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Tucson Int'l Refines Goals & Updates Terminal

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In the January/February issue, Michelle Robinson Design (MRD) was identified as the General Contractor in our Philadelphia International story. Please note, MRD provides Tenant Coordination Services for MarketPlace PHL. The General Contractor is EP Guidi.

columns

advertiserindex

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No Substitute for Experience

This winter, we hired a contractor to plow our driveway at home. I had shoveled the snow for years, and it was time to turn the job over to a professional.

The contractor has kept the driveway clear, but there was definitely a learning curve—nuances regarding where the snow should go after it is plowed, etc. As I prepare this issue for the printer, the stories we are showcasing about snow removal at ERI and RNO (pages 30 and 24, respectively) remind me of what we encountered with our driveway.

Lesson #1: Experience is king of the hill. My contractor had no experience with our driveway at the beginning of the season. Trees at the end of our pavement prevented crews from simply pushing all of the snow past the end of the driveway. When reading about the preparation and years of winter ops experience at ERI and RNO, it is clear that their crews move into winter thoroughly trained regarding who does what. ERI couldn't have handled 5½ feet of snow in two days unless they had done this before!

Lesson #2: Tools are important. A plow truck can clear my driveway in 10 minutes. It took me an hour or more per snowfall. The multi-tasking plow/broom units, high-tech blowers and deicing equipment that airports use today provide faster winter cleanup than ever before. Facility operators save time and money while keeping runways open and safe.

PAUL BOWERS, PUBLISHER

There are many lessons to be learned about winter operations—too many to be covered in one issue of the magazine. Fortunately, there are more resources available. One of the best is in Buffalo, NY: the 52nd Annual NEC/AAAE International Snow Symposium, April 14 to 18. It's a great place to learn about the latest equipment and share best practices. See you there!

Cheers, Paul

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Tucson Int'l Refines Goals & Updates

BY JODI RICHARDS

Prior to the Great Recession in the early 2000s, officials at Tucson International (TUS) were making plans to expand their aging two-concourse terminal to accommodate growing traffic. But as the economy took its toll on the airline industry by way of consolidation, they realized that expansion was no longer necessary at the origination/destination airport.


MIKE SMEJKAL

Instead, TUS opted to take a long, hard look at its facilities and "re-outline goals and priorities," says Mike Smejkal, vice president of planning and engineering for the Tucson Airport Authority. A terminal optimization study, led by HNTB and implemented by DWL Architects + Planners, evaluated the current and future needs of the entire facility and acted as the catalyst for a series of construction projects to revitalize and extend the life of the 382,000-square-foot terminal building.

Three major construction projects were subsequently executed to transform the travel experience for customers: a $28 million terminal optimization program, a $8.5 million concessions overhaul and the $14 million installation of solar panels. The trio of projects was united under the slogan "A Brighter TUS."

Terminal Optimization

When the U.S. economy contracted from 2008 to 2011, TUS experienced a 20% decline in passenger traffic. With less volume, the Arizona airport no longer needed a terminal expansion, but the 1960s facility *did* need to be updated and reconfigured to better accommodate a more modern passenger flow, Smejkal explains. Currently, TUS serves 3.4 million annual travelers on seven airlines. Last year, it experienced a 4.5% increase in passenger traffic.

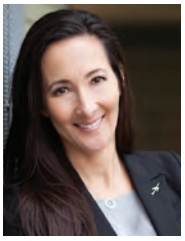
The terminal optimization study analyzed traffic demands and capacity to help officials determine how much space was needed to process passengers in the most efficient manner. While much of the subsequent focus was on improving security checkpoints, projects were also designed to enhance the entire customer experience—from passenger processing and wayfinding to amenities and decor.

TSA screening stations were completely relocated and expanded. When originally added, they had been "thrown in the throats of concourses," resulting in dark, inflexible spaces, Smejkal relates.

"The security checkpoint experience needed to be improved," notes Sandra Kukla, executive vice president with DWL Architects

PHOTO: KYLE ZIRKUS PHOTOGRAPHY

Terminal



SANDRA KUKLA

+ Planners, the prime architect. "It was shoehorned in between the terminal and the concourse—it was never planned that way for that building." Because TSA checkpoints tend to be the highest point of anxiety for travelers, they were an effective place to make noticeable improvements, she adds.

With more passengers checking in online and bypassing the linear ticket counters at the front of the ticketing lobby, project designers pulled the security checkpoints out closer to the front of the building. This, in turn, opened up post-security space to add new passenger amenities, including business centers and expanded concession options.

DWL Architects reconfigured the existing space to accommodate current and future screening needs. "With the old checkpoint, you came out of the recomposure area and were right in a holdroom," Smejkal recalls. "Now, we have nice separation and a transitional space." The recomposure area is also more spacious.

Previously, each concourse had three security lanes. The new layout includes four lanes for each checkpoint, and seven of eight are already up and running. Officials are waiting for capacity in Terminal A to increase before adding the last lane. "We have a spot for it, but it hasn't been installed yet," says Smejkal. TSA would also need to provide the equipment and staffing, he adds.

The B Concourse checkpoint, used by Alaska Airlines, American Airlines and Delta Air Lines, opened mid-April 2017. The Concourse A checkpoint opened in September and is used by Southwest Airlines, United Airlines, Sun Country Airlines and Via Air. The formerly dark area now features LED lighting, new terrazzo floors and windows that provide ample natural light. In all, it's a "more pleasing atmosphere," Smejkal reports.

The terrazzo flooring not only provides a lighter, brighter space, but also represents the region and helps guide travelers through the airport. The color combination of browns and purples plays to desert sunset colors; the pattern, which mimics a river cutting through the desert floor, is designed to intuitively lead passengers from the terminal to the concourse.

Windows on both sides of the checkpoint eliminate the previous claustrophobic feel and offer travelers a view of the Santa Rita Mountains as they wait to be screened. Awnings installed over the windows control heat gain and add a decorative wayfinding element. Cutouts of flying birds project shadows onto the floor, again helping lead passengers toward the concourses.

"The architect came up with a number of unique things to help guide passengers and improve the experience," Smejkal remarks.

Reconfiguring Concessions

Making the best use of TUS' existing square footage was also critical to concessions planning. "Our former design didn't match the way the airline industry had gone with consolidation, and we needed additional

FACTS&FIGURES

Location: Tucson (AZ) Int'l Airport

Project: Terminal Optimization

Facility Size: 382,000 sq. ft.

Cost: $28 million

Funding: Passenger facility charges; airport revenue bonds; private investment from concessionaires

Contractor: Sundt Construction

Architect: DWL Architects + Planners

Electrical Engineer/Special Systems: Monrad Engineering

Structural Engineer: Martin, White & Griffis Structural Engineers

Mechanical Engineer: Adams & Associates Engineering

Program Manager/Commissioning: Hill Int'l

Terrazzo Installation: Advance Terrazzo

Project: Concessions Overhaul

Retail Concessionaire: Hudson Group, collaborating with Poravion & Cambios y Servicios

Food & Beverage Concessionaire: Creative Food Group

Concessions Program Consultant: SI Partners

Cost: $8.5 million

Project: Installation of Solar Panels

Cost: $14.3 million

Construction: 11 months for Phase 1; 13 months for Phase 2

Completed: Fall 2013 & fall 2017, respectively

System: 118 Type 1 arrays with 98 panels/array; 11 Type 2 arrays with 42 panels/array

Total Capacity: 2.5 megawatts

Power Generated: 41,800 kWh AC/month

Overall Savings: 25,000 gallons of gas/month; 245 tons of CO_2/month
$35,000/month on electric costs (average)

Parking Spaces Covered: 1,360

Solar Panel Manufacturer: Solar World

Inverters: SMA Solar Technology America

Phase 1 Design Builder: Barker Morrissey

Phase 2 Electrical Design: Monrad Engineering

Phase 2 Civil Engineering: DOWL HKM

Phase 2 Architecture: Herzog Associates

Phase 2 Structural Engineering: Schneider Structural Engineers

Phase 2 Landscaping: Wheat Design Group

Phase 2 General Contractor: Sturgeon Electric


BARB HEMPEL

post-security space," says Barb Hempel, director of properties for the airport authority. Moving the security checkpoints to the ticketing level allowed TUS to install more post-security concessions and amenities.

Working with SI Partners, the airport authority studied the space and amenities offered at similar-sized origination/destination airports. "I think it was more about right-sizing the program," Hempel says of the square-footage decisions.

It was also a matter of placement. Previously, the airport had a gift shop and restaurant tucked away on the third floor of the terminal. "Everyone thought they were the best kept secrets—except the people who had to cover the overhead," says Hempel. "We knew that we needed to bring those amenities down to the ticketing level where they'd be more visible."

The airport authority also embraced the current industry trend of highlighting area cuisine and brands. "It seems the traveling public is more interested in eating where the locals eat," Hempel observes. To ensure the region was accurately reflected at the airport, her team asked staff members to make lists of favorite restaurants and shops. "We also went down 4th Avenue and handed out flyers to local businesses," she recalls.

Ultimately, authority officials awarded the new food and beverage management contract to Creative Food Group. Its lineup includes several well-known Tucson dining options such as Empire Pizza, Beyond Bread, El Charro Café, The Maverick, Noble Hops, Arbuckles' and Sir Veza's Taco Garage.

The new local brands are intermingled with more widely recognized national names, such as Bruegger's Bagels, BUILT Custom Burgers and Dunkin' Donuts. "We tried to hit both segments," Hempel notes.

Dining options are now located throughout the concourses. The new layout is popular with "holdroom huggers," who want a bite to eat but don't want to venture too far from their gate, she explains.

Design concepts for the new concessions fit in well with the overall look and feel of the facility, Hempel adds. "They are innately Tucson," she says. Ink by Hudson, for instance, sells books, stationery, fashion, artwork, toys and travel items in a 1,000-square-foot, Tucson-inspired space adorned with weathered wood beams and Southwest imagery. Gates Pass is a 2,529-square-foot travel essentials and convenience store on Concourse A. Its name and décor pay tribute to the scenic Gates Pass that runs along the crest of the Tucson Mountains.

Hudson Group is collaborating with Tucson-based Poravion and Cambios y Servicios on retail locations.

Although Creative Food Group and Hudson Group are still building out their spaces, Hempel reports that both are "really hitting it out of the ballpark," in terms of meeting passengers' wants and needs.

To allow for the public's changing tastes, airport authority officials included a mid-term refurbishment agreement in the new concessions agreements. The retail program is an eight-year contract, while the food and beverage program is a 10-year contract.

In addition to expanding concessions, the airport added other passenger amenities such as business centers and will soon install nursing pods. Officials are also working with local sponsors to add a children's play area. "Now that we have the space, we're able to add those to the post-security areas," Smejkal states.

Pre-security, TUS provides baggage scales and repacking tables to help travelers stay on the right side of airline weight limits for checked bags.

Harnessing the Sun

Capitalizing on the roughly 350 sunny days Tucson experiences each year, the airport authority constructed a two-phase,

FAA grants paid for 91% of the solar project.

2.5-megawatt solar installation in the hourly and daily parking lots at TUS. "We thought it would be a great program to bring to the airport," Smejkal relates, noting that Tucson is a solar city and TUS is the first and last impression people have when visiting the area.

Photovoltaic panels supported by an open metal canopy and columns make up two structures, one 56 feet by 36 feet and the other 37 feet by 23 feet. The units also include electrical infrastructure to facilitate direct connection to the terminal's central plant power system. Except for "peak summer loads," the solar arrays power the terminal and concourses—and at a savings of $35,000 per month, Smejkal reports.

New concessions are being phased in incrementally

Annual retail revenues are expected to increase 20%.

A popular feature has been the covered parking that the installation provides. "It was not the goal of the project, but it's a nice side benefit," he comments.

Installing the solar panels required temporary detours, and small areas of the parking lots were shut down in phases. "We tried to maximize the amount of spaces open during our peak travel times," Smejkal says. "And in the summer, when we're a little slower, we took down bigger portions of the parking lot."

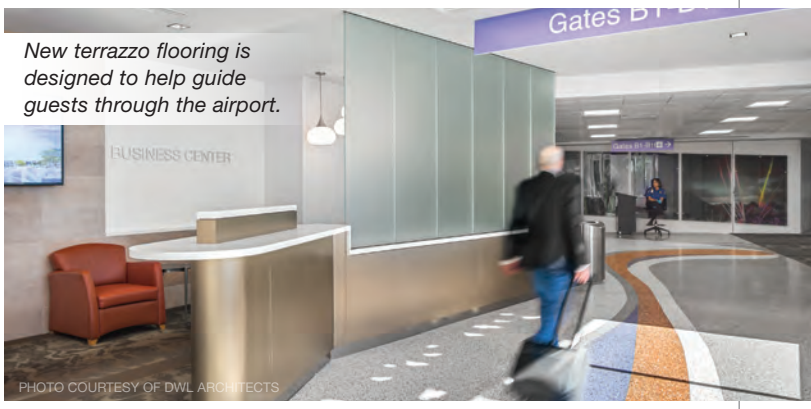
FAA grants funded about 91% of the $14.3 million solar project; the Arizona Department of Transportation and airport authority paid for the remaining portion.

Overcoming Challenges

Because the terminal is roughly 50 years old, updating its infrastructure technology was critical. One of the most technically challenging aspects of the project involved

the backbone infrastructure, says Smejkal. Designing and planning for cutovers while ensuring airport operations were not compromised required much time and effort, he adds. Most of the switchovers took place between 1 a.m. and 3:30 a.m., to cause the least amount of disruption.

