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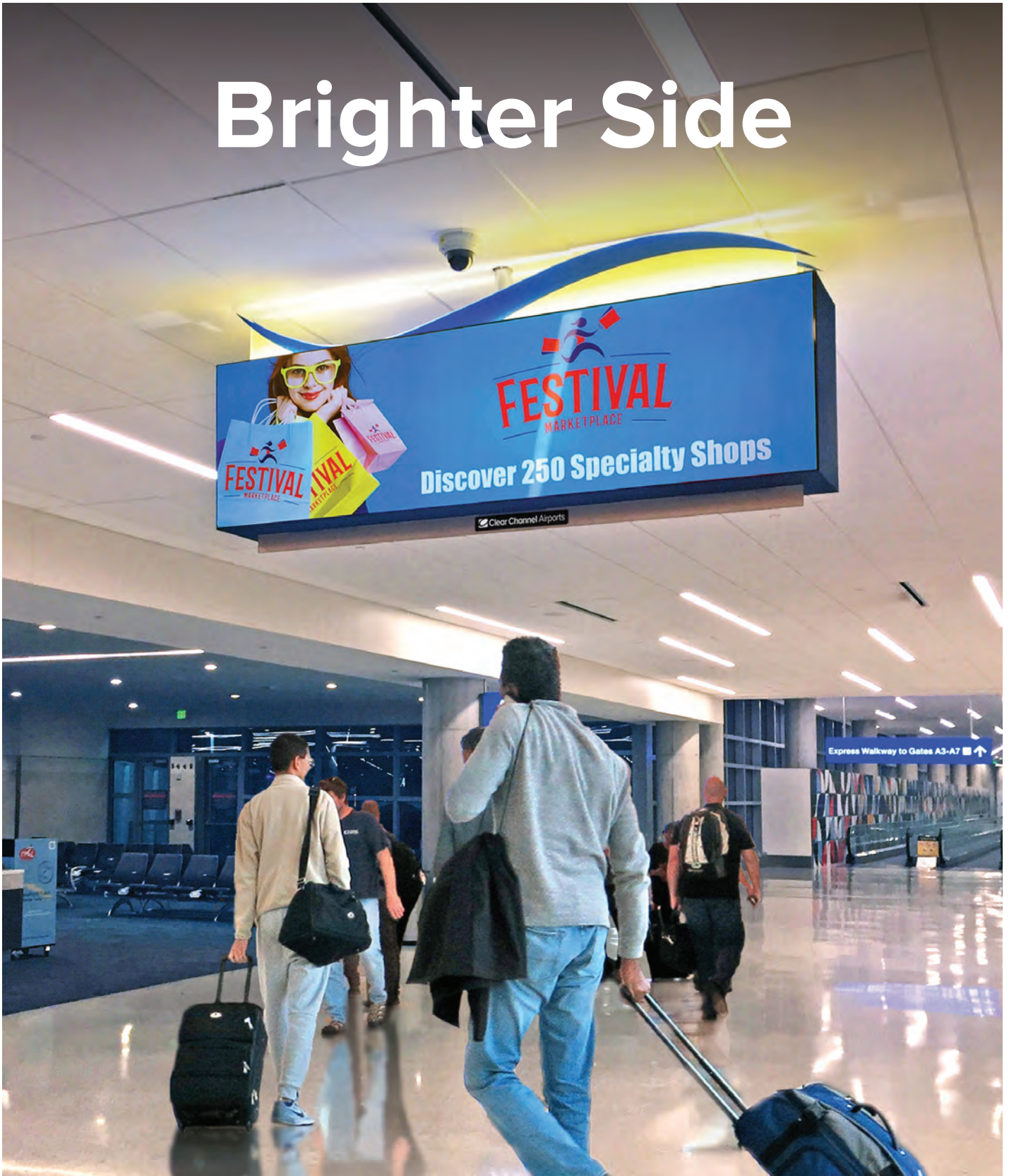


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## Change of Heart?

The runway story about DeKalb-Peachtree Airport (PDK) that ran in our May/June issue was tough to publish. Yes, it contained valuable details about how the successful runway project was accomplished. But it also noted that PDK's new engineered materials arresting system (EMAS) would likely be one of the last installed at a U.S. airport for quite some time. And that was difficult for us to report.

You see, the EMAS provider, Zodiac Aerospace, had merged with Safran; and soon after, Safran announced it would no longer sell EMAS in the U.S. It planned to supply replacement blocks for existing systems, but the company would not be installing new arrestor beds. Because Zodiac was the only FAA-approved system eligible for FAA funding, most of the U.S. airport market was essentially going to be left high and dry.

The announcement that Zodiac/Safran was leaving the U.S. market as an active participant was a stunner, and, quite frankly, disappointing. After all, Zodiac had been an integral, decades-long partner with FAA and our airports to develop the game-changing product in the first place. It had installed more than 100 systems at nearly 70 U.S. airports!

Fortunately, something changed. In mid-May, shortly after our story about PDK was released, we received a letter from Safran

saying that it was re-engaging in the EMAS marketplace—both in the U.S. and internationally. “We are pleased to inform you that Safran has signed a multi-lease extension for our EMASMAX production and R&D facility. The lease extension ensures that the business is able to provide blocks and all other services throughout our ongoing divestment process...This includes all our original capabilities such as: design of EMASMAX beds for new and replacement installations, maintenance/repairs, inspections, training and field strength testing.”

This is welcome news, and reason to celebrate! Despite the heartburn caused by earlier announcements about Zodiac/Safran leaving the market, it's reassuring to know that a product that has proved successful saving aircraft and lives will still be available.

For the latest details about Zodiac, Safran and/or PDK, visit our website: [airportimprovement.com](http://airportimprovement.com) and type EMAS or any of the three names into the search field.

Cheers!

*Paul*



PAUL BOWERS, PUBLISHER



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# #1

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U.S. Customs  
Border Protection

Rochester International



# Rochester Int'l Modernizes Terminal, Builds First Hybrid Federal Inspection Station

BY JENNIFER BRADLEY

## FACTS&FIGURES

**Project:** Upgrades to Terminal & U.S. Customs & Border Protection Facility

**Location:** Rochester (MN) Int'l Airport

**Operated by:** Rochester Airport Co. (wholly owned subsidiary of Mayo Clinic)

**2018 Passenger Volume:** 370,000

**Passenger Airlines:** American; Delta; United

**Project Cost:** \$12.3 million

**Funding:** FAA -\$7.35 million; state of MN- \$3.12 million; city of Rochester-\$1.83 million

**Timeline:** April 2017-Aug. 2018

**Architect/Engineer:** Mead & Hunt Inc.

**Contractor:** Kraus-Anderson Construction Co.

**New Federal Inspection Station:** 20,000 sq. ft.

**Medical Cargo:** 22 million pounds/year, via FedEx Express

**Project Awards:** 2019 Project of the Year—MN of Council of Airports; Kraus-Anderson Construction Co.—MN Construction Assoc. Merit Award; Top Project of 2018 – Finance & Commerce



In addition to serving local travelers, Rochester International Airport (RST) caters to thousands of passengers who fly to southern Minnesota each year for care or work at the world-renowned Mayo Clinic. In fact, the two organizations, located just 15 minutes apart, are inextricably linked.

The Mayo brothers, William and Charles, built the first airport in Rochester in 1928; and ties to their early efforts are now evident at RST. The city-owned facility is operated by the Rochester Airport Company, a wholly owned subsidiary of Mayo Clinic.

Last summer, RST completed a \$12.3 million project to modernize its terminal and improve its U.S. Customs & Border Protection facilities—upgrades that will greatly benefit passengers and garnered RST several awards, including Commercial Service Project of the year from the Minnesota Council of Airports.

Recent improvements will also help the airport keep pace with continued growth. Last

year alone, passenger traffic increased 28% to 370,000, notes Executive Director John Reed. Beyond providing passenger service on three major airlines, RST handled 22 million pounds of medical cargo such as specimens and supplies via FedEx Express.

The recent modernization project, led by architects at Mead & Hunt, broke ground in April 2017; and the airport celebrated the grand reopening of its updated terminal in August 2018.

## Project Overview

“The project certainly was a long time coming,” says Matt Dubbe, national market leader of Architecture for Mead & Hunt.



JOHN REED



MATT DUBBE



s and  
ction

*The airport's new hybrid Federal Inspection Station provides a jet bridge for domestic commercial operations when it is not in use by Customs for international flights.*

# International Airport



Before beginning the design process, the team took stock of the extended list of project stakeholders, which included TSA, Homeland Security, Mayo Clinic, the city of Rochester and multiple airlines. “We had to prepare for a lot of review time,” Dubbe notes.

“We were in every little corner of this airport doing something,” adds Chad Pike, project manager for construction contractor Kraus-Anderson. He notes that upgrading the U.S. Customs and Border Protection facility was a significant project in its own right, given the airport’s growth in international passenger volume.



CHAD PIKE

In 2015, there was a push from the federal government to upgrade RST’s Customs facility. It was simply too small and needed greater capacity to clear the amount of people coming from around the world to do business in Minnesota or visit Mayo Clinic, explains Reed.

“The existing facility was down in our FBO, with less than 500 feet of space; and yet we were clearing 747s, 757s, Airbuses, even 787s,” he recalls.

To address RST’s particular needs, the design team developed a new type of Federal Inspection Station (FIS) that expands the functionality of the main terminal and provides use of a jet bridge to domestic commercial operations when it is not in use by Customs for wide- and narrow-body aircraft. The team had to demonstrate the design’s efficacy and security to the Department of Homeland Security before it could be built, notes Dubbe. Now, RST is the first airport in the country to have a hybrid FIS. “We also wanted to make sure the airport was positioned to process larger international charter aircraft in the future,” he adds.

The new FIS is four times larger than the previous Customs facility. With 20,000 square feet of space, it is large enough to hold 150 people and equipped to process 75 passengers per hour. More than 200 aircraft and approximately 1,200 passengers travel through the RST Customs facility each year.

The airport gained additional space for the new FIS by redesigning the main terminal, which was originally a mirror design with ticketing and baggage on both sides. Today, all ticketing counters are in one area and baggage is in another.



The airport provides special facilities for passengers who are ill.

For about half of the active construction period, only one baggage claim was open. “It was a critical phase for us and the airport,” Pike recalls. After the additional baggage claims were reopened, the focus shifted to remodeling the passenger screening area.

The airport’s previous TSA checkpoint was well out of standard, notes Reed. During the modernization project, designers expanded the area and made it more user-friendly. They also added additional restrooms just beyond the checkpoint.

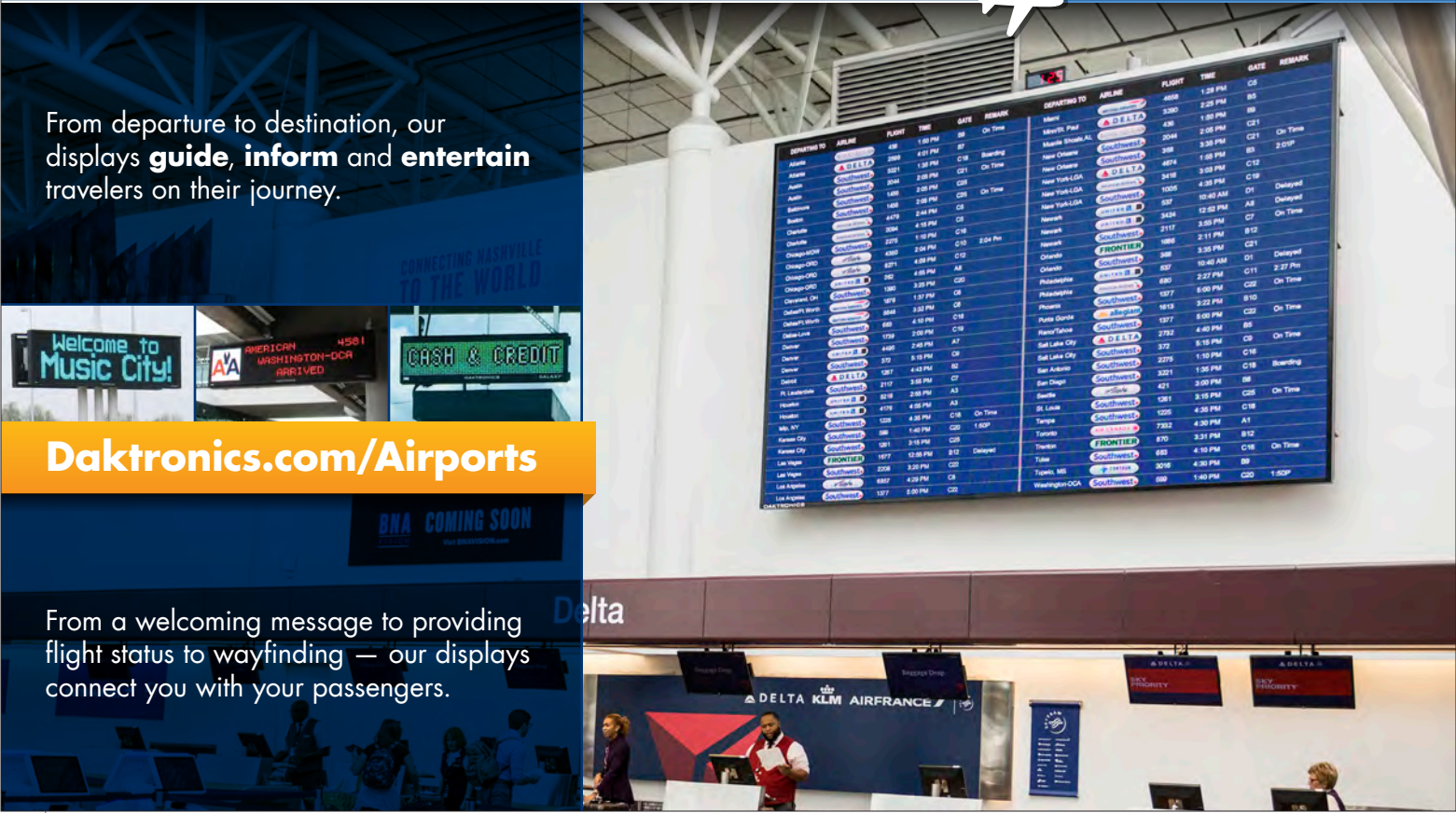
“The unsung part of this project was bringing the building up to code,” Reed reflects. “We spent a lot of time upgrading some of the base systems: sprinklers, fire alarms, heating and a generator in the Customs facility.”

Pike says the overall design by Mead & Hunt has received a lot of positive feedback, and he enjoyed helping it come to life. He reports that federal personnel who have visited to assess the changes were succinct in their comments: “We should make this a model for the rest of the country.”

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## Caring Design Details

The airport's new terminal includes three quiet rooms, specially designed for passengers who are ill or particularly stressed by medical challenges. One is located in the main lobby, and two are post-security. Each is equipped with a private restroom and a bed or recliner. Airline and airport personnel are trained to spot patients who may need respite and direct them to one of the rooms.

To cultivate a positive atmosphere for passengers throughout the terminal, designers integrated more daylight—even in stairwells. Marble walls were simulated with porcelain tiles to provide a soothing environment.



NICK LEIMER

As a Rochester-based company, Kraus-Anderson had previous experience on many projects with patient care implications. "It's always interesting and intriguing," says Nick Leimer, director of

operations for the construction contractor. "There are all different kinds of people coming through this airport; so when you start to think about the components to have in place to accommodate them, it can really have an impact on our community for many years."

In addition to being forward-thinking, the special design considerations help demonstrate RST's firm and long-term commitment to serving the patients, visitors and staff of Mayo Clinic, adds Dubbe.

## Challenges & Successes

Maintaining operations during construction was cited as the biggest challenge of the modernization project.

United joined the airport's carrier lineup in June 2017, just a few months after construction was underway. In addition, Delta increased its flight frequencies and American increased the size of aircraft it flies into and out of RST. The cumulative result: more passengers, which meant more activity in the terminal.

"During this entire project, we were seeing double-digit growth, month over month," notes Tiana M. O'Connor, marketing and communications manager for the Rochester Airport Company. "The challenge was to put that many more people through a



TIANA M. O'CONNOR

facility that was already constrained with temporary walls and construction going on. But everyone really stepped up and did a great job."

Moving the sophisticated TSA scanning equipment and keeping lines open amid construction was not simple, recalls Pike. "It wasn't like we were able to shut down one checkpoint and use another for two days," he comments. "Everybody had to get along and get cozy!"

In a similar vein, crews didn't have the luxury of bringing concrete trucks into a separate staging area; they had to come into the space where daily airport operations were occurring. "This terminal isn't huge in scale, like O'Hare," says Leimer.

# 5 CONSIDERATIONS FOR MANAGING CHANGE

- 1 DEMAND DRIVERS
- 2 RISK-BASED FORECASTING
- 3 CONTINGENCY SCENARIOS
- 4 FINANCIAL PROJECTIONS
- 5 MONITOR, ADAPT, IMPLEMENT



**THE AVIATION INDUSTRY IS A DYNAMIC ENVIRONMENT** where demand forecasts, capital improvement plans, and financial analyses grow stale quickly. At Mead & Hunt, master planning is about creating a flexible decision-making framework that allows an airport's investment in planning to retain its value over time.

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People from around the world fly into Rochester Int'l for care or work at Mayo Clinic.



“So we couldn’t phase the construction to occur when people aren’t around.”

Good communication was key to keeping the workflow smooth and disruptions to a minimum, he emphasizes.

“We really had to understand that they had a business to run,” Pike adds.

Dubbe commends the airport on fulfilling a long-term vision that spanned leadership transitions and still came in under-budget.

In turn, Reed gives a nod of appreciation to Mead & Hunt and Kraus-Anderson for their knowledge and dedication to completing a unique and demanding project. He also credits the FFA, city and state for understanding what the airport was trying to accomplish. “The project was recognized at the legislative level to be of marquee value to the state, as Mayo Clinic is the largest employer in Minnesota,” he explains.

## The Next Chapter

As major tech and biomedical companies move parts of their businesses to Rochester for proximity to Mayo Clinic, the buzz and increased activity at RST is noticeable. Every day, the effects ripple through TSA, the airlines, car rental companies and even the parking lot, which is starting to become strained on a regular basis, Reed reports.

