduct of critical day to day planning analyses, particularly those related to obstructions and protecting airspace and approaches. For example, the iALP tool is tailored to the specific needs of each airport to let airport staff quickly determine how high structures can be built near an airport. The iALP is utilized at over 100 airports nationwide. **The iALP is currently the only system directly linked to the FAA's OE/AAA system that automatically transfers on-airport development proposals to the FAA for review, tracking and approval.** As evidence of the value that the iALP produces, current users offer the following testimonials:

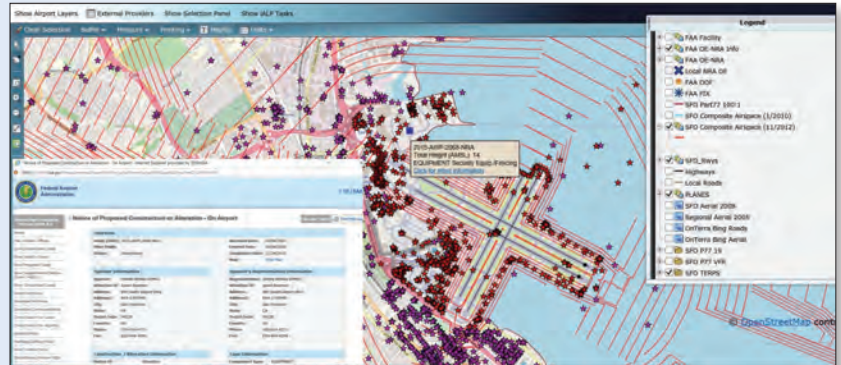
*"I was involved with the original development of this tool back in 1989 and have used it ever since. Working with PTI and helping them set future enhancement requirements for the program, it has evolved to be the best on-line tool for everyday planning analysis including airspace, ATCT line of sight, NAVAID and Airports GIS data maintenance. The staff at PTI has been great to work with."*

**Tony Mantegna**, Height Zoning & Land Use Manager,  
Hillsborough County Aviation Authority



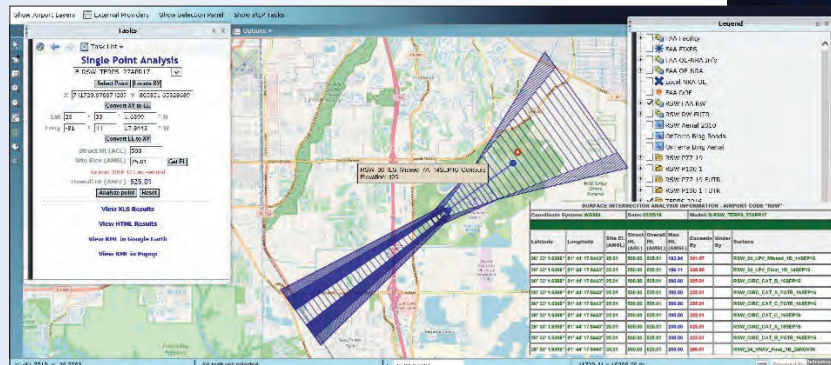
*"The iALP allows airport and city planners the ability to quickly assess proposed development on and off the airport to identify any potential land use compatibility impacts related to airspace, noise contours, or safety zones before they become an issue."*

**John Bergener**, Director, Airport Planning,  
San Francisco International Airport.



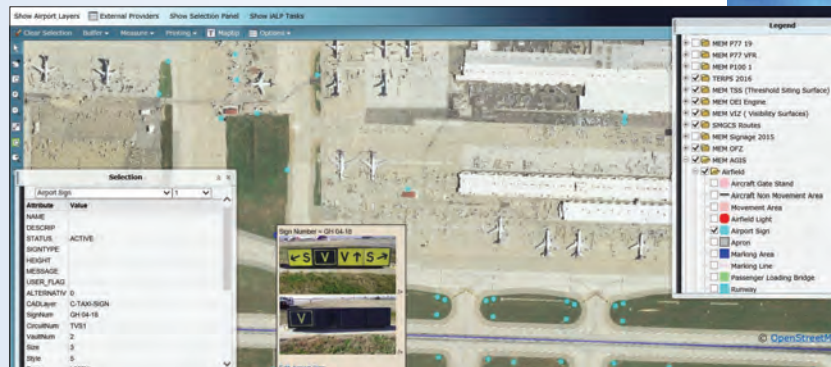
"We have been utilizing the iALP for over five years at both our facilities for all our airspace analysis needs."

**Chad Rosenstein**, Director, Government Affairs and Grants,  
Lee County Port Authority



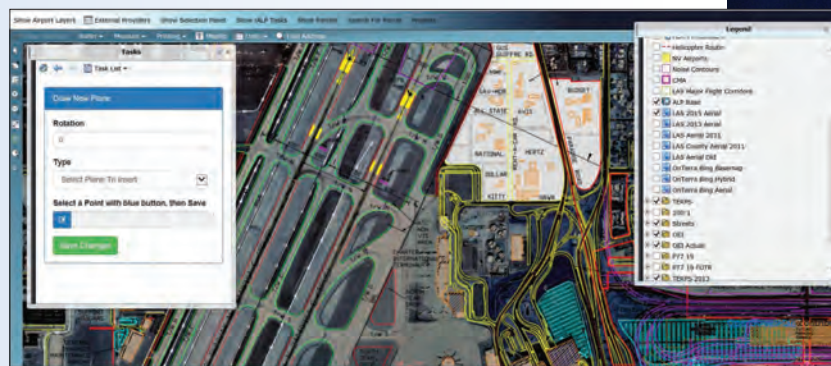
"We have found that using PTI's iALP tool has been very beneficial to support our airport facility planning efforts."

**Spencer Evans**, Sr. Airport Operations Representative at FedEx.



"We've used the PTI iALP for our airspace planning and analysis for over 10 years at both McCarran and North Las Vegas Airports. We helped PTI developed some key modules specifically for Clark County to help us with our local airspace issues at all our facilities. We really appreciate all the support we've received from PTI."

**Charles Hall**, Airport Program Administrator at Clark County  
Department of Aviation



PTI is a  
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state-of-the-art  
computer technology  
to fulfill client  
requirements. Let  
PTI show how we  
can provide savvy  
technical and analytical  
services for applying  
computer technology,  
mobile applications  
and web-based  
services for  
your airport.

*"Using the PTI iALP greatly assists us in our day to day planning analysis, and we also use it to expeditiously coordinate projects with the FAA."*

**William Castillo**, Manager of Airport Planning at Fort Lauderdale - Hollywood International Airport

Welcome to the iALP v2 web portal for  
Fort Lauderdale/Hollywood International Airport - (FLL) Airport



## **PTI OFFERS SEVERAL PACESETTING TOOLS DESIGNED TO SUPPORT AIRPORT PLANNING AND DECISION MAKING INCLUDING:**

### **Three-Dimensional Airspace Analysis Program (3DAAP) Services**

– This program automates FAA and ICAO criteria allowing the evaluation of on and off-airport development for potential conflicts with all FAA and ICAO review criteria including FAA Part 77, TERPS, OEI & Threshold Siting surfaces, NAVAIDS, line of sight, radar and more. Incorporated into 3DAAP are Airports GIS data standards and assisted attribution tools for assignment, maintenance and submittal of data to the FAA. 3DAAP is used throughout the U.S. and international airports and consultants.

**Safety Management Systems (SMS)** PTI offers complete Safety Management Systems to assist airports in identifying potential hazards for airport projects. PTI's SMS is scalable and can offer safety benefits to airports ranging from General Aviation airfields to complex certificated aerodromes. PTI's SMS includes a number of tools for the safety professional such as a pick list to help guide the Safety Risk Management Process, automatically determining risk levels to classify hazards and risks, review and track proposed mitigations to both determine their effectiveness as well their necessity. PTI offers an industry unique capability that allows airport staff the ability to quickly visualize safety hazards, mitigations, and system changes in a three-dimensional virtual reality environment. Based on the existing airport iALP, or the airport GIS data, combined with as built drawings from proposed construction

projects, the resulting model can be augmented with real world factors and scenarios providing a visualization of potential risks and subsequent mitigating solutions. PTI's safety promotion portfolio provides an easy means for airport staff to report potential hazards to a database using a custom mobile app that allows geocoding of hazard locations.

**CurbPING** - PTI has partnered with ACI-NA to develop and offer airport operators a scalable mobile application tool that gives airports the power to independently capture the information regarding all approved commercial vehicle activity at their facilities and use that information to enforce the agreements. Using an accurate digital geo-fence to capture and report information on the numbers of trips by airport registered Transportation Network Company (TNC) vehicles. CurbPING helps airports keep control of their curbsides. CurbPING provides real time independent data to effectively enforce regulations and provide a level playing field for all operators. Additionally, a CurbPING Incentive Program is available, benefitting TNC's, drivers, and the airport to encourage driver enforcement.

**Dispatch on Demand (DOD) Services** provides a high-tech, simple to use technology that provides taxi dispatch services unique to your airport to control the flow of taxis through the airport. DOD Services provides airport and taxi management with real time reporting and statistics in addition to trackable accountability of taxi usage. Dispatch on Demand Services are currently in use by the Port Authority of NY & NJ at Newark Liberty, John F. Kennedy Intl. Airports and Milwaukee General Mitchell Airports.

### **Automated Capital Improvement Programs (ACIP)**

PTI provides web-based tools to automate an airport's CIP process including the development, tracking and sharing of project, grant and contract data. This program is customized to each individual airport sponsor throughout the lifecycle of a project and can feed a State DOT and FAA programs.

**PTI is a service-oriented firm specializing in identifying, developing and implementing state-of-the-art computer technology to fulfill client requirements. Let PTI show how we can provide savvy technical and analytical services for applying computer technology, mobile applications and web-based services for your airport.**



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# LaGuardia Opens New Concourse in Terminal B

BY JODI RICHARDS



 In early December, LaGuardia Airport (LGA) opened the first 11 gates of its new Eastern Concourse in Terminal B. By the middle of this year, the concourse will have 18 gates in operation.

When the Western Concourse is completed, Terminal B will include a total of 35 gates and feature dual pedestrian bridges that span active taxi lanes and connect the main departures and arrivals hall (known as the headhouse) with the two island concourses. In all, there is 1.3 million square feet of new space.

The larger project also includes a central hall, central heating and refrigeration plant, parking garage, associated airside development, roadway/bridge infrastructure serving the entire airport and utility upgrades.

The Terminal B expansion and renovation program is part of an aggressive \$4 billion effort to replace LGA's outdated and undersized Central Terminal Building. It is also the preliminary stage of the Port Authority of New York and New Jersey's \$8 billion initiative designed to transform LGA into a "unified 21st century terminal system." When the overall program is complete, the airport will include 2.7 million square feet of facilities, with 72 gates throughout six concourses, two new arrival/departure halls connected by a Central Hall, and miles of new roadways.

LaGuardia Gateway Partners is responsible for the design, construction, operation and maintenance of the new Terminal B facilities under a public-private partnership with the Port Authority. LaGuardia Gateway Partners is a private equity comprised of Vantage Airport Group, Skanska USA, Meridiam and JLC Infrastructure for development and equity investment; Skanska-Walsh as the design-build joint venture; WSP and HOK for design; and Vantage Airport Group for terminal operations. LaGuardia Gateway Partners took over operation and management of the terminal on June 1, 2016, with a lease agreement that lasts until December 30, 2050.

## New Facilities & Amenities

Constructed in 1964, Terminal B was originally designed to accommodate 8 million passengers per year. At its current load of 15 million, the facility was not only undersized, but in need of security and amenity upgrades as well.

Stewart Steeves, chief executive officer of LaGuardia Gateway Partners, explains that the Port Authority wants to redevelop LGA into a "world-class facility—to bring in the best passenger amenities and services, latest technologies and capacity for the traveling public, both today and into the future."




**LaGuardia**  
GATEWAY PARTNERS

**FACTS & FIGURES**

**Project:** New Eastern Concourse

**Location:** LaGuardia Int'l Airport, Terminal B

**Cost:** Part of \$4 billion construction project for new Terminal B

**Size:** 243,000 sq. ft.

**Gates:** 11 initially; 7 more by mid-2019

**Airport Owner:** Port Authority of New York & New Jersey

According to Steeves, “world class” is in the eye of the beholder—in this case, the airport’s passengers and airlines. As such, it was important for the consortium to understand what services, amenities and products both key customer groups wanted at LGA. LaGuardia Gateway Partners consequently combined passenger surveys and tenant feedback along with Vantage Airport Group’s 20+ years of developing airports around the world to craft a development program tailored specifically for LGA.



STEWART STEEVES

“Travelers will notice the higher ceilings, better sightlines, natural and better lighting, spacious and well-appointed bathrooms, more amenities adjacent to the gate, and wider circulation aisles,” says WSP’s Ulrich Lemcke, project director of the design joint venture.

Demolition of a multi-level parking garage located in front of the existing terminal made room for the construction of the new headhouse, which includes passenger ticketing and check-in, security and baggage claim. The headhouse is slated to open in 2020, along with the first gates of the Western Concourse.

Although Terminal B will now be larger, walking distances will be minimized, and check-in and security will be centralized to improve passenger flow. Glass curtainwalls bathe the entire departure hall in natural light, and concessions are also centralized to “offer the best kind of services and amenities in a comprehensive way that everybody has access to,” says Steeves.

Aside from the “mathematical level of service”—having enough physical capacity to meet demand—there’s also the “guest level of service,” Steeves explains. Considerable effort was made to develop what he calls the

- LaGuardia Gateway Partners:** Vantage Airport Group; Skanska USA; Meridiam; JLC Infrastructure
- Design Build Joint Venture:** Skanska-Walsh
- Terminal Operations:** Vantage Airport Group
- Design Joint Venture:** WSP (lead & engineer of record); HOK (architect of record)
- Docking System:** ADB SAFEGATE
- Boarding Bridges:** ThyssenKrupp Airport Systems.
- Fire/Life Safety Engineering:** Arora Engineers
- Seating:** Vitra
- Interactive Wall in Play Area:** Breeze Creative
- Interior Features:** 55-foot-high ceilings; floor-to-ceiling windows; indoor park with benches & landscaping; new concessions lineup; closed-captioned TVs to decrease noise in holdrooms; hospitality-grade restrooms
- Associated Projects:** Dual pedestrian bridges that span active taxi lanes & connect the main departures/arrivals hall with both concourses; 7-story parking garage that opened in Feb. 2018



The Eastern Concourse will include 18 gates.

“softer side” of service—offering products, amenities and services for all travelers, and making sure guests enjoy their experience and appreciate the time spent at LGA.

Upon completion, wayfinding will be simplified, because there will only be one decision point for passengers—head to the Eastern Concourse or the Western Concourse.

The 243,000-square-foot Eastern Concourse features 55-foot-high ceilings and floor-to-ceiling windows. An indoor

park with benches and landscaping styled to look like a traditional New York City park provides travelers with a surprising place to relax. “It’s been very attractive for people to spend time in that area instead of going directly to the gate area,” Steeves reports.

The new food and beverage program will feature a variety of options, with a heavy emphasis on New York City brands. Restaurants include: Shake Shack, La Chula Bar and Taqueria, Osteria Fusco, Kingside, Irving Farm Coffee Roasters and 5 Boroughs Food Emporium. On the retail

and services side, there is District Market, FAO Schwarz, McNally Jackson, MAC Cosmetics, Hudson, LaGuardia Dufry Duty Free Shops and SpaHere.

“We’ve really tried to create an environment that is somewhat personalized by offering a range of options, so people feel that they’ve had an enjoyable experience here and we’ve met their needs,” he elaborates.

For example, televisions in the holdrooms are closed-captioned, so passengers who aren’t interested in programming are not disturbed by its noise.

Acoustic ceiling tiles and carpet combine to dampen noise in the terminal and provide a more calming environment for travelers to relax, adds Thomas Nilsson,

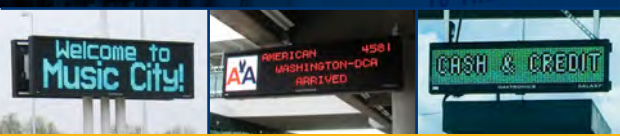


THOMAS NILSSON

# INFINITE POSSIBILITIES



From departure to destination, our displays **guide, inform** and **entertain** travelers on their journey.



[Daktronics.com/Airports](http://Daktronics.com/Airports)

From a welcoming message to providing flight status to wayfinding — our displays connect you with your passengers.