Replacing all of the terrazzo flooring proved challenging as well. In retrospect, Smejkal notes that the multi-step, multi-day process was probably the most disruptive project of all, from a passenger perspective. At the front of the building, workers opened doors and windows to bring in fresh air, but that wasn't an option up on the concourses. The contractor consequently built a tent around the work area to contain fumes and allow them to dissipate. Filters were also installed so the odor would not overwhelm holdroom areas.



New terrazzo flooring is designed to help guide guests through the airport.

PHOTO COURTESY OF DWL ARCHITECTS

Bright Future

With new food and beverage locations debuting in stages, the airport is keeping at least one full-service restaurant in Concourse B open throughout the remaining transition. The first new restaurants opened in Concourse A, and half of all the concessions were operational as of mid-December 2017. Even though new spaces are "rolling out a little bit at a time," Hempel reports that food and beverages sales are pacing significantly higher than with the old program

During the first nine months of 2017, Creative Food Group had already pulled in 93% of last year's revenue. Moreover, the restaurants logging those sales haven't been opened long, and most concepts are still under construction, notes Hempel. Airport authority officials are consequently projecting an annual increase of 30% once all restaurants are open; and some are even more optimistic.

On the retail side, Hudson Group earned 83% of the previous year's revenue in the same nine-month period. "Again, this was operating in very small kiosks while the retail stores were under construction," advises Hempel. In December 2017, with most stores open, Hudson Group exceeded sales for the same period in 2016 by 8%. Revenue is expected to increase 20% after a full year of sales.

Assessing the current landscape, Kukla notes that "A Brighter TUS" has achieved the airport's goals to maximize underutilized space, increase airport revenue, improve passenger processing and enhance customer service. "The project revitalized an old building so it can thrive and be an asset to the region."

SMYRNA/RUTHERFORD COUNTY AIRPORT AUTHORITY

Smyrna Airport Adds 600-Acre Business Park

BY THOMAS J. SMITH

FACTS&FIGURES

Project: Airport Business Park

Location: Smyrna/Rutherford County (TN) Airport

Owner: Smyrna/Rutherford County Airport Authority

Consultant: Atkins Global

Park Size: 600 acres

Terms: 49-year land leases

Total Projected Private Investment: $225 million

Initial Developer: Hillwood

Investment: $100 million

Initial Development: 140 acres; 1.8 million sq. ft. of new construction in 4 buildings

Annual Lease Payments: $600,000 (after 2-year grace period for construction & marketing)

1st Tenant: NFI, a logistics company that services Lowe's

Space Leased: 622,000-sq.-ft. warehouse

The first axiom of real estate, "location, location, location," is the secret behind the fast start of the new business park at Smyrna/Rutherford County Airport (MQY) in central Tennessee. The second axiom, "it's all about relationships," helps explain how the airport landed its first $100 million investor.

With 71,000 flight operations last year, MQY is the busiest general aviation airport in the state. It also serves as a reliever for Nashville International Airport, just 12 miles to the north.

To diversify MQY's revenue stream, the Smyrna/Rutherford County Airport Authority has added a 600-acre business park on the west side of the airfield. The authority made the initial infrastructure improvements for the business park prior to the Great Recession, and continued with additional utility improvements in 2012 to prep the site for future development.


JOHN BLACK

Parcels will be leased to private developers, and the associated rental income will help underwrite airport operations and airside improvements. Jointly owned by Rutherford County and the town of Smyrna, MQY is self-supporting and does not receive any local funds, explains John Black, the airport's executive director.

According to projections, the completed business park will attract about $225 million in private sector investment and add 650 permanent jobs to the local economy.

Two buildings are already complete; two more are in the works.

The first four parcels—a total of 140 acres—have been leased to Texas-based Hillwood, a unit of the Perot family business empire. Hillwood is investing $100 million in four buildings that will ultimately offer tenants a total of 1.8 million square feet. The developer constructed the first two buildings on speculation, and one is already occupied. Crews broke ground on the third building in January and are expected to finish it in November. The fourth is scheduled to be complete next spring. According to Hillwood Market Leader Kurt Nelson, the company may lease additional acreage.


KURT NELSON

The airport authority has not hired an outside agent to market the MQY business park. Instead, Black works with the local real estate community to recruit interested developers. "As the infrastructure was going in, I made a point to establish good relationships with a lot of brokers in Tennessee," he explains. "The brokers are usually the first to know what is coming into the area, and brokers did help connect the dots with Hillwood."

Why Smyrna?

When Hillwood was shopping for potential sites to develop, it was not specifically looking for an airport property or even land near an airport. Proximity to Nashville was the key factor.

"There is a lot of growth in Nashville," explains Nelson. "We felt we could start a development there (in Smyrna) and be part of the growth. We were evaluating sites in the area, and the airport had a good location."

Access to three interstates (I-24, I-40 and I-65) and a high-quality labor pool associated with the local Nissan plant proved to be strong selling points. So did the established base of companies on the south side of Nashville.

Representatives from MQY and Hillwood began talking in 2014, and by late last year, the developer had finished constructing two of its four buildings—a notably fast timeline for most business park ventures.

MQY is leasing its development sites on 49-year terms, with building ownership reverting to the airport at the end of the lease. Developers must build structures according to the airport's design standards, and also complete roadways and utilities to the structures. After paying a deposit, developers have two years for construction and marketing before their lease payments begin.

Hillwood will pay $600,000 per year after its build-outs are complete.

The master plan, crafted by the Nashville office of Atkins Global, divides MQY's 600-acre business park into light industrial, commercial and aviation zones. Hillwood is leasing mostly industrial acres. About 35 acres of industrial space remains available—enough to support another 100,000-square-foot building, notes Black.

The airport is marketing 20 acres of commercial space for retail and hotel use. And 50 acres of the aviation zone could include direct access to the airfield. Hangars, aircraft maintenance shops and aircraft manufacturers are likely tenants for those spaces. There is also an option to extend a taxiway into some of the industrial parcels, notes Black.

If demand warrants, the airport has 45 acres on the east side of the airfield with direct airfield access that can be developed for aviation businesses. However, that acreage currently lacks utilities.

"The growth we have had entices more growth," says Black, noting that the airport currently anticipates being completely built out in 10 to 15 years. "The timeframe is going to be much faster than we originally anticipated. The growth becomes exponential when things get going, as they have here, now that people can touch and feel it."

As much as the airport stresses the advantages of locating a business on or near an active runway, direct airfield access has not been a factor in signing tenants.

NFI, a New Jersey-based logistics company that services Lowe's Home Improvement, is leasing all of Hillwood's first building. Just a small fraction of the 622,000-square-foot facility is devoted to office space, and the company's inventory arrives and departures via trucks rather than airplanes.

When marketing its second building, Hillwood mentions that the 301,000-square-foot facility has airfield access, but does not make that the focus.

Cargo's Role

Two former military runways—one 8,048 feet, the other 5,546 feet—allow MQY to handle Boeing 737s and DC-9 cargo jets. FedEx and UPS use the airport nightly, and other carriers fly in supplies to the Nissan plant and other local manufacturers.

Currently, the airport does not have a dedicated cargo warehouse on the airfield. Instead, freight is off-loaded and trucked directly to the nearby plants. "We will be reviewing cargo in the update of the master plan to see if we want to do more," notes Black.

Years ago, when initially considering the prospect of a business park, MQY personnel traveled to Fort Worth, TX, to survey the 18,000-acre, all-cargo Alliance Field that Hillwood developed with the Perot family. (For more information about Alliance, consult the Oct. 2017 issue of *Airport Improvement*.)

Two 30,000-square-foot hangars are also under construction.

More Construction

The business park isn't the only area of the airport currently being developed. Hollingshead Aviation, one of MQY's two fixed-base operators, is building a 30,000-square-foot hangar, and the airport authority is also building a 30,000-square-foot hangar. Currently, there are 26 hangars at MQY, housing 224 based aircraft. Nine hangars are privately owned and will revert to the airport when their leases expire. Some were built by the U.S. Air Force around 1950.

Contour Aviation, the airport's other fixed-base operator, bases a fleet of regional jets and turboprops at the field. The company uses the aircraft to fulfill essential air service contracts throughout the Southeast.

Beyond the airport's potential improvements to further support cargo operations, it is also exploring the possibility of constructing a new terminal building and control tower. Ramp repairs, rehabbing Runway 1-19 (its shorter runway) and an airfield re-marking project are already slated for 2018.

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Reducing Emissions & Operating Costs Sparks Push for Electric Buses

BY KEN WYSOCKY

INDIANAPOLIS INTERNATIONAL AIRPORT

KANSAS CITY AVIATION DEPARTMENT

NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT
SILICON VALLEY'S AIRPORT

FACTS&FIGURES

Project: Electric Courtesy Buses

Locations: Indianapolis Int'l Airport; Kansas City Int'l Airport; Mineta San Jose Int'l Airport

Cost: $500,000 to $750,000 per bus

Funding: FAA zero-emission grants, airport revenues

Bus Manufacturers: BYD Heavy Industries; Complete Coach Works; Proterra

Key Benefits: Reducing carbon emissions & exhaust fumes; decreased operating and maintenance costs; smoother, quieter ride for passengers; less driver fatigue

A growing number of U.S. airports are replacing their fossil fuel-burning courtesy buses with electric vehicles, spurred by the promise of smaller carbon footprints and lower operating costs. FAA grants that subsidize emission-free technologies and a smoother, quieter ride for passengers also sweeten the deal.

Indianapolis International Airport (IND) is enjoying six new 35-foot-long, 25-seat electric buses made by Complete Coach Works, and it plans to take delivery of three more before the end of the year. Last summer, Kansas City International (MCI) began operating four 30-foot-long, 22-seat electric buses built by BYD Heavy Industries; and officials are verbally committed to electrifying the remaining eight buses in the airport's fleet during the next two years.

Almost 20 Proterra electric buses are scheduled to go into service this year: ten 40-foot-long, 30-seat buses at Mineta San Jose International Airport (SJC); five at Sacramento International Airport (SMF) and four at Raleigh-Durham International (RDU). SMF's new electric vehicles will supplement its existing fleet of buses powered by compressed natural gas.

Reducing carbon emissions is a key factor in the trend. At SJC, for example, officials estimate that their new electric buses will eliminate 3.1 million pounds of greenhouse-gas tailpipe emissions over the vehicles' 12-year lifecycle. IND officials estimate a 15 million-pound reduction in carbon emissions over the expected 10-year lifespan of the buses.

Another major aspect driving the purchase of electric buses is FAA grants from the Zero Emissions Airport Vehicle and Infrastructure Pilot Program created in 2012. It awards grants for up to 50% of the cost of zero-emission vehicles and associated infrastructure (primarily charging stations).

Mario Rodriguez, executive director of the Indianapolis Airport Authority, reports that IND received two such grants totaling $3.6 million. The grants will defray part of the roughly


MARIO RODRIGUEZ

Indianapolis Int'l has invested in nine electric buses


BOB LOCKHART

$5.2 million cost of the airport's nine electric buses. Similarly, SJC obtained a $3.8 million FAA grant to help pay the $7.6 million bill for 10 new Proterra Catalyst E2 buses, says Bob Lockhart, the airport's deputy director of operations. General airport revenues will pay for the balance of the costs at both airports.

MCI applied for, but did not receive, a zero-emission grant to help fund the $1.8 million tab for its new buses. The FAA denied its request because the airport isn't located within an environmental non-attainment area. This means its air quality meets federal standards, explains Ian Redhead, deputy director at MCI. Even without an FAA grant, investing in electric buses still made sense, he adds.


IAN REDHEAD

Decreased Operating Costs

MCI was drawn to electric buses for the same reason other airports are embracing them: lower operating and maintenance expenses. BYD's electric buses cost only 30 cents a mile to operate, says Macy Neshati, a senior vice president with the company. Fully charging the batteries for one bus costs an average of about $20 a day, he adds, noting that costs vary according to local electricity rates.

"BYD has the world's largest fleet of electric vehicles, some 40,000 electric buses globally," Neshati reports. "According to accumulated data provided by our customers, we see an average cost of $1.35 a mile for a diesel-powered bus versus about 30 cents a mile for one of our electric buses. So even if a bus runs just 20,000 miles a year, which is low for airports, that's roughly $20,000 a year in savings."

In addition to its new electric buses, MCI currently owns a fleet of 26 buses powered by compressed natural gas (CNG). As a point of comparison, the cost per mile for operating those buses is about 80 cents per mile, says Redhead.

Multiple factors contribute to reductions in operating costs, including no expenses for fuel, oil and transmission fluid; no cost to dispose oil and transmission fluid; and fewer repairs and maintenance needs, because electric motors have far fewer moving parts than diesel engines, he explains.

Rodriguez says that electric buses will save IND about $2 million through reduced maintenance and fuel expenses during the 10-year lifespan of the buses. "With electric buses, you have to make sure the batteries are good and check the brakes occasionally, but you don't have to do much else," he remarks.

Electric motors are more efficient, adds Neshati. "A motor attached to each rear wheel directly drives (turns) the wheel, which eliminates parasitic losses of power that occur with a conventional transmission and drive shaft," he says.

Officials at SJC say new Proterra electric buses will be dramatically more efficient than their current fleet. The airport's 10 CNG buses, purchased around 2010, get between 4 and 5 miles per gallon; a miles-per-gallon gasoline equivalent for electric motors is about 21 miles per gallon. (Buses with diesel engines typically get 3 to 4 miles per gallon.)