“It’s been very rewarding professionally to be a part of this,” he reflects. “And this is just the beginning. We now have 100 companies within our community that have pledged to fly local, but also put into their policies and practices to make RST their airport of choice.”

The shift began five years ago, with the launch of the Destination Medical Center, which is executing a 20-year, \$5.6 billion economic development initiative supported by the state of Minnesota, Olmsted County, city of Rochester and Mayo Clinic.

Lisa Clarke, the agency’s executive director, explains that half of the initiative is focused on Mayo Clinic, while the other half concentrates on attracting private investment from around the globe. “We will be bringing about 30,000 jobs in the next 20 years and generating billions of dollars in new tax revenue; but the premise of Destination Medical Center is to create quality patient, companion, visitor, employee and resident experiences.”



LISA CLARKE

Where does RST fit in? Clarke says that transportation is the backbone that’s critical to the success of the initiative and the city as a whole.

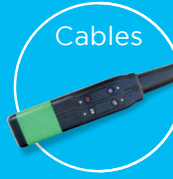
“We are very happy to have an international airport in Rochester supporting our patients, but also the talent and growth we need to drive to here,” she says. “They are definitely a forward-thinking organization, and the airport is really supportive of the economic development of the city.”

As the Rochester area continues to grow and change, the airport will continue developing with it. Next on RST’s list is \$52 million airfield project to rebuild Runway 2-20 and finish the airport’s CAT II Instrument Landing System. ✈️



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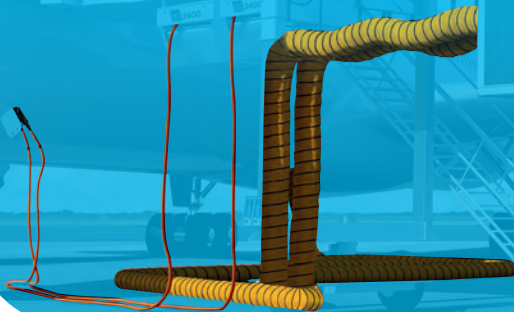
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# San Francisco Int'l Uses Progressive Design-Build Method for Recent Garage Project

BY KRISTIN VANDERHEY SHAW



## FACTS&FIGURES

**Project:** New Long-Term Garage

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

**Cost:** Budget: \$154.8 million

**Facility Size:** 6 levels; 3,600 parking stalls

**Project Delivery Method:** Progressive Design-Build

**Development & Design:** Team comprised of Nibbi Brothers General Contractors; DLR Group (formerly Kwan-Henmi); JV Builder; FMG Architects

**Project Management Support Services:** Joint venture of CPM Services & the Allen Group, LLC

**Timeline:** Planning began May 2015; construction completed April 2019

**Key Benefits of Progressive Design-Build:** Reduced financial risk, litigation & scope creep



San Francisco International Airport (SFO) is in the middle of a \$7.3 billion modernization program.

Main components of the initiative include reconstruction and expansion of Terminal 1 and the new 27-gate Boarding Area B; additional gates in Terminal 3; a new hotel; expansion of the AirTrain system; and a second long-term parking garage.

No matter what is being built, projects with *multibillion*-dollar price tags often get messy and complicated. You know the story: Something goes awry and finger pointing among the mind-boggling number of participants slows construction.

Looking for a better way, SFO has employed a different contracting approach to deliver projects. The new method helps project teams deliver design excellence and strive for exceptional outcomes that exceed expectations, explains Geoffrey Neumayr, the airport's chief development officer.

When planning began three years ago, Neumayr was already using a methodology called design-build with progressive guaranteed maximum price packaging (quite a mouthful, right?). Unlike the traditional

design-bid-build method, it does not require airports to accept the lowest bid. Instead, it requires a project's prime contractors, designers, engineers, builders and subcontractors to work together to agree to a maximum price before construction begins.

"With the traditional design-bid-build process, there were compromises to avoid litigation, which means projects would be behind schedule and budget," he says. "It was rampant—not just in aviation, but throughout other industries, too."

The newer project delivery process, now commonly referred to as progressive design-



GEOFF NEUMAYR



build, is structured to be an antidote for such problems. It operates on the premise that cheapest isn't always the best, and acknowledges that prices quoted at the beginning of projects often increase due to scope creep, contractor clashes and unforeseen obstacles.

"The progressive design-build method builds trust and collaboration between the owner, designer and construction teams," says Praful Kulkarni, CannonDesign's



PRAFUL KULKARNI

executive director of Integrated Services, former president of the Design-Build Institute of America, and a leading advocate for progressive design-build. "When you're doing everything in collaboration, you're no longer pointing fingers." Kulkarni and CannonDesign

did not participate in the recent garage project, but are assisting the airport with its current Capital Program and other progressive design-build projects.

"Progressive design-build offers some interesting dynamics that develop better efficiency and are changing the industry," observes Neumayr. "Productivity has been lagging because of old processes."

### Greater Flexibility

Using the new method, SFO and a design-build team comprised of Nibbi Brothers General Contractors, DLR Group, JV Builders and FMG Architects added a new \$154.8 million long-term garage on time and on budget, without any claims.

The new garage added 3,600 much-needed stalls to the airport's parking capacity. Features of the six-level structure include:

- pedestrian and vehicle connections with AirTrain, the airport's 24/7 automated people mover;
- automated parking guidance technology with variable message signage and wayfinding;
- electric vehicle chargers in 3% of stalls, plus preliminary infrastructure for more chargers if needed;
- space for customer amenities on the ground floor (options under consideration include valet parking, car detailing, dry cleaning drop off, pet boarding and customer pick-up for Amazon Prime, Google Express, Instacart and Safeway);
- Park Smart Certification, for green design and operation; and
- net zero energy consumption, largely due to rooftop panels.

Neumayr notes the airport's ambitious sustainability goals were no small undertakings; but planning for them early in the progressive design-build process helped make it possible to achieve them.

Tasso Mavroudis, SFO project manager, says that the traditional design-bid-build method locks in a low bid proposal at the beginning of a project, leaving no room for uncertainty and/or adjustment as the project progresses. This substantially

increases the risk of change orders and claims, he explains.

With design-bid-build, compromises may be necessary to avoid litigation, which can cause projects to fall behind schedule and budget, Neumayr adds.

In response, the industry came up with progressive design-build, which allows an airport to choose a design-build team based on qualifications rather than price. Then, the airport buys the project out trade by trade to determine an agreed-upon guaranteed maximum price.

Rather than providing risk transfer at the time of the bid with partially completed drawings, progressive design-build is structured to minimize change orders, arguments about who is at fault and associated delays.

"Under design-bid-build contract delivery, the guaranteed maximum price is measured against the engineer's estimate or cost model and is based solely on the design bid documents and known conditions at the start of the project," says Mavroudis. "In my experiences, much time and energy is devoted to addressing changes and potential changes on contracts. It makes for contentious and adversarial relationships between the owner, designer and contractor."

In contrast, he notes that the progressive design-build method does not establish a guaranteed maximum price until the project is nearly bought out, which is usually at about 85% to 95% completion. Cost models and corresponding schedules developed by the design-builder are used in the early planning/design phases to provide reasonable estimates and budgets for trade package buyout. As trade packages are bought out over the course of the project, real costs are assembled. Toward the end of the project, a guaranteed maximum price is established with minimal risk to the final budget because actual costs are in place for the majority of the work.

Progressive design-build puts the design in the hands of the design-builder, explains Mavroudis. As a result, the design is advanced and implemented in constant collaboration with the construction team and owner—in this case, SFO. This allows elements of the project to be implemented

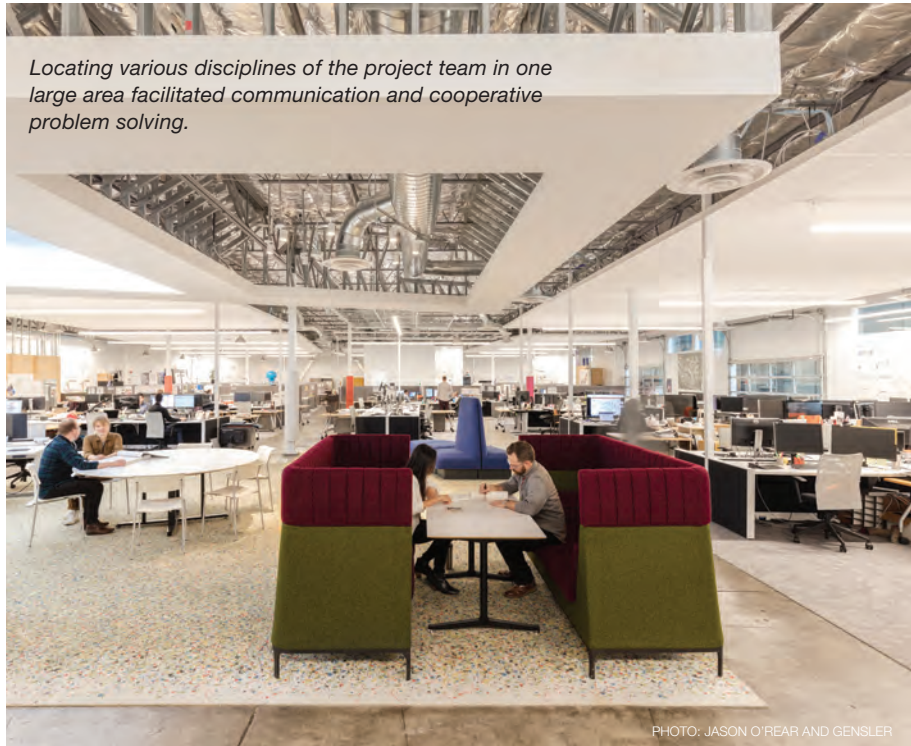
in steps, while the design process continues for the remainder of the work. The owner and design-builder progress together toward a final design and guaranteed maximum price with actual values rather than an estimate established at the beginning of the contract.

### The Big Room

One central concept of progressive design-build is the “big room”: a shared workspace where owners, designers and contractors can exchange ideas, make decisions and resolve problems quickly.

At SFO, the team uses a trailer complex for progressive design-build projects, which Kulkarni says is the most common way to set up a big room. At the project’s peak production, an open office space held over 100 people at once. The walls were covered with game boards, acronym lists and a clock counting down to the project activation deadline of Jan. 10, 2019.

Bringing various disciplines together allowed personnel to cross-pollinate and devise innovative



Locating various disciplines of the project team in one large area facilitated communication and cooperative problem solving.

PHOTO: JASON O'NEAR AND GENSLER

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ways to keep the airport open while safely executing concurrent projects, explains Neumayr.

“The building information modeling process becomes magical with progressive design-build, because it stays consistent all the way through,” he adds. “We end up with a 3-D model with all the data that we can take into the long-term project. In the past, the consultants might have kept it to themselves. Now, we have one master model, and it’s fully coordinated. It was meant to be a collaborative tool from the beginning to end.”

Kulkarni notes that communication in the big room helped build trust among team members. “The only way your team can get better at what they do is to protect them when they take a risk,” he says. “Can you imagine how people would behave if they are threatened to lose their jobs if their fail? They become risk-averse. Instead, we build a comfort zone for risk.”

### Big Project, Big Challenges

Kulkarni notes that progressive design-build can be particularly effective for airport projects. “Fifty million people go through these facilities, which is like a large city moving through a postage stamp,” he comments. “You can imagine the potential disconnect.”

SFO’s recent long-term parking garage project required significant redesign during the design phase—largely due to a major utility conflict and the value engineering needed to address unexpected cost model overruns. Because it was implemented under the progressive design-build method, the team was able to maintain the schedule by initiating foundation construction while the superstructure redesign was still underway.

Another challenge started with a forced sewer line positioned right in the middle of the site.

“If not for progressive design-build, we would have had a long and drawn-out process to figure it out,” says Neumayr. “Together, they realized they could use the guidance system; and they used that same system to connect to the old parking garage, too. They also had the challenge of integrating that with the other long-term garage and overcoming the challenges of connectivity on multiple floors. Without progressive design-build, it could have been a gigantic disaster for the airport.”

With a litany of major adjustments needed to address utility conflicts, the airport could have been locked into arbitration to settle claims if the project had been executed under a traditional design-bid-build method, observes Mavroudis. Redesign to address these conflicts would have been sequential, requiring foundation construction

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to halt until a solution was presented, vetted and approved. That would have most certainly resulted in schedule delay and extended overhead claims in addition to direct costs for the changes, he adds.

Mavroudis says that it's critical to keep projects moving while making adjustments to the design and/or design criteria to meet unforeseen conditions and/or necessary owner additions and changes. Progressive design-build facilitates that and allows the design-builder and owner to "partner their way to the best solution" within reasonable costs and schedule constraints that are flexible enough to meet the project budget and timeline.

"By committing to the scope too early, traditional design-build ends the collaborative approach much too soon," agrees SFO Program Director James Hawley. "Progressive design-build really brings out the best decisions throughout the life of a project."



JAMES HAWLEY

**Ideal Partnering 101**

Neumayr has experienced how the new project delivery method can help team members get to the root of problems and resolve them with unity rather than disparate factions.

"We're asking people to be good to each other and solve the real issues, not the fake issues of relationships," says Neumayr. "It's so much better than wasting our time blaming each other while avoiding the real issue at hand. All the issues come to the surface and you have to deal with them."

Kulkarni nods his head in agreement: "You have a team, and you can't let issues hang there without resolving them in a healthy way. We reduce negative stress by treating each other well. We try to remember to be soft on people and hard on issues."

SFO's "big room" was designed to help team members understand that it's acceptable to disagree and provided a platform to do so. A facilitator was also trained to help with mediation.

Neumayr says the secret is allowing decisions to be made and problems fixed at the lowest possible level. There's also a ticking clock on resolving issues. Parties are allotted a set amount of time to solve a problem before it is kicked up a level. "If they can't do it, it works its way up to the next level and the time frames get shorter," he explains. "This inspires people to just get along and figure it out."

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### Failure Begets Success

The design-build team for the parking garage project worked to complete the structure ahead of schedule to mitigate potential delays down the road. Ultimately, the team did not deliver the project early, but finished it on time due to lessons learned while trying to beat the original schedule.

Neumayr adheres to the philosophy that failure is sometimes necessary to achieve success, and he counsels his teams accordingly.

“It’s interesting how humans are,” muses Neumayr. His strategy is to empower personnel—and to reward effort and help pick up the pieces if they fail. That way, workers can focus on the job at hand instead of being overly concerned about getting in trouble for taking action, he explains.

Neumayr offers the scenario of a potential plumbing issue as an example: A piece of pipe must be added, and the team has to decide whether to cut the stud. Because the owner and builder are both represented on site, they collectively make the decision to cut out the stud and install the pipe. Later, they realize they need the stud for structural reasons and have to put it back.

“In some cases, maybe the right decision would be to choose a different action,” Neumayr says. “But you don’t pound people for

making a decision when they’re trying to keep the project moving. The only way we might have discovered the next step is to make a decision.”

Hawley agrees about the importance of cooperation. “When individuals from separate entities come together to put the project outcome ahead of their own distinct interests, the resulting team mentality encourages individuals to do their best,” he says. “No matter the delivery method, it comes down to the people; progressive design-build simply brings out the best in people who are willing to collaborate.”

In retrospect, Mavroudis notes that SFO’s recent garage project and other progressive design-build efforts were not successful just because of the delivery method. The top-down commitment from the airport director to rank-and-file workers really makes it work, he explains.

“We are embarking on something that will change the industry and delivery methodology,” says Kulkarni. “We’ll see much more progress with greater value and less conflict, and we are committed to moving the industry in this direction. Progressive design-build creates a highly collaborative process with the best value for clients and even taxpayers. This is big.” ✈️

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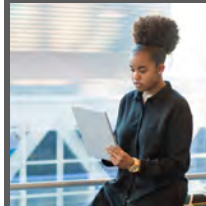
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## FACTS&FIGURES

**Project:** Managing the Environmental Impact of Firefighting Foam

**Location:** Gerald R. Ford Int'l Airport — Grand Rapids, MI

**Compounds of Concern:** PFAS (per- or poly-fluoroalkyl substances), a required component of FAA-mandated aqueous film-forming firefighting foam (AFFF)

**Proactive Steps Taken:** Discontinued all use of AFFF for onsite training; switched to a “shorter chain” PFAS firefighting foam that meets FAA requirements; purchased new equipment to test & calibrate foam dispensing equipment without any PFAS discharge to the environment; developed & implemented strategic testing plan for soil & water; tested airport sites in question & water/wells of residential neighbors; initiated new procedures for AFFF use during emergencies; maintaining open communication with public, regulators & aviation industry about the issue

**Consultants:** LimnoTech Inc.; Mead & Hunt Inc.; Prein & Newhof

**Legal Counsel:** Barnes & Thornburg LLP

**Test Equipment for Foam-Dispensing**

**Vehicles:** Ecologic, from E-ONE

**Local Partners:** Michigan PFAS Action Response Team; Michigan Dept. of Environment, Great Lakes and Energy (EGLE); county & state departments of health & human services; neighboring communities

**Environmental Awards:** 2018 Jay Hollingsworth Speas Airport Award for innovative & sustainable stormwater deicing treatment system; 2017 American Council of Engineering Companies Engineering Excellence Awards; 2016 Airports Council International Environmental Achievement Award for environmental protection & preservation; 2014 Airports Council International Environmental Achievement Award for Outreach, Education & Community Involvement

**For More Information:** Visit the Airport Consultants Council Training Hub at <https://training.acconline.org/live-webinars>

# Ford Int'l Takes Action to Manage Potential Environmental Impacts of Firefighting Foam

BY RONNIE WENDT



In 2016, dozens of U.S. communities were hit with alarming news: Harmful chemicals from a large family of man-made compounds known as PFAS (short for per- and poly-fluoroalkyl substances) had been found in their drinking water. In fact, a nationwide groundwater study detected PFAS-contaminated drinking water in 43 states. Many of the affected communities were near military bases, airports and industrial sites—a clue that inspired more research.