DEPARTING TO	AIRLINE	FLIGHT	TIME	GATE	REMARK	DEPARTING TO	AIRLINE	FLIGHT	TIME	GATE	REMARK
Atlanta	DELTA	455	1:00 PM	B8	On Time	Atlanta	DELTA	455	1:00 PM	B8	On Time
Atlanta	Southwest	2889	4:01 PM	C19	Boarding	Atlanta	Southwest	2889	4:01 PM	C19	Boarding
Atlanta	Southwest	3321	1:28 PM	C21	On Time	Atlanta	Southwest	3321	1:28 PM	C21	On Time
Atlanta	Southwest	3544	2:08 PM	C25	On Time	Atlanta	Southwest	3544	2:08 PM	C25	On Time
Atlanta	Southwest	1486	2:08 PM	C8	On Time	Atlanta	Southwest	1486	2:08 PM	C8	On Time
Atlanta	Southwest	4479	2:41 PM	C5	On Time	Atlanta	Southwest	4479	2:41 PM	C5	On Time
Atlanta	Southwest	1486	2:08 PM	C8	On Time	Atlanta	Southwest	1486	2:08 PM	C8	On Time
Atlanta	Southwest	3534	4:14 PM	C16	On Time	Atlanta	Southwest	3534	4:14 PM	C16	On Time
Atlanta	Southwest	2378	1:54 PM	C10	2:04 PM	Atlanta	Southwest	2378	1:54 PM	C10	2:04 PM
Chicago-ORD	Southwest	4559	2:54 PM	C12	On Time	Chicago-ORD	Southwest	4559	2:54 PM	C12	On Time
Chicago-ORD	Southwest	3271	4:08 PM	C16	On Time	Chicago-ORD	Southwest	3271	4:08 PM	C16	On Time
Chicago-ORD	Southwest	352	4:08 PM	C16	On Time	Chicago-ORD	Southwest	352	4:08 PM	C16	On Time
Chicago-ORD	Southwest	1380	3:55 PM	C8	On Time	Chicago-ORD	Southwest	1380	3:55 PM	C8	On Time
Chicago-ORD	Southwest	2641	1:28 PM	C8	On Time	Chicago-ORD	Southwest	2641	1:28 PM	C8	On Time
Chicago-ORD	Southwest	1819	1:28 PM	C8	On Time	Chicago-ORD	Southwest	1819	1:28 PM	C8	On Time
Chicago-ORD	Southwest	689	4:14 PM	C16	On Time	Chicago-ORD	Southwest	689	4:14 PM	C16	On Time
Chicago-ORD	Southwest	1759	2:08 PM	C16	On Time	Chicago-ORD	Southwest	1759	2:08 PM	C16	On Time
Chicago-ORD	Southwest	4468	2:48 PM	A1	On Time	Chicago-ORD	Southwest	4468	2:48 PM	A1	On Time
Chicago-ORD	Southwest	373	3:15 PM	C8	On Time	Chicago-ORD	Southwest	373	3:15 PM	C8	On Time
Chicago-ORD	Southwest	1281	4:43 PM	B2	On Time	Chicago-ORD	Southwest	1281	4:43 PM	B2	On Time
Chicago-ORD	Southwest	1281	4:43 PM	C7	On Time	Chicago-ORD	Southwest	1281	4:43 PM	C7	On Time
Chicago-ORD	Southwest	2112	2:08 PM	A3	On Time	Chicago-ORD	Southwest	2112	2:08 PM	A3	On Time
Chicago-ORD	Southwest	4176	4:08 PM	A3	On Time	Chicago-ORD	Southwest	4176	4:08 PM	A3	On Time
Chicago-ORD	Southwest	1225	4:38 PM	C16	On Time	Chicago-ORD	Southwest	1225	4:38 PM	C16	On Time
Chicago-ORD	Southwest	981	1:40 PM	C20	1:50 PM	Chicago-ORD	Southwest	981	1:40 PM	C20	1:50 PM
Chicago-ORD	Southwest	315	3:15 PM	C25	On Time	Chicago-ORD	Southwest	315	3:15 PM	C25	On Time
Chicago-ORD	Southwest	1077	12:55 PM	B12	Delayed	Chicago-ORD	Southwest	1077	12:55 PM	B12	Delayed
Chicago-ORD	Southwest	3208	3:05 PM	C22	On Time	Chicago-ORD	Southwest	3208	3:05 PM	C22	On Time
Chicago-ORD	Southwest	689	4:08 PM	C8	On Time	Chicago-ORD	Southwest	689	4:08 PM	C8	On Time
Chicago-ORD	Southwest	1077	2:08 PM	C22	On Time	Chicago-ORD	Southwest	1077	2:08 PM	C22	On Time
Atlanta	DELTA	455	1:00 PM	B8	On Time	Atlanta	DELTA	455	1:00 PM	B8	On Time
Atlanta	DELTA	3300	1:28 PM	B5	On Time	Atlanta	DELTA	3300	1:28 PM	B5	On Time
Atlanta	DELTA	2048	2:08 PM	C21	On Time	Atlanta	DELTA	2048	2:08 PM	C21	On Time
Atlanta	DELTA	3474	1:08 PM	B1	2:01 PM	Atlanta	DELTA	3474	1:08 PM	B1	2:01 PM
Atlanta	DELTA	5418	3:08 PM	C19	On Time	Atlanta	DELTA	5418	3:08 PM	C19	On Time
Atlanta	DELTA	1005	4:38 PM	C1	On Time	Atlanta	DELTA	1005	4:38 PM	C1	On Time
Atlanta	DELTA	537	10:40 AM	A8	Delayed	Atlanta	DELTA	537	10:40 AM	A8	Delayed
Atlanta	DELTA	3434	3:58 PM	C7	On Time	Atlanta	DELTA	3434	3:58 PM	C7	On Time
Atlanta	DELTA	2117	2:11 PM	B12	On Time	Atlanta	DELTA	2117	2:11 PM	B12	On Time
Atlanta	DELTA	1088	3:31 PM	C21	On Time	Atlanta	DELTA	1088	3:31 PM	C21	On Time
Atlanta	DELTA	368	10:40 AM	D1	Delayed	Atlanta	DELTA	368	10:40 AM	D1	Delayed
Atlanta	DELTA	857	2:27 PM	C11	2:37 PM	Atlanta	DELTA	857	2:27 PM	C11	2:37 PM
Atlanta	DELTA	1377	6:08 PM	C22	On Time	Atlanta	DELTA	1377	6:08 PM	C22	On Time
Atlanta	DELTA	1819	3:22 PM	C23	On Time	Atlanta	DELTA	1819	3:22 PM	C23	On Time
Atlanta	DELTA	1377	6:08 PM	B5	On Time	Atlanta	DELTA	1377	6:08 PM	B5	On Time
Atlanta	DELTA	2782	4:40 PM	C3	On Time	Atlanta	DELTA	2782	4:40 PM	C3	On Time
Atlanta	DELTA	372	1:10 PM	C16	On Time	Atlanta	DELTA	372	1:10 PM	C16	On Time
Atlanta	DELTA	2275	1:28 PM	C19	Boarding	Atlanta	DELTA	2275	1:28 PM	C19	Boarding
Atlanta	DELTA	3221	3:08 PM	B8	On Time	Atlanta	DELTA	3221	3:08 PM	B8	On Time
Atlanta	DELTA	1281	3:15 PM	C28	On Time	Atlanta	DELTA	1281	3:15 PM	C28	On Time
Atlanta	DELTA	1225	4:38 PM	C18	On Time	Atlanta	DELTA	1225	4:38 PM	C18	On Time
Atlanta	DELTA	7832	4:38 PM	A1	On Time	Atlanta	DELTA	7832	4:38 PM	A1	On Time
Atlanta	DELTA	870	3:31 PM	B12	On Time	Atlanta	DELTA	870	3:31 PM	B12	On Time
Atlanta	DELTA	683	4:10 PM	B9	On Time	Atlanta	DELTA	683	4:10 PM	B9	On Time
Atlanta	DELTA	3018	4:30 PM	B9	On Time	Atlanta	DELTA	3018	4:30 PM	B9	On Time
Atlanta	DELTA	059	1:40 PM	C20	1:50 PM	Atlanta	DELTA	059	1:40 PM	C20	1:50 PM



vice president of Skanska, the leading partner in the Skanska-Walsh joint venture responsible for the design and construction of Terminal B.

An airport-themed children's play area includes a 16-foot interactive display. The multi-user experience allows children to design their own aircraft on a tablet and watch them come to life and take off from LGA's runway on a giant digital wall.

Pet relief areas (set to open later in construction), family restrooms, a room for nursing mothers and upgraded restrooms also add to the enhanced passenger experience. "The new restrooms have caused quite a bit of excitement," reports Nilsson. In addition to eliciting positive reviews on social media, the new facilities have received local and national news coverage. Constructing quality, well-appointed restrooms was important to all parties, because they often create the first impression of an airport for travelers, he explains.

Steeves describes the restrooms as "hospitality standard," with spacious stalls and above-sink shelves to keep belongings dry while visitors wash their hands. Moreover, they are stocked with fresh flowers—just another way to surprise and delight guests as they travel through LGA, he notes.

### Airfield & Other Improvements

On the airfield, LaGuardia Gateway Partners and Skanska-Walsh will add two miles of additional taxiways, including a system of circular taxi lanes that wrap around the concourses under elevated passenger walkways. The dual pedestrian bridges will span more than 400 feet from the headhouse to concourses A and B, about 60 feet above the active taxiways.

The layout is designed to provide more options for greater functionality to get aircraft into/out of gates and load/unload passengers more efficiently. The new airside design takes advantage of the surroundings

by showcasing the Manhattan skyline from the departures level. "The view is truly amazing," says Nilsson.

WSP's water and environment group is providing drainage and stormwater management design and construction services for the airside portion of the project.

"The design includes a series of trench drains and manholes that discharge to a series of manufactured treatment devices before discharging to the existing storm sewer system," says Darren Delenick, the firm's airside drainage and storm water lead.

Information technology upgrades include a new fiber optic data network that facilitates improved building management systems and allows for the deployment of common-use technology to increase operational flexibility.

Civil work makes up a large portion of the project, including 8 miles of new roadways, 2.5 miles of which are elevated

## ALIS: the new go-to airside asset registration, tracking and maintenance solution for airports

ALIS – ADB SAFEGATE's new digital asset tracking, inspection and service solution – helps airports easily register airside assets using GPS data, electronically schedule and track maintenance, and record maintenance and inspection tasks in compliance with FAA standards.

ALIS can also be integrated with an electronic wrench for accurate, ergonomic torque inspections of AGL fixtures. It easily integrates torque measurements and photometric measurement reports to provide a complete view of the asset's status.

ALIS gives airports increased visibility of airside assets, helping them plan and schedule preventive maintenance, or undertake corrective maintenance more quickly, to reduce downtime and significantly improve operational availability.

Map View



**Map view** provides the perfect workflow between airside operations and the maintenance teams. With observations reporting, operations can capture the exact location, status and even photos of the asset and immediately upload it to ALIS for maintenance scheduling.

# ALIS

AIRSIDE LOCATION-BASED INSPECTION AND SERVICE



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The new restrooms are garnering compliments on social media.

roads and bridges. A new flyover exit ramp that crosses perpendicularly over the east-bound Grand Central Parkway reorients and improves the traffic flow to the airport by distributing vehicle traffic to the eastern and western sides of the airport.

Monthly open houses are held to update employees about the project and allow them to participate in some decisions that directly affect their areas. “The success of a project like this is frequent engagement with all of our business partners—really listening to the voice of everybody who participates here,” Steeves notes.

Customer service training programs have been implemented across the airport, and LGA has added performance-based incentives to some service contracts, so providers are rewarded for doing a great job.

### P3 Facilitates Alternate Design

The massive redevelopment is occurring while Terminal B remains fully functional. Ensuring uninterrupted operations throughout construction is a tremendous, yet critical, challenge, says Nilsson. “We have to maintain as close to 35 gates as we can through the construction, and that is the guiding principle,” he specifies. That principle dictated much of the phasing. The first 11 gates in the Eastern Concourse were constructed in one phase, thus allowing the team to move operations to new gates, before decommissioning the others to begin replacing them.

Maintaining a comfortable interior temperature for passengers and staff fell to WSP’s energy team. “The first phase of the construction plan called for demolition of the existing central heating and refrigeration plant that served the existing Central Terminal B,” explains Chris Tso, the firm’s lead mechanical engineer. “The challenge was to find a way to

provide heating and cooling for the existing terminal without using the existing central heating and refrigeration plant.”

The solution was a three-phase approach that included the creation of an interim cooling tower that is currently in operation. Eventually, the final cooling tower will be constructed for the new concourse.

A public-private partnership (P3) allows for more innovation in operating the facility and financing the project, says Nilsson. It also facilitates the close coordination necessary to carry out a project of this scale and scope, he adds.

“We were interested in a P3 because it really spoke to the strengths of our various consortium partners,” Steeves explains, noting the importance of keeping the busy airport operational throughout the complicated project. “The P3 model brings a lot of innovation, perspective and experience to a project that can be very constructive.”

For example, the design solution for the new Terminal B is a revision from the original project proposal, which Nilsson describes as a “very cumbersome kind of construction” that shifted passenger flow four separate times through 12 construction phases. The project team worked together to devise an alternate design that included six construction phases and required just one shift to the new headhouse.

“We’re approaching the project here in a completely different way than had originally been envisioned, and that’s a direct consequence of the partners that came together through this model,” remarks Steeves.

Originally, the Port Authority planned to have the Terminal B parking garage and road network reconfiguration projects outside of

## Fire/Life Safety Systems

Due to their size and occupancy levels, the new facilities in Terminal B at LaGuardia Airport require a myriad of fire/life safety protection measures. For instance, the entire building had to be outfitted with sprinklers.

Arora Engineers Inc. designed a variety of fire/life safety systems to accommodate the terminal’s diverse potential hazards and unique physical configuration, which includes two elevated pedestrian walkways. Rising 60 feet over active taxiways, the 400-foot pedestrian walkways extend from the headhouse to concourses A and B. Because of the unique design, there was no prescriptive fire safety standard for the structure that met current codes.

Working with project stakeholders, Arora designed two fire protection systems—glazing protection sprinklers and under-bridge sprinklers—to provide a cooling effect to protect occupants inside and maintain the integrity of the bridge.

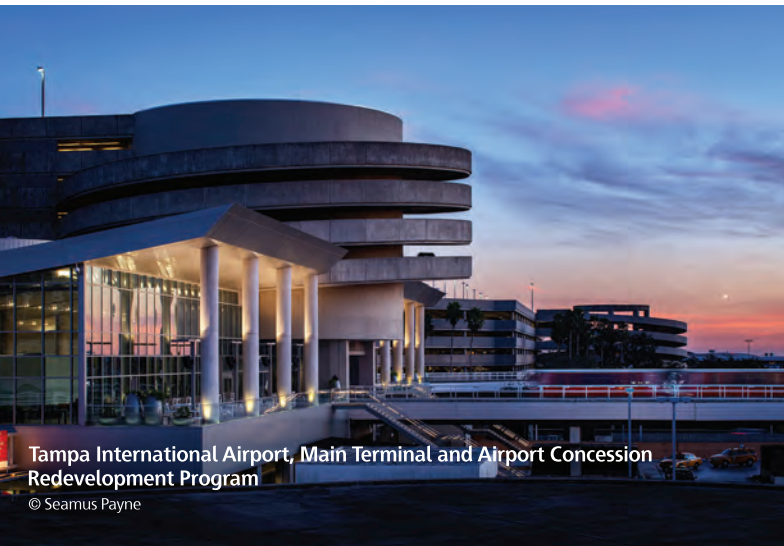
Because of the massive size of the bridge glazing, engineers determined that activating all of the glazing sprinklers simultaneously would exceed the facility’s water supply. To address that issue, the glazing protection system for each bridge was subdivided into multiple, zoned deluge sprinkler systems located and activated by a corresponding group of flame detectors.

Arora personnel note that these innovative and functional design features can now be implemented in future projects with similar challenges.





LaGuardia Airport, Central Terminal B Redevelopment  
Rendering courtesy of HOK/WSP on behalf of Skanska Walsh and LaGuardia Gateway Partners



Tampa International Airport, Main Terminal and Airport Concession  
Redevelopment Program  
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Portland International Airport, Concourse E Expansion  
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the scope of the P3 contract. In the long run, however, bringing it all under one contract proved beneficial for the Port Authority and the construction process. “We can coordinate everything and we don’t have to go through a separate contractor,” Nilsson explains.

The seven-story Terminal B parking garage opened in February 2018 with 3,100 spaces. Like many other airports, LGA has seen a reduction in the demand for parking thanks to the increase in the popularity of companies like Uber and Lyft. To accommodate the shift, the second floor of the new parking garage is dedicated to ride-share vehicles.

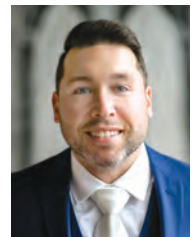
The growth of for-hire vehicle services has also influenced traffic patterns around the airport. When Skanska-Walsh bid the job in 2014, such apps were in their infancy, so they offer a good example of the need for flexible planning and design, Nilsson reasons.

“We spent a lot of time in the early stages future-proofing,” he remarks. An open design for the check-in area allows for a flexible layout able to more easily adapt when and if check-in needs or technology change in the future. Along with additional square footage, the terminal features a more effective and efficient flow as passengers move throughout the facility, he adds.

Steeves agrees it is crucial that the new terminal can easily adapt as the industry evolves. “Preserving flexibility will allow us to reconfigure, reshape things over time as trends might emerge that we can’t contemplate today,” he says.

### Peak Passenger Volume, Peak Construction

Chris Villari, communications manager for Skanska-Walsh, points out that 2018 was the peak year for construction on the project, with about \$90 million invested each month. The airport also experienced its highest annual passenger volume ever in 2018, with passenger volumes in March through June setting new individual month records.



CHRIS VILLARI

Despite hosting nearly \$1 billion of construction work each year, the Terminal B has remained operational for 15 million passengers. “I think we have shown that it is possible to do,” Nilsson says.



FROM LEFT TO RIGHT: Boston Intl Airport, MA | Honolulu Intl Airport, HI | Denver Intl Airport, CO | San Francisco Intl Airport, CA; BOTTOM: San Diego Intl Airport, CA

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The P3 structure and design/build joint venture allowed the designer, operator and builder to communicate and develop the project collaboratively from day one, Villari adds. "Having input from all three upfront gives you a better chance of building and implementing something that can be operated for the entire lifecycle successfully," he says.

Overnight shifts have been key to the construction process, with more disruptive tasks, such as utility or water main work, occurring during the five hours that LGA is without traffic. That window is also used to transport construction materials on and off the airport to minimize the impact on roadways.

An on-site concrete crusher allows most of the concrete that is removed from the existing airport infrastructure to be reused on the project, Nilsson notes. Additionally, an on-site system filters groundwater that is pumped from the site, and some is reused in lightweight cellular concrete fill, a solution that helps improve the stability of construction site soil.

**Additional Benefits**

Careful phasing has been and will continue to be critical in moving the project along with minimal impact to travelers, Nilsson notes.

Construction of the Western Concourse is divided into two phases to continue accommodating airline operations.

Incorporating various sustainability aspects, officials will seek Silver certification in Leadership in Energy and Environmental Design from the U.S. Green Building Council for the new Terminal B.

"It's a different class," Nilsson says of the facility improvements. "I think we're raising the standard of what an airport should look like."