Plenty of Choices

The basic technology that propels electric buses is similar, but manufacturers differentiate their products in various ways. Proterra buses, for instance, feature bodies made from advanced composite materials, which makes them lighter, more durable and easier to repair than conventional vehicles.

"There's no set standard for bus weights, but we estimate that one of our bus bodies is about 2,000 pounds lighter than a standard bus," says Matt Horton, chief commercial officer for Proterra. "Light-weighting vehicles is very important…the primary benefit is increased range, plus better longevity than a comparable steel body."

Kansas City Int'l purchased its electric buses without the help of FAA grants.

While driving range varies according to usage, the buses sold to SJC can travel between 175 and 200 miles per day on a full charge and can be fully recharged in three hours. According to Lockhart, the airport's buses drive between 150 and 200 miles per day, shuttling passengers between the airport's two terminals and an economy parking lot.

Richard Sullivan, vice president of sales for Complete Coach Works, says his company's vehicles cost about 40% less than conventional electric buses because the company rebuilds "retired" diesel buses, effectively offering customers a completely remanufactured chassis. "It saves about 10 tons of raw materials from going into landfills," he says. "Plus, we're re-using a bus platform with which drivers and mechanics already are familiar."

The base vehicles Complete Coach Works begins with are either 12 years old or have 500,000+ miles on them, and all are structurally sound, notes Sullivan. When rebuilt, they have an average range of about 150 miles, and their lithium-ion batteries can be fully recharged in about six hours. Rodriguez says buses at IND average about 120 miles of driving during each eight-hour shift.

BYD Heavy Industries touts that it makes its own batteries, and that the company is the world's largest manufacturer of rechargeable batteries. The lithium-iron phosphate batteries are designed to last two to three times longer than conventional batteries, and each includes a 12-year warranty. The fully recyclable batteries provide a driving range of up to 300 miles and can be fully recharged in about three hours, notes Neshati.

MCI buses run about 120 miles per eight-hour shift, or about 360 miles per day. "We have three economy parking lots (with shuttle bus service), and we strive for no longer than a 10-minute wait for buses; so we run our routes often," Redhead says.

Return on Investment

In general, electric buses usually cost more than diesel-powered buses, but they cost less to operate and maintain. Proterra's 40-foot Catalyst E2 bus, for example, carries a price tag of about $649,000; a typical 30-foot BYD bus costs about $500,000; and a 35-foot Complete Coach Works bus goes for around $500,000. By comparison, a standard diesel-engine bus costs between $450,000 and $500,000, and a CNG-powered bus sells for around $700,000.

"The payback periods [for electric buses] vary widely, but generally speaking, purchasers get an attractive return on their investment," Horton says. "Payback generally comes within the first half of the

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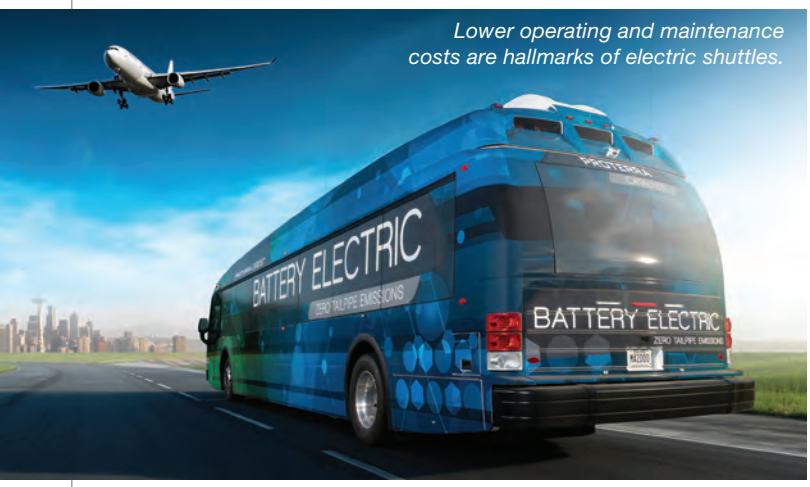

Lower operating and maintenance costs are hallmarks of electric shuttles.

lifetime of the vehicle; so it's usually less than six years." And the more miles the buses are driven, the faster the payback period, Neshati points out.

Electric buses offer another benefit that often gets lost amid discussions of return on investment periods: They greatly improve the transit experience for airport customers and drivers. Why? Because the ride is significantly quieter and smoother. No transmission means no gears to shift, and no associated lunging. Plus, there aren't any smelly exhaust fumes.

"In fact, our drivers have to be careful, because people don't necessarily hear these buses coming," Redhead notes. "They're much quieter inside, too. You can carry on conversations much more easily. The ride is a lot smoother…and driver fatigue decreases. You really never have to brake— just take your foot off the accelerator, and the bus slows down."

Electric buses also help airports fulfill long-term sustainability goals inspired by stakeholders asking them to become more eco-friendly. As such, there's more to consider than sheer economics.

At IND, the goal is to ultimately become a carbon-neutral facility. "As a public entity, the bottom line for us is not a financial metric, but a public-value metric," Rodriguez explains. "If we align with what the public wants, it's a strategic win. And the public wants us to be good stewards of our environment. Using electric buses instead of diesel buses helps us be good stewards."

Environmental expectations and standards run especially high in California, and SJC strives to measure up. "We have a general plan for the city and the airport to be as environmentally friendly as possible," says Lockhart. "Our goal is to become a zero-waste facility by 2022 (through recycling and composting programs). We also have a one-megawatt solar array on top of our rental-car garage. Each step we take—going from diesel buses to CNG buses to electric buses, for example—helps the airport's environment immensely."

Emerging Trend

Executives from companies manufacturing electric buses agree that the airport industry is on the cusp of a dramatic shift away from diesel-engine shuttles. "I believe we're seeing the start of a trend," says Horton. "The airport market is poised for takeoff. Idle interest has turned into action…airports have been looking for solutions to high emissions for a long time, and electric buses finally have become more cost-effective, because battery prices have come down so dramatically. The time is finally right—the moment for which transit operators have been waiting."

"We're seeing a huge upswing in the market for electric buses," reports Shetterly. "The buses might cost a little more up front, but, operationally, customers can expect a savings of about $450,000 over the expected useful life of a bus (generally about 12 years)."

"The trend is picking up speed," agrees Neshati. "The numbers just make sense."

Many airport managers are also bullish about the movement toward greener bus technology. Lockhart reports that SJC also plans to switch to electric ground support vehicles—tugs, bag carts, pushback tractors, etc. "As for our buses, we needed to buy new vehicles anyway," he concludes. "So why not buy the best possible technology for your customers and the environment?"

Read CCW Electric Bus Article on Pages 18 - 23

OUR LEGACY STARTED IN 1945 AND CONTINUES TO THIS DAY

1945

1953

1961

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Reno-Tahoe International Airport

FACTS&FIGURES

Project: Snow Removal Operations

Location: Reno (NV) Int'l Airport

Est. 2017 Volume: 4 million passengers

Airport Altitude: 4,400 feet

Average Annual Snowfall: 24 inches

Snow Season: Sept. to May

Maintenance Staff: 27 people

Snow Equipment: 29 vehicles

Weather Data: Nat'l Weather Service; DTN Aviation Sentry Online radar system; Vaisala Navigator surface & air sensor system

Keys for Success: Teamwork & pride of removal crews; coordination among multiple airport departments; modern equipment & storage facility

Airside Snow Removal Equipment

- 2011 Oshkosh/MB 22' Snow Broom
- Two Oshkosh 20' Snow Brooms (1996 & 1997)
- Three 2017 Larue 22' Snow Brooms
- Two 2006 Larue Snow Blower (5,000 & 7,500 ton/hr)
- Two 2015 Oshkosh Trucks with 22' Plows & Epoke 6-yd. Sanders
- 2012 Oshkosh Truck with 22' Plow/Scraper & Epoke 6-yd. sander
- 2004 Ford F650 Truck with 11' plow & 4-yd. sander
- 2008 John Deere 328 Skid Steer with 10' Plow & 4-yd. Sander
- 2014 Caterpillar 966M Loader with 26' Winged Plow
- 1994 Caterpillar 966F Loader with 20' Box Plow
- 1986 Ford Jet Air Truck
- 2006 MB 16' Snow Broom, towed by 2009 Dodge 5500
- 2006 Haige 90' Boom Deicer/Light Plow-2000 gal.
- Kueper Blades

Landside Snow Equipment

- 2004 Dodge Plow/Sander
- Two GMC 1-ton Plow/Sanders (1998 & 1994)
- 1993 Bobcat 543B Loader
- 2004 Ford F-550 1-ton with dump bed
- Two 2005 Bobcat Skid Steer S300 Loaders
- Two 2005 Bobcat Toolcats

Teamwork is Lynchpin of Snow Removal at Reno Int'l

BY MIKE SCHWANZ

As the gateway to world-famous ski slopes, big-name casinos and other popular tourist attractions, Reno International Airport (RNO) is under a lot of pressure to remain open 24/7 throughout the year, regardless of weather. Multiple departments band together to face the challenge head-on, but responsibility for clearing snow and ice off the runways falls on Airfield Maintenance Superintendent J. Scott Harkema and his staff.

SCOTT HARKEMA

"One of the key reasons our process works so well is that RNO is small enough that everyone involved in the process is on a first-name basis, and we all share a passion for safety and constant process improvements," says Harkema. "They work hard, take ownership of their work and take a great deal of pride in what they do. Good equipment and technology are vital to effective airfield snow removal, but teamwork gets the job done."

When a big snowstorm is imminent, teams all over the airport snap into action. "Due to rapidly changing conditions, real-time National Weather Service data is communicated to the snow teams. This data is used for everything from long-term manpower forecasting to determining the best time to break the crews for lunch," he explains. "The air traffic control tower receives real-time field condition reports from Airside Ops, and works with the snow teams to spread traffic to enable snow removal operations. The Snow Desk sends weather and condition updates to tenants, pilots and the control tower. RNO Public Affairs uses the media and social media to get relevant information out to the traveling public."

Harkema, who has worked at the Nevada airport for 34 years, considers its location both a blessing and a challenge. "We don't get buried in snow, as is the case for some of the snowbelt cities east of the Great Lakes; we average only about 24 inches a year," he says. "But at a 4,400-foot altitude, the snow season runs from September to May."

While large mountains due west of the airport tend to block some of the snow, the biggest weather fronts come in from the south and north. That means RNO


PHOTO: VANCE FOX PHOTOGRAPHY

The storage facility features 22 bays with door actuators for each plow.

occasionally gets socked by monster storms. "In 1990, we had 18 inches in one day," Harkema recalls. "In 2005, we had to plow for 17 straight days."

Culture of Readiness

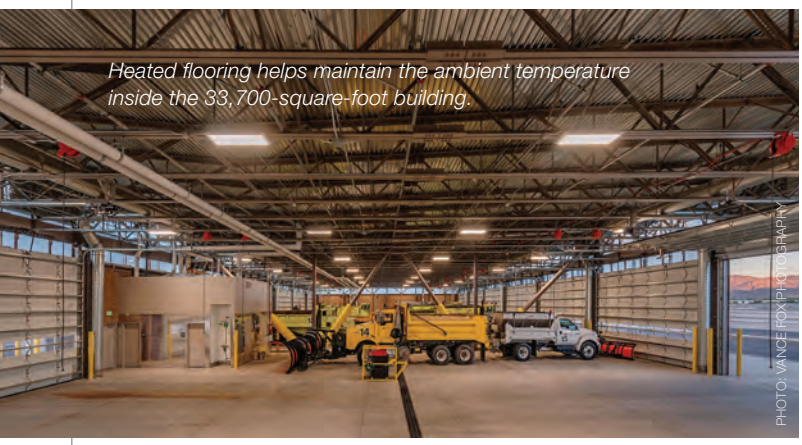
Harkema firmly believes that being prepared to handle any situation requires considerable advance planning. "The work begins well before the first snow event," he says. "Each year, the Airport Operations Department hosts a preseason luncheon with participants from its staff, the National Weather Service, air traffic control tower, landside and airside snow removal departments and executive management. Leaders introduce new team members, debrief operations from the previous winter and discuss any changes for the upcoming season."

Input from the National Weather Service is especially helpful, Harkema relates. "They not only participate, they also provide a speaker for the meeting to discuss upcoming forecasts."

The Airside Operations Department also holds similar, but smaller, preseason meetings with airport tenants.

In early fall, before the first storm hits, the Airfield Maintenance staff performs several test runs. "We practice a lot in the preseason," Harkema says. "New drivers ride with senior operators, and the lead plow is always operated by a very senior driver. Less experienced crew members are positioned in the middle, flanked by an experienced driver at the back."

The overriding mission is to have the right resources, in the right place, at the right time, throughout the snow removal season. Communication is critical to ensuring this occurs, Harkema emphasizes.



Heated flooring helps maintain the ambient temperature inside the 33,700-square-foot building.

PHOTO: VANCE FOX/FOX PHOTOGRAPHY

"We can clear our main 11,000-foot runway in less than 20 minutes," he reports. "We use a convoy of three brooms, two trucks and one blower. There is usually a six-man crew, plus one mechanic. Another three blowers are used on ramps and taxiways. We have our own radio frequency, so everyone can talk to each other throughout the operation."