The issue hit close to home for Gerald R. Ford International Airport (GRR) last spring, when local media ran targeted news coverage about GRR's use of aqueous film-forming foam (AFFF), the FAA-mandated firefighting material that contains PFAS. Like many others throughout the aviation industry, the Michigan airport had historically sprayed AFFF during training exercises and for equipment calibration, as required by law.

After a provocative seven-minute television expose aired, GRR became one of the first commercial airports to be propelled into what has become an industry-wide challenge related

to PFAS exposure and possible contamination. And true to its reputation for environmental stewardship, GRR worked quickly to proactively address the issue and respond to questions from regulators and the public.

The airport's voluntary, proactive measures include:

- switching to an FAA-certified AFFF formulation that does not contain the long-chain PFAS chemicals that are most often associated with possible health and environmental impacts;
- acquiring new equipment to test and calibrate AFFF-dispensing vehicles without having any AFFF released to the environment;
- developing a strategic environmental investigation plan;
- testing the soil and groundwater near its historic onsite firefighter training facility and other AFFF-use areas; and
- paying to test neighboring wells and drinking water to protect against any possible exposure above state standards.

“We have learned there are remnants of AFFF [sprayed during training exercises from the 1970s to the 1990s],” reports Casey Ries, P.E., the airport’s engineering and planning director.



CASEY RIES

“There is PFAS in the dirt around the old firefighter training site; but we have not found any drinking water samples with levels above the Environmental Protection Agency’s (EPA’s) lifetime health advisory, nor have we identified a pathway from our former firefighter training area to a drinking water source.”

Airport officials note that they acted quickly, but responsibly—and plan to continue to do so. Given the public controversy and potential for litigation, GRR consulted its on-call environmental team including LimnoTech, Mead & Hunt, and the law firm of Barnes & Thornburg LLP.

“This issue is very complicated and challenging,” says Jeffrey Longworth, a partner at Barnes & Thornburg. “It presents challenges because it’s emerging faster than the regulatory process



JEFFREY LONGWORTH

can react. There are technology issues—in this case, being able to measure parts per trillion. There are health concerns that are real but still somewhat unquantified. And, we are still trying to assess risk, because there are approximately 4,000 of these compounds. This is a very challenging issue with a lot of public and media scrutiny involved.”

While GRR may have been “outed” early, PFAS contamination is an issue for all commercial airports that must use AFFF onsite. “Airports really factor into this discussion because of the material we carry on our fire trucks,” explains Ries. “Any federally-certified, commercial (also called “Part 139”) airport is required to have AFFF on hand and on our fire trucks, and ready to be discharged in an emergency. AFFF is mandated by the FAA and must contain PFAS.”

In other words, any Part 139-compliant airport is a potential source of PFAS contamination.

LimnoTech, an environmental engineering and consulting firm, helped lead the investigation. “Given the evolving regulations and the state of understanding, we felt it critical that the investigation be guided using a measured and data-driven approach,” explains Scott Bell, P.E., BCEE, senior environmental engineer and vice president at LimnoTech. “It has been our experience that regulators in these situations sometimes recommend activities that do not necessarily serve the long-term interest of assessing actual environmental impacts and that will support identification of appropriate follow-up actions.”

The airport addressed the implications in a recent press release: “Learning about PFAS and its impacts has become an evolving national conversation taking place at airports, military bases and other facilities across the country. Our commitment to environmental stewardship and our community has always been part of the airport’s foundation, and that commitment continues to guide our work moving forward.”

### What are PFAS?

PFAS are known as emerging contaminants, because concerns about their environmental and human health effects are still being researched and much is still unknown. For these reasons, PFAS are the subject of evolving regulatory scrutiny and technical debate.

Longworth explains that PFAS entered the scene in the 1940s, and are currently used in hundreds of common products and industrial processes. Consumers are regularly exposed to PFAS in non-stick cookware, water-resistant clothing, food packaging, cleaning products and personal care items. At airports, PFAS are used in firefighting foams, and it is these foams that are often implicated when PFAS are found in nearby groundwater, he explains, even though many sources exist beyond airports.

Studies show that once PFAS are in the groundwater or environment, they stay there for a long time. And because our

bodies are not very good at breaking them down, they tend to build up in our organs or tissues, which can eventually lead to health problems. Research finds that high levels of PFAS can change hormone levels, and affect liver, thyroid and pancreatic function. Studies also show PFAS can affect fetal and child development, leading to possible growth, learning or behavioral problems. Other research links them to cancer, immune system disorders and fertility problems.

### Management Strategies

There are three broad categories of situations when airports might discharge AFFF. Ries urges airports to take a close look at each one to find ways to minimize the potential spread of PFAS.

Airports use AFFF during emergencies to suppress and extinguish fires. It is so effective that once sprayed across a fire, a safety “blanket” is formed, allowing passengers exiting an aircraft and personnel fighting the fire to do so safely.

Airports also use the foam for FAA-required equipment calibration. Every 12 months, airports must confirm that their crash trucks are discharging foam in the correct concentration. To do so, many discharge a small amount, test it and verify that the correct type and amount of foam was released. The most common formulation is 97% water and 3% AFFF, notes Ries.

Finally, airports may have historically discharged AFFF during some live fire training exercises. Typically, they limited the amount sprayed because of the cost of AFFF and challenges related to reigniting a burn pit once the AFFF material has been sprayed, Ries comments.

Because AFFF will continue to be the go-to fire suppression option for aircraft emergencies (at least until FAA certifies an alternative), GRR has developed new standard procedures regarding its use. “Safety of passengers is paramount and our No. 1 priority in an emergency,” Ries emphasizes. “In the event that AFFF is discharged, there is a physical cleanup process in place to capture soils and liquid runoff and contain them for disposal.”

The airport addresses other instances

of AFFF/PFAS use in its remediation program. It stopped spraying foam during onsite training exercises decades ago, and firefighters now train at other facilities. "Many of our counterparts have done the same," Ries reports.

In mid-January, FAA published Cert Alert 19-01, *Aqueous Film Forming Foam (AFFF) Testing at Certificated Part 139 Airports*, to provide information about optional equipment for testing AFFF systems on airport rescue and firefighting vehicles.

The Cert Alert recommended three FAA-approved systems that enable testing but limit or eliminate the need to dispense AFFF onto the ground:

- Ecologic, from E-One;
- NoFoam System, by NoFoam Systems; and
- Oshkosh Eco EFP (Electronic Foam Proportioning) System

The official notice also recommends establishing procedures for containing AFFF during training and/or testing, as well as establishing proper handling and disposal procedures during testing and re-servicing response vehicles that dispense AFFF.

GRR purchased Ecologic, a mobile test cart from E-ONE, for \$35,000. It is an *input*-based testing system designed to test the accuracy of AFFF systems without the expense or environmental

impact of using foam for *output*-based tests. A single, compact cart can test multiple trucks and is an excellent system for retrofitting vehicles currently in the fleet, says Ries.

"This small trailer has the ability to hook into any one of our crash trucks, so it can calibrate all three pieces of equipment in a mobile fashion," he elaborates. "The Ecologic is retrofitted into the plumbing of the trucks to bypass the foam tank, but it is able to meter the draw out of the tanks to verify that the system is functioning correctly and the proportioning is appropriate."

### Test & Respond

"We conform to the minimum annual calibration of equipment; we don't hold fire training on site; and fortunately, we have not had an aircraft incident in many years," summarizes Ries. "So the rest of our environmental response has focused on historical use. We know that decades ago, foam was discharged in a training area on airport property. So we are working on moving forward as safely as possible."

To understand the potential for harm, GRR worked with the Michigan Dept. of Environment, Great Lakes and Energy (EGLE), and county and state health departments.

GRR began the testing process by drilling five deep groundwater monitoring wells and 10 shallow borings on airport




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property. This helped the project team characterize conditions and plan subsequent steps. “Our scientific approach has been designed to address the highest areas of potential first, and is a continued, deliberate investigation,” explains Ries.



DEAN MERICAS

The airport also tested the drinking water/wells of 28 private residences, after offering the service option to 44 homeowners. Test results showed non-detectable levels of PFOA and PFOS, two PFAS compounds for which Michigan has established criteria. Acceptable levels are below 70 parts per trillion (ppt) combined. Dean Mericas, Ph.D., of Mead & Hunt points out this is equivalent to 70 drops

in an Olympic-sized pool or 70 seconds in about 32,000 years. State regulatory agencies confirmed that the low-level results at the homes tested do not pose health concerns.

“We applaud the airport’s efforts in going above and beyond the requirements to conduct off-site residential testing,” said Adam London, administrative health officer, Kent County Health Department, in a press release. “Based on the data and related results, we concur there is no need to continue additional residential testing at this time.”

His comments followed GRR’s June 2018 announcement that results for the presence of PFAS in groundwater on airport property fell below the state of Michigan PFAS health advisory level and cleanup criteria. Even though results were below health advisory levels, GRR went beyond regulatory requirements and tested off-site private drinking water wells northeast of the airport—the direction the groundwater flows.

But the airport isn’t stopping its efforts there.

“We are looking at locations where foam could have been discharged, the soil type at these locations, and the flow of water—both surface and groundwater—at those locations,” says Ries. “We’ve taken water table samples, shallow water samples and soil samples to understand where we are today.”

The ultimate goal is to determine that there is no hazard. “But we are learning with PFAS, that is very, very difficult,” he explains. “As it moves through the environment, it changes. That makes it hard to follow.”

### Open Communication Policy

“PFAS are out there, and airports need to be aware what’s going on,” advises Ries. “Unfortunately, a lot of airports don’t fully understand the issue; but they need to.”

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For this reason, Ries, Longworth and personnel from Mead & Hunt joined forces to present an educational webinar about the topic on June 20. The webinar, presented by the Airport Consultants Council, was designed to help participants identify likely sources of PFAS contamination at their airports, define potential risks and create a step-by-step plan to address and manage them. After it airs, the webinar will be available at the ACC Training Hub, found at <https://training.acconline.org/live-webinars>.

GRR's participation in the webinar was not surprising. The airport believes in being open about its experience and efforts with fellow airports and the general public. "I always tell people that public relations is telling our story so that someone doesn't tell it for us," muses Tara Hernandez, the airport's director of marketing and communications. "It's very easy for the media to point fingers, especially when groundwater contamination is a concern. But we have taken efforts to really engage the community. We held community forums where residents could openly talk about the issue with Casey [Ries] and our CEO."



TARA HERNANDEZ

Her advice to other airports grappling with the PFAS controversy? "When dealing with an environmentally sensitive issue, you want to communicate with the people it could potentially affect. Keep them aware of the steps you are taking and the testing you are doing."

In fact, Hernandez suggests keeping the public informed every step of the way. In addition to holding public forums and granting media interviews, GRR posted information on the FAQ page of its website.

"Being open has gained us a lot of respect among community members," Hernandez reflects. "They call us and visit us instead of posting about it on social media or going to the news media. They have trust in us because they know we are doing all that we can to be good environmental stewards."

**Act Now**

Industry insiders tracking the PFAS issue foresee new regulations for airports.

"In the near-term, I anticipate that regulatory standards will be set at the national and/or state level to provide a basis for regulatory limitations, as well as response criteria," states Mericas.

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“The USEPA PFAS Action Plan identified this as a priority. Given the evolving nature of scientific understanding on impacts, I wouldn’t venture a guess at this time as to where limits for various media and protected resources will be set.”

Even though federal standards are still pending, Longworth advises airports to pay attention on the regulatory front. Many states are moving forward with regulatory actions as EPA continues to research the issues and develop possible regulations. Moreover, EPA released a national PFAS strategy in mid-February that focuses on multi-regulatory approaches, but most of the attention has been on developing drinking water standards. According to Longworth, the agency plans to designate some PFAS as hazardous substances, perhaps in 2019. Congress also has entered the picture, with hearings and over 30 bills introduced in recent months in both the Senate and House of Representatives.

But new EPA standards will take time. “There are over 450 military bases that have problems with PFAS; so, the EPA cannot just promulgate regulations without buy-in from the Department of Defense and other federal agencies,” reasons Longworth. “The EPA is working hard to move regulatory protections forward, to do the right thing, but it also needs buy-in and support from the rest of the government.”

Changes are also afoot at the FAA. An amendment to the 2018 FAA Reauthorization Bill requires the agency to research and approve a PFAS-free AFFF within three years. FAA has since built a research center to study PFAS alternatives.

“There are differing perceptions on how well fluorine-free AFFF works,” says Longworth, noting that it’s currently used at some foreign airports and in non-airport settings in the U.S.

Various states are also addressing the PFAS issue, with many establishing their own standards. Fresh on the heels of the Flint water crisis, Michigan is leading the way. It developed the Michigan PFAS Action Response Team, which is coordinating initiatives among the state’s environmental and health agencies.

California recently announced a measure that requires its 31 commercial airports to investigate for PFAS contamination, in what Longworth describes as a “limited and for many an unreasonable timeline.”

Even with regulations in a state of flux, he encourages airports to determine their PFAS exposure, reduce use of AFFF, and begin remediation if necessary.

“If you believe your site may have PFAS contamination, and there may be a pathway for that contamination to get into the groundwater offsite, there is a risk to not investigating,” he advises. “It may ultimately come back to you as causing a health issue and a public relations problem, let alone expose you to significant potential liability. While there may be no legal obligation to investigate today, you should be considering all your options now. It won’t get any easier moving forward.” ✈️



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# New Orleans Int'l Continues Improvements With Fuel System Upgrades

BY JODI RICHARDS

## FACTS&FIGURES

**Project:** New Fuel Farm & Hydrant System

**Location:** Louis Armstrong New Orleans Int'l Airport

**Cost:** \$46 million

**Programming, Planning Design, Bidding, Construction Administration:** Argus Consulting

**General Contractor:** Kinley Construction Group

**Fuel Consortium:** New Orleans Fuel Facility

**Consortium Chair:** Southwest Airlines

**Fuel Operator:** Menzies

**Architecture:** Corgan

**Ramp Designer:** Atkins

**Geotechnical Design:** PSI Engineering

**Structural Engineering:** Thomas F. Heausler Structural Engineering

**Corrosion Protection Engineering:** Kadlec Associates Corrosion Engineers



While a striking new 972,000-square-foot terminal typically gets the glory when it comes to recent projects at Louis Armstrong New Orleans International (MSY), there's more going on than the \$1.029 billion capital improvement program. When operations move to the north side of the airfield this fall, a new hydrant fueling system and fuel farm will begin operating to support them.

The \$46 million investment by New Orleans Fuel Facility, MSY's fuel consortium chaired by Southwest Airlines, has been carefully synchronized to move in lockstep with the construction of the new 35-gate terminal and ramp. That means that delays in the opening date of the terminal—four as of late May—have required the team designing and constructing the fuel upgrades to remain dynamic and flexible.

"For us, our main goal has been to be up and operational, regardless of the start date," says Madelyn Tackett, fuel

category manager with Southwest Airlines. "We have no control over when the terminal opens, but we don't want any delay to be a fuel delay."

## Simulation Plays Role in Solution

When officials decided to build a new terminal on the north side of the airfield in 2013, New Orleans Fuel Facilities contracted Argus Consulting to conduct a study evaluating the most efficient and cost-effective means to receive, store and dispense jet fuel to aircraft at the new terminal. "All of the existing fuel facilities are on the south side of the field, essentially next door to the existing terminal," relates Paul Johnke, an Argus director. Ultimately, Argus also provided programming, planning design, bidding, construction administration and resident engineering services for the project.



PAUL JOHNKE



MADELYN TACKETT

The company conducted extensive simulation modeling based on flight schedules of the hydrant system and vehicle operations data to analyze several alternatives. The two main options that emerged were direct tank truck delivery to aircraft and hydrant delivery.

Without an internal airport circulation road, trucking fuel from the existing south side location to the new terminal on the north end would have required fuel trucks to exit the airport, drive on public roadways and then reenter the operations side on the north side of the property. Depending on traffic, the one-way drive could have taken up to 40 minutes, Johnke relates.

Argus worked closely with the fuel consortium and Menzies, the fuel operator at MSY, to estimate the price of both options. Continuing to operate as they were in 2014 included high variable costs (vehicles and people), but low capital costs. Conversely, the hydrant system had higher capital costs, but lower variable costs. Ultimately, the analysis showed that a hydrant system would be more efficient and cost-effective.

Several other factors also supported a hydrant system as the optimal choice, including lack of available space on the north side of the airport, limited access from the south side to the north side of the airfield and the ability to install the new piping system and pits before the new terminal ramp.

“With the new airport opening, it gave us the opportunity to go with the hydrant system,” Tackett relates. Although it requires a significant upfront investment, hydrant fueling is the safest, preferred method to deliver fuel and is more economical over the long term with an airport of this size, she adds.

Safety was the primary goal when designing the hydrant system, followed closely by operational efficiency, says Tackett. Serving a new terminal on a greenfield site gave the fuel consortium flexibility to construct a system specifically designed for MSY’s needs (80 million gallons of fuel annually), with up-to-date technology. Providing a safe and efficient operating environment for all was key, emphasizes Tackett.

From the safety side, for example, parts of the hydrant system can be segregated and shut down during an emergency while still allowing operations at the non-impacted gates.

### System-wide Upgrades

Once the decision was made to construct a hydrant system, Argus focused on right-sizing the system to ensure economical operation with an ability to expand with the airport in the future. Argus used simulation modeling to right size the system’s components, including the pump/filter-separator trains, tanks and transmission lines based on passenger and flight forecasts.

To support the anticipated increase in demand for jet fuel at the airport, the project included significant expansion of the existing tank farm, including the construction of:

- two new 10,000-barrel aboveground tanks,
- five 750-gallons-per-minute hydrant system pump/filter trains,
- one 800-gallons-per-minute inbound pipeline receipt filtration train,

- two tank truck offload stations and
- a 2,700-square-foot administration/operations/maintenance building with a control room that provides a view of the tank farm.

The new building houses a central control room, offices, locker rooms, a break room, an electrical equipment room and a foam fire protection room.

“We wanted something that was going to also be a really good working environment for our operators,” Tackett explains. Now operations, maintenance and administration are all housed in one facility, which will streamline communication and cross training.