The program's goal for overall participation by minority and women-owned business enterprises (MWBES) is \$680 million. "To date, we have paid out over half a billion to MWBEs in the New York metro market," Villari reports. "That is a tremendous stimulus to that market."

To assist the program and its participants, Skanska implemented a program it calls Building Blocks, designed to provide participants with knowledge and resources to help scale their businesses from local projects to large LGA projects. Ultimately, Villari states, this project will not only create a new facility for passengers, but also a stronger, larger local MWBE market. ✈️

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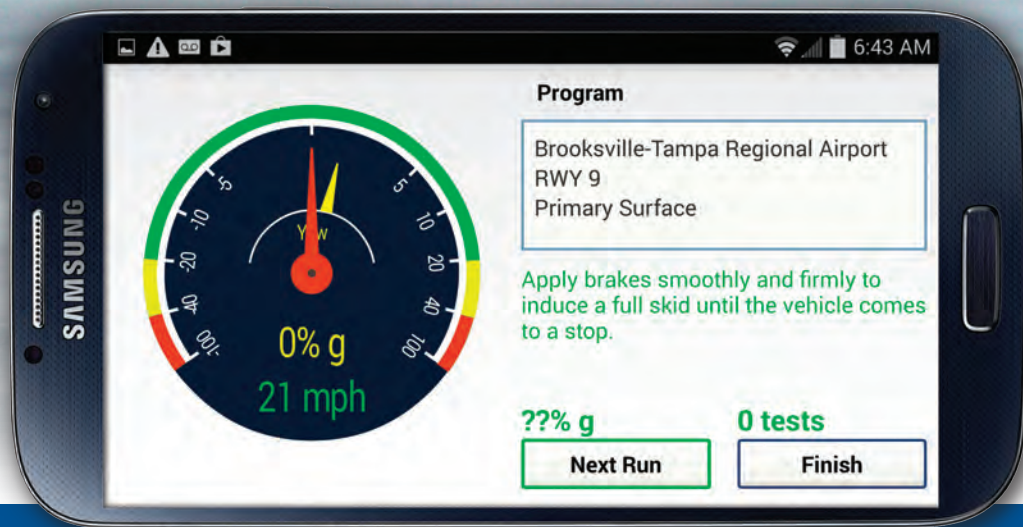


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# Denver Int'l Takes Deep Dive into Power System to Ensure Reliability & Resilience

BY JODI RICHARDS



## FACTS & FIGURES

**Project:** Energy Master Planning

**Location:** Denver Int'l Airport

**Consultant:** Burns Engineering

**System Details:** 2 substations from local utility, each capable of supporting airport's entire power load; 25kV distribution system, so voltage from utility must be stepped down to lower voltage before use

**Guiding Philosophies:** Multiple redundancies; mixing & matching technologies; tailoring solutions to specific applications

**Ideal Goal:** Low-cost, low-carbon systems that improve reliability & resiliency



Like many other airports throughout the industry, Denver International (DEN) was unnerved when Hartsfield-Jackson Atlanta International (ATL) experienced a massive power outage in December 2017. In addition to causing an 11-hour blackout at the nation's busiest airport, the outage impacted air travel throughout the country and prompted airports around the globe to take a second look at their own power systems.

Cullen Choi, manager of systems engineering at DEN, notes that he and other industry insiders know what happened at ATL was not unique, that every airport's power system has potential

vulnerabilities that could have a ripple effect throughout the air transportation system. "That's something that can't be understated," he emphasizes. "When we improve our own reliability and resiliency, that not only has the benefit of making sure we can maintain our operations, but that every other airport can also maintain their operations."



CULLEN CHOI

## Evaluating Needs

Choi and his team have consequently taken the opportunity to evaluate DEN from top to bottom, identifying opportunities for improvement. Like ATL's, the energy supply system at DEN includes a high degree of redundancy, but airport officials nevertheless want to eliminate as many vulnerabilities as possible, he explains.

When considering solutions for current and future power/utility needs, the team focuses on four goals: low-cost, low-carbon, enhancing reliability and improving resiliency. "Those are not always in harmony—sometimes they can be in conflict a little bit," he notes.

For instance: Batteries are a relatively expensive backup option with a comparatively short life; but they are reliable, resilient and low-carbon when used in partnership with a solar photovoltaic array. Diesel generators are low-cost in terms of capital investment and operations, but not low-carbon. They are also not a resilient solution if diesel fuel is in short supply when the power goes out. "So, we always want to look at potential solutions through all four lenses," says Choi.

At the same time, it's important to accommodate various stakeholders. "Everyone has specific needs that we as an airport, landlord and service provider want to meet in a cost-effective way," he adds. Airlines, tenants and other business partners need the ability to serve passengers in the event of a power disruption. And, as the event at ATL showed, disruptions at one location can have a domino effect.

### Multiple Redundancies

DEN has two substations through the local utility, each capable of supporting the airport's entire power load. "We have redundancy on top of redundancy at the airport boundary," Choi comments.

If the power supply at one substation is interrupted, transfer switches automatically change the system over to the other substation. In addition, the substations are located about 10 miles apart, so problems that affect one would not likely affect the other.

Between the airport boundary and the interior wall plugs, the system transitions from redundancy to a single feed. *That's* where DEN really scrutinized its strategy, Choi explains. The primary service voltage from the local utility provider, Xcel Energy, is not widely used throughout the utility's territory. DEN runs on a 25kV distribution system, so the voltage it receives from the utility is too high for equipment and needs to be stepped down to a lower voltage before it transitions from the utility's system to the distribution system owned and maintained by the airport.

During its facility-wide assessment, DEN found opportunities to inject additional redundancy and reliability for mission-critical loads at the lower voltage side to ensure the transition occurs in appropriate places and represents appropriate risk versus the cost of carrying the redundancy all the way down to point of use.

"It's just not cost-effective for any airport to carry redundancy down to every single end load," Choi explains.

The team consequently focuses on finding the right tool for the right job. For example, critical equipment like the airport data centers have large racks of uninterruptible power supplies where power comes in from the grid and essentially charges large batteries that subsequently power the network infrastructure. Elsewhere, a diesel generator is at the ready with emergency backup power to ensure continuous operations in the air traffic control tower. "We want the right kind of backup, reliability and redundancy for the right application," Choi stresses.

### Metered Response

After the high-profile outage at ATL, some airports pressured their local utilities to guarantee a more reliable feed and spent millions purchasing generators for every

potential load. "We didn't do that," says Choi. "We're taking a slow, metered approach."

DEN's excitement to help move the aviation industry forward is tempered with patience to deploy the most appropriate technology, Choi explains. Support from executive leadership has been integral to exploring innovative energy solutions, he adds.

Choi predicts that ultimately, the best solution will likely be a mix of technologies—traditional and innovative measures working together to provide a high level of reliability in a cost-effective manner. "There are different tools for different applications, and different solutions lend themselves well to specific needs," he says.

For example, emergency lighting is served well by batteries or generators. However, diesel generators are not intended to run continuously for long periods of time, so electrical storage batteries or fuel cells make more sense for such applications. Because diesel generators are relatively expensive to run and maintain, Choi notes that they can become "stranded assets."

DEN is exploring a combination of solutions that include generation and storage technologies to create a more cost-effective solution. By interfacing the generation side with the load side, the airport could improve power quality, reliability and resiliency on day-to-day operations and beyond, Choi explains.

### Microgrids

One potential solution to improve power reliability and resiliency is creating a microgrid, a local energy network designed to separate from the larger electrical grid during power outages. Burns Engineering helped DEN assess a microgrid as part of a larger Energy Master Plan that includes potential zero-net-carbon strategies.

Microgrids incorporate smart technologies with diverse power generation and storage systems to provide a level of

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power continuity that exceeds what backup generators typically can offer. At the same time, microgrids can also enhance power quality and provide energy savings and environmental benefits. The customized electric distribution system is designed to provide added reliability and resilience, explains David Smith, Burns' director of Energy Services. And while a microgrid works in coordination with a larger grid, it can also operate independently.



DAVID SMITH

In the event of an outage on the larger grid, a microgrid can provide power to an airport through alternative energy resources such as diesel generators, natural gas generators, solar arrays, wind systems, battery storage or a hybrid approach that combines several.

Smith explains that under normal conditions, a microgrid can take power from the grid *and* make some of its own power. If power from the main grid goes out, the microgrid is equipped to take on the responsibility of the full load. "It's like a big backup system, but it's not just for backup purposes," he remarks. "It operates day-to-day in 'blue sky' to the benefit of the owner."

Ideally, a microgrid is designed and configured to allow the owner to make power cheaper, more reliably and/or cleaner

than power from the outside grid. Microgrids can serve various purposes, depending on a user's challenges and needs. "There are no two microgrids exactly alike," says Smith. "It really depends on the goals, objectives and needs of the client."

What makes sense for one airport might not be possible at another for a variety of reasons, including physical space, climate or budget. A microgrid can be modular and adapt incrementally as an airport grows or its needs change, Smith adds.

Typically, a microgrid includes a number of complementary resources, depending on the objectives, to provide a predetermined level of reliability and resilience for a collection of interconnected loads, he explains. Each technology has different cost, performance and operating characteristics and serves different purposes. For example, solar is renewable, but as an intermittent resource dependent on sunshine, it can't be dispatched in the way natural gas engines can. "Diesel generators are good for what they do, but they are not rated for continuous duty and also have limited amounts of stored fuel, so you don't want to develop a use-case that says you need to be able to operate on diesel generators alone for more than 24 to 72 hours," Smith says.

In many cases, microgrids could reduce an airport's energy expenses. Cogeneration, whereby electricity is generated on-

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site and the heat produced in the process is recovered and put to use, can provide efficiencies and cost savings. “There’s the potential to save money, the potential for resilience and the potential for making money,” Smith summarizes.

**Possible Changes**

DEN has an 11.5-megawatt solar photovoltaic system with five separate arrays, but the airport is not able to use all of the energy it produces with the infrastructure currently in place. That could change if the airport expands the array and combines it with other technologies in a coordinated airport microgrid, says Choi. “That improves our return on investment by reducing the overall blended utility costs, but also has benefit to the utility, where it is not having to address our peak loads,” he explains. If that demand responsibility is no longer on the utility, energy costs could be reduced for all ratepayers, he adds.

The airport’s large footprint can be both a challenge and an opportunity. Not all 53 square miles of land carry critical loads or even need to be served by utilities. Because the current infrastructure is underground, with many buried interconnection points from the two substations, it’s difficult for maintenance technicians to access connections when the region receives significant snowfall.

At the same time, the land offers DEN significant opportunities to expand its solar arrays or install other microgrid components. Specifically, it could incorporate a large solar farm with utility-scale battery storage and reciprocating engine technology that would provide resilience and carbon reduction. Leveraging strengths is important to energy planning, Smith notes.

Keeping airport tenants, employees and passengers safe and comfortable is a top priority when DEN explores power backup systems. Choi and his team consequently focus on evaluating each facility and its critical functions, and take an integrated systems approach to providing solutions that improve reliability and resiliency while also being cost-effective and low-carbon.

However, electrical service and infrastructure can be very site-specific for airports, as can issues regarding power reliability, resilience and supply. Finding solutions that take a systems approach, where every component’s benefits and drawbacks are evaluated in the context of other components, is key. That said, Smith says that over time, microgrids combining on-site generation, energy storage and smart, responsive energy loads, could prove to be an increasingly viable means to address the growing challenges at any airport. ✈️



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## FACTS&FIGURES

**Project:** Campus-Wide Electrical Service & Distribution System

**Location:** San Diego Int'l Airport

**Owner:** San Diego County Regional Airport Authority

**Cost:** \$28.7 million

**Project Scope:** Design & install electrical utility grade 12kV power distribution system with utility grade controls & monitoring system; upgrade 12kV switchgears; eliminate numerous Authority-owned utility meters & migrate select facilities to 12kV loop

**Contractor:** BSE Engineering

**Solar Elements:** 5.5MW array built in 2016-17; 4MW hour, 2MW battery storage system currently in the works

**Annual Maintenance:** \$800,000-\$1 million

**Est. Energy Savings:** Up to \$100,000/yr (with battery storage in place) plus demand reduction through meter consolidation & future savings through solar power purchase agreement

# San Diego Int'l Takes In-House Approach to Energy Management

At San Diego International Airport (SAN), energy planning and management runs in parallel with sustainability goals. As the airport has grown in recent years, officials identified the need for increased utility capacity and redundancy.

The project team at SAN used energy modeling to analyze the airport's load profile during planning for the \$811 million Green Build that was completed in 2013. The modeling illustrated how much power was currently being used, what would be necessary in the future, what was being

supplied from the utility and the potential gap in between.

The solution was a 12kV electrical service and distribution system designed to reduce energy costs and provide resiliency and redundancy for the growing airport.

"It's not only planning for immediate needs, but long-term plans as well — coordinating with utility and stakeholders, and doing an analysis of what our requirements are now and what are they going to be and how can we meet them," says Cogan Semler, energy



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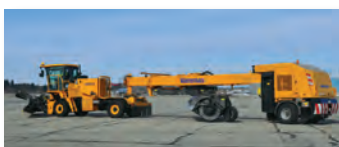


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manager with SAN's Facilities Management Department.

The 12kV is comprised of five loops. One loop wraps around the perimeter of the airport campus; terminals 1 and 2 each have a loop; a fourth is located at the new parking plaza and the fifth is in the central utility plant.



COGAN SEMLER

Two primary circuits located in the airport's main vault can each independently power the entire airport. Most days, however, each powers half. If the airport loses one of the primary power sources, the alternate circuit would come online, providing a high level of redundancy. Because the process is automated, power would be restored in a matter of seconds, notes Semler. The process can also be performed manually.

Throughout the five loops, automatic throw-over switch stations located where loads are connected allow the system to switch between the two primary circuits. If there is an issue at a specific load, it can be isolated so it does not impact the rest of the airport's grid.

Additionally, the system includes a supervisory control and data acquisition (SCADA) system and sensors throughout the grid that measure voltage, current, which breakers are open and where there is/is not power. The SCADA system includes built-in logic that allows it to respond effectively and isolate trouble areas while maintaining power for the rest of the airport, Semler explains.

Along with separate vaults and special controls, the system is also programmed to load shed. For example, if the airport lost both primary circuits and the alternate circuit had less capacity available, the system is designed to take less critical loads off of the grid and maintain the critical loads instead of dropping the entire circuit.

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Critical systems, like sensitive explosives detection system machines that would be hampered by even momentary power interruptions, benefit from a closed transition. “Halting operations has a financial impact,” says Semler.

The 12kV loop system also allows SAN better control over its maintenance program, he adds. “Not having to rely so much on the utility when we have outages or projects going on where we need to tie in somewhere provides increased flexibility.”

**Green Gains**

“Sustainability is always one of our goals,” says Semler, noting that the 12kV system offers more opportunities to consolidate energy loads and provides more capacity for photovoltaics and other onsite renewable energy sources. It has resulted in reduced utility costs through demand savings from the local utility provider, consolidation of smaller meters and the integration of power, he reports.

The local utility provides three circuits (two primary plus an alternate), and SAN has a 5.5-megawatt photovoltaic solar array, installed in 2016-17. The airport is also in negotiations with a firm to install a 4-megawatt hour, 2-megawatt battery storage system that will allow the airport to further leverage solar power. Officials



estimate the energy cost savings could approach \$100,000 annually.

Given its small footprint of about 660 acres, SAN had to be creative about the installation of its existing solar array, and divided the infrastructure among three locations. Additionally, it has partnered with the local utility on a program that allows the airport to purchase renewable power from outside sources.

While solar is not a backup for SAN, it does supplement the airport’s power needs by about 15%. This, in turn, aids the Authority’s goal of reducing its environmental footprint. ✈️

# FACING MOUNTAINS?

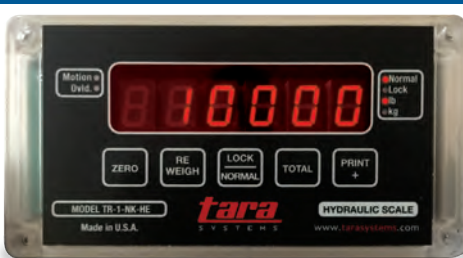
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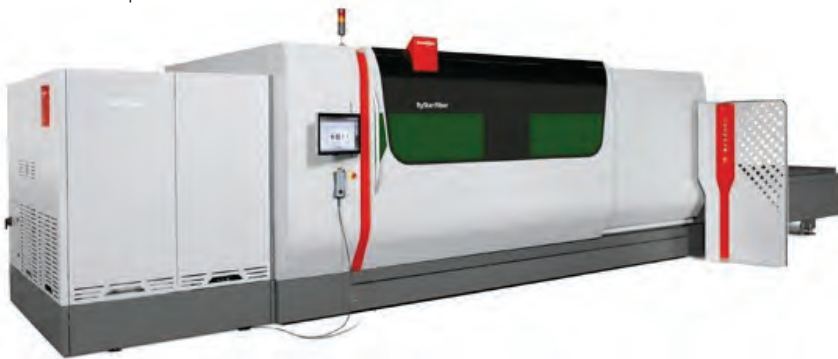
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# San Antonio Int'l Solicits Broad Community Involvement for 50-year Master Plan

BY MINDY HAMLIN



CITY OF SAN ANTONIO  
AVIATION DEPARTMENT

## FACTS & FIGURES

**Project:** Master Plan Update & Strategic Plan

**Location:** San Antonio Int'l Airport

**Master Plan Consultant:** WSP

**Public Involvement Subconsultants:**  
Auxiliary Marketing Services; Poznecki-Camarillo

**Cost Estimating:** Connico

**Noise:** Environmental Science Associates Regional  
Economic Analysis: Economic & Planning Systems

**Facility Planning – Terminal:** Hirsh Associates

**Facility Planning – Drainage:** Maestas  
& Associates

**Environmental Resources & Utilities:**  
Poznecki-Camarillo

**Airport GIS:** Quantum Spatial

**Forecasting & Financial Planning  
Support:** Unison

When it came time for San Antonio International Airport (SAT) to update its master plan, officials knew that many in the growing city felt there was no room left to expand at the airport's current site.