The 27-person maintenance staff is split in two 12-hour shifts, with employees working on call. Staff is summoned well before a big storm hits to ensure that blocked roads do not leave the airport shorthanded. During extended weather events, crews are housed in two hotels—one on-site, another just across the street.

A 4- or 5-inch snowstorm, however, is considered no big deal. "I sit down with the Ops staff, as well as the National Weather Service, and we decide when to put people on standby. We might call in 10 or 11 people [for that kind of storm]," Harkema says. "Besides snow, we sometimes have nasty icing conditions, or bad windstorms, and have to be prepared for those as well."

BRIAN KULPIN

Keeping the public informed about possible weather delays is part of Brian Kulpin's responsibilities as vice president of marketing and public affairs. Kulpin is alerted about any delays and cancellations, and he spreads the word via the airport website, social media apps, phone interviews with the media or press conferences, if necessary. "Fortunately, the National Weather Service forecasting is more accurate than ever," he says. "They also use social media apps, so we know right away when something changes."

Harkema reports that the various departments at RNO do a terrific job working with each other. "Communication is now the best it has ever been since I have been here," he remarks.

Despite the area's sometimes-unpredictable climate, the airport rarely closes completely. "In all the years I have worked here, we had to close the airport only twice," Harkema says. "The airlines know we have a great team here. They rely on us to do our part. And the pilots that regularly fly here are used to the conditions and can handle occasional delays."

Ongoing Equipment Upgrades

The airport has a fleet of nearly 30 vehicles from a wide number of manufacturers. (For a complete list, see Page 24.) With equipment vintages ranging from 1986 to 2017, crews typically use the older machines for landside tasks and the new machines for runways and other airfield pavement.

DAVID ROBICHAUD

In December, the airport took delivery of three new Larue snow brooms. The T95 FB 22s feature 22-foot brooms and twin directional, high-velocity air blowers at the rear. "This is one of our most popular models," says David Robichaud, international sales representative for J.A. Larue.

"The tendency for international airports today is to have high-speed blowers, with a large capacity," he says. "Our T95 blower can run at speeds of up to 25 mph. Airports like to have a 10,000-foot runway cleared in 20 minutes or so. With 1,320 horsepower, the T95 can blow snow 100 to 150 feet away from the pavement. The broom can be angled left or right, and the operator can choose different angles."

The machine also can be used for rubber removal. It has a non-caustic releasing agent designed to prevent damage to concrete and protect painted airfield markings.

The base price for the Larue T95 FB 22 is more than $600,000, but various optional equipment can boost the cost considerably. Popular options include automatic rear steering, spare wheel, air conditioning, all periphery heated glasses (except windshield), AM/FM radio with CD player and a deluge system.

Training for new buyers such as RNO occur at the company's factory in Quebec or on-site at the airport. "For an experienced driver or mechanic, it usually takes eight to 16 hours of training," says Robichaud.

He recently completed training for operators at Jeju International Airport in South Korea. "They were gearing up for the 2018 Winter Olympics," he explains, noting that Larue has many overseas customers.

Modern Storage Facility

RNO's new Larue vehicles and other pieces of snow removal equipment are housed in a well-appointed storage and maintenance facility that opened in spring 2012. The 33,700-square-foot building features 22 bays with door actuators for each plow, and a boiler-heated hydronic radiant floor that helps maintain the building at 50 degrees Fahrenheit. The concrete apron around the building is also heated with this system. An automated venting system provides CO2 monitoring, and lighting turns on and off via motion sensors. The facility also includes five hot pressure wash stations with water bibs and air hose reels.

The modern facility not only provides a conducive environment for maintenance and repairs, it also keeps the fleet ready for deployment. Once the Operations staff and control tower make a request for a runway to be cleared, Harkema's team is ready to go.

Local Conditions

"We are lucky that we are a popular destination for many types of travelers, and our annual traffic numbers support that," says Kulpin. Last year, RNO served an estimated 4 million passengers, and airlines added capacity for 2,000 more seats. In late November, the airport welcomed a new carrier, Frontier, with routes from Reno to Denver.

Unlike many newer airports, which are located outside the cities they serve, RNO is at the epicenter of its region. "We are only five minutes from the main downtown strip," says Kulpin. "The city was basically built around the airport. So any traveler who wants to visit all the attractions downtown can be there in no time."

Lake Tahoe's ski resorts are only a 45-minute drive away; in winter passengers even can see a few ski runs right from the airport. The main terminal, in fact, was built specifically for the 1960 Winter Olympics in Squaw Valley, CA.

Although RNO's relatively high altitude can lead to unpredictable weather, it also has its advantages. "At an elevation of 4,400 feet, the weather conditions can change quickly. But on the plus side, we get 310 sunny days a year. Bright sun at altitude will melt snow quite a bit faster than at sea level," Kulpin explains. "With our modern equipment and our excellent maintenance staff, we can get rid of snow here fairly quickly."

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From left to right; Louis Larue Vice President, Company Founder and Past President Andre Larue and Denis Larue President.

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ERIE INTERNATIONAL AIRPORT TOM RIDGE FIELD

How Erie Int'l Bounced Back After 5 Feet of Christmas Snow

BY BRIAN SALGADO

Erie International (ERI) is used to sudden bouts of heavy snow, courtesy of nearby Lake Erie. It's not unusual for the Pennsylvania airport to get 20 or 30 inches at a time. But even ERI's seasoned personnel were challenged when a lake-effect storm lingered longer than usual and pounded the airport with more than 5 feet of snow—at Christmas, of all times.

In just two days, the storm dumped 63 inches of snow—nearly half of the area's *annual* volume.

The localized blizzard may have dampened some Christmas cheer, but a team effort from airport personnel, police officers, airline employees, rental car companies and even folks from a neighboring airport helped operations resume in about two days.

WILLIAM BANISTER

"Our crews did a heck of a job, especially only having six people out there," says William Banister, ERI's director of operations and maintenance. "Everybody came in to help out—even those on vacation. Everybody was in for a week straight."

On the Horizon

CHRIS KAROTKO

The massive snowfall wasn't a complete surprise to airport personnel. Crew Chief Chris Karotko still has a screenshot from his phone's weather app, which forecasted up to 32 inches of lake-effect snow with winds reaching up to 45 mph. Though off by a factor of nearly 100%, even that amount would have proved daunting; so Karotko had second-shift personnel stick around to help clear the airfield and keep traffic landing and taking off.

Then it started to snow, and it just didn't stop. ERI officials soon shut down the main runway; and by 10 a.m. on Christmas, the entire airport was closed.

According to Executive Director George Doughty, heavy snow accumulation was a factor in shutting down operations. However, the main reason was the blinding conditions, which forced managers to suspend snow removal efforts for the safety of their crews.

"Once you recognize that you can't remove snow that's accumulating that fast, you know you have a runway condition no one

FACTS&FIGURES

Project: Snow Storm Response

Location: Erie (PA) Int'l Airport

Storm Specifics: Stationary lake-effect storm pounded airport with 63 inches of snow & high winds beginning Dec. 24, forcing 2-day closure

Airfield Maintenance Crews: 6 employees

Equipment Fleet: 2 MB5 multifunction plow/broom vehicles from MB Companies; Oshkosh Class LII P-series plow; Oshkosh Class LV P-series plow; 2 Oshkosh high-speed rotary blowers; Case wheel loader; Bobcat skid steer

Team Effort: Airport employees from other departments & those scheduled for holiday vacations pitched in with snow removal operations; Pittsburgh Int'l sent blower & crew to help; police & airline personnel provided extra labor; car rental companies remained open

is willing to operate on," explains Doughty, who missed part of the storm while visiting relatives for Christmas. "Normally, lake-effect situations have breaks—it snows for 12 hours, breaks for a few hours, then you get hit again. In this case, it came almost constantly over that period of time."

In total, 13 inbound and 13 outbound flights were cancelled, and a few passengers had to seek shelter in the airport until conditions improved. Most passengers, however, managed to find their way to nearby lodging or stayed with friends and family in town.

After conditions cleared up a bit, maintenance crews started working to remove snow from the airfield and relocate it off the runways. ERI's fleet includes two large multi-function vehicles from MB Companies that plow and broom pavement at the same time; two high-speed blowers; two plows and a broom vehicle. The airport also has two single-function plows and a broom vehicle. However, one blower broke down in the middle of the cleanup operation.

Fortunately, nearby Pittsburgh International Airport (PIT) came to the rescue. After ERI's blower stopped working, PIT not only sent one of its own blowers to replace it, it also sent a crew to train ERI's people how to operate it. Moreover, the crew remained on standby in case ERI needed additional manpower.

After clearing away the bulk of snow, crews also focused on making the runways and taxiways usable. Multi-purpose vehicles spread sand as they plowed, and a separate piece of equipment sprayed deicing fluid to prepare the pavement for aircraft.

Post-Storm Analysis

Despite the deluge of snow, ERI only sustained minimal damage to a few marking lights and one sign panel. The record-breaking storm did, however, leave a significant dent in the airport's annual supplies of sand, liquid deicer and salt. It also socked the maintenance budget with lots of overtime charges. Economic hits notwithstanding, Doughty says the overtime pay is a sign of the teamwork that was required to get the airport through a very difficult situation.

"One of the nice things that happens is everybody pitches in," he remarks. "We had a real coming together of airport staff to get the place back open."

Everyone at the airport played a role in getting operations up and running by Dec. 27, he notes. Airport police officers drove snow equipment; airline personnel worked alongside airport crews to dig out their planes; and rental car companies stayed open despite the conditions to provide stranded passengers with transportation.

"This is typical of small airports—everybody knows everybody, so we can get everyone where they want to go as soon as we can," Doughty comments.

The lone hiccup ERI encountered was working with FAA's new Runway Condition Assessment Matrix (RCAM), which was rolled out in October 2016. RCAM ties the type of weather contaminants to specific aircraft manufacturers braking

performance data and standardizes the method for determining and reporting surface conditions.

Unfortunately, RCAM was down for maintenance during ERI's monster snowfall, and airport personnel were forced to call FAA Flight Service multiple times. This expanded what should have been a 10-minute process to almost a half-hour, depending on what the issue was and how long it took to be resolved, explains Banister.

Snow storage was another challenge. Between the 63 inches of snow that fell around Christmas and the additional 2 feet that followed on New Year's Eve, finding space for snow piles was a lingering concern. In fact, ERI had to keep some taxiways and other areas closed due to lack of storage space for all the snow.

Within a few weeks, however, unseasonably warm temperatures and rain melted a sizeable amount of the snow. "We still have piles, but most of the snow was eventually eliminated by the 50-degree weather," Doughty reported in early January. "Mother Nature helped out."

Executive Director George Doughty was pleased by the way staff pulled together to battle the storm.

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Portland Jetport Produces All of its Deicing Fluid In-House

BY VICTORIA SOUKUP

FACTS&FIGURES

Project: Recycling Effluent from Aircraft Deicing Operations

Location: Portland (ME) Int'l Jetport

Process: Distilling effluent to 99.1% propylene glycol & using it to produce Type I Aircraft Deicing Fluid—for use & outside sales

Projected Cost Savings for 2017/18 Winter: 18%

Facility Size: 7,000 sq. ft.

Storage: 60,000 gallons of Type I deicing fluid available at all times

Blending Capability: 10,000 gallons in 5 hrs

Plant Owner: Airport, which is owned/operated by the city of Portland

Project Partner/Plant Operator: Inland Technologies Int'l

Owner of Proprietary Processes: Inland Technologies Int'l

Consulting Engineer: Stantec

Electrical Engineer: MED

Effluent Recycled: 6.5 million gallons (2010 thru 2017)

Glycol Reclaimed: 1 million gallons (2010 thru 2017)

Of Note: 47% of effluent that is recycled comes from other airports, which pay associated processing fees

Airfield maintenance crews at Portland International Jetport (PWM) in Maine had one less item on their to-do list last fall: They didn't have to order any aircraft deicing fluid for the upcoming winter. It was a bold change for the Atlantic coast airport, which receives an average of 62 inches of snow annually and is no stranger to blistery nor'easters.


PAUL BRADBURY

"For the first time, we are introducing a closed-loop process, which is really brilliant," reports Airport Director Paul Bradbury. "We will not be buying any new product. Every bit of Type I deicing fluid we spray on aircraft this year will be from reclaimed fluid."

The airport's product is coming from its own on-site plant, which manufactures aircraft-grade deicing fluid using virgin quality propylene glycol distilled on-site from effluent collected during 2016/17 winter deicing operations. Moreover, the plant has created two new revenue streams for PWM. It sells the deicing fluid it produces, and it collects fees from other airports for accepting their deicing effluent.

"The first recycled aircraft deicing fluid certified for resale in the country is what we are producing here at Portland Jetport," Bradbury says proudly. "It meets all FAA test requirements for a Type I deicing fluid and is chemically identical to a non-recycled fluid."

As of December 2017, the facility had sold aircraft deicer to White Plains Airport in Westchester County, NY, and Logan International in Boston. In addition, the plant produces and sells FlightBloo, an antifreeze used in aircraft lavatories, which is also manufactured using recycled glycols.

The airport owns the recycling/processing facility and associated storage tanks; Inland Technologies International owns the processing and blending equipment inside

the facility. Plant operators are employees of Inland, and the company owns the proprietary processes it uses at PWM. The airport and Inland partner to sell the plant's final product. "It is structured that way so we both participate in the upside financial benefits of the sale," explains Bradbury.