Additionally, the project included upgrades to the two existing 5,000-barrel aboveground tanks, the existing four-position remote refueler load rack, the communications system between the load rack and tank farm, as well as the load system and the addition of a foam fire protection system and a hydrant cart test stand.

The hydrant system provides fueling for the new 35-gate terminal on the north side of the airfield, with five emergency shutdown zones, each with 10-inch mains. The new system also includes an isolation valve manifold for the eventual extension of the system to service a future Concourse D. The tank farm



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and terminal hydrants are connected by one mile of new dual transmission 12-inch pipelines beneath Runway 11-29 and two taxiways installed by horizontal directional drilling. The drilling pits were located outside of the runway safety areas and object-free areas to avoid impacting airfield operations. Additionally, much of the most sensitive work was performed overnight, reports Johnke.

A new tightness testing system will be used to monitor the fuel system overnight, while the airport is down, to make sure the system is maintaining a safe operation, Tackett notes.

### **Careful Choreography**

Design and construction of the hydrant system was fast-tracked, so it wouldn't affect construction of the new terminal's ramp. Argus, Kinley Construction and New Orleans Fuel Facility worked closely with stakeholders to avoid delays. "We choreographed the construction almost continuously with [ramp and terminal contractors] to make sure we were moving just ahead of them," Johnke says. "We were very concerned about getting the fuel infrastructure under the pavement in time so we wouldn't impede construction of the ramp." At times, that required weekly meetings between both project teams, and adjustments to the original fuel system construction schedule.

"We've been tracking the opening date and adjusting our schedule," Johnke adds. The multi-phase project eventually spawned "microstages" as the fuel team and terminal team coordinated to keep both projects moving as smoothly as possible.

Just after construction of the hydrant system began, MSY expanded the terminal project from 30 gates to 35. "We were in the middle of construction on the under-ramp fuel infrastructure when the decision was made to include Concourse A," Johnke recalls. Because the design included provisions for future expansion, the project team was able to respond quickly to the change.

### **Soil Prep Requires Unique Solutions**

Geotechnical conditions of the region posed a particular challenge to construction, relates Larry Crisafulli, vice president, Kinley Construction Group.



LARRY CRISAFULLI

“The biggest challenge, and I think the challenge for everybody, was the soil conditions,” Johnke agrees.

Because of poor soil conditions, the terminal construction team surcharged the site with about 8 feet of sand to consolidate the soil and push out water prior to construction. The surcharge eliminated a lot of settlement, but potential remains for more over the next 25 to 30 years, Johnke notes. The hydrant system’s design addresses that potential. “We performed a stress analysis on our piping based on the anticipated remaining settlements and designed our system to keep the stresses within the allowable limits,” he explains.

Design solutions like piles for foundation support and expansion joints in fuel pipe at below ground to above ground transitions were employed, Crisafulli adds.

Pile supports were used for the two new 10,000-barrel tanks and associated containment structures, the equipment pad, inbound filtration system pad and tank truck offload system pad.



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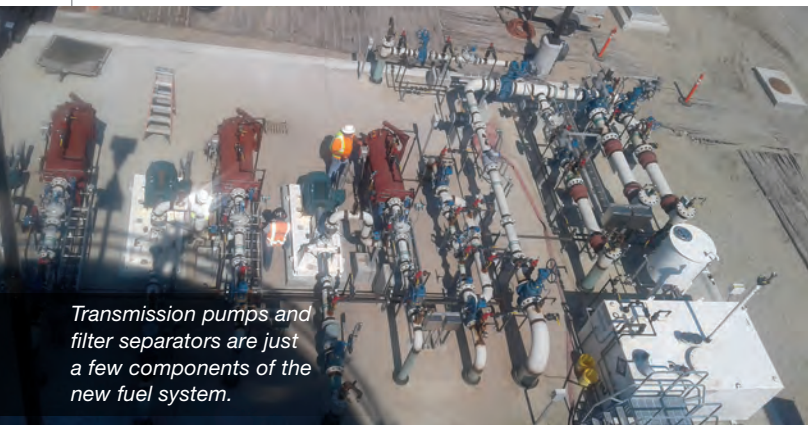
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Transmission pumps and filter separators are just a few components of the new fuel system.

A secondary concern regarding the poor soil conditions was differential settlement with the transition off of pile-supported structures onto soil that is essentially settling or sinking. To meet that design challenge, Argus analyzed the anticipated settlement and designed several sets of ball joints to accommodate the transition and possible settlement.

“Everything that is pile supported is going to have very slight amounts of settlement—almost imperceptible,” comments Johnke. “It’s not an exact science—geotechnical is more a modeling and forecasting type business.” The ball joints, much like a human elbow joint, are designed to accommodate

movement without inducing any stress from one part of the system to another, he explains.

“Once you’re off of the piles, everything is generally going to settle uniformly. But it’s just that initial transition from the pile-supported structure to the unsupported systems where you have to be concerned,” he adds.

The same concept extended to the fire protection systems and fire foam room in the operations and maintenance building. “We had to design the domestic water from the street coming in with flexibility so we wouldn’t break that connection—because the building was supported on piles,” says Johnke. “If the water line coming in from the street were to settle, we wouldn’t want to have a break in that.” The same applies to the foam and water-cooling lines exiting the fire protection room—they also have ball joints to accommodate potential settlement in the ground.

Breaking from tradition, the emergency fuel shutdown valve system is located aboveground. Often, such safety systems are located underground in vaults; but the high water table and associated potential for flooding prompted designers to house the motor-operated valves aboveground, away from the terminal.

### Concurrent Operations

Delays to the opening of the North Terminal have made things “tricky” on the fuel side, Tackett acknowledges. While the new fuel facilities have to be up and running to service the new terminal, the existing facilities also have to remain operational in the meantime. “The challenge is put on my general manager out there,” relates Tackett. “She’s done a great job of coordinating efforts and working with the airport, as well as our engineering firm and construction folks.”

Sequencing and planning construction of the new system with stakeholders while supporting operations of the existing system has been a challenge, Crisafulli agrees.

Due to the dynamic nature of the project necessitated by terminal opening delays, there was no such thing as over-communicating, says Johnke. “We found that it was better to invest in communication so that we can be agile and flexible.”

Working in an operational tank farm to construct the new and upgraded system required careful coordination and constant communication, he stresses. “We were really dependent on the operator,” Johnke recalls. “Menzies has been a great partner in helping Argus and Kinley be able to complete the construction.”

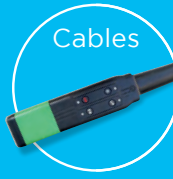
With so many moving parts, Tackett concurs that consistent communication was vital. “The coordination effort that has gone into this project has been huge,” she comments. Often, the fuel project team had to postpone certain work until the terminal and ramp project teams completed theirs. Not wanting to waste time or resources, the fuel project team remained flexible and accommodating to best use its assets, says Tackett.

Once a firm opening date is established for the new terminal, the next challenge will be providing a seamless transition from existing fuel system operations to the new system, without interruption to service. ✈️

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## FACTS & FIGURES

**Project:** Runway Rehabilitation

**Location:** Dallas Fort Worth Int'l Airport

**Cost:** \$135 million

**Funding:** Capital funds (\$80 million); Airport Improvement Program funds (\$55 million)

**Timeline:** May 2018 - March 2019

**Project Overview:** Rehab of airport's busiest arrivals runway with high-grade asphalt overlay; new drainage system; all-LED lighting conversion

**Design & Engineering:** Jacobs

**Program & Project Management:** AECOM

**Prime Contractor:** Austin Bridge & Road LP

**Electrical:** EAS Contracting

**Runway Status Lights Shelter:** Chambers Engineering

**Pavement Markings:** Hi-Lite Airfield Services

**Directional Drilling/Jack & Bore:** JMEG

**Underdrain:** Renaissance Contractors

**Sod:** Texas Environmental Management

**Saw & Seal:** Diamond Drilling and Sawing

**Pavement Grooving:** Cardinal Int'l Grooving

**Materials Trucking:** FOS Brokerage Services

**Materials Testing:** Terradyne Engineering

**Concrete Crushing:** TBK Materials

**Drill & Dowel:** MCL Contracting

**Crack Repair & Sealant:** Crafcoc Mastic One

**Lighting Fixtures:** ADB Airfield Solutions

**Lighting Base Cans & Extensions:** Jaquith Industries

**Airfield Guidance Signs:** Lumicurve

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# Dallas Fort Worth Int'l Rehabs Primary Arrivals Runway With Asphalt Overlay

BY ROBERT NORDSTROM



After nearly 35 years of service and approximately 650,000 arrivals and departures, the primary arrivals runway at Dallas Fort Worth International Airport (DFW) was due for a significant facelift. The \$135 million project that provided it was the first full runway rehabilitation effort since the airport opened in 1974—and its first asphalt overlay.

Prior to the project, the rate of pavement deterioration and the consequent maintenance costs for Runway 17C-35C were increasing drastically, explains DFW Project and Design Management Assistant Vice President Smitha Radhakrishnan. "The runway, which handles up to 400 flights a day and 40% of DFW's arrivals, had reached the point of diminishing returns on expensive repairs, and a full-scale rehabilitation was the only logical solution to extend the life of this asset," says Radhakrishnan.



SMITHA RADHAKRISHNAN

DFW tasked Jacobs to design and engineer a solution that would best meet four overarching goals:

- shortest downtime during rehabilitation,
- longest possible pavement life,
- minimal interruptions for scheduled maintenance and
- a cost-effective design and construction method that emphasizes sustainability and helps maintain the airport's carbon-neutral status.

Jacobs presented the airport with a lifecycle cost analysis for eight scenarios, ranging from full-depth Portland cement concrete (PCC) to asphalt to combinations of the two. Each scenario considered the initial construction cost, long-term maintenance costs over 30 years and operational impacts resulting from runway closure during initial construction and subsequent maintenance, says Jacobs Senior Civil Airfield Engineer Johnny Jackson.



JOHNNY JACKSON





As a result, the chosen plan called for full 17- to 19-inch PCC replacement of the middle 50-foot-by-6,000-foot keel section, full-depth shoulder reconstruction with lime subgrade and recycled concrete base and a minimum 6-inch asphalt overlay on the entire surface.

Choosing an asphalt overlay instead of a full-depth concrete replacement for the entire runway resulted in less demolition, tighter construction schedule and shorter closure time, explains McCollom. It also cost less—\$135 million versus \$150 million for full concrete replacement. Moreover, an asphalt surface simplifies runway maintenance throughout its 30-year lifecycle because future repairs can be performed at night and the runway does not have to be shut down for extended periods.

As the nation’s first carbon-neutral airport, DFW emphasized environmental sustainability throughout the recently completed project. Concrete material removed from the keel section was taken to a 72-acre materials management site on airport grounds, where crews crushed and recycled it for use on the runway’s shoulders. “We generated 260,000 tons of recycled concrete base,” reports DFW’s Senior Project Manager Mohammad Rehman.



MOHAMMAD REHMAN

After extensive consultation and deliberation, airport management chose the rehabilitation option that best balanced initial and long-term costs, and also preserved and protected a majority of the existing pavement system, which was determined to be in good condition.

Construction on the 13,401-foot runway began in May 2018 with a partial closure. The runway was fully shut down in August and reopened on March 10, 2019.

**Good News**

Evaluation of the runway’s existing subgrade found that the cement-treated base and lime-treated subgrade were still in very good condition, which eliminated the need for complete replacement of the concrete pavement and underlying subgrade layers.

“Since 17C is the most trafficked arrivals runway at DFW, it was expected that after thousands of landings most of the runway would be compromised,” Jackson recalls. “But our analysis showed that the runway’s base and the outer lanes still had a lot of life left, giving us more design alternatives.”

AECOM Associate Vice President Pat McCollom, who oversaw project and construction management, notes that the cement-treated base beneath the concrete pavement measured better than crews could make it today. “It told us, as engineers, that it actually got stronger over time,” he relates.

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DFW Runway 17C Rehab, photo courtesy DallasFortWorth International Airport



DFW's primary arrivals runway now contains the same asphalt mix as the Formula 1 racetrack in Austin.

By recycling the material and not hauling truckload after truckload offsite, the airport minimized its carbon footprint, diverted materials from landfills *and* saved money, Radhakrishnan points out.

### A Stiff Mix

Runway 17C-35C is the first asphalt runway at DFW. Before the project team set that precedent, it investigated many other options. "Even though the concrete surface showed a lot of defects, the structure below the top 1 to 2 inches was very sound," explains McCollom. "With this discovery, we were determined to come up with a design approach that would incorporate this asset into our paving solution."

Milling the grooves off the existing concrete pavement removed a lot of the surface defects, he informs. Then,

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crews filled the concrete joints with Crafcro Mastic One crack repair and sealant, which is impregnated with sand. The most deteriorated panels were removed and replaced, leaving the underlying cement-treated base in place.

The asphalt mix followed FAA's P-401 specifications using the Superpave method, wherein asphalt binders are selected based on the expected pavement temperature extremes of the area. At DFW, withstanding the North Texas summer heat was a primary issue. Consequently, the mix was engineered for high stiffness and rutting resistance to accommodate heavy traffic and high-pressure aircraft tires.

FAA specifications called for PG 76-22 binder, whereby 76 refers to the average seven-day maximum pavement design Celsius temperature and 22 the minimum pavement design temperature. In between those two temperature extremes, the binder is designed to retain its elastic recovery properties. The airport's design stepped up the binder grade to PG 82-22; so it is designed to maintain elasticity in temperatures up to 190 degrees Fahrenheit.

"Although the mix is stiff and harder to place and finish, it will give us a longer service life," Rehman explains. "We were fortunate because our prime contractor Austin Bridge and Road had a lot of experience with this mix. They placed the same mix on Austin's Circuit of the Americas Formula 1 racetrack."

Throughout the project, an onsite batch plant produced 225,000 tons of asphalt.

### Let There Be Light

While 17C's pavement resurface was the catalyst for the rehab, the airport also saw the project as an opportunity to upgrade its airfield lighting and drainage infrastructure.

"Our runway lighting and electrical system was a major consideration," reflects Rehman. "In January 2017, during a walk of the runway, workers opened some light fixtures and water was bubbling out. We had collapsed conduit where you couldn't pull a wire through. It was that bad."

During the recent project, crews replaced the runway's entire electrical infrastructure with new conduit, wiring and light fixture cans. Work included:

- 7,300 linear feet of 24-inch to 32-inch jack and bore,
- 30,500 linear feet of directional drilling,
- 167,000 linear feet of duct bank,
- 1,700 in-pavement lights and
- a new runway status light shelter.

Drainage work called for 53,000 linear feet of PVC underdrain.

In addition to being DFW's first asphalt runway, 17C-35C is its first all-LED runway.

"Pilots have been very complimentary on the quality of the runway's smooth surface and enhanced visibility," Rehman reports. "The LED lighting is amazing when compared to the incandescent lighting on our other runways."

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Crews worked around the clock when the weather permitted.



The airport plans to convert its remaining runways to LED lighting, notes Radhakrishnan.

### Challenges

The runway was originally slated to open in November 2018, but Mother Nature had other plans. She pelted the region with record rainfalls in September and October—the prime months for laying asphalt. The inclement fall weather pushed work into winter, when temperatures often impede paving operations.

“We had 54 inches of rain in September,” Rehman laments.

“And it’s not just [each] rain day,” Radhakrishnan adds. “It’s waiting the two or three days after for surfaces to dry.”

The original schedule called for crews to pave 24 hours a day in temperatures no lower than 50 to 55 degrees Fahrenheit. “We had to pay close attention to temperature and wind conditions throughout November, December and January,” McCollom recalls. “Our last paving day was at the very end of January. And then we had temperature issues with runway striping as well.”

To push the project forward, up to 300 contractors and subcontractors worked 24/7 when the weather permitted—roughly 595,000 total hours of labor. “Our highest production total was 5,000 plus tons of asphalt in one day in December,” Rehman reports. “Every opportunity we got, we just cranked it out.”

Given the large contingent of workers, the airport instituted a certified movement area escort program that allowed contractor personnel trained in airport operations to guide materials and workers throughout the secure airfield areas.

Clay Stark, senior project manager for Austin Bridge and Road, says the escort program was a big, *big* help. “We didn’t have to wait for dedicated escorts from airport operations to move us around the airfield, which is a production killer,” explains Stark. “That’s a big deal when working in secure airfield areas.”

On a related note, he also credits airport management for addressing access concerns: “When we had issues with the gate, the airport allowed alternate access so we could get materials in through one gate and personnel in and out through another.”

As with other large airfield projects, communication, flexibility and collaboration were key issues. “We had to learn on the fly along the way,” Radhakrishnan reflects. “We had to be toe-to-toe with operations, the FAA, all our stakeholders—ready to respond to any curveballs thrown our way. With the congestion and materials we needed to get in and out of the airfield on any given

day, we learned through trial and error. But it was very encouraging to see how the various departments at the airport geared up and stepped up to achieve the common goal.”


Overall, Rehman gives the DFW runway rehab high marks. “I’ve worked on numerous projects at different airports, and I can truly say this was a well-executed project,” he reflects.

### Lessons Learned

A couple months before the 17C-35C rehab was finished, airport management interviewed 140 stakeholders and project participants about the project. Input about what did/didn’t work will be applied to DFW’s next big runway project.

Several participants mentioned that providing more than one access point for the jobsite increased productivity. Having the runway designers onsite to help project managers and contractors evaluate problems and resolve issues quickly was also highlighted as a timesaver and valuable benefit. During the planning phases, including an airline representative as an integral member of the team was very helpful with decision-making, adds Radhakrishnan.

In retrospect, the airport learned that the partial closure of Runway 17C from May to August was of limited value. The shortened runway was seldom used because pilots requested alternate runways, explains Radhakrishnan. “For the next runway project, we will do as much prep work at night and outside the safety zone as possible before shutting the runway down,” she says.

Members of the design, construction management and construction team emphasize DFW’s positive role throughout the project. Speaking with extensive experience as an aviation construction project manager, Stark notes that DFW was extremely cooperative during both preconstruction and construction activities. “Here at DFW, management wanted to help us be successful,” he emphasizes. “Partnership with the owner played a critical role in making this project successful.” 