"For years, the community has been debating if the airport's site will meet the needs of the airport for future decades," says Russ Handy, aviation director for the city of San Antonio.



RUSSEL HANDY

One reason for the debate was the tremendous growth that has taken place at SAT since airport officials turned their focus to securing new air service in 2015.

Prior to then, passenger growth had remained flat. However, as the San Antonio metro area grew, the airport recognized it had an opportunity to attract new air service and hired an air service development executive to

attract new air service to the city. Since then, the airport has grown 10% to 12% annually.

"This year, we will exceed 10 million in passengers," Handy reports. "We believe that steep curve was due to some areas that were ripe for air service development, so we don't foresee the same growth in the future. We expect it will flatten out to 1 or 2%."

The airport's passenger growth coincided with several major capital improvement projects, including a new rental car facility and parking garage. As it checked off many projects on its master plan, the airport decided to update the plan for the next decades.

"It was time," explains Handy. "After seven to eight years, enough had changed in the community, including the diversity of businesses, airport design standards and in what people expect in the airport experience. We needed to update our Airport Layout Plan with the FAA, and it was time to do a holistic strategic plan."

## Public Opinion Influences Planning

As SAT began to launch its master plan program, much of the community assumed that a new airport would have to be built at some point to meet future air service demand without constraints or congestion. Airport leaders were not so sure.

“Many folks thought the airport was too small and landlocked,” Handy relates. “However, our airline partners and city leaders saw we had a lot of potential.”

What the airport needed, officials concluded, was data to back up its assumptions. So it turned to engineering and professional services firm WSP.

“There was a regional debate going on about congestion at the airport,” says John van Woensel, the company’s national aviation planning manager and vice president. “There had been construction and demolition for eight years straight, and it caused congestion and changes in the roadway. It made the airport site seem tighter than it is.”



JOHN VAN WOENSEL

The airport and WSP decided to take a strategic, longer-term approach and to focus phase one of its master plan program on the question of whether or not the airport could expand at its current location. They devised a compressed six-month planning effort and launched a comprehensive public engagement effort to answer this question.

“Instead of us, as the consultant, saying that it fits, we needed to produce data and let people make their own decision,” explains van Woensel.

WSP consequently kicked off a data-driven study based on aggressive growth projections over the next 50 years, compared to the more typical 20-year horizon for most airport master plans.

## Wide Outreach

To ensure broad public input, San Antonio Mayor Ron Nirenberg appointed representatives from aviation and non-

aviation-related businesses to the airport system development committee.

“The committee included everyone from small IT companies to large cybersecurity firms,” van Woensel points out. “It was a really good mix of people who could make a decision without political interest.”

Throughout the process, the airport presented its findings and recommendations to the committee, which ultimately made recommendations to the mayor and the San Antonio City Council.

In addition to the mayor’s committee, WSP and the airport created additional committees and working groups, including a technical committee, transportation partners planning group and a general stakeholder working group, which included representatives from groups not included on the other committees.

Committees, however, were only part of a larger strategy that not only targeted airport users, but also residents who were infrequent travelers.

“This group included representatives from homeowners’ associations, the LGBTQ community, organizations for the aging and young professionals’ organizations,” van Woensel chronicles. “Everyone in this group represented a constituency that needed to be represented. They offered us a wide reach to the community because they reported the information we gave them back to members of their groups.”

To support its outreach efforts, WSP contracted Auxiliary Marketing Services, a public engagement firm, and engineering/planning company Poznecki-Camarillo, both local disadvantaged business enterprise firms with deep connections throughout the community

“They understood the local lay of the land and had experience launching community engagement programs in the region,” says van Woensel. “We coordinated with the airport, of course, and made sure we were closely orchestrated to show we were all on the same frequency.”

During the outreach campaign, WSP addressed what it would take to build a new airport.

“We showed people what the process was to get a new airport,” says van Woensel. “We recognized that it sounds good and exciting until you look at what it takes and costs. We said, ‘Here is the process for building a new airport,’ and people said, ‘That won’t work for us.’”

Additional tools used for broader public engagement included open houses with presentations on the hour, handouts, flyers, electronic surveys, pop-up meetings, committees and reading lists.

“It was important to target areas of the city where there are folks who don’t use the airport a lot,” notes Handy. “They are citizens *and* need to understand the airport’s plans as well. We have learned that you have to be appropriately targeted and broad. If you don’t, you learn that later. If you are not inclusive, you pay for it later when you try to sell your plan.”

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The amount of feedback the airport received illustrated the community's interest in SAT's future. "This is my 33rd year developing master plans," reflects van Woensel. "I have never seen 2,500 surveys answered. It's really incredible. The residents of San Antonio really care about their community and airport."

### Findings & Feedback

WSP's preliminary findings during phase one indicated that SAT has the land, and can purchase additional land if needed, to support the construction of new terminals and runways to meet future demand.

"Based on high-level demand projected for 50 years, we were able to estimate how many acres would be needed for a new terminal and parallel runways," explains van Woensel. "While we did not come up with a final plan, we did explore high-level alternatives and found that there are several options in which a terminal will fit. There are also a couple of ways they can go with the airfield."

As phase one neared completion, WSP and the airport presented their findings to the various committees and to the general public at open house events. The airport system development committee then made a recommendation to the mayor and city council, which gave the airport the green light to move forward with phase two.



Public outreach strategies included open houses, pop-up meetings, electronic surveys and printed leaflets.

"There were some surprises among the city leadership when we showed them the data," Handy recalls. "The community and committee were surprised they had the real estate to expand."

WSP's van Woensel credits the airport with success of phase one.

"We did a lot of meetings, and the airport showed up at every event," he reports. "Airport staff participation in the open houses was very important. People always saw the airport there, and they were available for questions and open to people's feedback. They committed to make this happen in six months and committed tremendous time to making all of this happen."

WSP and the airport are now turning their attention to phase two of the master plan, which will set the airport's priorities and goals for the next five, 10 and 20 years.

"Although phase one looked like it would be tough, that was the easy part," reflects Handy. "Now it is time to ask ourselves, 'What does this all mean?' We are excited to jump in and get to the hard work." ✈️

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# Kansas City Int'l Test Drives Asset Management Software in Maintenance Facility

BY KRISTIN VANDERHEY SHAW



 In November 2017, local residents voted in favor of building a new terminal at Kansas City International Airport (MCI), with a resounding 75% saying yes to the project. The terminal is scheduled to open at the end of 2023 on the site of the now-closed Terminal A. In the interim, the airport is deploying new asset management software in a recently completed maintenance facility, so the technology will be ready to use in the new terminal when it is built.

Ian Redhead, deputy director of the Kansas City Missouri Aviation Department, gathered information about the value of such systems from colleagues at various conferences. He liked the idea of having the ability to monitor and manage the full lifecycle of MCI's enterprise assets, such as facilities, communications, transportation, production and infrastructure. As the plan for a new maintenance facility took shape, Redhead seized the opportunity to pilot an asset management program on a smaller scale before using it at the new terminal.



IAN REDHEAD

Redhead asked members of the Airports Council International – North America, Operations and Technical Affairs Committee

what they were using for asset management software, and the answer was Maximo, an enterprise-level computerized maintenance management system from IBM. With the power of the Internet of Things behind it, Maximo provides users with real-time visibility of data on people, places and things that directly communicate with the software. That struck a chord with Redhead.

## Leading-edge Initiative

"It's not the easiest software package to use, but it has the most horsepower," reports Redhead. And horsepower is exactly what the airport needed, especially as it began to unravel all the data it would need for a successful software integration.

When designing projects, airports rely on their partners to create and present plans via BIM (Building Information Modeling), an intelligent 3D model-based process that helps architecture, engineering and construction companies efficiently plan, design, construct and manage buildings and infrastructure. Redhead sought a consultant willing to work with the airport to not only use Maximo, but to integrate Revit BIM software as well. Redhead discovered that although Revit has been used at airports for years, most had not been using it for this purpose.



KANSAS CITY  
AVIATION DEPARTMENT

## FACTS & FIGURES

**Project:** Asset Management Program

**Location:** Kansas City Int'l Airport

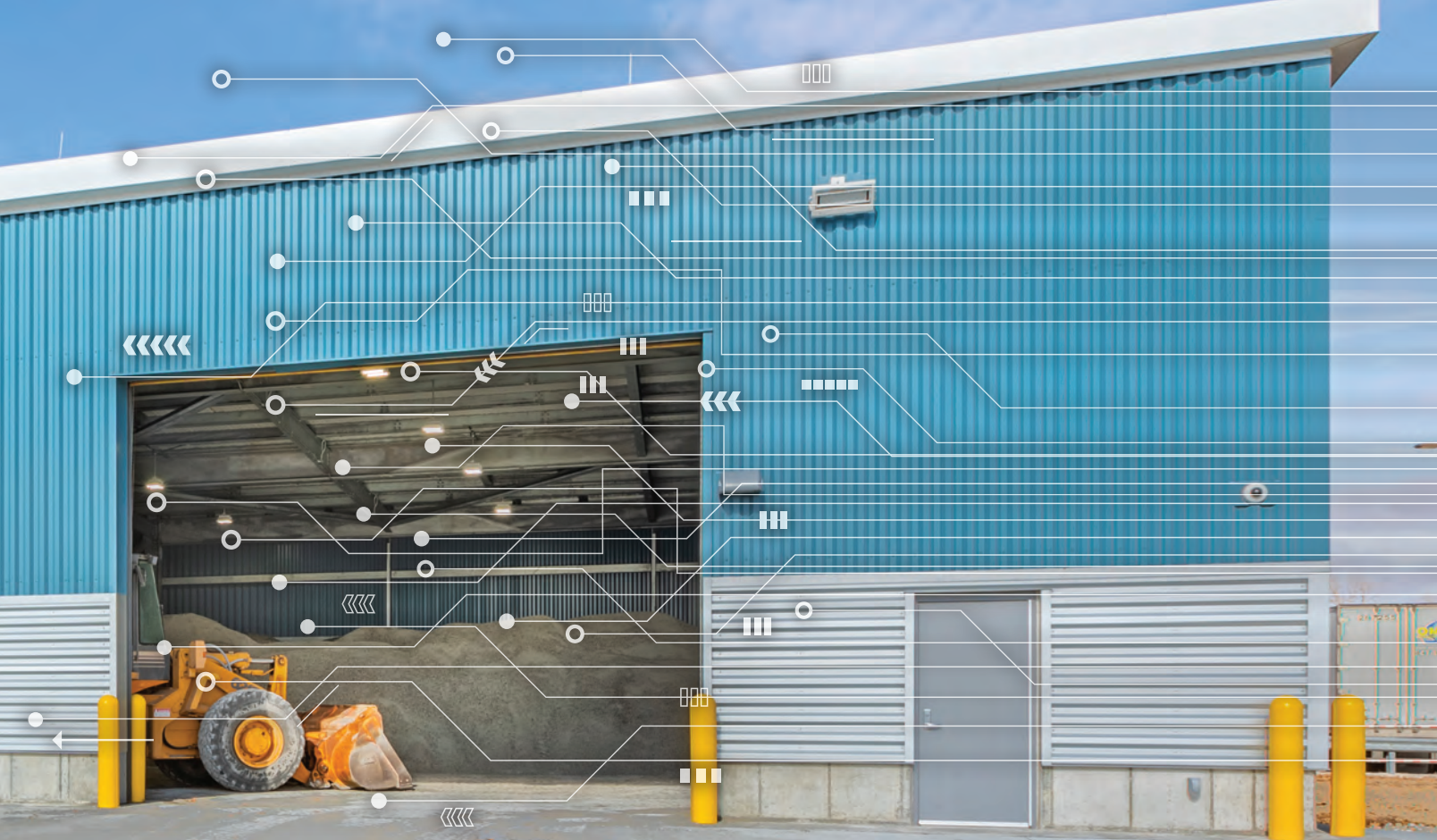
**Architecture & Design:** Burns & McDonnell

**Maximo Implementation & Data Integration:** Electronic Data Inc.

**Scheduled Completion:** 1st quarter 2019

**Key Benefits:** Monitor & manage full lifecycle of enterprise assets, such as facilities, communications, transportation, production & infrastructure

**Of Note:** Airport is deploying software in maintenance facility to ready for future deployment in new terminal



“I didn’t realize how bleeding edge I was going to be,” he laughs. “I found out that not a lot of people had integrated Revit into Maximo in this way.”

The airport hired Burns & McDonnell to pilot the asset management program for the maintenance facility building. The strategy is to test the process and extract best practices before rolling it out for the larger terminal project.

“It’s an innovative approach to implement asset management at the very beginning,” says Burns & McDonnell Project Manager Wendy Hageman. “It was easier to incorporate the elements of the building the airport wanted to track, instead of trying to address it after the fact.”

Redhead agrees, noting that asset management is often an afterthought. “Until a few years ago, airports weren’t really managing assets; they were running a piece of equipment until it failed,” he says. “We wanted to better manage our assets, and the best way to do that is through an asset management tool. You can track exactly where your assets are and how they’re performing.”

Tracking the performance and establishing maintenance timeframes for assets such as roofs, water heaters and heating/ventilation/air conditioning systems helps airports stay ahead and prevent emergencies, Hageman says. Much like the sticker that oil change facilities place on your vehicle windshield to remind you when to return for service, asset management software alerts airport staff to facility maintenance milestones.

The software is also designed to improve response for urgent maintenance needs.



WENDY HAGEMAN

“The benefit is saving time,” Hageman explains. “On the mobile app, a maintenance worker can report a broken faucet in a restroom. He can submit the work order on his mobile device from the restroom, and then the equipment is ordered and can be there that afternoon. As a result, that faucet is fixed in half the time.”

### Critical Prep

For airports not using asset management software, maintenance crews might have to go investigate a broken asset, travel back to an office to pull up details on a computer, look up the part number on a different site, and then order it. With MCI’s new system, managers receive alerts that let them know when maintenance is due.

Before mobile access is established, however, data must be assembled and strategic plans set for every asset that will be covered. That includes establishing a naming system for sites, rooms and assets for clear labeling. Vicky Borchers, BIM project manager at Burns & McDonnell, says the heavy lifting needed on the front end makes a strong case for filling a role like hers to manage all the moving parts during design and construction.



VICKY BORCHERS

“Historically, all of the plans are packaged up in three-ring binders or some digital folder structure. In this case, the airport wanted that handoff to be more organized in a way they could receive it and not have to reshuffle it for Maximo,” says Borchers. “If you have a system in place and enact it during construction, you won’t have to worry about arriving at the handoff and not knowing what to do. A lot of clients will literally spend years reshuffling that information so they can use it down the road.”

Burns & McDonnell brought in Electronic Data Inc. (EDI), an information technology subcontractor from Florida, for the large-scale Maximo implementation, data integration and migration of data from the BIM model to Maximo. The EDI team oversaw the process, including strategy development, testing and staff training. Technicians completed test migrations of data and attributes to ensure everything aligned and mapped properly for the airport. Joseph Mahaz, the company's chief executive officer, says that it's important to perform "just in time" training shortly before testing and go-live so the staff understands the procedures and system functionality as soon as the system is fully live.



JOSEPH MAHAZ

"As you work through Agile sprints and develop different aspects of Maximo, you can move them into testing and make sure each is working properly," Mahaz says. "Eventually, what you're doing is building test scripts for the customer so that after everything is configured accurately, you can train individuals. Test scripts are the guide to make sure everything is working correctly."

If issues arise during configuration or user acceptance testing, they are fixed and tested again. Once everything tests properly, the

process moves into the training phase, with materials such as test scripts based on the results.

"There's a lot that goes into how to organize this information so that when the system is turned over to the airport, it's useful from day one," says Borchers. "The goal is a fully-functioning asset management."

### No Digital Garbage

Borchers emphasizes the importance of starting with organized data. "If the data is not set up properly, it would be as if the contractor puts all of the operations and maintenance information into a dumpster and hands it over that way. You don't want a digital version of a dumpster; it makes life easier for the contractor but is not useful for the airport."

In contrast, a computerized maintenance management system like MCI's acts more like a data funnel. All data is organized and aligned so the airport team can add and delete information as needed each step of the way. The big gap, says Borchers, is the specificity of data sets. If users request a certain level of detail that doesn't match the Construction Operations Building Information Exchange (COBie) data filing, they'll get the least common denominator of data, which requires more manual manipulation.

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## Advisory Circular

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COBie is an international standard for managed asset information including space and equipment. It is closely associated with BIM approaches to design, construction and management of built assets and helps capture and record project data including equipment lists, product data sheets, warranties, spare parts lists and preventive maintenance schedules.

Based on the results of data testing at MCI to this point, Mahaz advises other airports considering similar projects to be very sensitive to pre-testing early in the process and to build a standard model for extracting data.

“If the data is not very specific for each department, once the model is delivered, there will be data sets pertinent to one department but not another. You have to understand the requirements and bring everyone to the table to ensure it matches rather than going through a manual data population so the data will map easily,” he explains.

Redhead understands that the transfer of data is extremely important. “You could make simple mistakes that screw up the data; it’s crucial to have it in a format that is usable to you.”

In terms of process and communication, Redhead and Mahaz agree that involving all stakeholders from the inception of the project is key. If everyone’s not at the table helping develop the standard, Mahaz says someone could get shortchanged, and the team would have to supplement the data set with manual processing. Incorporating all potential needs at the airport saves time on the back end, he adds.

Redhead says, “If it hadn’t been for the dedication and coordination of our department heads along with Burns & McDonnell and EDI, we wouldn’t be where we are now.”

The idea, he explains, is for this project to iron out any wrinkles before rolling out asset management in the new terminal, which is a much larger project.

“We knew this had to be scalable for the new terminal,” says Hageman. “We needed to be able to create the system without having to recreate it all over again, and we had to be conscientious that the data sets were set up properly. The standards had to be such that if it were one room or a whole terminal, it could be scaled.”