ROGER LANGILLE

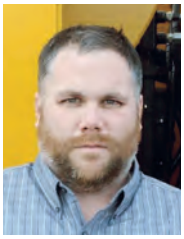
Roger Langille, president and chief executive officer of the Inland Group of Companies, is pleased with the structure and results of the arrangement. "As a corporate group, we have enjoyed serving the Portland Jetport over the years," he remarks. "The model is one based on a partnership; and seeing the project expand over time to better meet the needs of the airport and the region is something we are all very proud to be part of."

Win-Win for Airport & Environment

The collection and recycling process has been a long time coming—starting about a decade ago, with PWM's capital improvement plan. At the time, management was talking with the Maine Department of Environmental Protection about changing how the airport disposed of runoff from deicing operations.

"Even though it was a small amount, we were essentially discharging effluent [containing propylene glycol] into the ocean via the Fore River," Bradbury explains. Although propylene glycol is not toxic, it can kill fish and other aquatic life because it depletes oxygen as it breaks down in water.

Being essentially landlocked on 769 acres, PWM did not have space available to construct aeration ponds or other commonly used options for treating deicing effluent. "We had to go in a different direction," says Bradbury. The idea to pursue full capture and recycling was the result of research by airport staff and Stantec, PWM's engineering consultant.



ADAM THURLOW

The airport eased into the venture by contracting Inland to develop and operate a small on-site glycol recycling facility. Operations began in 2010, with a collection system that captured the airport's deicing effluent and equipment that distilled the fluid to 50% propylene glycol concentration and produced a raw-grade glycol product. Clean water left over from the process was discharged to the local wastewater treatment plant, explains Adam Thurlow, Inland's plant operation manager. The facility even produced a small amount of revenue by collecting fluid containing propylene glycol from area businesses that use it for non-aviation purposes.

The plant at Portland Jetport produces saleable Type I deicing fluid and antifreeze for aircraft lavatories.

"But it was still very expensive, and it put us at a cost disadvantage against other airports that were not doing this type of capture and processing," Bradbury notes. "It did, however, put us on the trajectory to a process whereby we were capturing the value of otherwise wasted propylene glycol. We recognized this value could make us more competitive with other processes such as aeration ponds other airports were using."

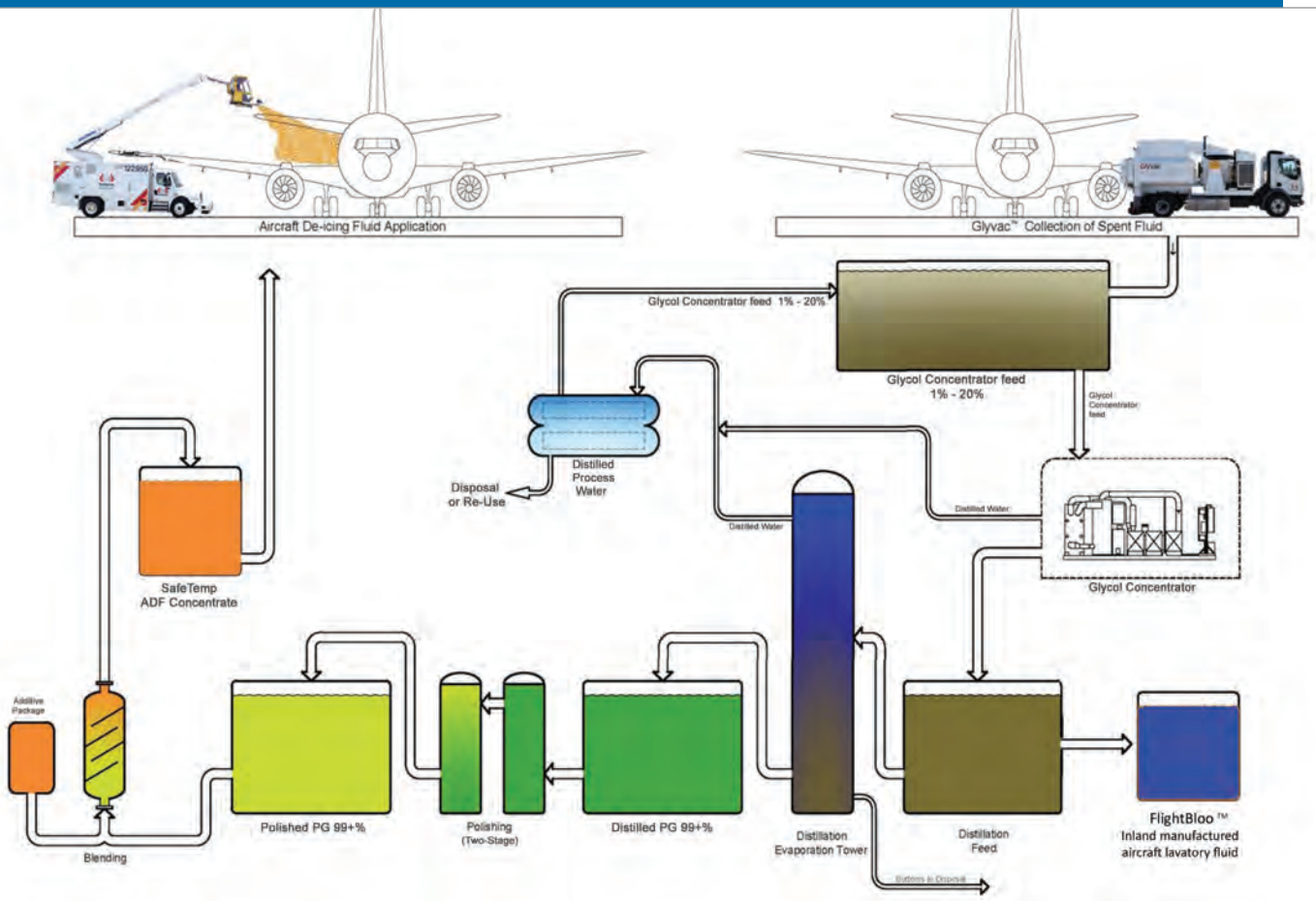
One year later, Inland added a distillation plant for an in-depth trial. The goal was to determine the feasibility of creating a high-grade propylene glycol product that could be sold to area businesses for use in heating/cooling units and to winterize recreational vehicles.

"The availability of this locally-produced glycol delivered regional economic benefits and competitive advantages for the industry," says Thurlow. "Furthermore, the value obtained from product sales helped offset the costs of operation."

Soon, the facility began receiving and processing glycol-impacted stormwater from neighboring airports. The plant charged a small fee to further offset the operational costs paid by the city of Portland, which owns and operates the airport.

By 2015, it was clear that the trial was working and full-scale operation made sense, explains Thurlow. By late 2016, the currently used 7,000-square-foot facility was commissioned. It combined existing 166,667-gallon underground tank and 333,333-gallon underground tanks with new aboveground storage on a two-acre site. These days, the facility has 60,000 gallons of Type I deicing fluid available at all times and can blend 10,000 gallons every five hours.

Each year, crews at PWM spray approximately 100,000 gallons of aircraft de-icer, which contains about 50,000 gallons of concentrated Type I fluid, notes Thurlow.



Collection & Processing

Effluent at PWM is collected in two ways: a drainage system on the deicing pad funnels it into underground tanks, and a mobile recovery vehicle vacuums it into onboard tanks.

As the effluent is drained off the tarmac, plant operators use a valve to direct high or low concentrations of mixed deicing fluid effluent to one of the two underground tanks. This saves time and resources during subsequent processing in the lower concentration tank.

The Glyvac, a patented recovery vehicle the airport purchased from Inland last year, shears visible effluent off apron surfaces using air speeds of nearly 200 mph. It also scrubs away trace amounts of glycol with a wash bar.

"The Glyvac was purposed-engineered from the bottom up for airport glycol recovery operations," recalls Thurlow. "But while street sweepers are great for picking up items from the street, they aren't necessarily great at picking up glycol. The Glyvac is specially designed for airport use, as opposed to an airport using a vehicle originally designed for another industry."

Bradbury reports that the vehicle saves PWM time and money. “In an active snow or mixed rain and ice event, you are getting all that precipitation mixing with the deicing fluid,” he explains. “If you’re right up there with the glycol recovery vehicle, actively catching it on the ramp before it has time to flow the length of the ramp and enter the drainage system, you’ve removed much of the opportunity for significant mixing. You can see on the apron right where the fluid is accumulating and be efficient at capturing fluid at higher glycol concentrations.”

Since 2010, Inland has recycled about 6.5 million gallons of effluent at PWM, reclaiming 1 million gallons of pure glycol. Nearly half (47%) of the fluid it processes has come from other airports in the region—Bradley International in Windsor Locks, CT; Dulles International, Reagan National and Andrews Air Force Base in Washington, D.C.; New York’s LaGuardia and Newark Liberty International in New Jersey.

While the economics of the process are positive, Thurlow notes that Inland has not lost sight of its original mission. Prior to 2010, the biochemical oxygen demand (BOD) readings were very high in the stormwater surrounding the airport. Since Inland began operating, levels have stayed below 300 mg/L.

The airport owns the facility; Inland owns the equipment it houses.

"Having our current level below 300 mg/L is a significant environmental achievement," he emphasizes. The stormwater readings are very clean and in the process we are reclaiming a chemical for local reuse. What would have been harmful is now transformed into a benefit."

Competitors Welcome

While PWM is proud to be the first U.S. airport producing aircraft-grade deicing fluid from material previously considered waste, Bradbury hopes it won't be the last. He acknowledges that processing effluent from other airports helps the industry, because less fluid has to be trucked long distances for disposal or recycling. But he would still like to see more collection sites emerge. "Another facility in the mid-Atlantic would split the distance," he says. "Today, we're 'it' in the United States in terms of getting final distillation to a 99% pure propylene and then manufacturing it into deicing fluid."

Between the revenue it earns from accepting outside effluent and selling recycled product, PWM expects to save 18% in the 2017/18 winter. "Business nirvana would be 100 percent; we're not there yet," quips Bradbury. "If we get to 50%, 60%, 70% offset, we're getting pretty close. But even an aeration pond isn't free.

"This will be our first year buying all our own product and meeting demand all from reclaimed product," he continues. "We don't know all the numbers yet—it could be that we beat the 18% which we are projecting."

In addition to recycling the glycol it collects, PWM is also working to have less glycol to collect. Bradbury acknowledges Northeast Air, the airport's deicing contractor for almost 50 years, for reducing the amount of glycol it sprays. "We have actively participated in the evolution of deicing technology," says Henry Laughlin, the company's president. "Our introduction of AirFirst technology trucks significantly reduced the volume of glycol used in the overall process, and our glycol blending system ensures minimal waste. We are all proud we completed the circle through this season's application of recycled glycol using the world's most advanced deicing equipment."

Bradbury considers the airport's recycling initiative an easy sell, because it involves sustainability and technology. "Overall, this is where the industry is going," he reflects. "We're using the best available technology; we're capturing the maximum amount. It's not going into the environment, and it's being treated efficiently without any loss of the original product. We're trying to keep the original market value of the product without having to truck it or discharge it. And we do think the economics will be there."

casper natrona county international airport

PHOTO: JVIATION

Casper Int'l Builds New Equipment Storage & Maintenance Facility

BY LAURA WAVRA

Commercial airports that were originally built as military airfields are often a mixed bag to operate. Costly infrastructure elements such as runways and buildings are already in place, but they weren't designed to accommodate modern civilian traffic.

Casper/Natrona County International Airport (CPR), in central Wyoming, is a prime example. Ever since the U.S. Army turned over its airfield along the North Platte River to Natrona County in 1949, CPR has used several World War II-era buildings to serve an evolving mix of commercial airlines, private aircraft operators and cargo carriers.

For decades, the airport housed its snow removal equipment and maintenance department in a military motor pool building; but a new $5.5 million facility, completed in fall 2017, is proving to be considerably more efficient. Because the former maintenance building was not contiguous to the airfield, snowplows and other equipment had to cross public roads to clear the airport's two runways and associated taxiways—a cumbersome situation that presented undesirable logistic and safety issues, explains Airport Director Glenn Januska.

GLENN JANUSKA

CPR's new 27,000-square-foot facility is located directly on the airfield, and is much larger than the old military building. It also includes a wash bay for large equipment; 4,000 square feet of mezzanine storage space; a 10-ton overhead crane; a dedicated welding area; a maintenance shop and parts room; separate electrical, plumbing and carpentry shops; a backup power generator; and a security/badged entry system.

As-is, the new facility cannot accommodate CPR's entire fleet of maintenance equipment, which includes snow plows, brooms, deicers and tractors. But the building was specifically designed for expansion, and two more 25,000-square-foot phases are already on the drawing board. When complete, the facility will total about 75,000 square feet. Until then, the airport staff compensates by storing off-season equipment in the former maintenance building.

FACTS&FIGURES

Project: Snow Removal Equipment & Maintenance Facility

Location: Casper/Natrona County (WY) Int'l Airport

Size: 27,000 sq. ft.