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# Airports, Car Rental Agencies Join Forces to Recruit Disadvantaged Suppliers

BY NICOLE NELSON



## FACTS&FIGURES

**Project:** ACDBE Recruitment in the Rental Car Market

**Event:** Airport Rental Car Supplier Diversity Outreach Day

**Organizer:** Airport Business Development Group

**Date:** April 30, 2019

**Hosts:** 30 airports across the U.S.

**Total Attendance:** 1,224

**Partners:** Airport Minority Advisory Council; Avis Budget Group; Conrac Solutions; Enterprise Holdings; Hertz; Fox Rent A Car; Sixt Rent A Car



Lynn A. Boccio, vice president of Strategic Business & Diversity Relations for Avis Budget Group,

distinctly remembers picking up a call from a then-unknown airport colleague just before the 2016 Airport Minority Advisory Council (AMAC) Conference.

On the opposite end of the line was Raymond Christy, who had just been hired as the airport senior planner and disadvantaged business enterprise coordinator at Salt Lake City International.



LYNN BOCCIO

Christy introduced himself and quickly cut to the chase, asking Boccio to meet him at the AMAC conference to discuss an idea.

Subsequent conversations not only led to a friendship, but also to a joint gathering of corporate and airport industry champions advocating for increased participation of Airport Concessions Disadvantaged Business Enterprises (ACDBEs) in the airport rental car sector.



RAYMOND CHRISTY

From Avis Budget, Boccio brought Senior Procurement Specialist Sue Pettit and Senior Vice President of Properties and Facilities Robert Bouta. Christy was joined by eight fellow airport executives attending the AMAC conference and the operational manager from Conrac Solutions, a company that specializes in developing and operating consolidated rental car facilities.

“We all brought various professional business relationships to the table, so we could affect positive change at our respective airports,” explains Christy.

Bound by a common cause, the people and their respective organizations united to form the Airport Business Development Group. “We’ve been ‘under the radar’ because we came together to get results—not to be recognized for what we are doing,” Christy relates.

Confident in the power of strong partnerships, he was certain that positive change was within reach, given the cooperation already brewing between the airports and car rental companies.

The organization’s recent Airport Rental Car Supplier Diversity Outreach Day is a case in point. On April 30, 30 U.S. airports simultaneously hosted events to increase opportunities with existing and potential ACDBEs in their individual local markets. The event was designed to be extremely impactful for the rental car companies and small businesses within each of the specific airport communities.

“The participating airports organized it and ran it on that particular day,” Christy explains. The Airport Business Development Group provided support in the form of draft agendas and planning outlines. “We sent them enough information so that they could design, create and implement this event at their airport. We gave them the framework to work with.”

There was only one requirement: Participating airports had to use the same promotional flyer to show solidarity. Otherwise, each airport was free to structure the event to suit its particular market and objectives.

**Supporting Roles**

To offer his strong endorsement, Joe Ferraro president, Americas, for Avis Budget Group, penned a letter that mandated local employees to attend and participate in the April 30 event at each host airport.

“Our airports at corporate airport locations contain an ACDBE requirement, which sets forth a percentage/compliance goal that we must attain either with regard to our total spend or total revenue as specified and detailed in each concession agreement,” Ferraro wrote. “At the present time, it is difficult to attain all of these goals with properly certified vendors. An outreach event, such as this, is designed to bring our company new ACDBE businesses



Rental companies informed attendees about the nuances of conducting business at an airport.

with whom we can potentially partner, while at the same time providing us with good faith efforts which are required pursuant to 49 CFR Part 23.”

Enterprise Holdings and Hertz supported the cause by sending representatives to each airport-led event to talk about the various goods and services they purchase locally. They also discussed how to conduct business with their respective companies.

Several airports also invited representatives from Fox Rent A Car and Sixt Rent A Car to their events.

**Success Stories**

In total, the outreach day attracted 1,224 attendees. While Detroit Metropolitan Airport (DTW) had the highest attendance at 126, Christy notes that the event exceeded expectations at all 30 airports.

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The national outreach day was deemed a success at all 30 airports that participated.

- Columbia Metropolitan Airport (CAE) in South Carolina reported a successful event that generated positive feedback from all attendees. Two businesses even walked away with contracts from car rental companies. No Smell, an ACDBE-certified company that provides sanitizing and deodorizing services for vehicles and interior spaces, secured business with three of the four car rental companies in attendance; and Eagle Corps Services LLC, a non-certified company, gained the opportunity to provide spill kits and safety supplies to 40 locations with one rental company. Eagle Corps also earned business from CAE's Maintenance Department and is beginning the process to become ACDBE certified.
- At Salt Lake City International (SLC), the owner of a non-certified painting company secured appointments to meet with Avis Budget Group and Enterprise the following day to conduct a walk through and provide a bid for power washing services. She also set an appointment with the local community business center for help completing the ACDBE certification application.
- Orlando International Airport (MCO) garnered positive media coverage, when George Mourning, director of its Small Business Department, was interviewed by the local NBC news affiliate about the national outreach event.
- Jolene Cochran, senior business development counselor with city of Austin, reported that multiple detail body shops had pending contracts within days of the event at Austin-Bergstrom International Airport (AUS).



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### Same Time Next Year?

Within days of the coordinated nationwide event, Christy had already received inquiries about the next Airport Rental Car Supplier Diversity Outreach Day. He and other organizers fully expect it to become an annual event, but a specific date for 2020 has not been selected.



KRYSTAL BRUMFIELD

AMAC President and CEO Krystal Brumfield says her organization was pleased to support the effort to advance the ACDBE agenda.

“The car rental companies that have been members of AMAC and many of the airports have participated in a working group to identify some of the challenges that minority businesses and small businesses have working at airports,” Brumfield remarks. “We know that in the car rental concession space that the participation goal is

low, and therefore the achievement is low. So we were trying to look at policy changes, look at regulatory changes and just look at all kinds of practices that we can do to utilize our airports and really get behind them and strengthen them so that we can increase our minority participation numbers.

“This initiative has become a really big thing,” she reflects. “When we first started talking about an outreach day, we didn’t see it coming together this way. It has really changed the way that we can make an impact—not just on the car rental side of things, but industry-wide.”

*The Airport Business Development Group provided promotional materials that each airport customized to its particular market.*



# Measles Outbreak Underscores Importance of Communicable Disease Response Plans

BY PAUL NOLAN


## FACTS&FIGURES

**Project:** Preparedness Plans for Disease Outbreaks

**Status Report:** A record 81 flights were investigated in the U.S. last year for carrying at least 1 person contagious with measles, up from 15 investigations in 2017 and 10 in 2016. Of the 81 flights, 66 were on domestic routes; the rest were inbound from foreign airports.

**Other Known Threats:** Since the SARS outbreak in 2002, the CDC and World Health Organization have identified 5 additional major communicable disease threats: tuberculosis, flu, cholera, measles & H7N9 influenza.

**Existing Format:** FAA-required Airport Emergency Plans should address communicable disease events by outlining a notification process, integration of multiple agencies, command and control, response efforts, mutual aid & staging. Mandated annual updates are opportunities to refine & revise response strategies.

 As confirmed reports of measles continue to emerge in pockets throughout the United States, airport operators throughout the country face the prospect of receiving contagious passengers and visitors.

John F. Kennedy International Airport (JFK) experienced the swirl last fall regarding Middle East Respiratory Syndrome (MERS), a communicable disease that had killed more than one-third of the people who had contracted it at the time. Prior to landing, the pilot of an Emirates Airline flight from Dubai notified the tower that a large number of people on board were complaining of flu-like symptoms such as coughing and fevers. Airport authorities quickly contacted the Centers for Disease Control and Prevention

(CDC), and local health services and laboratories prepared for the plane's arrival.

Health officials met the flight on the tarmac, and all onboard were held for evaluation (see Editor's Note on Pg 46.). After medics and Customs agents took temperatures and assessed symptoms, 11 people were sent to the hospital for further evaluation and treatment. Ultimately, none had MERS.

Although the incident was frightening for many, airport and health officials say it was actually reassuring evidence about the efficacy of detailed preparedness plans that have been in place for decades and are updated regularly.

"There have been port preparedness plans for years that have been written and revised



and iterated in partnership with state and local health departments, with other federal partners at ports, with the local [emergency medical services] response system, with communications officers,” and other stakeholders, Martin Cetron, director of CDC’s Division of Global Migration and Quarantine, told Stat News, a health-oriented website.

Just one day after the incident at JFK, 250 passengers arriving at Philadelphia International Airport (PHL) on two flights from Europe were evaluated and held for medical review after a dozen passengers complained of flu-like symptoms. Aside from the sick passengers, everyone else was eventually allowed to leave. And again, preparedness plans worked exactly as they are designed, Cetron says.

With international air travel at record levels and continuing to climb, airports are under additional pressure and scrutiny. Health experts say that air travel, more than any other mode of transportation, creates the potential for an infection to move rapidly from one part of the world, because passengers share confined quarters with other travelers.

The International Air Transport Association (IATA) reports that 3.8 billion people traveled by air in 2016, and it predicts that will balloon to 7.2 billion passengers by 2035.

In 2014 and 2015, the Ebola epidemic in West Africa renewed concerns about the spread of communicable diseases through air travel. There were proposals in the United States to restrict travel and trade to/from affected countries.

While deaths and illnesses may be the most visible effects of an outbreak, communicable diseases also create economic costs. For example, a report from the U.S. Government Accountability Office (GAO) states that during the 2003 severe acute respiratory syndrome (SARS) epidemic, IATA estimated the overall cost at \$33 billion of global gross domestic product. North American airline revenue losses alone were estimated at \$1 billion, while Asia Pacific airlines lost an estimated \$6 billion.

### What Preparedness Looks Like

In addition to its FAA-required airport emergency plan, San Francisco International Airport (SFO) also maintains a communicable disease response plan, which it shares with the CDC.

“This plan is not a required document under federal regulations, but we find this helpful, as it adds further clarity to who does what, and covers illness response processes in greater detail,” says Doug Yakel, public information



DOUG YAKEL

officer at the airport's External Affairs Office. "This document is reviewed as needed, based on changing information and new sources of concern. We're currently in the process of reviewing it again, as we'll be drawing from this in our annual full-scale emergency exercise in the fall."

SFO also has concept of operations (con-ops) documents specifically developed for managing a health concern. Yakel notes that during the Ebola outbreak, the airport gathered its stakeholders together to review and clarify roles and responsibilities, review threat information and create a strategic plan that personnel could practice in a tabletop exercise. "Although we never were a location for screening activities,

this was a good way to ensure our readiness had anything developed," he explains.

In certain extraordinary circumstances, passengers or flights from areas experiencing the outbreak of a communicable disease can be redirected to designated U.S. airports with special capabilities to receive them. For example, in October 2014, during the height of the Ebola crisis, the CDC initiated enhanced screening at five U.S. airports: JFK, Washington-Dulles International (IAD), Newark Liberty International (EWR), Chicago O'Hare International (ORD) and Hartsfield-Jackson Atlanta International (ATL). Passengers whose recent travel included Ebola-affected countries were routed to one of these airports, where U.S. Customs and Border Protection personnel and CDC staff conducted enhanced entry screening procedures.

### Measles Scare

Recently, a resurgence of measles has been the main concern in the U.S. In late May, the CDC reported 940 confirmed cases of measles in 26 states since January—the highest number reported since 2000, when the virus was declared eliminated in the U.S..

Most current cases have been linked to international travel. Unvaccinated travelers come to the U.S. from countries with ongoing outbreaks and expose people who are not vaccinated.

A CDC spokesperson says the agency is working with its partners to consider some measles response options that could be implemented at airports; but no new policies or procedures had been announced as of late May.

For now, standing orders for airport personnel and government officials stationed at U.S. airports is to be aware. A spokesperson for U.S. Customs and Border Protection told the *Atlanta Journal-Constitution* that CBP personnel at ATL, the world's busiest airport, review all travelers entering the U.S. for "overt signs of illness." The prescribed process includes visual observation, verbal questioning and notifying the CDC as appropriate.

### Awareness & Communication

Airlines workers and airport personnel are trained to recognize and respond to symptoms of communicable diseases in passengers. However, that only works when symptoms are evident during travel. It is possible for infected travelers not to show signs of illness until a day or more after flying, notes Clive Brown, chief of CDC's Quarantine and Border Health Services Branch. In such cases, CDC depends on state

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and local health departments to develop a travel history for each sick person and, with help from airlines, attempt to notify other passengers identified to be potentially exposed.

Annually updated airport emergency plans required by the FAA include specific response strategies for medical scenarios such as communicable disease events. Such plans outline the notification process, integration of multiple agencies, command and control, response efforts, mutual aid and staging. Every preparedness plan should go into great detail about the chain of communication needed to effectively respond to an infectious disease incident, says SFO's Yakel. "Communication and coordination with all first responders, medical health facilities and responding agencies is critical," he emphasizes. "Ensuring that a threat is identified correctly is the basis for a good response and guides how an airport will communicate with health officials."

Yakel reports that SFO's plan includes a detailed communication process to respond quickly if the airport receives information of a credible threat. "The jurisdictions and notifications are clear," he explains. "The two agencies that will make the determination are the health department of our local county (San Mateo) for domestic flights or CDC for international. These are the primary jurisdictions, although we expect they will always work together to diagnose and make a call to enact a plan."



PERRY COOPER

Perry Cooper, senior manager of media relations at Seattle-Tacoma International Airport (SEA), says it works much the same way there. If CDC officials determine that a planeload of passengers must be detained for medical evaluation, SEA would block off the far end of one terminal for health officials.

Cooper says SEA personnel are trained to take direction from the CDC or local health departments in such situations. "We don't make the decisions to hold someone," he explains. "We are there for management of space if that is needed."

### National Plan Needed

In a 2015 report, the U.S. Government Accountability Office emphasized the need for a national aviation-preparedness plan for responding to communicable diseases. Personnel interviewed officials at 14 airports and three major U.S. airlines during their research. While all 14 airports had individual emergency preparedness plans in place, the

GAO report notes that the United States lacks a comprehensive national plan aimed at preventing and containing the spread of diseases through air travel.

It also addressed preliminary steps for improvements: "GAO recommends that DOT work with relevant stakeholders, such as the Department of Health and Human Services, to develop a national aviation-preparedness plan for communicable diseases. DOT agrees a plan is needed, but suggests public health agencies lead the effort.

"DOT and CDC officials acknowledge that only certain 'elements' of a national aviation-preparedness plan are in place. Such a plan

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*International air travel creates a unique opportunity for communicable diseases to spread around the world.*



could help maximize an effective response to a public health threat, while minimizing potential inefficiencies in the national response effort and unnecessary disruptions to the national aviation system. A national aviation-preparedness plan that is generic to all communicable diseases and can be adapted for specific diseases would provide individual airports and airlines with an adaptable and scalable framework with which to integrate their individual plans and promote harmonization of individual plans across airports and airlines. As such, the plan could also serve as the basis for testing communication mechanisms among responders to help ensure those mechanisms are effective. In addition, it could help ensure that airport and airline staff have received appropriate training and access to properly maintained equipment during an outbreak to reduce the risk of exposure to communicable diseases.” 

*Editor's Note: While most media reports about affected flights mention passengers being quarantined, Airport Improvement magazine adheres to the CDC definitions:*

**Quarantine** separates and restricts the movement of people who were exposed to a contagious disease to see if they become sick. Passengers and crewmembers suspected of exposure are often simply **held for medical evaluation** and/or **isolated** from others who are not sick.

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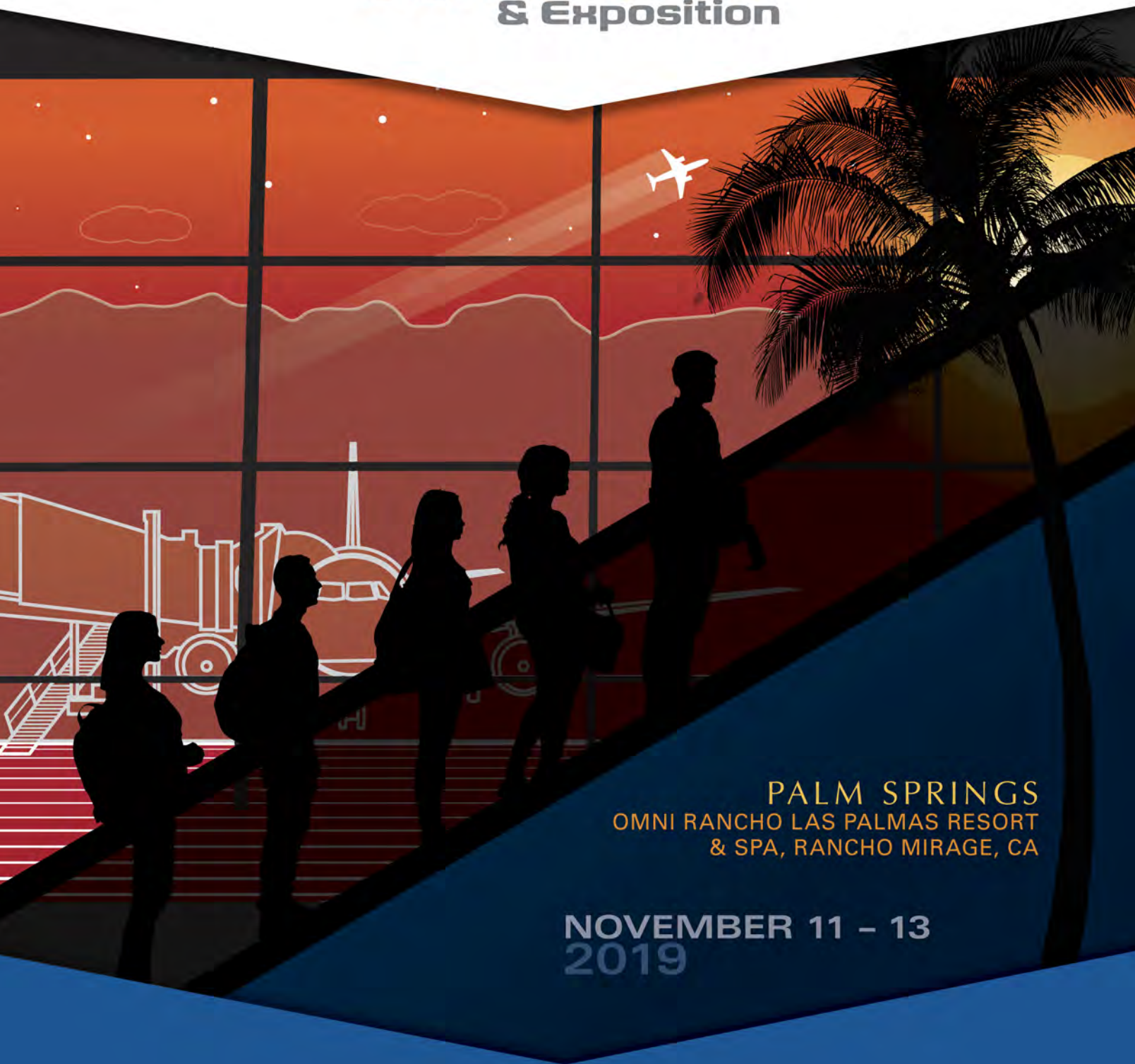
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# Salt Lake City Int'l Tests Designs & Components for Redevelopment Program

BY BRIAN SALGADO



When building a new terminal for an airport that serves more than 25 million passengers annually, the plans must be solid from the start. Salt Lake City International (SLC) is using several full-scale mockups to ensure that even minute details of key components for its \$3.6 billion redevelopment program yield the best results possible.