The most important aspect of this project, Hageman says, is finding a test case such as a small paving project that allows the team to pilot the process from beginning to end and see how the whole cycle works. Then, the airport can tweak and modify for the larger project.

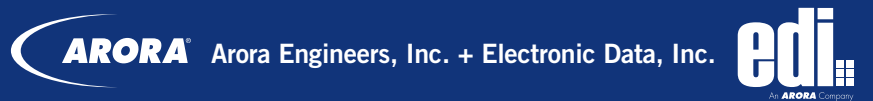
“A pilot is a great way to mitigate your risk when you’re not sure what you’re getting into,” says Redhead. “Realistically, I didn’t know the magnitude of what we were biting

off when we started this process; I thought the science of this was further along. I don’t regret where we are or how and why we are doing what we’re doing, because I believe it will pay off significantly. The pilot will help us look at real-time data and improve our efficiency before we begin the terminal project.”

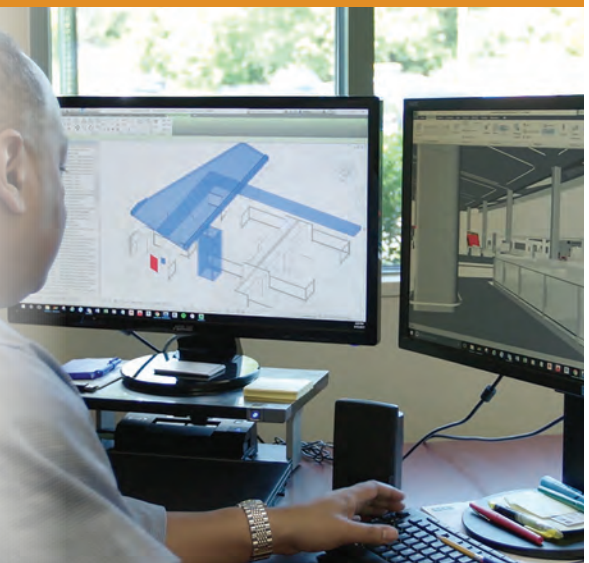
## Wave of the Future?

The Burns & McDonnell team sees computerized maintenance management systems as a trend that airports will embrace because it increases efficiency overall. Moreover, the team applauds MCI for taking steps to embrace innovation and change. While making the leap from BIM to computerized asset management programs is still in progress for many airports, they’re discovering new ways to link the model to the physical environment and use it as a 3D image of facility-wide data. Understanding implicitly how data is organized—and to what level of integration and detail—is part of the change management process, says Borchers. With national infrastructure needs projected to increase exponentially through 2021, the opportunity for new construction is vast.

“If you look at the lifecycle of current airport facilities in North America, many are 40+ years old,” observes Redhead. “If you have the chance to add asset management as you renew facilities, it might be negligent to not consider it. I don’t think I’m being harsh. I think it really is a tool that can provide significant cost savings in the long run.” 



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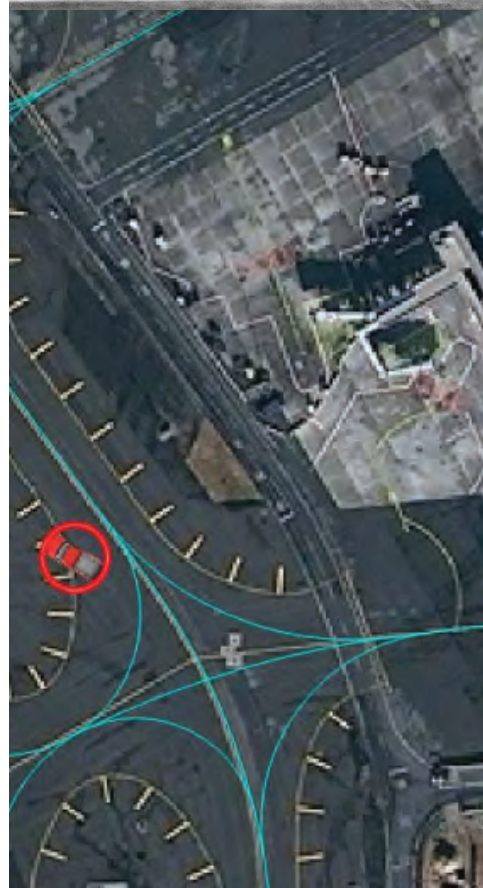
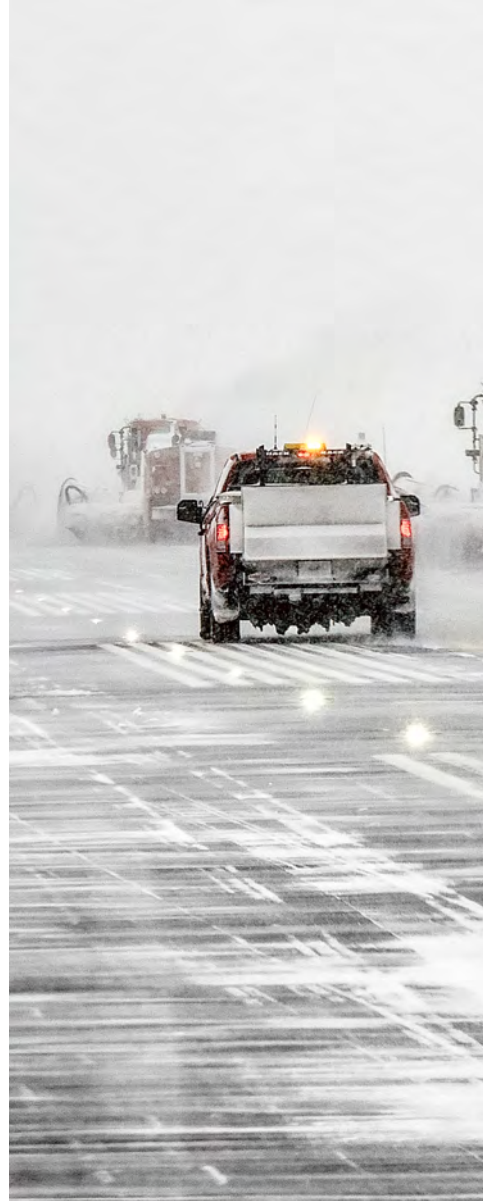
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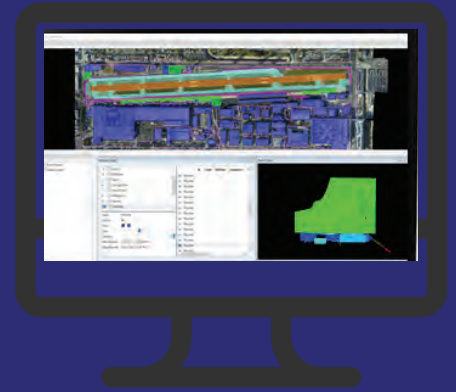
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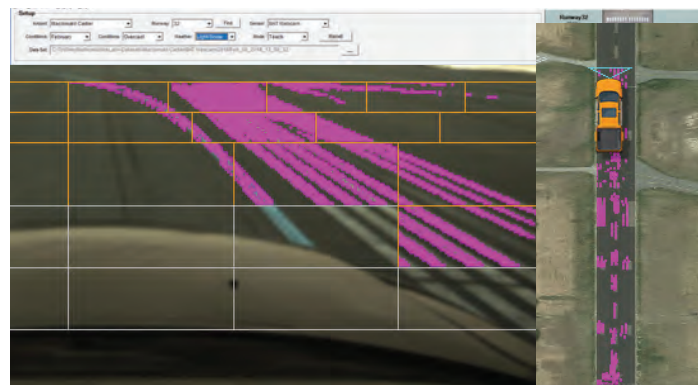
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# Colorado Aeronautics Division Makes Pavement Preservation a Priority

BY MIKE SCHWANZ



When it comes to runway renovations and other projects, officials at general aviation airports in Colorado are especially fortunate, because the state regularly offers proactive financial and technical assistance.

The Division of Aeronautics, a branch of the Colorado Department of Transportation, makes resources available to many of the state's 74 public use airports. "We are 100% funded by state aviation fuel taxes, and most of that money goes right back to the airports," says David Ulane, the division's director.

"Our total revenue is roughly \$33 million a year, and about two-thirds of this money is reinvested every month back to each airport where fuel is sold, depending on how much tax revenue that facility has earned. The individual airports can decide how to use it, so as long as they do so only for aviation purposes on the airport," explains Ulane. "Most of the remaining third of our revenue

we invest back into airports through grants to airports for various projects including pavement maintenance, if they request such funds. Some of the remaining third also goes to the U.S. Department of Agriculture, for wildlife management on airport properties and other statewide initiatives."

Each airport chooses the type of pavement or product it wants to use and the vendors it wants to work with, he emphasizes. The Division of Aeronautics, in turn, performs pavement inspections of each airport every three years. A comprehensive inspections report, including pavement condition index results and other details, is continually updated and available for any airport manager to review. "We are available to answer any questions they may have," Ulane comments. "We don't recommend specific products, per se, but do encourage our airports to touch base with their colleagues from other airports that might share similar conditions in climate, altitude or other factors."

Traveling to all of Colorado's general aviation airfields to collect pavement condition data can be a challenge, given the state's



DAVID ULANE



## FACTS&FIGURES

**Project:** Pavement Restoration Assistance Program

**Location:** 74 public general aviation airports in Colorado

**Sponsoring Organization:** Colorado Div. of Aeronautics

**Annual Revenue:** \$33 million

**Reimbursement to Airports for All Projects:** \$22 million annually (approx.)

**Total Grant Funding to Airports:** \$6 million (approx.)

**Key Benefits:** Financial assistance for pavement projects; detailed pavement inspections on 3-year rotation; detailed online reports with pavement condition index scores & other various airport improvements.

unpredictable climate and mountainous terrain. “The inspections are usually done in summer,” says Ulane. “We have a staff of eight people, and three are aviation planners. Generally, our people cover two or three airports in one trip. For large-surface airports such as Colorado Springs, it can take two full days. For small airports, it might only take half a day.”

The state’s time and effort reap valuable benefits, says Brad Grose, managing director at Asphalt Systems Inc. (ASI). The company sells asphalt preservation products throughout the world. Being familiar with programs elsewhere, Grose believes Colorado has one of the best pavement and inspection and inventory programs in the United States. “They maintain an incredible database of each airport’s pavements, including taxiways and runways,” he says. “All data is available on the state’s website, and this is an invaluable resource for any airport manager considering a new project.”



BRAD GROSE

### Climate Challenges

Colorado’s weather puts airfield pavement through the ringer. Ulane recalls the challenges he experienced as an assistant airport director at Aspen/Pitkin County Airport, which is at 8,000 feet: “It can be 80 degrees in summer. At high altitudes, there is more sun damage, since the sun’s intensity is greater. Then in winter, Aspen might get 200 inches of snow a year. I remember we had to perform a great deal of pavement maintenance. Snowplows also damage runways, since they are used so frequently.”

Since pavement resurfacing projects are continually in the pipeline throughout the state, Ulane was very pleased that the Colorado Aeronautical Board added an additional \$3.54 million in January 2019, just for pavement maintenance and rehabilitation. “Division staff, our board and the FAA are excited about that,” he says. (See chart on Page 41 for information about which airports received funds.)

The Division of Aeronautics encourages all eligible airports in the state to apply for grants to help pay for pavement maintenance projects. “We are a funding entity, so we tell our airports: ‘Take care of what you have so that everyone’s limited resources will go further,’” Ulane remarks.

### Rifle Airport

One airport executive who has taken full advantage of the state’s assistance is Brian Condie, director at Rifle Garfield County Airport (RIL). “We are very diligent in our pavement maintenance,” Condie



BRIAN CONDIE

reports. “We have only one main runway, Runway 8-26, and it is busy; we had about 24,000 annual operations in 2018. About 90 percent of our traffic comes from private jets. We sell the third-most amount of jet fuel of any general aviation airport in Colorado—about 1.5 million gallons in 2018.”

Two factors drive RIL’s strategy. “First, we feel we save money by spending money now on preventive maintenance, rather than having to completely rebuild our runway like we did in 2010,” Condie explains. “Second, due to our somewhat high-end clientele, image is important. We want to keep our runway, taxiways, lights and buildings in great condition, since it shows our customers that everything is well maintained. We also repaint the runway every other year.”

Condie has received state funding for multiple projects. “After we rebuilt our main runway in 2010, the Division of Aeronautics recommended that we do our first fog seal four years later. Then, as they suggested, we did our next fog seal in 2018,” he relates. “In addition, we do weekly inspections of our runway for cracks. So far, our pavements have held up extremely well since last summer’s work.”

Condie closely monitors the products used by other airports in the region. “We asked the state for information about what asphalt product other airports in our area have used successfully, since the state inspects all the surfaces. In our case, we decided to go with ASI’s GSB-88.”

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With only one runway, it was important to minimize disruption when that runway had to be closed for resurfacing. "When we did the fog seal in 2018, we did the entire airfield. We spent one day doing the fog seal, and two days applying the first coat of paint. We did the second coat of paint six weeks later. In all, we had to close the airport for about four days," he recalls.

Advance planning was the key to minimizing disruptions. "We sent out NOTAMs well in advance; we tried to give all our clients and pilots two months of advance notice," Condie explains. "We also made sure our construction dates did not conflict with other big events in our area. For example, Atlantic Aviation is our main FBO, and they sponsor a couple of big events every year. We made sure our scheduled runway work did not conflict with those."

Although RIL has used state funds for pavement projects in the past, the airport paid for all the pavement maintenance completed last year itself. Total cost was about \$435,000. "The reason for that was that we needed to spend about \$800,000 in 2018 for snow removal equipment, and the Division of Aeronautics told us they would provide more funding for that," Condie explains.

In retrospect, he is pleased that the pavement work is over and has been well received. "We have been given excellent feedback

from the pilots. The pavement surfaces and the lights are all in excellent condition. We should not have to do another resurfacing until 2023."

### Rangely Redesignates Main Runway

Another airport that has benefited from Aeronautics Division funding is Rangely Airport.

"They have helped us in the past with various resurfacing projects, and this year we expect to ask them for funding help in another area," says Airport Manager Jason Krueger. "We will have to change our main runway designation from 6-24 to 7-25, due to variations in magnetic readings. We have a flight school here, and 98% of our 10,000 annual operations come from that school. This is a safety issue, especially with lots of student pilots. We will also need new signs."



JASON KRUEGER

In five years, the airport will need to move its main taxiway about 100 feet south because it is too close to the runway and does not meet B2 standards. "This will be a big project that will take a substantial amount of time and money," says Krueger. "We will hopefully get help from the state on that project as well."

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One of the most popular products used by Colorado airports is GSB-88, manufactured by ASI. “Our role is material supplies; we do not install any product,” Grose specifies. “If airport managers or their engineers need more information from us, we are, of course, happy to oblige. We are very committed to the aviation industry, and are always happy to help find pavement solutions for airports, even if that means recommending other suppliers’ products if they are better suited to the need. We like being the ‘go to’ company for pavement preservation or problem solutions here in the United States.”

Often, ASI sends technical employees to assist with pavement projects. “If someone decided to use our product, we will work closely

**2019 State Local Grant Hearing List**

	State	Local	Total
<b>Eads Airport</b>			
<i>Runway 17/35 Pavement Maintenance</i>	\$100,000	\$11,111	\$111,111
<b>Eagle County Regional Airport</b>			
<i>Runway &amp; Taxiway Pavement Maintenance</i>	\$500,000	\$55,556	\$555,556
<b>La Junta Municipal Airport</b>			
<i>Runway 8/26 Pavement Maintenance</i>	\$540,000	\$60,000	\$600,000
<b>Meadow Lake Airport</b>			
<i>Complete Runway Rehab</i>	\$2,200,000	\$244,445	\$2,444,445
<b>Mineral County Memorial Airport</b>			
<i>Runway Rehab Design</i>	\$200,000	\$22,222	\$222,222

Grand Totals	Federal Funding	State Funding	Local Funding	Total Funding
	\$0.00	\$3,540,000	\$393,334	\$3,933,334

The chart above shows additional funding that the Colorado Aeronautical Board approved in January 2019.

Colorado Aeronautical Board

with the contractor chosen for the job,” explains Grose. “If the airport or contractor requests our presence, we are happy to send one of our representatives on site to assist. Most of our customers do take advantage of that service.” ✈️



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# Mineta San Jose Int'l Partners with U.S. Customs & Border Protection on Facial Recognition Systems to Screen Arriving & Departing Int'l Passengers

BY RONNIE L. WENDT

## FACTS&FIGURES

**Project:** 1-Step Biometric Screening for Arriving & Departing Int'l Passengers

**Location:** Mineta San Jose (CA) Int'l Airport

**System Debut:** June 2018 for inbound arriving passengers; February 2019 for departing

**Common-Use System:** Amadeus Airport IT Group

**Facial Recognition Biometrics:** Gemalto

**Funding:** U.S. Customs & Border Protection for entry; airport for exit

**Key Benefits:** Faster processing & enhanced passenger experience; reduced overtime costs for Customs & Border Protection agents

As the gateway to Silicon Valley, it's natural for Mineta San Jose International Airport (SJC) to leverage technology, researched and developed by local tech companies, to solve everyday passenger processing challenges. Of late, the California airport is using biometric facial recognition technology to screen international passengers and is leading the way for other U.S. airports to follow.

Explosive traffic growth that tripled the number of international flights since

2013 had led to unacceptable passenger processing delays. With four gates for international arrivals, passengers from multiple flights sometimes flooded the U.S. Customs and Border Protection (CBP) facility simultaneously.

"There were times when we had three to four aircraft at those gates; some wide-body and some narrow-body," explains Bob Lockhart, SJC's deputy director of operations. "We would have 700+ people trying to go through the facility at the same

time. People ended up waiting for an hour or two. We had one occurrence when people waited over three hours.”