Cost: $5.5 million

Funding: 62% FAA; 33% WY Dept. of Transportation; 5% airport

Construction: July 2016 – fall 2017

Building Features: Wash bay; 10-ton overhead crane; welding area; mechanic shop & parts room; designated shops for electricians, plumbers & carpenters; backup power generator; security system/ badged entry; 4,000 sq. ft. of mezzanine storage

Primary Building & Civil Engineer: Jviation

Design & Building Engineering Subcontractor: Mead & Hunt

Field Operations: MOA Architects

Material Testing: Inberg-Miller Engineers

Sitework: Applied Construction Technology

Construction: Caspar Building Systems

Paving: Grizzly Excavation & Construction

Fence & Auto Gate: SWI Fencing

Overhead Doors: Overhead Doors of Wyoming

Fuel Tank & Dispenser: Eaton Metal Products; Co-Casper Pump Service

HVAC Controls: LONG

Overhead Fans: Big Ass Fans

10-Ton Crane: Wazee

Flooring: Blueline

Fire Suppression: Western States Fire Protection

Plumbing & HVAC: CK Mechanical & Plumbing

Electrical: Alliance Electric

Communications: Alliance Communications

Planned Expansion: 50,000 additional sq. ft., in 2 more phases

Smooth Process

The three-phase project began in 2011 with a concept and budget study performed by Mead & Hunt. The outside engineering firm validated what Januska and his maintenance team had known for years: In addition to its remote location and inadequate size, the previous maintenance building was plagued by operational inefficiencies common to old structures, such as inadequate heating/cooling systems and poor insulation. Airport staff members worked closely with Jviation, CPR's current engineering consultant, to make sure that these and other issues were corrected in the design of the new maintenance building—a strategy that undoubtedly helped make the project successful, says Januska.


ANDY REMSTAD

Andy Remstad, architect/project manager of Jviation, agrees about the importance of employee input. "The institutional knowledge provided by Glenn Januska and his staff, involved from the start, allowed the firm to really dial into the needs and wants of the airport," he explains.

FAA funded about 62% of the project, and the Wyoming Department of Transportation covered approximately 33% of the cost. CPR broke ground on the project in July 2016, with Caspar Building Systems, a local company, serving as the construction contractor.

John Griffith, the firm's project manager, was not at all surprised when crews unearthed an underground fuel storage tank with no associated records. "We knew there was a chance we might find some interesting things during the remediation process, but the resolution proved to be relatively straightforward."

Because most of the construction occurred during winter months, crews largely worked at night, after the winds died down. Despite the cold Wyoming weather and the added challenges of building on a former military airfield, Griffith describes the overall construction process as smooth.

Though the new facility is much larger than the previous space, Januska expects to pay less for utilities. "We were willing to spend extra money up front to save in the long term," he explains. A radiant floor system, for example, circulates hot water under the floor to provide most of the heat in the shop areas.

Creature Comforts

In addition to improved work areas and more equipment storage, the airport's new building includes welcome upgrades to administrative areas such as staff offices, training areas and break rooms. A full kitchen, showers and sleep rooms facilitate sustained operations during around-the-clock snow events.

"These things aren't novel, but they're new to Casper," says Januska. "The staff no longer has to drive home during inclement weather after working 12-hour shifts only to sleep for a few hours and drive back. It's much safer."

Radiant floors help maintain a more comfortable work environment in shop areas by offsetting the air movement produced by large overhead doors and specialty exhaust systems for vehicles, welding and carpentry operations. Large overhead fans, isolated heating units and make-up air systems work together to maintain a consistent air temperature by mitigating the effects of massive influxes of cold air when the large garage doors open.

Griffith is happy to have played a role in providing CPR's maintenance personnel with a much-needed upgrade from their previous World War II-era facility. Before working on the project, the Casper resident took for granted the ability to fly out in the midst of snowy winter weather. "You have people working around the clock to make that happen, people doing a tremendous amount of work," he comments. Thanks to the airport's recent project, those crews have a more comfortable and efficient base to work from.

Tri-Cities Airport Updates & Expands its

FACTS&FIGURES

Project: Terminal Renovation & Expansion

Location: Tri-Cities Airport (Pasco, WA)

Owner: Port of Pasco

Total Cost: $41.9 million

Funding: $24 million airport revenue bond, backed by passenger facility charges; $7.8 million TSA equipment grant; $6.9 million in Airport Improvement Program entitlement grants; $6.8 million from airport's cash reserves; $6 million in FAA discretionary funds; increased fees for public parking & rental cars; increased airline landing fees

Original Terminal: 60,000 sq. ft.

Space Removed: 13,000 sq. ft.

Space Renovated: 47,000 sp. ft.

Space Added: 63,000 sq. ft.

New Size: 110,000 sq. ft.

Construction: Aug. 2014 – Jan. 2017

Designer: Mead & Hunt

Contractor: Bouten Construction Co.

Baggage System: Logplan

Subcontractor: Automatic Systems

Project Manager: Strategic Construction Management

Seating: Airport Seating Alliance

Flight Info Display System: Infax

After decades of making periodic small changes, Tri-Cities Airport (PSC) in southeast Washington state "ripped off the Band-Aid" and completed a $41.9 million renovation and expansion of its 1968 terminal.


BUCK TAFT

"We couldn't just continue to do a little bit here and there," says Airport Director Buck Taft, noting that no major improvements had been made since the 1980s. "We didn't have enough gate space, concessions were in the wrong area because everything was obviously pre-9/11 design. Its useful life was over."

The multi-phase construction project ran from August 2014 to January 2017, nearly doubling the size of the terminal to a total of 110,000 square feet. Specific attention was given to improving passenger flow and the baggage and ticketing processes; but the overriding goal was to update the facility and prepare it to accommodate the future needs of the airport and Tri-Cities area.

To do so, Mead & Hunt devised a plan that removed 13,000 square feet of the original building and renovated another 47,000 square feet, but also added 63,000 new square feet of space. Although the terminal's square footage nearly doubled, its utility bills did not increase accordingly due to new energy-efficient systems and products—a feat Taft finds impressive.

Concessions were moved behind the TSA security checkpoint and designers added a large, open gallery area, with an array of concessions and 30-foot windows that provide striking views of the airfield and surrounding area.

Behind the scenes, a new baggage handling system designed by Logplan includes inline explosives detection. In addition to optimizing screening efficiency, the new system is decreasing TSA operating costs and improving the customer experience.

Designed for Growth

From 2008 until the early expansion phases of the program were complete, PSC was busting at the seams. Today, Taft feels like


PHOTO: MIKE VERANZA

Aging Terminal

BY JENNIFER BRADLEY

it is outfitted for whatever comes next. In the last five years, traffic increased by 100,000 passengers; in 2016, PSC served nearly 375,000 passengers, an 8% increase over the previous year. Currently, it is the fourth-largest commercial airport in the state of Washington.

The national recession that began in 2008 didn't affect PSC the same way it impacted other airports. "It kind of skipped us," says Taft. "We're a very diverse economy, with a lot of federal facilities, a national laboratory, and we're big in food processing. We're the frozen french fry capital of the world!"

In fall 2015, crews completed the first expansion phase: a new west concourse and new car rental and baggage claim areas. The second phase, which demolished the old boarding area and replaced it with a new east concourse, was finished in summer 2016. The new ticketing area opened in November 2016; and the TSA checkpoint was next, with four screening lanes to allow room for future growth of passenger volume.

The gate area and main gallery were also specifically designed to accommodate more traffic. The gallery, in particular, has become one of Taft's favorite spots in the entire airport. "Our original terminal had no windows," he remarks. "The gallery is the best. It's just a big, open, windowed view.
It's so warm and clean."

Design & Build—Together

Because the Port of Pasco owns PSC, rules governing state-owned facilities applied to the project. In particular, the state approved use of the general contractor/construction manager process rather than the standard low-bid method. The Port was consequently able to hire Bouten Construction Co. as the prime contractor when just 30% of the project design was complete.


TIM DACEY

"It allows you to get the right person at the table," says Tim Dacey, project manager with Mead & Hunt's Portland, OR, office. "It's still competitive; but you get to select the construction manager based on qualifications, it's not entirely cost-driven." Having Bouten on board early to review costs and drawings, and to help make sure decisions worked within the project budget, helped make construction more efficient, he explains.

"We were able to work with them throughout design and construction, for estimating and working out phasing issues to make sure operations were continuous through construction," says Dacey. "In the end, the results were clear: We were under budget and able to complete the project without a plane being delayed."

In short, he considers the collaborative process the right solution for complex construction projects.

Nick Gonzales, vice president of Bouten, agrees that the alternative delivery method helped the team keep the airport fully operational


NICK GONZALES

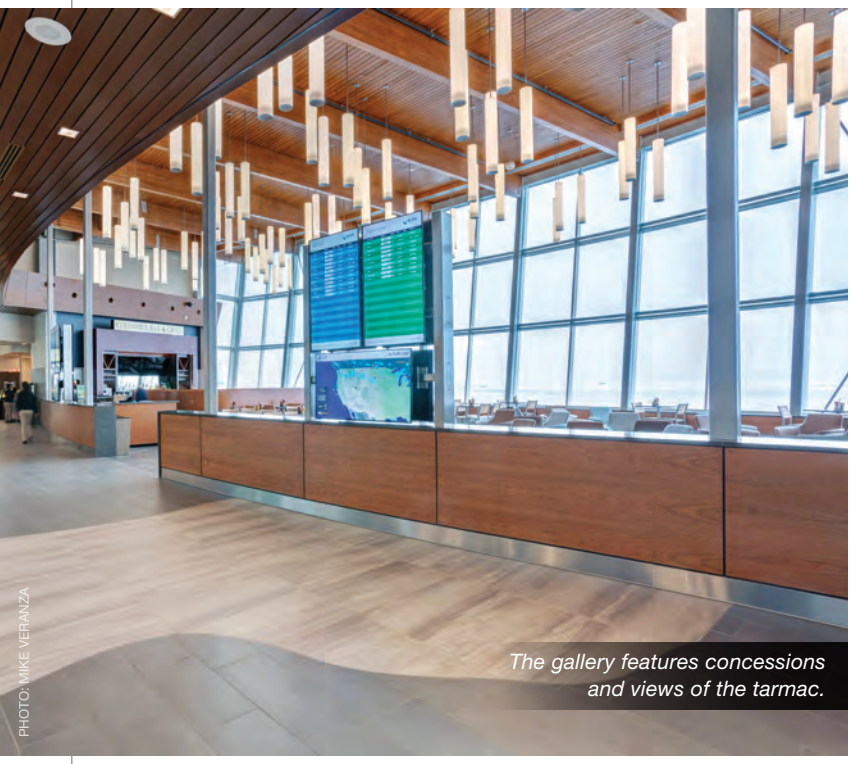


PHOTO: MIKE VERANZA

The gallery features concessions and views of the tarmac.

throughout construction and renovations. "Every single part of this building was touched by us, and to keep everything up and running was a huge challenge," he remarks, noting that the project lasted nearly three years and regularly required crews of 100 to 150 workers on site.

Gonzales is a big fan of the general contractor/construction manager process, especially for airport projects. He feels that it is critical for airport operators to have a relationship-based contract with a general contractor rather than automatically awarding the job to the lowest bidder. "When you've got every inch of your facility being worked on, you want to make sure your passengers have the best experience they can while under construction—and the staff, too," he explains.

Team Spirit Prevailed

In retrospect, Taft says that great relationships flourished when the airport commissioners allowed everyone to do their jobs and remembered that large construction projects invariably cause temporary disruptions. "We knew we had to get through this, because it was best for the community," he reflects.

For instance, customers were understandably unhappy when Baggage Claim was relocated to a heated tent adjacent

to the ticketing hall for a full year. But getting in front of situation with media stories and involving the community helped take the edge off. "When it happened, everyone knew it was coming, knew what to expect, and tolerated it," Taft reports.

He gives a huge nod of approval to the general contractor/construction manager method for creating the team environment necessary to get through tough times. "The contractor was able to buy into the project and to the phasing, and it really created a good team environment," he explains. When Bouten had to rearrange the phases, the airport and staff did everything they could to help the contractor finish the job on time, he adds.

Gonzales felt that everyone had the same goal in mind. "Being very relationship-based was the key to the success of this project," he says. "It took a very high level of coordination from Buck and his staff to really pull this off."

"Everybody that came to this project were the best people for the job," Taft adds. "That made such a huge difference. Everyone was excited and willing to do what they had to do to make this project successful. You help here, then they help you later."

In the end, Taft says that passengers were happy with the results—and so was the team that worked hand-in-hand to create the new terminal.

Unusual Challenges

PSC's original terminal had a thin concrete shell, with a roof that looked like inverted martini glasses. At only 2 to 4 inches thick, the concrete shell was sensitive to vibration, notes Gonzales.

"We in-filled all of these areas, so they weren't so deep; and then added a second roof drain," he explains. "This meant we had to raise the bottom so we could add additional piping and drains, and fill them up 2 to 2 ½ feet. It was a project!"

Another challenging aspect was constructing the gallery in the addition area. The exposed wood structure took many hours to complete, but adds a warm, relaxing feel to the area, says Gonzales. "It was tongue-and-groove, with decking 3 inches thick; and every 12 inches, we put a railroad stake horizontally through the front of one of the ports. We also had to nail it from the top and pre-drill everything."

PHOTO: MIKE VERANZA

A new baggage claim area was created during the first expansion phase.

It didn't help that last winter was the worst the Tri-Cities area has experienced in 50 years. Fortunately, construction was far enough along that the harsh weather didn't affect crews, or the budget, too severely. Contingencies that were built in through the general contractor/construction manager process helped all around, notes Taft. He was also happy that the project qualified for rebates from the gas and electric companies.

Although the majority of the project was funded through revenue bonds, it also used FAA entitlement and discretionary dollars. This required the team to synch the work schedule with the availability of funding. It was important to understand what money could be spent and how to best coordinate the construction timeline, notes Dacey.