Knowing how crucial restrooms are to passengers, SLC had the project team build a life-size, fully functional model of a proposed design for testing. After the broad concept and finer nuances are finalized and approved, the model will be replicated 18 times throughout the new Central Terminal.

“People chuckle, but for a hub airport, the first thing people do if they are reconnecting is go to the restroom. So, we gotta get that right,” says SLC Executive Director Bill Wyatt. “A tremendous amount of thought went into those details.”

Overall, the \$3.6 billion redevelopment program is designed to bring the airport into



BILL WYATT

the modern era in terms of technology and passenger capacity. In addition to the new \$577 million terminal, major components of the program include:

- a 502,000-square-foot rental car center;
- surface and covered parking facilities that will add 6,600 new spaces;
- two linear concourses;
- two tunnels; and
- an elevated roadway.

The first phase of the project is on track to open in fall 2020, and the second phase is expected to be completed in 2024/25. When all the work is finished, SLC will have a single terminal, A and B concourses connected by a tunnel, and 78 gates. Altogether, the new facilities will occupy 4 million square feet of space.

## Readying the Restrooms

The construction team created a life-size mockup of restrooms that will eventually be used in the two new concourses. Key stakeholders such as patrons and employees had the opportunity





## Salt Lake City International Airport

### FACTS&FIGURES

**Project:** Redevelopment Program

**Location:** Salt Lake City Int'l Airport

**Key Components:** New terminal; 2 concourses; rental car facility; additional surface & covered parking; 1 tunnel; elevated road

**Total Budget:** \$3.6 billion

**Funding:** Airport cash (14.8%); passenger facility charges (11.5%); rental car facility charges (4.9%); 2017 airport revenue bonds (23%); federal grants (4.5%); future bonds (41.3%)

**Timeline:** Phase 1 is slated to open fall 2020; Phase 2 in 2024/25

**Gates:** 78 at completion

**Footprint of Addition:** 296.7 acres

**Total Acreage:** 7,824

**Owner:** Salt Lake City Corp.

**Developer:** Salt Lake City Dept. of Airports

**Operational Readiness, Activation & Transition Subcontractor:** Chrysalis Global Aviation

### CENTRAL TERMINAL

**Size:** 908,754 sq. ft.

**Cost:** \$577 million

**Construction Manager at Risk, Terminal Redevelopment:** Holder-Big-D Construction, a joint venture between Holder Construction Co. & Big-D Construction

**Master Architect:** HOK Architects

**Architecture Services:** HOK; ArchNexus; MHTN; FFKR; GSB

**Civil (Landside & Airside):** HNTB

**Mechanical/Electrical/Plumbing & Fire Protection:** HOK; Envision Engineering; Colvin Engineering

**Structural:** HOK; Reaveley Engineers + Associates; Dunn Associates

**Program Director:** Making Projects Work Inc.

**Baggage Handling System:** Cage

**Info Technology/Security:** HOK; JWG

**Interior Design/Lighting/Signage:** HOK

**Public Address/Acoustics:** CSA

**Passenger Conveyance:** SHG

**Waterproofing:** SGH

**Hardware:** DHC

**Code:** Jensen Hughes

**Central Tunnel:** 106,140 sq. ft., 990 ft. long

**Cost:** \$120 million

### CONCOURSES

**North Concourse:** 2,252 linear ft.

**Cost:** \$536 million

**Contractor:** Austin Okland Aviation, a joint venture between Austin Commercial & Okland Construction Co.

**South Concourse:** 3,691 linear ft.

**Cost:** \$525 million

**Passenger Boarding Bridges & Assoc. Equipment:** AERO

**Hydrant Fueling:** HNTB

**Airfield Lighting:** Lean Engineering

**Geotechnical:** RB&G

### PARKING

**Economy Lot:** 3,000 spaces

**Cost:** \$12.5 million

**Garage:** 1.7 million sq. ft.; 3,600 stalls

**Cost:** \$165 million

### RENTAL CAR FACILITIES

**Total Size:** 502,000 sq. ft.

**Quick Turnaround Facility:** 469,567 sq. ft.

**Features:** 64 fuel pumps; 75,000 gallons of fuel storage in 3 tanks; 14 car wash units that recycle 85% of water used

### ROADWAY IMPROVEMENTS

**Total Cost:** \$91 million

**Elevated Roadway:** 2.1 miles

**At-grade Roadway:** 11.9 miles

**Engineering:** Horrocks

**Mid-Concourse Tunnel:** 41,454 sq. ft., 990 ft. long

**Cost:** \$19 million

to put the sample facilities through the rigors. The logic? It is much easier to make modifications to one restroom now than to 18 later.

“Once we have everyone on the same page with what we want in the bathrooms, we will build all of them according to that,” says Thomas Walters, interior superintendent for Holder-Big-D Construction, construction manager at risk for the terminal redevelopment. “The whole purpose is to give the visual and life-sized view of the project’s intents and drawings. With these, we can walk in and see it in real time.”

In addition to illuminating kinks in the initial design, the mockups will eventually give construction crews a standard for the quality needed on the final product, adds Walters.

For example, the restroom mockup showed that the trash cans needed to be reconsidered. The size of the container made it difficult for janitorial staff to quickly empty the can, and



THOMAS WALTERS

The team used a full-size, fully functional restroom model to test design details before construction.



it also did not have a lock to prevent patrons from accessing the contents inside.

Maintenance personnel noticed that the millwork right above the mirrors had sharp edges that could pose a risk to people reaching for paper towels. Moreover, they would have to remove the mirrors if there was a problem with one of the faucets, and that would be a time-consuming process.

“The advantage of doing this is getting feedback and perspectives from all levels of the organization built into the final product,” explains SLC Program Director Mike Williams. “Anybody who has worked on this project sees the value of doing this, even if it takes a little longer up front.”



MIKE WILLIAMS

Beyond adjustments for maintenance and janitorial staff, the project team found a way to make the restrooms more convenient for travelers. The designers made each stall 2 feet deeper than usual to accommodate baggage and other personal items.

“That extra 2 feet allows you to bring all your belongings into the restroom with you,” explains Fred Groome, general superintendent with Holder-Big-D Construction.

The project team used mockups for several other aspects of the project as well:

- column covers to hide the mechanical, electrical and plumbing hardware;
- terrazzo that will be used for high-traffic flooring; and
- a cloud feature in the ceilings directly in front of the restrooms.

“This mockup process helps get everyone interested in servicing passengers and maintaining the facilities,” Williams observes.

### Even the Artwork

Another element that merited a mockup is *The Canyon*, an integrated piece of artwork that will span 362 feet on both walls of the new terminal. Gordon Huether Studio of California used more than two acres of composite fabric and nearly 800 individual “fins” to create the installation, which evokes the Salt Lake City landscape.

Matt Needham, project manager for HOK, notes that a full-sized structural model of the artwork was essential to verify that the artist’s concept could be executed in the airport.



MATT NEEDHAM



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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“We had to have a mockup in the studio in Napa to make sure the fabrication could work, then to ensure it could be applied over these large surfaces,” Needham explains. “[Huether] had to experiment with ways to wrap the flameproof, smokeproof fabric around the aluminum tubing so it would be sculptural enough to represent the geography. It took a while, but we got it figured out.”

**At the Ready**

Just as SLC is using mockups for physical elements, it is also using a transition specialist to ensure operational readiness when it moves into its new facilities. Given the massive nature of its redevelopment program, the airport contracted Chrysalis Global Aviation for operational readiness, activation and transition (ORAT) services.



SUZANNE PHELPS

Suzanne Phelps, managing partner of the company, explains that ORAT has been around for 30 to 40 years in Asia and Europe, but it is still a relatively new concept in the U.S. SLC, however, has taken the issue of operational readiness very seriously early on, she notes. In addition to contracting Chrysalis, the airport appointed Medardo Gomez as its internal ORAT director for the project.

“By the time we hit the ground, they had already formed working groups around functional areas that had been meeting for a year,” Phelps reports. “They are putting money where their mouth is when it comes to operational readiness.”

To ensure the airport is ready to roll when the ribbon is cut, Chrysalis is reviewing designs for operational feasibility. The goal is to avoid costly change orders once crews are into the teeth of the construction schedule, explains Phelps.

“There is a tendency to equate operational readiness with those last-minute activities that occur right before the facility opens,” she says. “But ORAT really is a much broader endeavor. The earlier you start, the more you can head off problems before they arise.”

Instead of engaging Chrysalis through its construction manager or architect as many airports do, SLC is contracting directly with the company. Phelps says this is much more effective because it helps ensure the owner’s operational needs are met.

“When the ORAT consultant is subcontracted through another program player, the ability to advocate for the owner can be diminished and the potential for

conflict is increased immeasurably,” she explains. “In addition, ORAT succeeds in part through interaction with, and integration of, disparate project elements and players. This is best accomplished from a position of independence.”

At SLC, concessions has been a particular area of focus for Chrysalis. While some concessionaires have contracts in the new concourses, others do not. These “orphans,” as Phelps calls them, will continue operating until the concourse they’re in is deactivated, and certain areas of the concourse will be deactivated before others.

“Our job is to identify the spaces that need to be there that aren’t there yet,” Phelps concludes. ✈️



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# Scottsdale Airport Opens New Aviation Business Center

BY MIKE SCHWANZ



## FACTS & FIGURES

**Project:** Airport Redevelopment

**Key Components:** New Aviation Business Center; veterans memorial; 2 new hangars

**Location:** Scottsdale (AZ) Airport

**Project Timeline:** Initial planning began in late 2015; construction started in July 2017; new facilities opened in Nov. 2018

**Total Cost:** \$27 million

**Funding:** City-issued bonds

**Primary Design/Engineering Firm:** Mead & Hunt

**Architect Subcontractor:** DWL Architects

**Contractor:** JE Dunn Construction

**High-Performance Glass Mfg:** Vitro Architectural Glass

**Key Hangar Tenant:** Gemini Air Group

**Agreement Terms:** 20-year lease, with 10-year option; \$80,000/month rent plus percentage of gross hangar revenue & fuel flowage fees for two 30,000-sq.-ft. hangars & 2 support offices

**Key Benefits:** Better amenities for tenants & general public; new revenue from recently built hangars; more space for corporate aircraft; reduced energy costs due to high sustainability standards



Last November, Scottsdale Airport (SDL) inaugurated its Aviation Business Center, the centerpiece of a \$27 million redevelopment project that also includes a veterans memorial and two new hangars.

The 23,800-square-foot building replaces SDL's outdated, underutilized terminal built in 1968. Now, the Arizona airport has fresh new facilities for its landside administrative offices, Customs operations, restaurant and existing tenant spaces. Glass facades allow visitors to enjoy connections to the airfield and views of the nearby McDowell Mountains. A shaded public plaza provides a welcoming area for tenants and visitors alike.

Key features of the new complex include:

- The Thunderbird Field II Veterans Memorial—a tribute to the airport's previous role as a training center for pilots and aircrews during World War II. Exhibits include a historic PT-17 Stearman aircraft similar to those flown during the airport's early years, an interactive educational kiosk and donor plaques.
- Glass artwork by Martin Donlin, featuring imagery and maps of Scottsdale and the surrounding desert
- The Volanti Restaurant and Lounge, with a shaded outdoor patio that highlights views of the airport and nearby mountains

- Two banquet and meeting rooms with space for up to 400 people
- Airport administrative offices on the first floor
- Private aviation business offices
- U.S. Customs and Border Protection offices
- Civil Air Patrol offices

The new building and executive hangars were needed for several reasons, says Aviation Director Gary Mascaro. "Our airport is home to many of the Phoenix area's corporate aircraft, and functions as a



GARY MASCARO

general aviation reliever facility. In the past few years, we had a significant increase in demand for more parking for larger corporate jets. We were not using our existing space as efficiently as we should have. We needed high-quality facilities for airport clientele, and additional customer amenities," he explains.

The first step to getting the project off the ground was finding an anchor tenant/long-term business partner for a new hangar. This would provide steady income that would eventually recover the building costs. Fortunately, Gemini Air Group—a longtime tenant at the airport—was seeking to expand its facilities, and agreed



to a long-term rental agreement. Under the terms of the 20-year lease, Gemini will pay \$80,000 a month in rent plus a percentage of gross sales for hangar revenue and fuel flowage fees. Gemini also will cover its own utility costs. In exchange, the airport agreed to build two new 30,000-square-foot hangars and two ancillary support office spaces totaling 4,000 square feet.

To finance the project, the city of Scottsdale issued a \$27 million bond that covered the cost of building the new hangars and Aviation Business Center. The airport expects to pay off the debt service in 15 years, says Mascaro.

The airport hired Mead & Hunt as the primary engineering/design firm, and DWL Architects as a subcontractor for architecture. One of their primary design challenges was fitting new buildings into the airport's tight footprint. Initial planning for the new project started in late 2015, and construction began in July 2017.

Besides the monthly rent payments from Gemini, the airport also expects to collect income from tenants in the new Aviation Business Center, including U.S. Customs and Border Protection, the Civil Air Patrol, private firms leasing office space, meeting space rental and the new restaurant/bar.

"We are a very user-friendly facility for outside visitors," Mascaro comments. "Parking is free. We are at the epicenter of one of the largest airparks in the state. Many employees at nearby businesses are coming to the restaurant and bar, to enjoy its attractive patio for lunch or after work."

SDL's location in the middle of a thriving airpark is a big plus. Last year, the Scottsdale Airpark had more than 59,000 employees, almost 44 million square feet of buildings and about 3,200 companies. The development includes offices, industrial



space, medical businesses, retail shops, multi-family residences, hotels and car dealerships. By 2030, Airpark officials anticipate having 82,000 employees, 53 million square feet of buildings and about 4,100 companies.

"We expect our meeting/venue space will be in high demand, and that also will help our bottom line," Mascaro predicts.



MICHAEL BRAUN

Currently, the airport derives 40% of its income from fixed tenant rent, 30% from transient landing fees and 30% from fuel flowage fees.

## Planning & Project Management

Once funding was green-lighted by the city of Scottsdale, the planning team got to work. "We spent a lot of time with our partner Mead & Hunt, airport executives and other city officials, examining the whole property, trying how to figure out how to maximize the space," states Michael Braun, executive vice president and principal with DWL Architects. "We had biweekly meetings for nearly two years just in the planning phase. The city's Development Review Board was very thorough; we had to show access points, zoning, location of utilities and many other things."

The expansive public access was a potential sticking point for the project team to overcome. "Most airports are locked in on three sides; SDL has nearly total public access," Braun explains. "We had to address various levels of security and access, to meet the requirements of the Customs and Border Protection office, as well as the Civil Air Patrol."

Displaying the classic Stearman posed structural and architectural challenges. Ultimately, the project team showcased it in front of the building by suspending and securing the plane with cables. "It took us several intensive days to identify the best display option," Braun recalls.

Scot Whitney, the project manager for Mead & Hunt, says that having all key stakeholders meet face-to-face during the planning

stages was key to the project's success. "During the design phase, there could be as many as 20 people involved in a given meeting," recalls Whitney. "The city of Scottsdale brought in different people from many different departments, and gave them a chance to weigh in. This led to many positive suggestions."



SCOT WHITNEY

The design team also solicited input about the new building from incoming tenants. "Gemini was a great partner," he specifies. "They told us what they needed for their dual hangars early in the process."

Maintaining the budget was a continual challenge during the 15 months of construction, Whitney continues. "We had to make some hard decisions throughout the process, but I am very proud of how the entire team met those challenges," he says.

### Sustainability

As the primary engineering firm, Mead & Hunt provided the airport with guidance about achieving a LEED (Leadership in Energy and Environmental Design) rating for the project. "That was a priority of airport officials," says Whitney. "They wanted a sleek, glass, modern look, while maintaining maximum energy efficiency."

The new building consequently faces north, avoiding direct exposure to the sun. In addition, all windows are shaded with

high-performance glass, and a perforated screen shades the back patio.

Electricity for the building is produced by solar panels on the roof. "The energy bills for this building should be very low," Whitney predicts.

### Satisfied Partners

Put simply, the Aviation Business Center would not have been possible without Gemini as a hangar tenant. The partnership is off to a strong start, with both organizations anticipating mutual long-term growth.

"The timing worked out very well," says Gemini President Tim Carpay. "We were leasing space in different hangars at SDL, and we really wanted to consolidate everything in one facility. We had originally wanted 30,000 square feet, but then SDL offered us 60,000 square feet. We eventually decided on two 30,000-square-foot buildings that are attached. We also wanted more office space."



TIM CARPAY

Currently, the maintenance department brings in 30% of Gemini's revenue, the charter management division accounts for 50%, and hangar rentals garner about 20%. "We expect revenue to rise with our increased space," Carpay says.