The backups put the airport at risk of losing international passenger traffic to two nearby competitors: Oakland International Airport and San Francisco International Airport. As such, it became essential for SJC to change its approach. “In our highly competitive market, it is crucial that Silicon Valley’s airport continue to be the region’s airport of choice, given the convenience and on-time performance we are known for,” says Director of Aviation John Aitken. SJC served 14.3 million passengers in 2018, a 63% increase over five years.

To address its processing delays, the airport sought a partnership with CBP—just when the agency was developing parameters for entry and exit programs using biometric facial recognition technology. The result is a new passenger processing system in the airport’s CBP arrivals facility and at SJC’s international boarding gates. The entry project was funded by Congress, which authorized CBP to spend up to \$100 million annually for biometric installations at airports. SJC committed to supporting entry and exit programs, and funded the exit biometrics program for a multiple airline, common use, one-step process. As such, SJC was one of the first airports in the country to commit to processing all international travelers with facial biometrics.

The new systems, which went live in two phases, expedite the processing of international travelers. Phase 1 was launched in June 2018, with CBP implementing biometric facial recognition screening for arriving international travelers. The process for departing international travelers debuted this February with SJC partnering with ANA as the pilot airline.

“Our airport wants to be on the cutting edge of technology, so it was important that we be an early adopter and investor to support our tech-oriented travelers,” Lockhart says. “I think we are the right-size airport with the right amount of flights to give the CBP a good testing bed to prove this technology can work, just as easily as at the larger airports. And, it’s something passengers see as an easy, simple and efficient process.”

The new system has produced impressive results, he reports. At a press conference after implementing biometric entry for a six-week period, the CBP demonstrated that each passenger is now typically processed in less than two seconds and with a 99% match rate, with the added benefit of eliminating the need to scan the traveler’s passport.

Despite being very new, Lockhart predicts Phase 2 will provide similar improvements for departing passengers. “The first phase has been very, very successful in processing people quickly and reducing wait times, and I expect the same results with exit,” he says. “The biometric process is so quick at reading faces and getting information back.”

CBP officials are also optimistic about the final phase. “We expect it will be more efficient than the current process and more secure because of its imposter detection capabilities,” says Dan Tanciar, deputy executive director of the agency’s Planning, Program Analysis and Evaluation Office.

The airport anticipates that making the process more efficient may save money. Cost estimates associated with the 559 Reimbursable Services Program that SJC uses to pay overtime to CBP officers run from \$1 million to \$1.5 million per year. While biometrics may not totally eliminate these expenses, they will help in managing the need for CBP overtime.

## The Road to Facial Recognition

CBP’s first foray into biometrics began in 2004, when it began fingerprinting foreign nationals as they arrived to the U.S. “But we just couldn’t get our heads around how to implement fingerprinting with outbound traffic in a way that didn’t grind travel to a halt,” recalls Tanciar.

While European airports operate separate international departure terminals, that’s generally not the case at U.S. airports. A flight destined for Kansas might depart next to a gate with a flight bound for Beijing, China. “Our airport infrastructure just wasn’t built for a final biometric mission involving fingerprints,” he explains.

But in 2016, CBP found that if it leveraged biometric information and photos on travelers’ passports, it could use facial recognition technology to expedite the process. “We thought, ‘What if we took a quick picture of people as they passed by and matched each person to a passport photograph in the Department of Homeland Security (DHS) database?’ We loaded the images of passengers for a single flight onto a tablet, hooked it up to a camera and tested the idea, and lo’ and behold, it worked,” he explains.

This revelation led CBP to develop a cloud-based solution that facilitates processing all international arrivals and departures with facial recognition technology. The CBP then decided to work with select airline and airport partners to transition the technology into airports, rather than mandate the process for all.

Tanciar explains that airports have unique limitations and size constraints, and airlines like to operate in a way that’s conducive to each. “Rather than go forward with a government-mandated solution for facial recognition, we gave some parameters by which the process and equipment should work, then let the airports identify what works best for them. San Jose was one of our first supporters in this endeavor,” he comments.

The goals for the partnership were simple, adds Tanciar:

1. Congress mandated inbound and outbound biometrics, and CBP sought to meet that requirement.
2. The system needed to be fast, effective and efficient. “We had to ‘do no harm’ in terms of how aircraft are boarded. We knew we wouldn’t get much more than two seconds per traveler to accomplish this biometric mission,” he recalls. “We had to be able to implement it in a way that didn’t delay departures.” Adding fingerprints in 2004 represented a significant security achievement but added about 90 seconds to every inbound transaction for foreign nationals.
3. The resulting system had to be accurate in matching the right people to the right document.

Rather than starting the process by scanning passports and collecting fingerprints for every international traveler, the new biometric system takes photos of arriving and departing international passengers as they walk by. The system then checks the photos against images on file from the DHS database of passport and visa photos. If passengers' basic information and airport photos match what's in the database, they continue on their journeys.

"It is a huge time savings from an inspections point of view because we've eliminated those administrative steps of handling and scanning the travel document," Tanciar says. "This all happens in less than two seconds, so that the minute-thirty that

was added with fingerprints has now been subtracted again. I predict you'll see arriving processing times for foreign nationals that are pretty close to those of U.S. citizens."

Using biometrics meters departing passengers better on the boarding bridge, adds Lockhart. "This helps get people on the plane faster," he reports. "They are boarding naturally, and everyone has time to do what they need to do before they sit down."

The system's speed and 99% match rate are made possible because it does not compare each passenger's image against the entire DHS database. Instead, CBP receives smaller galleries of passport and visa images based on each flight manifest.

If for some reason a passenger's image does not match the one housed in the database, the passenger goes through the traditional processing procedures already in place. An airline gate agent asks the traveler for a boarding pass, scans it and reviews the travel document. If everything matches, the traveler boards the aircraft. If the gate agent suspects the person is using someone else's passport, CBP takes it from there.

"We've had some great successes in identifying imposters," Tanciar reports. "At Washington-Dulles International Airport, the system identified three imposters in 40 days. It really helps us achieve what we need to do—find folks who should not enter the United States or wish to do us harm."

### Tackling the Tech

SJC partnered with Amadeus Airport IT Group for its new facial recognition system. Lockhart explains that the choice made sense, because the airport uses the company's common-use systems throughout its two terminals—flight information displays, boarding pass gate readers and various equipment at airline counters. By expanding the company's boarding pass readers with Gemalto facial recognition technology, the airport's goal is to tie biometrics into the boarding process, streamlining passenger processing to a single step.

After the system captures a passenger's face, it compares the image against a database of images for the flight. Gate agents watch a screen for either a green checkmark that confirms the passenger's identity or a red stop sign that indicates the individual needs to talk to an agent.

Betros Wakim,  
president of Amadeus  
Airport IT Americas,



BETROS WAKIM



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Facial recognition systems are currently being used for arriving and departing international passengers.

explains that the system required two points of integration. One involved taking the image and sending it to CBP and getting results back. To do this, developers incorporated two Gemalto facial recognition cameras that triangulate and capture an image as each passenger walks by. The system then leverages the company's image processing software to securely transmit the data to CBP. "Passengers don't have to stand there and pose for a picture," he says. "They don't have to hand their passport or even their phone [loaded with a boarding pass] to the agent. The idea is to remove all frictions from the travel journey so passengers can have a frictionless trip." (See sidebar on Page 46.)

The second part involved integrating systems to transport data back to the common-use system with the traveler's identification number, which gives airline agents clearance to board that passenger.

To ease implementation, SJC and Amadeus rolled out the exit system with ANA first, because it also operates the company's Altea system. Once the process is fine-tuned with ANA's daily nonstop to Tokyo-Narita, SJC will expand the technology to all international airlines. "If the airline uses third-party software, where we don't have a relationship, integration will be a little bit harder," Wakim explains. "But because of our background, we're able to integrate the systems and still deploy this capability as a single step."

### Passenger Privacy

The entire system had to comply with the EU General Data Protection Regulation, which is widely considered the most significant change of data privacy protections in 20 years. Because the facial recognition technology uses an image and other personally identifiable

information, processes were needed to protect the data and delete it from the cloud shortly after use. In contrast, CBP retains fingerprints and photographs of most foreign nationals for up to 75 years.

“We knew early on that whatever we put into the cloud to enable fast, accurate matching and responses back to the airline for departure had to be minimal. We had to minimize the amount of personally identifiable information that’s available, so [gate agent and CBP officers] receive a templated photo, which is encrypted and associated with a unique identifier tied to the airline manifest—that is all that is stored in the exterior cloud. There are no names, birthdates or other personal information being transmitted,” Tanciar explains. “We looked at the privacy aspect of this very mindfully, and security-wise, we have a great cybersecurity division at CBP, which helped us build a resilient system that protects against cyber threats.”

Airline agents do not see the whole image of a passenger, adds Wakim. Instead, they see coordinates and numbers. The system isn’t taking the whole dimension, it’s taking characteristics of the face and sending it to the cloud, he explains.


### What’s on the Horizon?

Currently, SJC has installed facial biometric systems at two international gates, with deployment to soon follow at two more.

Mobile systems will also be installed at up to three additional gates. “It’s important that we have global capability and flexibility on as many gates as possible,” says Lockhart.

On a holistic level, he sees the future as very bright for this technology and anticipates SJC may eventually use facial recognition technology for every flight, even domestic departures. More near-term, CBP and the airport hope to add cameras that can photograph groups of international travelers, such as families with small children, at the same time.

“Currently upon arrival, they have to walk up separately to get their photos taken by Customs agents, but CBP will eventually roll out a system that displays multiple pictures on the screen at the same time. SJC would like to offer the same for departing international passengers,” says Lockhart. “That way, CBP and airline agents can look at them and approve them all simultaneously, which will speed up processing dramatically because processing a family of passengers will take 30 seconds total instead of 30 seconds per person.

“Right now, we are on the leading edge with facial recognition technology, but eventually it will become the norm,” he adds. “There will be no more retrieving your passport and boarding pass multiple times, while juggling luggage and children.” 

## Coming Soon: Frictionless Air Travel

Leveraging facial recognition technology to speed the processing of international travelers opens the door a bit wider for what Betros Wakim, president of Amadeus Airport IT Americas, calls frictionless travel.

Wakim explains that current necessities such as showing a passport or state ID to airline agents, dropping off baggage and standing in security lines cause friction points in a journey that take time and create delays. But a frictionless trip removes such irritations so passengers do not have to talk to anyone at the airport if they so choose. “They can go in and use biometrics to navigate their way through the trip,” he explains.


In the future, Wakim predicts that passengers will enter a facial image and basic personal identifiers into their smartphones; and from that point on, their smartphone will interact with airport systems to verify that they are who they say they are. The travel journey will likely look something like this:

Passengers will approach a self-service bag drop, the system will identify them through biometrics on their smartphones and print bag tags, which they attach to their luggage. They then move through the TSA checkpoint, where a system

automatically verifies their identities. Airside, passengers can enter a lounge with biometric identification or purchase concessions through their phones.

“Anytime there is anything interactive, the passenger’s phone can enter a code on his or her behalf,” says Wakim. “You’ll tell your own digital ID, stored securely on your phone, to interact for a specific period, such as when you travel from Orlando to Los Angeles. The individual will give permission to use his or her data and specify for how long.”

Though it sounds like something from *The Jetsons*, Wakim reports that a lot of organizations are currently working on such systems. “I wouldn’t be surprised if the frictionless trip becomes reality within a few years,” he predicts. “We’re actually already prototyping the model.”

“Technology-wise, it could be done tomorrow,” he adds. “Process-wise, we need to make sure everyone follows the regulations. Meeting the EU General Data Protection Regulation and other governmental requirements will take some time. But when frictionless travel becomes reality, it will completely transform the travel journey.” 

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# Proactive Fleet Management & Fiscal Prudence Keep Montréal Trudeau Int'l Prepared for Snowy Challenges

BY JENNIFER BRADLEY



## FACTS & FIGURES

**Project:** Optimizing Winter Operations

**Location:** Montréal–Pierre Elliott Trudeau Int'l Airport

**Owner:** Transport Canada

**Operator:** Aéroports de Montréal

**Total Runway Surface:** 1.6 million sq. meters

**Apron:** 1.1 million sq. meters

**Avg. Snow Removal Time:** 17-25 min/runway

**Winter Season:** Nov. 15–April 15

**Snow Removal Crew:** 122.5 employees; 91 more on call with bank of guaranteed hours

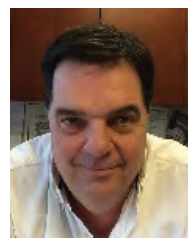
Winters at Montréal–Pierre Elliott Trudeau International Airport (YUL) are nothing to trifle with. Snow removal crews provide 24/7 coverage for the airfield from mid-November to mid-April. That's five long months of physically demanding work in cold, sometimes punishingly frigid, conditions.

In 2016-17, the area dealt with 13 freezing rain events and experienced average snowfalls of 220 cm (86.61 inches) each year. In preparation for the 2018 winter season, Aéroports de Montréal acquired new equipment to help crews maintain an increased amount of airfield surfaces, including new remote aircraft parking areas. It also replaced three units at the end of their lifecycles and bolstered YUL's fleet for dealing with ice and freezing rain.

Sylvain Marchand, assistant director of ground maintenance and mobile equipment for Aéroports de Montréal, says the main

objective is to optimize the lifecycle of all pieces—by not spending frivolously and keeping equipment for as long as it is useful.

Alexander Leonard, manager of mobile equipment for YUL, is glad he and Marchand are on the same page: focusing on what equipment is *needed* rather than what can be afforded. "We've always been a bit more frugal on the number of equipment," Leonard reflects. "But we know that if you don't have contingency equipment, your operations are directly impacted."



SYLVAIN MARCHAND



ALEXANDER LEONARD



With more than 19 million annual passengers, YUL needs a large-scale operation for battling snow and ice. Leonard emphasizes that it also requires a well-managed fleet that is flexible, benchmarked and balanced.

### Bone-Chilling Challenges

Many of the headaches Leonard experiences are simply matters of geography and weather. “We get pretty hard winters, a lot of accumulation and really different peaks in temperature and precipitations,” he explains. “We can see basically a cocktail of different weather patterns in 24 hours.”

The harsh weather is tough on both staff and equipment, notes David Robichaud, an international sales representative at J.A. Larue Inc. Steel becomes brittle, components break more easily, and extreme cold stresses hydraulics and engines, says the 40-year industry veteran.



DAVID ROBICHAUD

YUL has developed formulas to estimate the type and amount of equipment needed

for various weather situations. The formulas balance current and forecasted conditions with the amount and type of surfaces to be cleared: 1.6 million square meters of runways and traffic lanes, another 1.1 million square meters of aprons, and other miscellaneous airfield pavement.

Changes to the fleet affect the coverage levels. Over the last 10 years, equipment has become larger and more efficient. Snowplows equipped with 40-foot blades and other key tools reduce downtime for clearing operations and help prevent runway closures, observes Marchand. Currently, YUL’s average snow removal time is 17 to 25 minutes per runway. (Runway lengths vary from 7,000 to 11,000 feet.)

“If we rewind to a decade ago, for the same amount of equipment, we have reduced our time in half,” he remarks.

This is good news for passengers and air carriers—especially Air Canada, which uses YUL as a hub. It’s also a welcome trend for the airport’s snow crews.

Robichaud notes that the comfort, ergonomics, speed, safety and capacity of equipment have all increased over the years. “The speed of how fast you can do the work is a critical aspect for airports,” he says. “A lot of facilities are updating their equipment to higher-capacity models to be able to clear a 10,000-foot runway in 20 minutes.” Some of the sweepers and snowblowers he sells work at 25 to 30 mph.

### Planning Ahead

Scheduling equipment purchases can be tricky, as the lead-time for delivery of large pieces can be more than one year. According to Leonard, the key is finding the sweet spot between capital planning and complete amortization. “That’s the fine curve of maintenance,” he notes. “Right before it goes out, you have to get rid of it. You can’t have frontline equipment that’s in the garage all the time.”

If fleet managers wait too long, electronic parts can prove hard to find and software updates may be unavailable. “Sometimes, technology



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## YUL Equipment Fleet

- 5 Kenworth trucks with Epoke spreaders for liquid deicing product
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- 11 snow blowers for runways and aprons: J.A. Larue; Oshkosh
- 11 loaders: John Deere; Volvo
- 16 Oshkosh snowplows (24-foot)
- 16 MB sweepers (22-foot)
- 6 small tractors equipped with sweepers: Multihog; Bobcat; John Deere
- 5 John Deere tractors equipped with push blades
- 4 graders: John Deere; Volvo
- 1 John Deere bucket bulldozer
- 1 Caterpillar backhoe loader
- Plow blades from Metal Pless

## YUL Snow Removal Team

- 67 heavy equipment operators
- 16 light equipment operators
- 16 workers
- 8 team leaders
- 5 supervisors
- 9.5 mechanics
- 1 technical advisor

companies are just gone, so it's very important to watch that amortization schedule and turnover equipment at the right time," Leonard cautions.

Aéroports de Montréal provides a structure for the process. "Once we establish our needs for the future, we sit with our airport planning group and establish a 10-year plan for the future, incorporated with all the changes on the airfield," Marchand explains. "We do this because we have to keep delivering the service. We have to be ready when the time comes."

Even after decades of experience in airport maintenance and fleet management, Leonard studies what colleagues are doing to learn more about equipment planning. But he also knows there is no set recipe for optimum fleet management. What works in Toronto may not work in

Montréal. "Be flexible and have an open mind," he advises others. "Do a lot of benchmarking to see what's going on in the industry."

When possible, Leonard prefers to buy batches of the same brand of equipment—in part to streamline the spare parts needed. "With a diversified fleet, the key goal is to have ample parts for your front line critical/operational equipment, while using your stock room space wisely," he says. "Don't be shy to have local machine shops fabricate specialized parts that have long lead times and high price tags from the manufacturer."

Preventative maintenance is key to making sure machines are ready to go when needed, adds Robichaud. Even if an airport receives just one or two snows a year, it's important to be ready to plow the airfield quickly.



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"The idea is to replace a piece of equipment, which is an asset, before it becomes a liability," says Robichaud.