Reusing holdroom seating from the original terminal helped stretch the material budget. The seating that PSC purchased in 2009—Pacifica, from Airport Seating Alliance—held up so well, the design team supplemented the existing inventory with new units from the same line to outfit the larger new spaces.

"Cooperation between the contactor, the owner and ourselves was terrific," Dacey comments. "Some airports can close down five gates and work on those, because they have the space to shuffle around. We basically needed to keep the same amount of square footage online at all times, and we found a way to do it."

The gate area was expanded to accommodate more passenger volume.

PHOTO: MIKE VERANZA

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It's all about connections

McCarran Int'l Adds Walk-In Medical Clinic

BY NICOLE NELSON

FACTS&FIGURES

Project: Urgent Care Clinic

Airport: McCarran Int'l, Las Vegas

Location: Terminal 1, before TSA checkpoint

Service Provider: Code 3 Emergency Partners

Facilities: 3 patient rooms; X-ray machine; laboratory; retail sundries

Offerings: Acute medical care; pre-employment physicals & urinalysis drug testing; "concierge services" such as restorative IVs & B12 shots; prescriptions & over-the-counter products/sundries

Patient Mix: 75% airport & airline employees; 25% passengers

Concessions Contract: 7 yrs; airport receives undisclosed percentage of revenues

Of Note: Clinic has pre-registration arrangements for airport workers, TSA personnel & employees of Delta, United & Southwest; some services are pre-approved by Aetna & United Health Care .

McCarran International Airport (LAS) in Las Vegas offers customers and employees in need of immediate medical attention a welcome respite in Terminal 1. The Code 3 Urgent Care, located before the A/B security checkpoint, is the privately owned and operated facility with three patient rooms, an on-site X-ray machine and laboratory. In addition to treating ailments such as flu, strep throat, sprains and strains, it also offers employment physicals and drug testing.

MICHAEL ORAM

Michael Oram, contract specialist for the Clark County Department of Aviation, believes that the concept is hitting on all cylinders. "We thought (urgent care) was a great idea, as it adds extra value of service to our passengers and our employees, too," explains Oram. "It is certainly a lot easier to take care of a cold or injury right on site."

In operation since June 2017, fully 75% of the clinic's business comes from airport and airline employees; 25% of patients are passengers. This winter, most visits were for basic respiratory and sinus infections, fevers, colds and the flu. "I look forward to being in Vegas through an entire seasonal shift, just to see how things change," says Adam J. Daley, director of

ADAM DALEY

Airport Operations for Code 3 Emergency Partners. Last summer, the staff treated a lot dehydration cases—self-inflicted or otherwise, he notes.

After less than six months, the clinic had a lot of repeat patients coming in for "concierge services" such as restorative IVs and B12 shots. Accidents tend to be the majority of one-off visits, says Daley.

"If somebody falls, sprains an ankle, or if they suddenly have a break, we can take X-rays on site; and we have crutches, slings and boots to help stabilize an injury," he explains. "If somebody has sliced their finger on a knife while cutting meat in a restaurant, or they get cut on the job, we can provide laceration repairs, stitches, staples, glue…whatever is appropriate."

Rapid on-site lab testing allows Code 3 to screen for strep throat and flu, as well as provide urinalysis drug testing (pre-employment and post-accident).

Evolution of Care

While this style of urgent care is new to LAS, the concept of on-site medical support is not. Code 3 is the latest in a series of partners providing health care services in the same pre-checkpoint location.

"Many years ago, it originally began as a clinic staffed by the Clark County Health Department," Oram notes. "What they offered was literally first aid—treating bumps and bruises with Band-Aids, that kind of thing. There were no actual doctors or physician's assistants, prescriptions being written, or anything like that. That is what it was for many years."

Eventually, the health department wanted to cut its costs and obligations to focus more on street locations; and the airport had an opportunity to do something more with the concept. "We wanted to add an extra service that most airports don't have," explains Oram.

A company called Airport MD occupied the space next, elevating the level of service with doctors of record on site. After Airport MD's run, from March 2010 to September 2011, the space was converted into a full-service pharmacy and medical clinic.

Valuable lessons were learned from each of the previous healthcare concepts, notes Oram. "Particularly, there are a lot of barriers with the full-service pharmacy as far as people really being able to utilize it," he explains. Code 3 has a retail section that sells sundries and over-the-counter items. "It is learning the passenger flow and the needs of everyone, to really find that perfect service balance."

In addition to treating patients, the clinic also sells health-related sundries.

Increased Services

Oram says the clinic's biggest draw is its ability to offer urgent care services that were previously outsourced beyond the airport grounds. "Code 3 has what you would typically find in a clinic on the street, and they actually even have a little more, with in-house X-ray machines," he remarks. "That was one of the new things they brought onboard that none of the previous versions had done before. Code 3 has actual MDs, either there or on-call, as well as paramedics and physician's assistants. It is not quite an ER, but it offers what a normal medical clinic would do with all the typical calls and wellness checks."

Daley reports that patient volume at the LAS clinic has been on a nice growth trajectory since opening last summer. Month over month, it is averaging a 15% gain in traffic.

He credits the company's chief executive, Carrie de Moor, M.D., FACEP, for being a visionary in understanding the complexities of the airport environment and launching the clinic at LAS and its sister location, which opened at Dallas/Fort Worth International in August 2017. "One of the things that really attracted me to the business model was that Dr. de Moor was really intelligent in trying to build these locations from the inside out. Long before we opened the clinics, we made certain that we got in-network with the insurance companies to cover the thousands of folks who work at the airport every day," Daley explains.

At LAS, specific services are pre-approved by Aetna and United Health Care, and the company has pre-registration arrangements for employees of the Clark County Department of Aviation, TSA, American Airlines, Delta Air Lines, United Airlines and Southwest Airlines.

"Dr. de Moor wanted us to be at a point where it wouldn't cost these employees any more to walk down the hall and see us at the airport versus taking a half hour to drive across town to go to another urgent care," explains Daley.

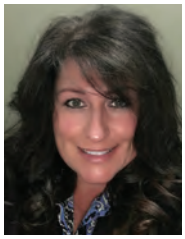
Code 3 also prides itself on shorter wait times than outside urgent care centers. "We try to be as efficient as we possibly can, and we typically can see people in about 20 minutes or less," he says. "Oftentimes, it is immediate. You walk in, process your paperwork, and you are right back in one of the patient rooms. Typically, we can have them on their way back to the office—wherever the office may be at the airport—by the time they could leave the airport to start their way to get to an offsite facility."

The company also plans to start marketing to patients in the neighboring community. "I would gladly pay $4 to park at the airport and be seen in 20 minutes, as opposed to having to go sit for two or three hours in a waiting room somewhere else," reasons Daley. "Once we have built our core business, we can continue to expand our offerings and really see what each of the airports need and tailor our model to really provide what is best for them."

Cincinnati Int'l Raises its Hand to Help Teach CPR

Beyond opening on-site medical clinics and pharmacies, some airports are jumping on another health trend: providing potentially life-saving education for passengers and employees.

Cincinnati/Northern Kentucky International Airport (CVG) is one of 11 U.S. airports that have aligned with the American Heart Association with Anthem Foundation's support to provide interactive kiosks that teach Hands-Only CPR in just five minutes.



WENDI ORLANDO

Wendi Orlando, the airport's senior manager of customer experience, says that offering a quick and easy way for passengers to learn a life-saving skill is part of CVG's mission to provide an unforgettably positive experience for the 7.8 million travelers who pass through its facilities every year.

"It's a good opportunity for travelers to practice," Orlando says.

The touch-screen kiosk begins with a video introduction and overview of the Hands-Only CPR method in English, Spanish or closed-captioning, followed by a practice session and a 30-second test.

Airport personnel were intrigued by the educational outreach idea after learning about the large number of cardiac arrests that occur, and how pivotal immediate CPR is to victim survival. More than 350,000 cardiac arrests occur each year outside of hospitals, and 20% take place in public spots such as airports. According to the American Heart Association, Hands-Only CPR has been shown to be as effective as conventional CPR for cardiac arrests that occur in public, and CPR can double or triple a victim's chance of survival.

CVG located its educational kiosk post-security, before gates A6 and A7, to allow public usage 24/7. Since its August 2017 debut, nearly 2,800 users have logged in to take advantage of the free educational tool, reports Orlando.

DAVE STOECKLE

The airport's emergency response team was excited about the program from the very beginning. "Hands-Only CPR is a good skill to know, and it continues along with our commitment to life safety," explains Fire Department/EMS Division Battalion Chief Dave Stoeckle. "We already have over 50 automated external defibrillators throughout the airport, and their significance has been proven. We have a 100 percent save rate, with over 15 cardiac arrests we've had on the airport; and the biggest reason for that perfect success rate of survival of a victim is because of fast bystander CPR and implementation of the AED.

"So to train more and more people, especially passengers and employees throughout the airport, to be comfortable with doing Hands-Only CPR was definitely a win-win situation for everybody."

In addition to CVG, 10 other international airports in the United States offer Hands-Only CPR kiosks: Baltimore/Washington, Chicago O'Hare, Cleveland Hopkins, Dallas/Fort Worth, Dayton, Harrisburg, Hartsfield-Jackson Atlanta, Indianapolis, John Wayne and Orlando. To date, the airport kiosks have trained more than 57,000 people.

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FACTS&FIGURES

Project: Situational Awareness & Security System

Location: Orlando Melbourne (FL) Int'l Airport

Timeline: System delivered & installed in June 2017; airport began using it in Sept. 2017

Prime Equipment & Software Vendor: Harris Corp.

Radar System Subcontractor: Security Radar Integrators

Est. Total System Cost: About $1 million (over 5-yr period) for airports with similar requirements

System Components: 2 Symphony Airfield Radar System units; license for AdvanceGuard ARS Software; Symphony ADS-B Xtend unit; 5 Symphony Vehicle Movement Area Transponders; 5 Symphony MobileVue Real-time Situational Awareness Software Licenses; license for Harris NextGen Surveillance Data; hardware/software warranty, maintenance & support

Key Benefits: Tracking ground support vehicles & aircraft on ground; improved perimeter security/wildlife management

Orlando Melbourne Int'l Deploys New Airfield Radar System

BY KRISTIN SHAW

When you think of cities with large high-tech and engineering sectors, you probably think of San Jose, CA. Or Austin, TX. Or maybe even Huntsville, AL. But Melbourne, FL, is a powerhouse of its own, with key facilities for Northrop Grumman, Rockwell Collins, L3, General Dynamics, Thales, Embraer Executive Jets, and the world headquarters of Harris Corp.

GREG DONOVAN

"If you look around our airfield, we're surrounded by high-tech titans," says Greg Donovan, executive director of Orlando Melbourne International Airport (MLB). "We embrace it."

Kennedy Space Center is a short drive up the sparkling Space Coast from MLB, and many of the components for NASA's rockets are created and manufactured in the area. "My next-door neighbor is, quite literally, a rocket scientist," says Lori Booker, the airport's director of communications.

A new system developed by Harris, one of MLB's high-tech neighbors, is helping improve situational awareness at the airport by tracking the ground movement of aircraft and ground support vehicles. It also enhances security by alerting personnel about incursions from wildlife and other unwanted intruders.

Neighborly Gesture

A few years ago, Harris Corp. approached MLB with an idea for a pilot program. "We were looking for ways to design our products to serve non-hub airports," explains Chris Zanardi, the company's general manager of Harris' Symphony commercial aviation solutions business unit. "We wanted to find a way to help the airport in Melbourne support their growth and give them affordable ways to acquire new technology."

The system Harris eventually proposed included a partnership with Security Radar Integrators (SRI). The company's Airfield Radar System (ARS) automates surveillance over much of MLB's airfield to monitor surface movement, provide perimeter security and detect wildlife issues.

DAN FLYNN

"Because of ARS' high resolution, object classification and user-defined rules, detection rates approach 100% and false alarms approach 0%," reports Dan Flynn, SRI founder and president.

Flynn spent several years at Honeywell, deploying 20 radar sites around the world for airports, seaports, industrial plants and

offshore platforms. To date, his company has conducted more than 10 field trials at U.S. commercial airports. Evaluated for the FAA by National Safe Skies Alliance at several U.S. airports, the ARS radar operates at 30 European airports and is now available in the United States, thanks to an FCC ruling finalized in 2017 allowing the ARS frequency with no license required. Because the ruling is so new, SRI has a considerable head start on competitors.

While traditional systems use transponders to keep track of aircraft on airfields, ARS tracks everything, whether it has a transponder or not, says Flynn. Although most aircraft have transponders, some small planes may not; and sometimes pilots don't turn their transponders on, which usually make them difficult to track. If a plane goes out of the aircraft movement area—to park overnight, for instance—it also may not be found by other systems. Aircraft personnel are instructed to turn off their transponders outside of set areas to avoid creating extra radio "noise."

"What attracted us to this program is that it could serve two functions: operations and security," says Zanardi. "Many security systems are fence-based and only look at the fence for surveillance. Our 360-degree system can look at the whole airfield. It's a security system for the whole airfield, not just the perimeter."

MLB also uses the radar system for wildlife management. "The system will detect wildlife, and it alerts us to potential problems in real time," says Donovan. "We're in Florida—wildlife abounds. We take special pride in the fact that we have designed our airfield to avoid wildlife, and the system Harris and SRI have designed allows us to take the next step to keep our guests, and the wildlife, safe."