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In the initial planning stages, the city of Scottsdale worked with the company for installation of electrical systems, water and other utilities. “They were very accommodating to our requests, and that made a big difference,” Carpay comments.

Gemini significantly reduced its energy costs by forgoing air conditioning. “We have huge fans to cool the hangars—four in each building,” says Carpay. “This creates an amazing amount of airflow. With air conditioning, it would be very hard to cool down the buildings with the doors open. In the eight months the hangars have been open, the energy bills are about what was predicted.”

The location of the hangars—in the center of the property, on the west side—also helps keep the buildings cool. “The hangars face east, so after 10 a.m. or so, the sun goes to the other side,” he adds.

Gemini performs a considerable amount of routine aircraft maintenance on its own fleet and outside aircraft. “All of our hangar-leased aircraft must have at least a one-year lease for our hangars,” Carpay specifies. “We are not an FBO, so we only can fuel aircraft that have leases with us. Another stipulation is that we have to be able to get all planes in the hangars, at the same time, off of the airfield.”

As of mid-May, about 57,000 square feet of the company’s total 60,000 square feet was already filled. “We can have up to

10 to 12 planes in each hangar, and can probably get up to 20 planes total in both buildings,” Carpay estimates.

### Compliments Abound

Mascaro reports that the new development has exceeded expectations during the initial months it has been open. The Aviation Business Center building and hangars have been universally praised by airport clients and tenants, he adds.

“With the new Aviation Business Center and the two new executive hangars, we have become one of the largest, most unique developments for an airport directly funded that I have seen for a general aviation airport of our size,” Mascaro comments. “Everybody loves it so far, both the airport’s tenants as well as the general public. Our two current FBOs, Ross Aviation and Signature Flight Support, are pleased that their customers can enjoy the new amenities of the Aviation Business Center.”

As for the future, there are a few upcoming construction projects on the docket. A new FBO recently bought out the leaseholders of existing buildings at the south end of the property, and will redevelop that site with a new executive hangar, contemporary fuel farm and terminal space for a third FBO. The airport also plans to design and construct 14 new executive box hangars on the north end of the airfield. “There are more exciting times ahead as the airport continues to reinvent itself,” Mascaro concludes. 

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# O'Hare Combines Public Parking, Shuttles, Mass Transit & Rental Car Operations Into One Facility

BY THOMAS J. SMITH

## FACTS&FIGURES

**Project:** Multi Modal Facility

**Location:** O'Hare International Airport

**Owner:** Chicago Dept. of Aviation

**Project Cost:** \$405 million

**Funding:** \$272 million Transportation Infrastructure Finance Innovation Act Loan; bonds backed by rental car fees & lease payments

**Facility Size:** 2.6 million sq. ft.; 2,600 parking spaces; 4,200 rental car spots

**Project Timeline:** Planning began in 2011; crews broke ground in 2015; parking garage & rental car facility opened Oct. 2018; rail station scheduled to open Sept. 2019

**Architect/Engineer:** TranSystems

**Construction Manager:** Austin Power Partners

**Program Manager:** DMJM Aviation Partners, JV (AECOM lead JV)

**Precast Supplier:** Illini Precast

**Precast Designer:** Precast Engineering Co.

**Key Benefits:** Reduce curbside traffic congestion; increase accessibility to terminals; facilitate future terminal expansion



Chicago O'Hare International Airport (ORD) is phasing in a new approach to managing ground transportation. Its new Multi Modal Facility brings together rental car operations, public parking, airport shuttles and bus stops—all in the same 2.6-million-square-foot complex. Moreover, the new facility is a short walk to/from an existing station for the region's commuter train system.

Rental car operations and public parking opened last October. Phase two, slated for completion in September, will include a stop for ORD's intra-campus rail system and bus bays for all regional mass transit bus systems, airport shuttles and hotel shuttles.

As a whole, the \$405 million project is designed to reduce curbside traffic congestion and make ORD terminals more accessible to travelers. It will also help set the stage for an \$8.5 billion terminal expansion planned over the next decade.

"The move to consolidate rental cars is not a new concept at airports," says Kieran Sheridan, chief operating officer for the Chicago Department of Aviation. "What

is unique is it brings together various modes of transportation to make the airport more accessible."

## New Runway Spurs Relocations

The project got its start when several rental car lots had to be relocated as part of ORD's ongoing multibillion-dollar airfield modernization program. Rental car lots and support facilities were located in what will be the runway safety zone area for the airport's new Runway 9C, which is scheduled to open next year.

When developing the masterplan, designers identified an area that included a surface parking lot and cell phone waiting lot as the best site for the new Multi Modal Facility. The location is close to the existing Metra regional rail station that serves the airport and is situated at the edge of the airport campus. By locating the new facility there, project designers eliminated the need for drivers to travel into the core terminal area, thus alleviating congestion and saving them time.



KIERAN SHERIDAN





The two-story atrium lobby includes 13 counters for rental companies.

Planning for the two-building project began in 2011, and construction began in 2015.

The Chicago office of the engineering firm TranSystems designed the facilities with support from numerous Chicago firms including Delta Engineering Group, Ross Barney Architects and Singh & Associates. The Construction Manager-at Risk was Austin Power Partners, a joint venture of Power Construction of Chicago, Austin Commercial of Dallas and Ujamaa Construction of Chicago.

### Facility Floor Plan

The main structure is five floors. The first three contain 4,200 stalls for rental car agencies; the enclosed fourth floor and roof level accommodate 2,600 public parking spots and 12 charging stations for electric vehicles. The structure features two 60-foot-wide interior courtyards with evergreen and deciduous trees. Exposed to the public parking floors, the courtyards provide natural ventilation, lighting and directional orientation to drivers inside the garage.

Counters for 13 rental car operators are located in a two-story atrium lobby. Previously, some were located inside the terminals and others were off site. The new structure consolidates all into one facility, which was 100% occupied when it opened, Sheridan notes.

The building also includes food and beverage operations, two nursing rooms for mothers and an outdoor relief area for service animals and pets.

Hertz, Enterprise and Avis have VIP areas that allow frequent customers to bypass the counters. The Enterprise space resembles a new car showroom that displays vehicles available for upgrades.

The second building houses a quick turnaround facility for the rental agencies. It connects on all levels to the parking garage, and includes heated floors, maintenance lifts, fueling bays and vehicle washing equipment.

All the rental companies lease this space and participate, pro rata, in a contract with a third party that manages the service area.

The quick turnaround building is topped with a green roof covered entirely in vegetation—a feature that supports the project

team’s efforts to earn a LEED Silver rating for Leadership in Energy and Environmental Design.

“We have had great feedback—specifically from the rental car companies, who are hearing great comments from their customers,” Sheridan reports. “They like the layout of the building, its convenience, the sleek modern look and the beautiful interiors.”

## Design Challenges

Several aspects of the rental car facilities caused wrinkles in the original planning for the overall complex. For instance, the desire to have fueling stations on multiple floors of the enclosed structure was originally at odds with Chicago fire codes.

"We worked with them on a special fire suppression system and ventilation to get approvals," explains Mike Lev, the TranSystems vice president who served as the firm's project manager.



MIKE LEV

Housing the quick-turn facilities in a separate structure from the parking garage, and installing automated doors, also helped meet code requirements. The large roll-down doors separate the fueling

area from the rest of the facility in the event of a fire, Sheridan explains.

To provide operational flexibility, the team strayed from the usual construction practice for concrete garages by using robust columns rather than shear walls for horizontal support. This created more wide-open spaces, so rental operators can park vehicles in a north-south direction some days and an east-west direction on others.

The garage contains 255 precast columns (each four stories tall) that transfer the building's load to the foundation. "We achieved this by using larger columns and very high-strength concrete with very heavy anchoring pieces tying each column to the foundation," explains Jacob Donnellan, a project engineer with Precast Engineering, the company that designed the columns.



Designers specified high-strength precast concrete columns rather than shear walls to provide horizontal support for the structure.



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- Rhode Island Airport Corporation, Iftikhar Ahmad, President & CEO
- Oil Price Information Service, Ben Brockwell, Director
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- IATA, Andrew Matters, Head of Industry Analysis
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Made with a highly engineered concrete mix, each column has a footprint of 44 by 42 inches and is designed to handle a load of 15,000 pounds per square inch, details Donnellan. By comparison, the columns in most of the precast parking garages the firm designs have footprints of 44 by 30 inches and handle loads of 5,000 to 7,000 pounds per square inch.

Illini Precast Concrete, the firm that hired Precast Engineering to design an alternative to shear walls for the project, poured the columns in its plant in Burlington, WI. Overall, the process took about four months.

In the end, the design reduced the number of pieces needed to build the garage, which saved time during the erecting process.

Although the airport is not currently planning to add more floors for public parking, the Chicago Department of Aviation required the garage's sub- and superstructure to be able to support four additional floors for future expansion.

### Transit Facilities Open Soon

Sheridan reports that ORD will coordinate the arrival of its rail system with the establishment of various shuttle buses at the new

facility. Currently, the airport is running shuttle service between the terminals and new garage.

The building includes 12 bus bays and three additional layover spots. All airport shuttles, hotel shuttles and regional transit buses will operate out of these bus bays, which are adjacent to the building lobby. Bus providers will make the move in phases, so each service is operating smoothly before another service is added, notes Sheridan.

A station for the Airport Transit System, ORD's intra-campus rail system, is located on the third level of the building. Currently, the system is undergoing improvements to increase the capacity and speed of the cars. Major construction is already complete, and crews are now working on system integration. Once the system is operational, the farthest terminal will be a nine-minute train ride from the Multi Modal Facility.

In the meantime, the airport is operating shuttle buses for passengers and employees between terminals and to/from its economy parking lots. Temporary shuttles are also serving the nearby Metra train station and the airport's new Multi Modal Facility. ✈️



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# El Paso Int'l Creates Airport Neighborhood With Paved Walkways, Lighting & Landscaping

BY VICTORIA SOUKUP



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## FACTS&FIGURES

**Project:** New Exterior Walkways, Landscaping, Lighting; Reconfigured Terminal Roads

**Location:** El Paso (TX) Int'l Airport

**Cost:** \$11 million

**Funding:** Airport enterprise funds

**Project Designer:** Meridian Green Works LLC

**Contractor:** Jordan Foster Construction

**Public Art:** Programmable colored LED light display

**Notable Features:** Public plaza around statue at airport entrance; marked walking/running paths; outdoor fitness equipment

Walkability is a buzzword usually associated with city planning; and curb appeal is typically an issue for real estate agents. Both, however, are now key features at El Paso International (ELP).

The West Texas airport is completing an \$11 million exterior renovation that links its terminal to nearby restaurants and onsite hotels via paved walkways. Improving passenger drop-off/pickup areas and upgrading exterior landscaping and lighting are other primary projects.

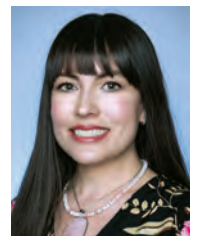
The initiative, paid for with airport enterprise funds, was spearheaded to give ELP a new sense of identity and provide a “wow factor” for visitors. Last year, the airport served more than 3.2 million passengers.

“The city of El Paso and El Paso International Airport are growing; and as we grow, it is our strategic goal to provide a superior passenger experience and a phenomenal first and last impression of this city,” says Monica Lombrana, A.A.E., managing director of Aviation and International Bridges. “The plan is to make the airport more than just a transit station by improving its curb appeal and overall connectivity. It will be a place people *want* to spend their time.”



MONICA LOMBRANA

ELP Project Manager R. Shane Brooks explains that the airport renovations are part of Sun City Lights, a citywide effort to add public art, improve urban design and promote neighborhood revitalization throughout El Paso. For its part, ELP opted to light up its property, change drop-off and pickup traffic patterns in front of the terminal and link the terminal building



R. SHANE BROOKS

with surrounding hotels and restaurants. It also upgraded exterior lighting and revitalized landscaping with new trees and plantings.

“The guiding principle was to create an airport neighborhood,” explains Brooks. A big part of the transformation was constructing a 1,000-foot-long, 20-foot-wide paved walkway that leads from the front door of the terminal to a 36-foot-tall bronze equestrian statue at the entrance of the airport property.

Previously, the statue was surrounded by rocks, limited plantings and a small adjacent parking lot. The airport made the area more inviting and accessible by creating a large paved plaza with seating and more landscaping features. The tree-lined walkway that leads to the new plaza cuts through ELP’s short-term parking lot to encourage airport customers to visit the plaza. Trees and the grounds have LED lights that can be programmed to display different color themes depending on the season.

H. Wayne Cooper, president of Meridian Green Works LLC, says the project links the terminal with the equestrian plaza and encourages walkability. “There really wasn’t a well-defined pedestrian corridor from the terminal to the equestrian plaza,” Cooper says. “We wanted to make a visual connection between those destinations.”



H. WAYNE COOPER

Overall, the design team sought to unify ELP’s property. “The airport landscape had been random in nature,” he explains. “Over the years, different things had been added here and there. Our goal was to have a continuous theme.”

Sidewalks were created off the plaza, leading to nearby restaurants and some of the seven on-airport hotels. The existing road that runs alongside the plaza was renovated to include a landscaped median that encourages people to drive a little slower. “We cleaned it up and made it more refined and more orderly,” says Cooper.

New push-button control signals were installed at crossways for pedestrian safety.

## Lights & Landscaping

Now, the property has a natural flow, reports Cooper. The design starts when motorists approach the airport and travel through an underpass called the “El Paso Passage,” a public art installation with programmable color-changing lights.

“The light system, designed by artist Bill FitzGibbons, is very impressive,” says Brooks. “It’s always running different themes. For example, it has a beating heart for Valentine’s Day and floating ghosts for Halloween.”

As motorists get closer to the airport, the landscape gradually centers on the large equestrian statue. “We opened that up into a big public plaza, and now it’s a destination for people,” says Cooper.

Landscaping designers selected native drought-tolerant trees and bushes that will withstand the Texas sunshine and heat with minimal support from a drip water irrigation system. Individual plants and ground cover varieties have different blooming seasons to provide color throughout the year.

“We wanted to make it really lush and full right off the bat,” Cooper says.

The roadway in front of the terminal was also improved. Previously, taxis, shuttle buses and city buses all loaded and unloaded from a center median. “But it was too narrow, and the space got more and more crowded,” notes Brooks.

To relieve that congestion, the airport added two “in and out” slip lanes off the lane farthest from the terminal for taxis and shuttle buses. “The vehicles can enter the slip lane, load and then go back out again. It allows for safer loading of passengers,” Brooks explains. The inner median has “a comfortable 10-foot width” for city buses and ride share vehicles.

White fabric canopies equipped with LED lights provide shade and decorative appeal at the passenger drop-off and loading areas.

Like the other new lighting, the canopy LEDs are programmable. “At night, visitors will see color when they are outside the terminal,” she notes.

## Fitness Features

The airport is also supporting Move El Paso, the city’s public health initiative that highlights walking trails and promotes daily walking as part of an overall healthy lifestyle. “We’re doing our part by establishing walking/running paths around the property—small, medium and large loops each identified by medallions in the ground,” explains Brooks. “Since everything starts at the statue, we will be placing signage there identifying the paths.”

A small area with stationary fitness equipment such as a balance beam, ab crunch machine, overhead ladder and a chin-up bar will also be installed for outdoor exercise.

Brooks reports that ELP is pleased with the neighborhood feel created by the fitness features and exterior renovations. “The airport is often the first experience people have when visiting a city,” she says. “And we want that first impression to be a good one for people who arrive at the El Paso Airport. We want it to have a ‘wow’ factor. All the lights and new plantings will help provide that. It’s about connectivity.

“The wide sidewalks will make it easier for our passengers to get from one place to another. We really want people who are staying at the airport hotels to have access to surrounding things to do. And the experience at El Paso now includes a visually stimulating landscape and walkable streetscape that provides an image of economic growth and development.”

## Changes Inside & Out

Recent and ongoing exterior changes come more than a year after the airport installed a 16-foot digital “touch wall” inside the terminal. The 18-monitor display allows users to access information about activities, restaurants and events to enjoy while visiting the area.