He explains that this is more of an issue than in the past, because engines have been upgraded to new standards and the industrial equipment airports use must now meet the same standards as highway equipment, which is more complex and expensive.

To address such issues, Marchand says that it's vital to make sure enough funding is identified for replacements as equipment nears the end of their lifecycles. At YUL, he performs an annual analysis and makes associated price adjustments on each piece of equipment every year. He assesses the equipment's physical condition and balances that with how much money has been spent on it since it came into the fleet and how much was spent in the last five years of use.

The process aligns the team about whether equipment needs to be replaced, and it works with every type of equipment, he reports.

Another thing these professionals agree on is not automatically accepting the lowest bid. "We will go to a quality price, but a quality machine, first," Marchand explains. "I'm proud of that."

Beyond price and quality, he solicits input from other airports that have used a particular piece of equipment. He also analyzes

reliability and service data. Based on his experience, Marchand believes that good equipment management practices are in place all across Canada. "It's very important," he says. "Make sure that you identify replacements in the right year, because you will spend a lot of money if you don't know; and you will have downtime of critical equipment that you don't wish."

Like Marchand, Robichaud sees scientific, methodical practices at a variety of airports. "The majority are using maintenance programs," he reports. "The software tracks any repairs, as well as fuel and labor costs. If it starts to hit the bottom line, they know they have to replace it."

## Team Approach

At YUL, a working group meets three to four times a year to make sure equipment aligns with airport planning. This has been more of a challenge lately, as the airport is growing faster than expected, and capacity is a challenge. "The main thing is to be ready to service the airlines and other partners as expected," says Marchand. "If we're not ready, we're in trouble".

He consequently depends on airport planning to guide the analyses. "There are many people around us that know many things. That helps us all in this process," he reflects.

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## Bracing for a Storm

Sylvain Marchand, assistant director of ground maintenance and mobile equipment for Aéroports de Montréal, offers these tips for other airports planning for a major winter weather event:

- Keep continually aware of weather forecasts five days in advance
- Verify inventories of deicing products
- Hold daily conference calls and forecast updates
- Prepare and verify condition of equipment
- Remove snow without interruption, from the first flake to the last

For Leonard, equipment operators are an important source. "Consult the users when you put the piece into service," he recommends. "Consult the users for the placements of radios, that type of thing. This is very important."


Mechanics and operators were consequently included in conversations about recent snowplow purchases. While some executives see shiny, new equipment at conferences and assume it will be a great fit back home, Leonard is happy that YUL waits to include the end users in the selection process.

"We have them drive the equipment at local airports or have one shipped here," he explains. "This is motivational for the employees, too."

According to Robichaud, the difference between a good airport fleet manager and a less-than-ideal manager is respect for the

equipment. "If you want a good operator, look for a farm kid. He was brought up to respect equipment. If he broke it, he had some explaining to do," quips Robichaud.

For quick equipment reviews and strategic advice, Leonard keeps handy a stack of business cards from every person in Canada with his job. "I find that important," he says. "At our level, we're not competing. We're just trying to get things done."

He also maintains close contact with equipment companies to learn about problems other airports are experiencing with products. On the flipside, Leonard keeps in close contact with his airport peers to learn about issues they are having with equipment suppliers. "I check with other airports first, to see if they are having the same problem," he explains. "Sometimes, we can approach the problem together and get things done." 

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# Prepaid Parking Online Enhances Customer Experience, Boosts Revenues at Dallas/Fort Worth Int'l

BY ROBERT NORDSTROM



## FACTS&FIGURES

**Project:** Online Parking Reservations & Prepayment

**Location:** Dallas/Ft. Worth International Airport

**Online Booking System:** ADVAM

**Mobile App Integration:** M2Mobi

**Parking Revenue Control:** SKIDATA

**Project Timeline:** 6 months preparation for Sept. 2017 soft launch; 6 months beta testing for April 2018 public launch

**Fiscal Year 2018 Usage:** 67,800 transactions; \$3.6 million in parking fees

**Customer Feedback:** 93% of users surveyed were satisfied with the service & would recommend it to others

**Noteworthy Details:** First U.S. airport to offer incentive-based variable pricing to book & prepay for parking; program is exceeding expectations for transactions & revenue



Dallas/Fort Worth International (DFW), *Air Transport World's* 2019 Airport of the Year, added online prepaid parking to its list of cutting-edge services for travelers last spring, and the program is exceeding all expectations. It's also helping increase the amount of parking revenue DFW collects.

A rarity for U.S. airports, the online system allows travelers to book and prepay for parking at discounts of up to 75%, depending on occupancy rates, where/when they book space and how long they will park. Currently, DFW is the only airport in the country to offer incentive-based variable pricing. (Phoenix Sky Harbor was the first to offer online prepayment for parking, but its system uses fixed pricing.)

DFW's John Ackerman, vice president of Global Strategy and Development, emphasizes that parking is very important to the overall customer experience. "A couple



JOHN ACKERMAN

of years ago, we started looking at online parking and parking yield management," he relates. "We realized that a prepaid online parking system, if implemented properly, would not only elevate our customers' experience, but would also drive the single-biggest source of nonaeronautical revenue at the airport."

According to preliminary reports for fiscal year 2018, DFW's inventory of more than 41,000 parking spaces grossed \$146.5 million—approximately 36% of the airport's nonairline revenue and 17% of overall annual operating revenue. (Denver International is the only other U.S. airport with more parking capacity than DFW.)

Given the revenue magnitude, airport management is keenly aware that customers' parking experiences should never be taken for granted. Especially since the rise of Uber and Lyft, DFW knows it has to make parking at the airport an attractive option.

"If we wish to encourage customers to choose parking, we need to make sure they have an elevated experience when they do,"



Ackerman emphasizes. “Revenues generated from business activities run the airport. The better we do driving our nonaeronautical revenues, the better we can operate the airport on behalf of our customers and community.”

### Efficiency & Savings

Teams worked for approximately one year to ready the online prepaid parking system—six months preparation for the soft launch in September 2017 and six months of beta testing before the public launch in April 2018.

To date, the system has far exceeded preliminary projections. The airport forecasted 30,000 transactions and \$1.8 million revenue during fiscal year 2018. Actual usage totaled 67,800 transactions and \$3.6 million—about double what was expected. Sweetening the results, more than 50% of users were new customers who had not parked at DFW the prior year. Moreover, follow-up surveys indicate that fully 93% of customers who used the online system were satisfied with the service and would recommend it to others.

Growth has been much faster than expected, Ackerman adds. “In December, approximately 15% of our transactions were online bookings. In just eight months, we have moved 15% of our customers online. In talking to our European colleagues, we thought it

would take two to four years to get to where we have gotten in eight months. Our conversion rate is outstanding! Of the people who access our website, nearly 30% are purchasing a parking product. The industry standard is in the 15 to 20% range.”

The system charges variable rates based on length of stay, convenience of parking location, time of booking and supply/demand. Drive-up fees for DFW’s three parking options—remote, express and terminal—range from \$10 to \$24 per day. By contrast, reservations made and prepaid online can cost up to 75% less.

Customers book prepaid parking online by entering their flight information, payment method and promotional codes, when applicable. The system automatically displays all available parking options and potential savings for

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each choice. Although specific parking slots are not assigned, users are guaranteed a spot will be available. Parking time can be amended up to one hour before scheduled arrival; time extended at either end is charged at the applicable rate. Customers can receive a full refund if parking is cancelled 12 hours before their scheduled arrival time.

### A Problem Worth Enduring

The airport hired ADVAM to manage integration of the parking system. In effect, the company linked together four separate information technology systems: the booking control system and PSB Webbank (ADVAM), parking revenue control system (SKIDATA) and the airport's mobile app (M2Mobi).

According to ADVAM Key Account Manager Chris Morris, DFW wanted to provide users with a high-quality online experience that required a minimal amount of keystrokes.



CHRIS MORRIS

Users are able to store their payment details to allow for one-touch payment at checkout. "This reduces the number of cancellations that may occur at checkout when people have to go search for their wallet," explains Morris.

DFW also wanted customers accustomed to scheduling and paying for parking on the airport website to have the same experience using its mobile app. To accomplish this, ADVAM opened its application program interface to make booking flow recognizable on the app and allow all features available on DFW's website to be available on the app, including one-click payment at checkout.

Customers with prepaid reservations use either a cellphone Quick Response code or North Texas Tollway Authority TollTag to enter parking facilities. Dovetailing with the TollTag system was important to the airport, notes Morris. ADVAM worked with the Toll Authority and SKIDATA to enable full integration, whereby a user's license plate number is checked against the TollTag database to verify the validity of the tag on purchase. The information is then transmitted to SKIDATA; and after the TollTag is validated upon arrival, entry is allowed to the parking facility.

"The entire experience is seamless for the customer," Morris reports.

In light of the complexity required to integrate three separate IT platforms, Ackerman reports that the airport is very pleased with how smoothly the system is running. "Although getting there was not without a few hiccups," he adds.

Case in point: The Wednesday before Thanksgiving week, the airport ran a one-day Orange Wednesday flash sale for bookings from Thanksgiving week through spring break. In preparation for increased demands on the system, the airport's IT team added extra bandwidth. "In effect, we supersized the system," explains Ackerman.

As it turned out, "supersizing" was not enough. The sale went live at midnight, and by 12:30 a.m. the system started experiencing severe slowdowns due to larger-than-anticipated loads. "We joke that we broke the internet," Ackerman quips. "Between our IT team here at the airport, ADVAM and M2Mobi, we had the system up and running smoothly by the time the sun came up. The sale was wildly successful. We had planned for 10 times our normal activity and got 20 times. If I'm going to choose a problem, that's the one I'm going to pick."

### Tip of the Iceberg

Enhancing customers' parking experience and maximizing associated revenue were the primary goals for developing the

prepaid parking online program. Currently, the airport is averaging 4,000 prepayments per week; total revenue through December 2018 was nearly \$7 million. However, the program is yielding long-term benefits for the airport as well.

"It helps us get to know our customers," says Ackerman. "I can tell you with a pretty high degree of certainty how many customers will move through our airport today. But before we initiated the parking program, I couldn't tell you who they were. We knew the number but not the name. Airlines know their customers, as do rental car companies—basically everybody connected with the customers' journey other than the airport. Today, with the online booking system, we are able to gather customer information: their zip codes, how often they travel, their likes and dislikes. Over time, we will be able to tailor offerings that benefit both the customer and airport. For example, parking products can be bundled with discounts in concessions or even expedited security queues."

In other words, DFW views parking as just the tip of the iceberg. Passengers have many opportunities to interact with the airport and its partners, Ackerman reflects. "For us, getting to know our customers is a multiyear journey." ✈️



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# Prevention Figures Prominently into FOD Program at Memphis Int'l

BY SCOTT BERMAN



## FACTS & FIGURES

**Project:** Foreign Object Debris (FOD) Control

**Location:** Memphis (TN) Int'l Airport

**Airfield:** 4 concrete runways; 18 major taxiways


**Traffic:** 224,000 annual operations; 9 passenger airlines (10 when Via begins service in June 2019); 4 cargo carriers

**FOD Removal:** 396 instances in 2018

**Staff Resources:** 9 Operations employees directly involved in FOD removal & prevention

**Airfield Inspections:** 3/day; 1/shift

**Removal Equipment:** FOD\*BOSS, from Aerosweep Pty Ltd; Air Sweeper 600, from TYMCO; FODBUSTER, from FOD Control Corp.

 Small rocks, aircraft parts, luggage tags, bits of garbage—you name it, the Operations team at Memphis International Airport (MEM) has found it.

Removing foreign object debris (FOD) from its four runways, 18 major taxiways, ramps and other airfield areas is a constant priority for the Tennessee airport. Last year alone, crews removed nearly 400 pieces of FOD, thus preventing the items from being ingested into aircraft engines and causing costly damage. Between aircraft repairs and related downtime, FOD is estimated to cost the global aerospace industry \$4 billion to \$10 billion per year.

Like other airports, MEM focuses on training, detection, removal and prevention, according to guidance from the FAA Office of Airports. “But every airport is unique,” notes Glen Thomas, MEM’s director of Strategic Marketing and Communications.

As the world’s second busiest cargo airport, much of MEM’s traffic occurs between 10 p.m. and 4 a.m. “That translates into a lot of aircraft, vehicle, service equipment and personnel activity in the dark, where materials can escape unseen,” explains Terry Blue, vice president of Operations with the Memphis-Shelby County Airport Authority. “It also means a lot of package sorting. And no matter how good a tenant’s mitigation program is, as is the case here in Memphis, it still creates the potential for FOD. That means the Operations team must remain ever-vigilant.”



TERRY BLUE

CREDIT: MSCAA

Not surprisingly, crews encounter extra plastic wrap, Styrofoam and cardboard on the airfield when cargo traffic increases during the holiday season. In warmer

months, however, they are more attuned to grass clippings blowing onto runways and other critical operating areas, because they can potentially make pavement slippery and also attract wildlife such as geese.

Given MEM's particular traffic, it goes above and beyond minimum FAA requirements for at least one airfield inspection

per day. Instead, the Operations department typically performs three every day, one per shift. Crews also execute different types of inspections and vary the routes they take.



JARIN HORTON

"This helps cut down on complacency and helps ensure that inspectors can view surfaces from multiple directions," explains Jarin Horton, manager of Operations with the Airport Authority.

Beyond their regular daily inspections, crews make additional checks during construction projects and other events that could increase the likelihood of FOD. "Meteorological conditions may also affect safe air carrier operations, such as a lightning strike causing a pavement break out," says Horton.

Usually, nine of MEM's 11 Operations employees are directly involved in clearing and preventing FOD. But once a year, the crew expands dramatically when all 63 full-time Airfield Maintenance employees join the Ops team to conduct a safety walk.

### Preventive Measures

In addition to searching for and removing FOD, the airport actively works to prevent it in the first place.

The installation of fencing on the north side of the airfield has helped stop trash from blowing onto critical operating areas. And MEM holds monthly safety meetings with airlines and other tenants. "We try to pinpoint where FOD is coming from," Horton explains. "It may be as simple as making sure a trash bin lid is on."

The airport scored a significant proactive win a number of years ago after



Once a year, Airfield Maintenance employees join the Ops team to conduct a safety walk.

crews began noticing stray fuel caps on runways and taxiways. Operations personnel started tracking what caps were found where, and prepared a report they shared with the FAA, Transport Canada and Airbus. "None of the original Airbus-designed fuel caps were found on movement areas; the problem was only aftermarket fuel caps used by some carriers on Airbus equipment," stresses Operations Duty Manager Dave Moreau. "The caps in question were believed to present problems for fueling agents if reattached incorrectly."

After receiving the report from MEM's Operations Department, Airbus issued a Service Information Letter in 2004 and Transport Canada issued a Service Difficulty Advisory in 2007.

"Since these documents were published, we have only found one fuel cap," reports Moreau. "This single find may have been lost in an infield area prior to the resolutions and training adopted by fuelers following the dissemination of these publications. This issue has not been a problem for MEM since 2008."

More than a decade later, prevention is still a primary issue discussed at the airport's annual FOD Committee meeting. Attendees include Airport Authority personnel, representatives from all airlines that operate at MEM, various airport departments, caterers and other tenants. "The committee discusses trends and ways to prevent and reduce FOD," says Horton.

### Leveraging Technology

The Airport Authority is also forging ahead with tech-based strategies. Currently,

it is acquiring a new database with a geographic information system (GIS) component. "Hopefully, this new database will allow us to run more sophisticated reports to help identify trends over a period of time," says Horton. "This information could then be shared with our tenants to ensure any problem areas are being addressed. Also, having a GIS map will allow us to easily create visual depictions of our problem areas that can then receive more focused inspections."

A FOD database and subsequent trend analysis by the FAA and airport personnel could prove to be important steps forward. If data show that a particular

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FOD item keeps appearing in a particular area, MEM can take counter measures accordingly.

According to Blue, MEM's efforts to leverage technology such as GIS reflect a larger industry trend. "In the past, process improvement seemed to focus on more and better training for everyone involved," he observes. "And though the attention to training programs has not dissipated in any way, lately the conversation has centered on the use of equipment and technology."

## FOD Fleet

While the Authority explores high-tech preventive measures, a mix of removal equipment continues to be the cornerstone of MEM's front-line defense strategy. (See list on Page 58 for specific products.)


Moreau explains that crews use a sweeper truck for lightweight FOD such as grass clippings, and sweeper mats for small but heavier items, such as rocks, screws and bolts.

Stuart Tozer, managing director of Aerosweep, stresses the safety benefits of his company's FOD\*BOSS tarmac sweeping equipment. Tozer notes that beyond aircraft engine damage, FOD also causes an alarming amount of damage to aircraft tires. One to three FOD\*BOSS sweepers can be towed by a car or truck to create a sweeping area up to 24 feet wide to prevent such damage, he advises.

"FOD creates an unsafe environment for crew, passengers and ground staff," Tozer emphasizes. "Just imagine the damage a rock sucked into a spinning propeller or turbine could do, as it ricochets like a bullet into the ground crew. Operation managers are fully aware of these risks, and are looking at increasing safety, by reducing FOD at an effective cost within the airport precinct."

Tom Rokas, Inside Sales for TYMCO Inc., notes that the nature and quantity of FOD varies greatly from airport to airport. "It really depends on the condition of the runways and taxiways," he explains, noting that the company's largest sweeper has a capacity of 6 cubic yards. "That is a very large amount for an airport to pick up in a day, unless they are doing some type of construction."

Lately, Rokas has found that many airports require their construction contractors to have a sweeper truck on site during projects on or near runways, taxiways and other areas where FOD is an issue. When choosing equipment for their own fleets, airports want flexible vehicles that can sweep roads and parking lots as well as airfield pavement, he adds.

No matter what type of equipment they use or strategies they employ, MEM and other airports share a common goal of airfield safety. "It is impossible to prevent FOD completely, however we make our best effort to reduce it as much as possible," Horton remarks. Toward that end, he suggests establishing a "safety culture" that includes regular safety meetings, newsletters, training and reward systems that encourage employees to take a proactive approach to reducing FOD. 

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*Photo courtesy of NASA*

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# Concourse Expansion at Charlotte Douglas Int'l Fuses Technology & Artistry

BY NICOLE NELSON



Charlotte Douglas International Airport (CLT) claimed a spot on the industry's architectural and design map for "placemaking" with a nine-gate concourse expansion it debuted last summer.

Architects, designers, consultants and CLT staff collaborated to make the 230,000-square-foot development a destination in and of itself. Together, the team revolutionized the visual aspect of Concourse A with sweeping high-tech windows, digital artwork and new customer amenities.

The new \$200 million concourse addition is the first major gate development at the airport in 16 years and represents a 10% increase in total gate capacity, notes Aviation Director Brent Cagle.

In addition to being wider and taller than CLT's other concourses, the build-out includes high ceilings, natural light, terrazzo flooring and sustainable windows. "Certainly, it has everything that a passenger of today would expect in a modern concourse," Cagle says, noting the facility's spacious restrooms, dedicated mother's room and pet relief station.

New food/beverage concessions include Panera Bread and NoDa Brewing, which makes local craft beer that Cagle says is a hit with visitors and Charlotteans alike.

The airport utilized a construction manager at risk delivery method, with the construction joint venture of Turner/Rodgers

and architects C DESIGN and Perkins+Will working together to deliver the project on time and on budget.

## Standout Features

Cagle's desire to "do something different and impactful" with the new space led to considerable variances from existing CLT facilities. Perhaps the most notable is a highly visible public art display that draws attention from inside and outside the terminal.

Utilizing the 1% art budget from the airport's capital improvement fund, the project team commissioned world-renowned media artist Refik Anadol to create an experiential piece of artwork for CLT customers. The end result is *Interconnected*, a digitally driven amalgamation of live airport data projected onto three large, eye-catching displays.

Using C++ programming language in conjunction with elaborate media servers, Anadol's modern streaming installation collects live data from the airport in three-month increments and siphons them through an algorithm that paints canvases as airport visitors watch. The live images intermingle with geometric shapes, liquids and numbers on a 140-foot-by-9-foot display at eye level for visitors inside the terminal. Images are also projected on two overhead trapezoid displays, each spanning 600 square feet. All three displays can be clearly viewed from the glassed exterior of the airport. An added accent of LED lighting on the architectural fins continually morph in coordination with the ever-changing images on exhibit.



BRENT CAGLE



*Interconnected, by Refik Anadol*

CREDIT: RICH TAYLOR PHOTOGRAPHY



CREDIT: RICH TAYLOR PHOTOGRAPHY



## FACTS & FIGURES

**Project:** Concourse Expansion

**Location:** Charlotte Douglas Int'l Airport, Concourse A

**Operating Entity:** City of Charlotte Aviation Dept.

**Phase 1:** 9 new gates & associated ramp & taxi lanes

**Primary Objectives:** Accommodate expanding air service; replace several existing gates

**Cost:** \$200 million

**Funding:** Future general airport revenue bonds; passenger facility charge revenues

**Construction:** Spring 2016–summer 2018

**Grand Opening:** July 18, 2018

**Construction Contractor:** Turner/Rodgers joint venture

**Designers:** C Design; Perkins+Will

**Electrochromic Windows:** View

**Seating:** Arconas

**Featured Artist:** Refik Anadol

**Visual Displays:** Nanolumens/Cenero Audio Visual

**Master Concessionaires:** HMS Host; Paradies Lagardere

“When you approach the airport, *Interconnected* really becomes the first element of the terminal that you see from the roadway,” says Cagle. “It certainly helps to define the look and feel of the airport, even as you’re driving up.”

CLT’s manager of Customer Engagement, Lauri Golden, says that the airport was thrilled to incorporate a work of this magnitude into the expansion project.



LAURI GOLDEN

“Art in the past has been hanging a picture on the wall, and that is not what it is today,” Golden remarks. “Our customers are looking for us to bring

something special to them, and we were up for the challenge. We want to create the CLT experience, and we feel like this is a huge success.”

The installation’s visual animations appear to be breathing as they evolve through three different chapters of an eight-minute presentation that runs on NanoLumens displays. Arch Nelson, the company’s southeast sales director, says that the displays provide an extremely vibrant color palette on a low-touch technology that is very efficient and different from its projection predecessors.



ARCH NELSON

“All of our technology is engineered to be lighter, thinner and greener—not only to have a low impact on the structure of the building, but also to keep in mind the green initiatives that this building has,” Nelson explains. “This is an emotive technology that allows people to experience the space in a much different way than you would with a typical art installation.”

Golden is similarly enthused about the installation’s effect on passengers. “Our goal was to expand the terminal and have something special that not only makes the impression of Charlotte on the customer, but also leaves them with something that makes them feel good 24 hours a day,” she explains. “This opportunity definitely demonstrates what art can be at an airport and how it is much more than the traditional canvas painting or statue. It really pushes the boundaries and puts us on the map.”

### Window Wonder

The exterior glass that helps showcase CLT’s artwork and new space is also notable. In fact, some predict it will be a game-changer for airport design.

“It’s not often that people in the construction world get really excited about windows, but we’re just as excited about the windows as we are all the other elements of the building,” Cagle remarks.

Why such enthusiasm? The tint of the windows adjusts automatically to enhance passenger comfort and views. In technical terms, each of the 733 electrochromic windowpanes from View Inc. has an independent IP address and is driven by software customized specifically for the Concourse A expansion. In addition to helping optimize the temperature within the concourse, the high-tech windows add natural light and maximize their unobstructed views in all weather conditions.

“We can control each pane independently through software tuned to the airport’s occupancy plans and building location and orientation using energy and daylighting analysis to become integral to the overall design,” explains Andy Kuchel, the dynamic glass company’s vice president for the aviation business. “Each pane is then monitored 24/7 upon installation via a secure cloud connect. Our vision is that View is the core of a true smart building and that our system is a platform for future Internet of Things (IoT) capabilities to allow buildings to work for humans.”

To showcase the innovative technology for the public, the airport spelled “CLT” on the large window canvas for the expansion’s grand opening in July.



ANDY KUCHEL

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“The windows will automatically change tint, but we can also change the tint on them manually,” says Cagle, explaining that the airport ID letters were formed by controlling specific areas of the panes using the View app. “We think it is cool and hopefully the rest of the world does, too.”

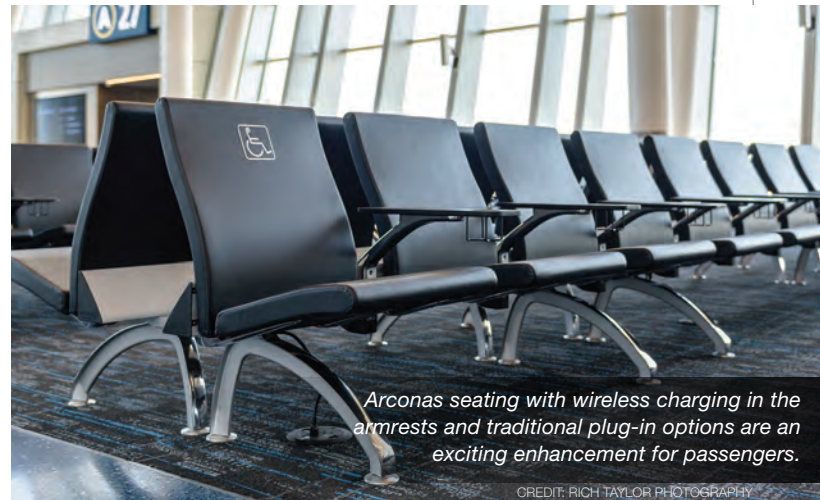
### Wireless Charging

The expansion project’s high-tech theme carries from the animated digital art and light-sensitive windows all the way down to the seating, which includes wireless charging armrests.

Originally, CLT planned to use Arconas seating with traditional plug-in charging stations below the seat. But between the time of purchase and delivery, the company rolled out a new product—a wireless charging tablet arm that is offered as an add-on feature to the seating company’s Place series.

Excited about the enhancement for customers, the airport considered it important to upgrade its order. “Arconas retrofit all of the existing seating that we purchased with wireless charging stations that are part of the armrest,” Cagle explains, noting that the armrests also include traditional charging options.

“We really wanted to have a high-quality passenger experience,” he reflects. “I think we are leading edge. Nowadays,



*Arconas seating with wireless charging in the armrests and traditional plug-in options are an exciting enhancement for passengers.*

CREDIT: RICH TAYLOR PHOTOGRAPHY

everybody has to be committed to sustainability, and airports have to be committed to meeting the passenger needs and providing a great experience. I think it all came together in a great way to value sustainability and to value customer experience. We’re really proud of it.” ✈️


## America’s airports are terminally challenged.

“We are approaching an infrastructure crisis. In some locations we are already there. While the US is in a better position than most, the fact is that no major new airport has opened here in almost 25 years. With the US market expected to add an additional 481 million passengers by 2037, **that just won’t do.**”

**Alexandre de Juniac**  
*Director General and CEO*  
 International Air Transport Association  
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# O'Hare Builds Central Deicing Facility to Improve Ground Flow

BY PAUL NOLAN

## FACTS&FIGURES

**Project:** Centralized Deicing Facility

**Location:** O'Hare Int'l Airport

**Size:** 835,000 sq. ft.; 20 bays

**Cost:** \$168 million

**Funding:** City-issued bonds

**Program Manager:** DMJM Aviation (joint venture led by AECOM)

**Design Engineers:** Kimley-Horn & Associates Inc.; BPC Airport Partners

**Construction Manager:** WSP


**Contractor:** Plote Construction Inc.

**Construction:** 20 months

**Staffing:** Operated jointly by United Airlines & American Airlines

**Maximum Capacity:** Up to 20 narrow-body aircraft or 5 wide-body aircraft

**Noteworthy Features:** State-of-the-art lighting system that directs aircraft into & out of the pads; glycol diversion system that collects & stores spent deicing fluid for recycling



If Tom Petty is right and waiting really is the hardest part, winters just got easier at O'Hare International Airport (ORD). A new aircraft deicing facility is helping carriers cycle gates more quickly by moving the crucial pre-flight process away from the terminal to the west side of the airport. As a result, passengers should spend less time waiting on the tarmac and in holdrooms.

Expediting airside ground flow is more important than ever, as the Chicago airfield topped 900,000 flight operations last year, recouping the title of busiest airport in the United States.

"This new facility is truly a game-changer for our winter operations, and will support our airline partners with access to a new dedicated space for deicing during winter operations," says Commissioner Jamie Rhee, of the Chicago Department of Aviation. "For one of the busiest snow airports in the world,

O'Hare's new facility gives airlines the option to deice aircraft closer to departure. Not only does this streamline our operations by freeing up gates, but it enhances safety during winter operations on one of the world's busiest airfields."

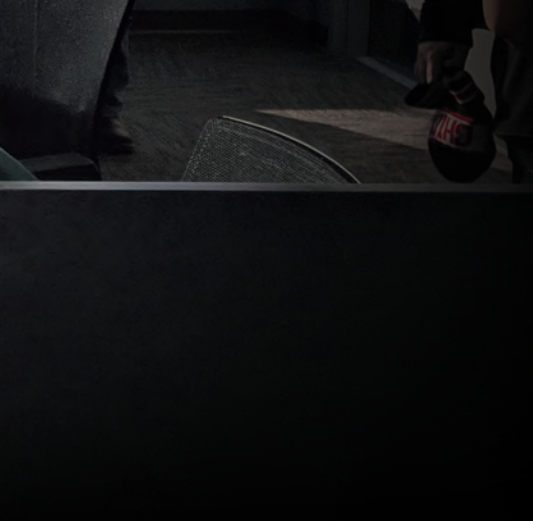


JAMIE RHEE

Depending on the timing and severity of ORD's weather, crews sometimes deice thousands of aircraft in a single month.

After 20 months of constructions, the new central deicing facility opened in late December, just in time for the bulk of the 2018-19 winter season. It is operated jointly by ORD's two hub airlines, United and American.

Kieran Sheridan, chief operating officer of the Chicago Department of Aviation,



in a new four-story ramp tower direct pilots into and out of the facility, and then turn aircraft over to FAA air traffic controllers as they exit. The facility can accommodate up to 20 narrow-body airplanes or five wide-body airplanes at the same time. United and American have eight bays each, and there are four additional bays for other carriers.

“The CDF (central deicing facility) makes things much safer for personnel on the ground, because they have so much more room on the new deicing pad. They’re not working in a congested area,” notes Sheridan.

notes that the new strategy is designed to dramatically enhance gate utilization. “Historically, there had been two ways to deice at O’Hare: at or near the gate,” explains Sheridan. “Either way causes congestion, because that gate is not available to use for other inbound aircraft. This frees the gate up entirely.”

**Increasing Safety & Efficiency**

Aircraft access ORD’s new deicing facility on a recently completed common-use taxiway system that connects the north and south airfields. Both projects are components of the broader O’Hare Modernization Program, which has delivered new runways and increased airfield capacity by more than 50% since launching in 2001.

With a footprint of roughly 835,000 square feet—about the size of 17 football fields—the \$168 million facility is the largest of its kind in the nation. Airline controllers

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Crews operate the same deicing trucks they previously used at the gates. Sheridan explains that the project team opted against outfitting the facility with built-in booms to spray deicing fluid, because that would have limited the number of aircraft that can fit between the booms.

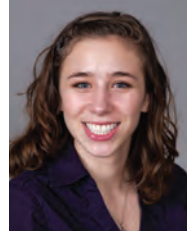
To help meet the airport's sustainability goals, the large deicing pad is sloped to trench drains, so the glycol-water mixture sprayed onto planes flows into a diversion structure and is captured in a 40,000-gallon storage tank. The fluid is later recycled and sold on the secondary market.

Looking ahead, ORD installed the infrastructure needed to eventually deploy a deicing pad management system, which will be procured and installed by the airlines. The system will feature message boards that display the aircraft type, destination and position number. It will also include signs and an updated lighting control system to maximize operational efficiency.

### Carriers Were Key

The airport worked with American and United to plan and execute the project, but all 50+ passenger airlines that operate at ORD use the central deicing facility.

Design engineers Kimley-Horn and BPC Airport Partners were tasked with meeting the goals of the airport and not one but two hub carriers. "Coordinating with all stakeholders was a unique and exciting challenge," says Jenni Morsches, a Kimley-Horn project engineer. "This project included frequent communication with both airlines to deliver a successful finished product."



JENNI MORSCHES

Sheridan notes that the hub airlines display a high level of professionalism and share the airport's goal of providing passengers with world-class service. "We continue to meet with their senior management, and I've been delighted with the collaboration," he remarks.

Executives from American and United cite coordination and compromise as essential elements of making the new facility a reality. "We are elated that the central deicing facility, which American first proposed more than five years ago, has come to fruition, bringing major benefits for our customers and the airport as a whole," says Franco Tedeschi, American Airlines vice president at ORD. "Our deicing team is the best in the business



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and takes great pride in ensuring we get customers on their way safely and quickly during Chicago's challenging winter weather. The new deicing facility will allow us to do just that."

In addition to expediting aircraft operations during cold weather, well-designed centralized deicing facilities help airports process excess glycol in a more sustainable manner, which has become a trend in the industry. Beyond the new facility at ORD, Kimley-Horn is currently working on similar projects at Memphis International and Detroit Metropolitan Wayne County Airport. "Each airport has specific goals when planning and constructing deice facilities," notes Morsches. "We apply the knowledge and experience from previous facilities to current and future projects."

At ORD, the central deicing facility will not just be a wintertime asset. The airport plans to use it during the offseason to provide staging for aircraft on ground holds during inclement warm weather. "One of the things we're very short of is concrete," Sheridan explains. "It hasn't been determined how we'll allocate space during non-snow events, but clearly, we're not going to be short of pavement to park airplanes. We'll be one of the best-prepared airports in the country when the need comes due to weather events that cause flight diversions." ✈️

*Airline controllers direct aircraft into and out of the deicing facility from a four-story ramp tower.*



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The aeronautical sector not only transports people but also drives the world. The figures speak for themselves: In 1970, the world's population reached 3.7 billion, and almost 10% (350,000 people) took a plane. Now, half a century later, the planet has doubled its number of inhabitants (7.6 billion) and the amount of air passengers has increased more than tenfold, to almost 4 billion.

Are airports ready to take on this passenger traffic? What experience can they offer to users? Architecture must become the guarantor of air infrastructure excellence and success. Intuitive orientation, use of natural light, color, acoustics, flexibility, human scale...all must be used to make the door-to-door process as satisfying and pleasant as possible, tailor-made to meet travelers' expectations and create positive, unforgettable memories.

Consequently, there is a need for more and better infrastructures, which implies an increase in funding from governments and the private sector. Only in this way it will be possible to face the challenges of the future, including the difficulties posed by a new generation of passengers that requires a different concept of airports. Responding to the new demands is an opportunity to innovate, to be at the forefront of the airport sector with sustainable and functional terminals.

Passenger growth seems unstoppable. The International Air

Transport Association estimates that nearly 8.2 billion people will take a plane in 2037, and more than 1.3 billion will do so in the United States, which will have become the world's second-largest aviation market by then.

This volume increase, together with demographic concentration in urban areas and expanding connectivity, places airports at the center of the social and economic scene. They have become the real driving force behind the growth of metropolises: genuine generators of activity, wealth and cultural exchange. Airports are the most relevant and influential works in cities because of their size, economic volume and what they represent.

Nowadays, airports are a traveler's first and last image of a city. They are also the main gateways to and from each country. In many ways, airports are the cathedrals of the 21st century. That means their terminals must be modern, flexible and practical—capable of adapting to the passage of time and the challenges of the future. They must be designed as places of encounter and activity, dedicated to the well-being of users and with a deep aim of public service.

In short, every airport should be conceived and designed with one idea: not only to be a means to an end, but a destination in itself...a long-lasting memory...an experience made to measure, worth living for itself. ✈️

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