Between the digital touchscreen inside and the landscaping and traffic improvements outside, ELP is investing to give passengers a positive impression of El Paso right after they land. ✈️

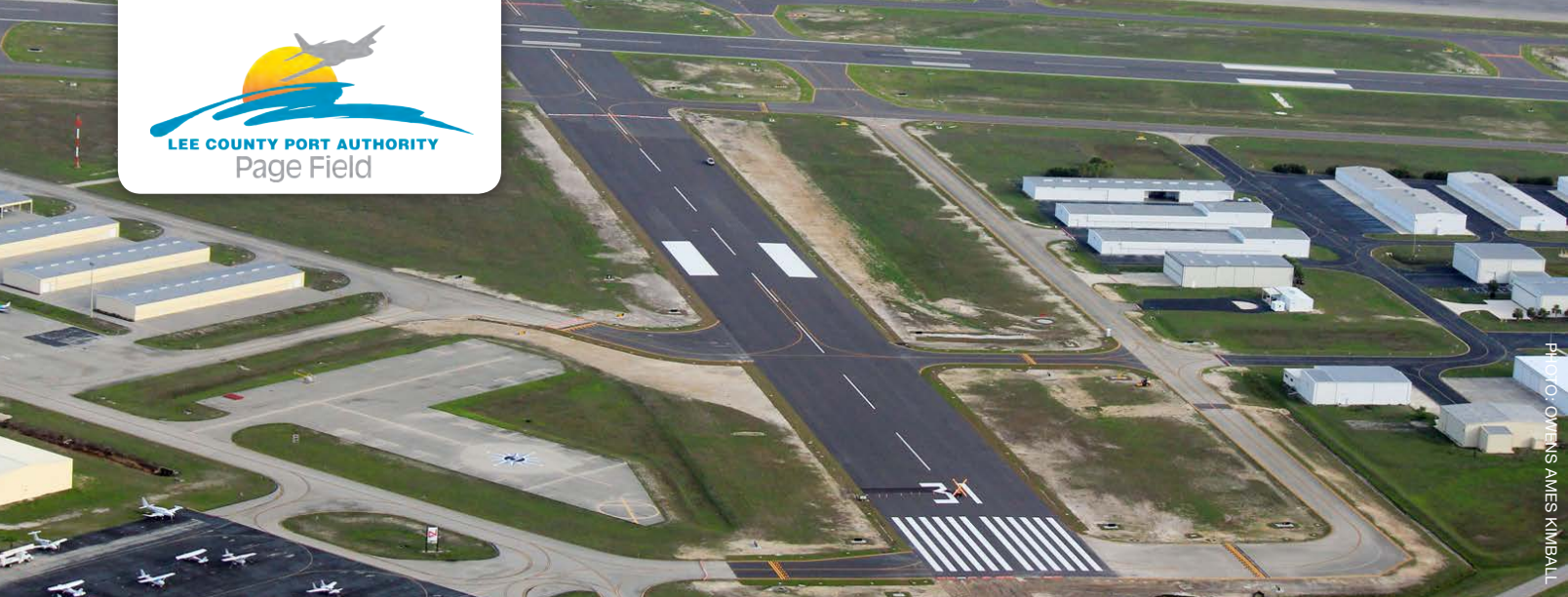


PHOTO: OWEN'S AMES KIMBALL

## FACTS & FIGURES

**Project:** Airfield Improvements

**Scope:** Repaving 2 runways & several taxiways; installing new lighting system with LED lights & signs

**Location:** Page Field—Fort Myers, FL

**2018 Annual Operations:** 97,816

**Project Cost:** Nearly \$30 million

**Main Runway/Taxiways Funding:** 90% FAA; 5% state; 5% Lee County Port Authority

**Main Runway Length:** 6,406 ft.

**Crosswind Runway & Taxiway Funding:** 80% state, 20% port authority

**Crosswind Runway Length:** 4,909 ft.

**Construction Timeline:** Jan. 2017-late Aug. 2018

**Primary Airfield Lighting Components:** 122 LED runway edge lights; 757 taxiway lights; 56 LED threshold lights; 139 LED signs; 85 junction can plazas; new airfield vault; about 100,000 ft. of conduit/duct work; 297,000 ft. of lighting cable

**Lights/Signs:** ABD Safegate

**Junction Cans:** Jaquith Industries Inc.

**Closures:** 107 days for main runway, 313 days for crosswind runway

**Airfield Lighting Design:** AVCON Inc.

**Project Design/Engineering:** Hole Montes Inc.

**Construction Management:** Owen-Ames-Kimball Co.

**Paving Contractor:** Ajax Paving Industries of Florida LLC

**Earthwork Subcontractor:** Ongrade Contracting Inc.

**GPS-Guided Equipment:** Topcon Corp.

**Electrical Contractors:** H.L. Pruitt Corp.; Baja Electric Service Inc.

**Drainage/Site Work:** Gulf Coast Underground; Christo Inc.

**Key Benefits:** Minimal operational disruption & revenue loss; improved runways; better airfield visibility/lighting quality; easier, safer lighting repair & troubleshooting; lower energy costs

# Page Field Upgrades Runways & Taxiways, Adds Energy-Efficient Airfield Lighting

BY KEN WYSOCKY

There's never a good time to close runways and taxiways for rehab work. But thanks to an intense coordination effort, Page Field (FMY) in Fort Myers, FL, completed a nearly \$30 million airfield project last year with minimal disruptions to flight operations. Crews repaved the airport's two runways, upgraded several taxiways and installed a new airfield lighting system in 19 months, despite imposing weather challenges that included Hurricane Irma in September 2017.

Key participants credit the decision to use GPS-controlled grading and paving equipment for helping the team complete the extensive project on time and under budget by about \$1.5 million. That cost savings allowed the airport to rehab an extra 1,500 feet of a taxiway, notes Scott Sheets, director of general aviation for the Lee County Port Authority, which owns and operates FMY.



SCOTT SHEETS

Work was strategically staged in two phases to keep at least one runway open for almost the entire project, which ran from January 2017 through late August 2018. As such, the airport suffered minimal revenue losses, Sheets reports.

The main runway closed for 107 days between mid-April and early August 2017. The crosswind runway was shut down for

313 days between late August 2017 and early July 2018. Both were closed for a five-day span in early June 2017 when crews repaved their intersection, plus a couple nights about one month later to groove the new pavement and paint runway markings.

## Many Moving Pieces

During the first phase of the project, crews completed a 4-inch mill-and-overlay of the main runway, which is 6,406 feet long. They also repaved portions of two parallel taxiways and several associated connectors and removed, realigned, relocated and reconstructed other sections. The FAA paid 90% of the \$21.1 million tab, with the Florida Department of Transportation (FDOT) and the port authority kicking in another 5% each.

The second phase, begun in late October 2017, focused primarily on a 2-inch mill-and-overlay rehabilitation of the middle 100 feet of the 4,909-foot-long crosswind runway. In addition, crews reconstructed the outer 25 feet on both sides of the crosswind runway.

This phase also included repaving one parallel taxiway and extending another to a full-length taxiway. FDOT paid for 80% of the \$8.8 million cost, and the port authority covered the balance.

"The pavement on both runways badly needed rehabilitation," says Sheets. "The last rehab work on the main runway was a mill-and-overlay project in 1996; so it was due for improvements."

The project also upgraded all airfield lighting and signage to light-emitting diode (LED) fixtures manufactured by ADB Safegate. Sheets reports the new LED lighting has decreased the airport's energy usage by about 55%, even though there are more signs and lights now than before the project.

"That equates to about \$12,000 in savings annually," he says. "That's not a huge number, but it's significant for us."

### GPS-Guided Machines Cut Costs

During a brainstorming session shortly after the project began, executives from Ajax Paving suggested using GPS-guided earthmoving and paving equipment for the project—a move that ended up saving the airport \$1.5 million by reducing the amount of materials such as asphalt and gravel that were used.



TIM PARKER

"To my mind, this made the project an even bigger success," says Tim Parker, senior project manager with project designer/engineer Hole Montes. "It was a big deal because the total cost came in \$1.5 million under budget. That allowed the airport to spend another \$756,000 to rehab an additional 1,500 feet of a taxiway, which was part of a future planned phase of rehabilitation.

So the airport actually got more work performed than what was in the original plan, plus it achieved a net under-budget savings of about \$744,000."

When contractors use conventional manually controlled machines, they typically apply extra material because they don't want to get "dinged" for applying thinner layers than what's required in the project specifications, Parker explains. GPS-controlled equipment applies materials to within a quarter-inch of specified tolerances, which results in significantly less material used.

In addition, site preparation goes faster because there's no need to manually place grading stakes or create string lines for machine operators to follow.

"We essentially 'built' a three-dimensional CADD (computer-aided design and drafting) drawing of all the surfaces in the project—about 20 surfaces in all," explains Ajax GPS Survey Manager Jacob Amann. "Then we used that and some traditional surveying methods to set up a GPS network, similar to an Internet network, on the job site."

After that, the CADD files were loaded via flash drive onto machines such as bulldozers, graders and pavers equipped with millimeter GPS devices made by Topcon Corp. In simplest terms, those devices "talk" to laser transmitters throughout the jobsite.

"This network set up all the design elevations and enabled us to achieve elevations and slopes to within a quarter-inch of the design specifications, which eliminated a lot of waste," Amann says. "When the machines get within 3 inches of the design parameters, they go on automatic control and basically just follow the CADD design."

### Coordination Was Critical

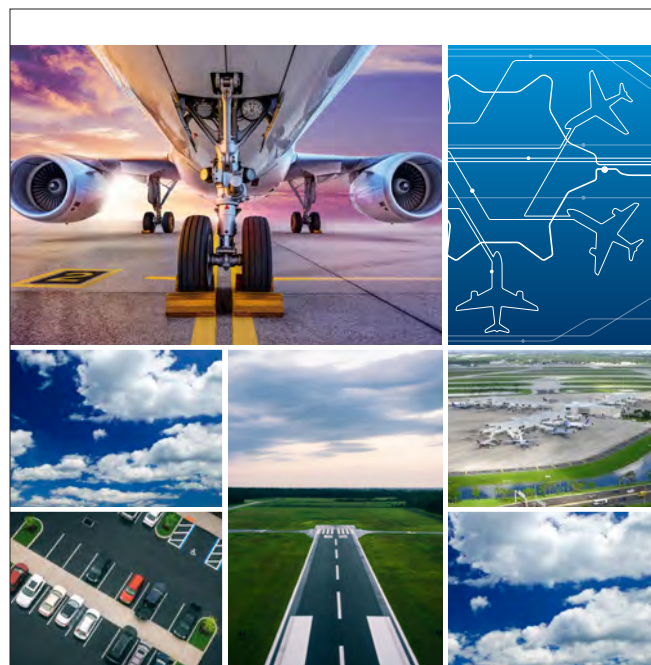
Aside from bad weather, keeping all affected parties in the loop and soliciting their input when unexpected obstacles emerged proved to be the most challenging aspects of the project. Key stakeholders included the airport's self-run fixed-base operator (Base Operations at Page Field), tower personnel, businesses that use the airport, private pilots, airport tenants, contractors and subcontractors.

"The biggest challenge was coordination," Sheets says. "We were disrupting the majority of the airport at one point or another; so just coordinating between the airport, the general contractors, tenants, the tower and subcontractors was a challenge."

Airport officials held town hall-style meetings with tenants to develop a phasing program and get them on board early in the process. "The taxi routes became very complex at times because of the various closures taking place around the airport," Sheets recalls. "If things aren't phased correctly, those closures had the potential to block in private tenants."

Sometimes, taxi routes had to cross an active runway. "It wasn't ideal, but at times it couldn't be avoided," he reflects.

When unexpected challenges arose, officials revisited the original plan and tweaked it accordingly. For example, 5 inches of rain fell during the five days that paving work was scheduled at the intersection of the main runway and crosswind runway.



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*Adjusting the schedule for rainy weather and coordinating changes with stakeholders were key challenges for the project team.*



“We were wondering if we’d get the runways open on time,” Sheets acknowledges. “But the contractors made it happen. We had a very good team. They all deserve a huge tip of the hat.” Contractors on the project included Hole Montes for design and engineering; AVCON Inc. for airfield lighting and vault design; Owen-Ames-Kimball Co. for construction management; H.L. Pruitt Corp. and Baja Electric Service for electrical work; Ongrade Contracting, an earthwork subcontractor; and Gulf Coast Underground and Christo Inc. for drainage and site work.

**LED Conversion**

Another key component of the project was a new airfield lighting system. The old lighting system included antiquated incandescent

and quartz incandescent, stake-mounted lights connected by direct-buried cables. The new system features LED fixtures that use a base-can-and-conduit system.

The system’s major components include 122 LED runway edge lights, 757 taxiway lights, 56 LED threshold lights and 139 LED signs, all made by ADB Safegate. Crews also installed 85 junction can plazas, with cans manufactured by Jaquith Industries; a new airfield lighting electrical vault; and about 100,000 feet of conduit/duct work. The 297,000 feet of lighting cable is routed in a series-circuit configuration to make troubleshooting and repairs easier, notes Carl Johnson, a senior aviation lighting specialist with AVCON.



CARL JOHNSON

Junction can plazas work like junction boxes in other electrical systems. Each concrete plaza typically contains two, four or six cans. When technicians perform electrical repairs, they simply reach down into the cans, which are 2 feet deep and 16 inches in diameter. That’s much easier and safer than climbing down into manholes—a process that requires confined space entry permits and extra safety precautions.

Furthermore, each can contains a limited number of circuits. As such, electricians can more easily identify and isolate the circuit



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that requires work. They also can tell if any additional circuits need to be taken offline for further work. “You can segregate circuits... and damaged circuits can’t damage other circuits,” says Johnson.

### Vault Improvements

The new airfield lighting vault facilitates troubleshooting, too. The interior workspace of the previous 1950s vault was very congested after decades of system revisions and updates and no longer adequately supported the airfield lighting system. In addition, the existing lighting circuits featured direct-buried cables that were circuited in large loops, which made troubleshooting difficult, Johnson relates.

“So we divided the runway circuits into quadrants...and now technicians can start troubleshooting from the vault,” he explains. “Before, they would start in the vault, but once they’d identify the issue, they’d have to go out onto the airfield and start breaking the circuit (loop) into segments to troubleshoot.

“Now they can break the runway circuit into two segments in the vault, then go out on the airfield and go to the first can plaza adjacent to the runway and break it in half again. As such, they know which side of the runway to troubleshoot. It’s a big time-saver.”

The taxiway circuits also were reconfigured to make troubleshooting easier. Other upgrades include a control-and-

monitoring system for the airfield lighting, operated via touch screens in the control tower, and a monitor in the vault. The control system features an auto-dial component, which automatically notifies maintenance personnel when a lighting problem occurs. The airport also updated the pilot-activated lighting system.

### Keys to Success

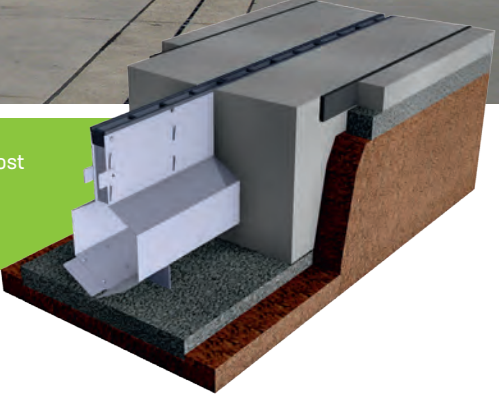
According to Parker, getting an early start on planning was crucial to the project’s overall success. “This project took a lot of coordination with the port authority, the FAA, FDOT and Owen-Ames-Kimball,” he says. “You can’t let things go out of control. And when we saw opportunities to save time, we went for it. The success of big projects like this often hinges on a bunch of little decisions here and there.”

Assembling a good team also was critical, adds Sheets. “Get your tower, your tenants and everyone else involved early in the process,” he advises.

“This was by far the most complex project I’ve had to oversee in my airport management career,” he adds. “And no matter how much planning you do ahead of time, there always are surprises. You have to be flexible—see what’s working and what’s not working. There were a lot of moving parts out there, so we needed a lot of communication.” ✈️



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# Air Service Development /s Economic Development

 In the old days in the U.S., if your town had a railroad station, the town flourished. If not, your town struggled.

It may seem like times were simpler then. But the basic concept of transportation remains the same. Business and commerce depend on having access to transportation to move people and goods, which helps to fuel regional economies.

In many large cities across the United States, people take this access for granted. After all, if you live in New York, Chicago, Los Angeles, Dallas, Atlanta or another large place, it's likely you have robust air service, probably through at least one hub carrier.

But for the rest of us, particularly those of us in the U.S. Midwest whose hub carriers left, it's not so simple. In Pittsburgh, the hub carrier left 15 years ago. The region saw 10,000 jobs disappear and businesses dependent on robust air service connections literally left town for better access.

Despite that loss, the Pittsburgh region continued the economic renaissance spurred a decade earlier by the collapse of the U.S. steel economy. The region created a strategy to diversify into several industries (instead of depending on just one) including technology, finance, energy, healthcare and advanced manufacturing.

Finally, over the past five years, the airport has caught up. We've nearly doubled nonstop destinations, recruited eight new carriers, increased our passengers and lowered our costs to airlines. The airport in Pittsburgh is no longer a drag on the economy but is helping to enable it. We have successfully transitioned from a former hub to a strong origin-and-destination market and feel we have the basic blueprint for other similar markets to follow. Air service development is economic development.



## CHRISTINA CASSOTIS

*As CEO of the Allegheny County Airport Authority, Christina Cassotis has led a dramatic turnaround at Pittsburgh International Airport – a near doubling of nonstop destinations served, four years of record passenger traffic growth, and a recently announced Terminal Modernization Program. During her tenure, Pittsburgh International was named Air Transport World's 2017 Airport of the Year and Regional Airport of the Year by the CAPA Centre for Aviation. Cassotis also received the 2017 Excellence in Visionary Leadership Award from Airports Council International – North America, and was named 2017 Director of the Year for medium-size airports by Airport Revenue News.*

Regional businesses are noticing. In business, time is money; and no company wants to waste valuable staff time as people connect on flights.

Our airport contributes \$29 billion annually in direct, indirect and induced economic benefits. The better we do, the better the economy does—and more people can watch their grandchildren's soccer games instead of watching their children leave to find jobs elsewhere.

After I gave one of my first public talks as CEO of the airport more than four and a half years ago, a tech entrepreneur followed me to my car to tell me what air service meant to his business. He needed venture capital to grow the business and hire employees; but potential investors got stuck in a snowstorm in Chicago on a connecting flight from the West Coast. They told him they loved his business but would never attend a board meeting here because it was too difficult to get to. Enter our West Coast strategy that has increased those flights and helped to fuel Pittsburgh's tech scene.

It's why PPG, ATI and other Pittsburgh businesses sent high-ranking company officials on British Airways' inaugural flight to PIT from London Heathrow in April. Their connections to the UK and Europe are plentiful, and that nonstop flight makes it easier for them to succeed and hire.

That's why we've worked so closely with VisitPittsburgh, our convention and visitors bureau, and the Allegheny

Conference, which oversees our Chamber of Commerce, and the Tech Council in recruiting new flights. Air service is not just people going on vacation—although that's important, too, in Pittsburgh's growing tourism industry. Air service facilitates families coming for college visits and businesses looking to expand. And the airport is the all-around front door for a region.

Our air service strategy works in tandem with real estate development, logistics and cargo development. All four work together to maximize the airport's benefit to the community.

Our region and many across the Midwest know what happens when air service disappears, which is why we compete so vigorously around the world for flights. The stakes are too high to lose.

Airports are economic engines that none of us should take for granted. Bringing in a year-round, wide-body international flight is tantamount to bringing in a mid-size corporate headquarters in terms of economic stimulus to the market. Every flight—regional, domestic and international—adds to a community's competitiveness.

Airports that leverage stakeholder relationships and take a seat at the table in their respective communities as leaders will help their regions flourish. We need more of that at U.S. airports. Our futures depend on it. 

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