ASDE-X Alternative

ASDE-X Model X (ASDE-X) is a surveillance system that uses radar, satellite technology and multilateration (a surveillance technique based on the measurement of the difference in distance to two stations at known locations by broadcast signals at known times). The mix of technologies allows air traffic controllers to track the surface movement of aircraft and vehicles on runways and taxiways, and was developed to help reduce critical Category A and B runway incursions. By collecting data from a variety of sensors, ASDE-X is able to track aircraft and vehicles in airport movement areas—whether or not they are equipped with transponders.

"By itself, SRI's radar system is very useful; but combined with Harris Symphony, it's a mini ASDE-X," says Zanardi. "The collaboration between Harris and SRI provides almost the same level of situational awareness capability as what an ASDE-X would provide."

SRI's services were a natural extension to Harris' portfolio, because they have a commercial data feed called "NextGen Data," into which all the FAA surveillance data is integrated, Zanardi explains. For non-ADS-B vehicles and aircraft, the system at MLB picks up the ARS radar data on the surface and fuses that with their existing track from the NextGen Data. Aircraft can then be tracked all the way across the airfield.

"ASDE-X typically tracks all aircraft transponding their identification information or tail numbers," says Zanardi. "With the ARS alone, you don't have that same identification information. The ARS identifies each aircraft as a target on the surface, and once integrated with our NextGen Data we are able to properly match the ARS track with the FAA aircraft tail number for that specific operation. This system only needs two ARS sensors."

"With the integration of Harris' NextGen and ARS data we maintain the aircraft identifier—that's where the science comes into play," says Zanardi. "MLB is one of the first to fuse its ARS data with NextGen data."

The system uses transponders to track ground support vehicles.

In addition to the ARS, the airport's system includes an ADS-B Xtend, which allows it to track ADS-B equipped aircraft all the way to the gate.

Tracking Vehicles

MLB is the first non-ASDE-X or non-ASSC U.S. airport to use VMAT (Vehicle Movement Area Transponder) units to track its surface vehicles. Currently, only ASDE-X or ASSC airports are eligible for FAA Airport Improvement Program funds. Surveillance data for vehicles equipped with VMAT units are fully integrated with the National Airspace System to make movement area ground operations safer and more efficient. VMAT is compatible with the FAA's Next Generation surveillance technology, ADS-B.

"All this integrated NextGen, ADS-B XTend, ARS and VMAT surveillance data is brought into our back-end system and displayed on the MobileVue app for the airport," says Zanardi. "Personnel can log in and see the full surveillance system on one interface, which displays the integrated data from both SRI and Harris."

What Other Airports Should Know

One thing to keep in mind is that radar systems use line-of sight sensors, and airports often have buildings that affect line-of-sight requirements. In such cases, Flynn notes that shorter range ARS units can fill the gaps, or long-range units can be used to create a virtual barrier between the buildings and critical areas.

More cameras aren't necessarily the solution. "A long-range 360-degree radar is much more effective than cameras for detection", he advises. "With cameras, there is a tradeoff between range and field of view. Radar, on the other hand, offers long range over 360 degrees."

The solution MLB chose was to place cameras around the airfield and zoom in as indicated by the radar, creating a system to cover all the bases. And the software can "learn." The rules-based system classifies objects it detects as people, vehicles and aircraft, and also recognizes exceptions. For instance, the airport may set up a rule to advise that autos on the surface roads are allowed, but people are not. Moreover, a rule can be set to alert security personnel if a person climbs over the perimeter fence.

The preponderance of data the system generates proved to be a mixed blessing for MLB. "In the compilation of data, there was so much that had never been at our fingertips before," says Donovan. "The enormity of the data and how to read it and apply it was something new. From a user standpoint, we didn't have to look at 20 different things anymore."

Flynn recommends a phased approach for airports considering a similar solution: "If your priority is security at the gates, or tracking vehicles, take a look at the data that can best meet those needs. Understand your business and the priorities, and phase-in different capabilities."

Beyond Security

In September, MLB landed its largest FAA grant ever: $18.1 million to upgrade the airport's longest runway, 9R-27L. Total funding, just north of $20 million, will be used for a runway lighting project and the design/construction of a mill and overlay project for the 10,181-foot runway. An additional $5 million in funding will be used to rehabilitate the airport's other two runways. MLB's Runway 9L-27R rehabilitation project was recently completed, and Runway 5-23 construction is currently underway. The runway projects, upgrades within the terminal and its new security/situational awareness system are all helping MLB gear up for future growth. Passenger numbers for February 2017 alone rose 3.6%.

Airport marketing personnel note that MLB is one of the least expensive airports in Florida from an airline cost perspective. And although it competes with nearby airports for passengers, the overall growth of Florida tourism has provided plenty of customers to go around in recent years.

Wyoming Airports Band Together to Save Their Commercial Air Service

BY PAUL NOLAN

WYDOT AERONAUTICS

Southwest Wyoming Regional Airport (RKS)

FACTS&FIGURES

Project: Wyoming Capacity Purchase Agreement Proposal

Objective: Maintain reliable, affordable air service to eight WY cities

Approx. Cost: Proposal calls for $15 million dedicated to commercial air service

Threat: Without additional funding, some cities may lose commercial service

Return on Investment: Economic study shows that every dollar spent to support commercial air service returns $24 to the economy

When Devon Brubaker began his job as manager of Southwest Wyoming Regional Airport (RKS) in spring 2015, many residents of the southwest Wyoming community were not even aware the airport offered service to major connecting hubs. Since then, his team has worked with SkyWest Airlines to create more affordable flights, supported by more effective marketing; and Brubaker is proud of the results.

DEVON BRUBAKER

The airport also recently changed its name to Southwest Wyoming Regional, to reflect a wider focus.

However, Brubaker and his counterparts at other Wyoming airports face the harsh reality that smarter marketing is not enough to preserve the level of commercial air service they want to provide. What's more, local business leaders say that if commercial air service declines more than it already has over the past decade, they may not be able to survive.

"Air service is the most important economic development for me," says Mike Wandler, president and owner of L&H Industrial, which manufactures machinery for oil, gas, mining and other industries.

The company is based in Gillette, WY, but has nine other facilities stretching from Alberta, Canada, to Chile. Wandler consequently serves on several boards and committees working to ensure that commercial airlines continue to fly into Gillette, Rock Springs and at least four other small cities in the state. For these communities and hundreds like them nationwide, customer demand is not enough to make commercial air service self-sustaining. Federal and state subsidies have helped keep service in place for more than a decade, but those funds are getting harder to build into budgets, leaving airport managers like Brubaker and entrepreneurs like Wandler searching for solutions.

Shrinking Funds

Recognizing the need for reliable commercial air service, the Wyoming legislature created the Air Service Enhancement Program (ASEP)

in 2004. At the time, Wyoming had the fifth-highest airfares in the country. Many residents drove to neighboring states to take advantage of lower ticket prices, more flight options and increased reliability.

For many years, ASEP was funded at about $3 million annually, with proceeds divided between five airports – Southwest Wyoming Regional (RKS), Sheridan County Airport (SHR), Riverton Regional Airport (RIW), Yellowstone Regional Airport (COD) in Cody and Jackson Hole Airport (JAC). More recently, the legislature reduced funding for ASEP to $1.2 million annually, which has depleted the program's cash cushion.

Money from ASEP is mostly used to fund minimum revenue guarantees—annual contracts with regional carriers that each airport negotiates separately. Currently, four carriers service airports in Casper, Cheyenne, Gillette, Rock Springs, Riverton, Laramie, Cody and Sheridan—all with their own schedules.

"In fiscal year 2018, we have enough money to support the program at the current level," says Amy Surdam, aeronautics administrator for the Wyoming Department of Transportation (WYDOT). "On July 1, 2019, we will only have $1.2 million to give out. At that point, we won't be able to help our communities at the level we've been helping them, and we don't know if they will be able to help themselves retain air service."

AMY SURDAM

Because the airports in Cody and Jackson Hole draw heavy traffic for tourism, they are more self-sustaining, Surdam notes. The three remaining airports will be left to fight for funding that is only enough for a single airport. "We think there is a huge risk of losing commercial air service in two of our communities unless we do something different," she says.

New Twist to Existing Formula

In June, WYDOT formed a taskforce to review the funding problem and propose potential solutions. It settled on a plan to use capacity purchase agreements, which call for the state to contract with airlines for regular service to Wyoming airports. The format is currently used by large airlines such as United to contract with smaller carriers including GoJet for regional air service, but it has never been used by a state or federal entity.

Under the plan, the state would secure a long-term contract (10 years is suggested most often) with a single regional carrier that would serve all of the affected airports. That way, each airport would no longer need to negotiate annually with several different regional carriers. The proposal calls for funding the plan with $15 million to secure the long-term air service contract.

WYDOT Director Bill Panos uses a local analogy to explain the idea: If there were five ranches in Wyoming buying cattle feed from five different companies, it

would make more sense for all of them to buy feed from the same company for a bulk price and have more of a say about the quality.

"No state has done it this way [for air service]," Surdam notes. "We're trying to be proactive and creative to help our economy."

Legislative Approval Needed

The plan has widespread support from business leaders and elected officials statewide, but must be approved by the Wyoming Legislature, which meets for just 20 days beginning in February to approve a budget. The goal is to gain legislative approval and implement the plan on July 1, 2019—the same day the state will no longer be able to fully fund the ASEP program.

Even though several elected officials publically support the proposal and it is included in one of the governor's key economic plans, proponents say legislative approval is still not a slam-dunk. In 2016, Wyoming Governor Matt Mead announced an initiative to coordinate and expand statewide efforts to diversify Wyoming's economy. The initiative, known as Economically Needed Diversity Options for Wyoming (ENDOW), identifies efforts to secure reliable and affordable commercial air service across the state as a top priority for long-term economic growth; and ENDOW endorses the proposed capacity purchase agreements plan.

Supporters of the plan point to a WYDOT-funded 2016 economic impact study that shows every dollar of state funds invested into commercial air service returned $24 in direct or indirect economic benefits. Without the airports in Cody and Jackson Hole, which skew revenue results due to high-spending tourists, the return on investment for air service development across the rest of the state remains a respectable $7.71 per every dollar spent.

The Business Factor

Surdam considers support from the business sector critical to winning legislative approval, and business leaders are, indeed, helping push for approval. "What's going to make a difference to our legislature is having our businesses say, 'This matters to me. This is 20 jobs that I want to keep in the state; but if you can't give me commercial air service, I can't keep them here.' All of the data in the world won't make as much difference as someone saying, 'I have to get to the Mayo Clinic and if I can't do that, I have to move.'"

The current pilot shortage and stronger profit incentive for routes in and out of larger cities make it challenging for airlines to continue serving small cities. Also, as commercial airlines begin phasing out smaller jets that serve many Wyoming airports in favor of aircraft with 70 or more seats, it will become more difficult to

continue attracting carriers to the state. Without creative solutions like the proposed capacity purchase agreement plan, Wandler and other business leaders expect things to get worse, not better.

Flying national and global clients in and out of Gillette is critical to securing contracts for L&H, notes Wandler. Although the company is getting by with the three daily round-trip flights currently offered between Denver and Gillette, he would like to have connections to at least one other city. He also fears a bidding war will break out between small cities when air service gets tighter, and he doesn't feel Wyoming communities are in position to win that battle.

"Half of small-town America is going to lose commercial code-share air service. Wyoming is the smallest of that half," he explains. "If we don't do something interesting, different and aggressive, we're assured of losing it. I liken it to when the interstates came through or when the railroads were built. If your town didn't have the interstate or a railroad stop, it dried up and blew away. This is the same thing. The towns that don't end up with commercial code-share air service are going to be irrelevant, and you're going to see people start moving to the towns that do have it."

Surdam and others note that maintaining commercial air service in Wyoming communities is about more than keeping businesses profitable. Connections to hospitals and treatment facilities in other states are critical for cancer patients and other residents who are seriously ill.

Ron Wild is president of the Uinta Cancer Care Foundation, a nonprofit organization based in Evanston, WY, that helps connect cancer patients and their families with proper care. Sometimes that means flying from southwest Wyoming to the Mayo Clinic in Minneapolis or other treatment facilities around the country. As such, Wild works closely with Brubaker to improve—or at least maintain—commercial air service in and out of RKS. "Improving service would be great. Not having it at all would be catastrophic," he says.

Brubaker acknowledges that rural cities around the country are grappling with the same challenges as cities like Rock Springs and Gillette in Wyoming. "It's encouraging to know we're thinking outside the box, but we're not getting too crazy," he remarks. "Wyoming was a leader in 2004 when the ASEP was started. Here we are looking at being innovative and creative once again. You don't find very many states where you can go to all four corners and everyone is working toward a common goal. That's impressive and I'm glad to be part of it."

St. Clair Regional Closes Up Shop After 10-Year Struggle

BY ROBERT NORDSTROM

FACTS&FIGURES

Project: Airport Closure

Location: St. Clair (MO) Regional Airport

Closing Date: Nov. 17, 2017

Duration of Process: About 10 yrs.

Consultant: QED Airport & Aviation Consultants

Funds Reimbursed: Approx. $540,000 (not including closing & other costs) to state Dept. of Transportation

Of Interest: City officials enlisted multiple congressional reps to help cut through bureaucratic red tape; closure proposal was initially included in a federal transportation bill that failed to pass; President Obama ultimately signed standalone bill in 2014; airport closed about 3 yrs later

Building and opening a new airport is no easy task—that goes without saying. As it turns out, closing one may not be any easier. Just ask the folks in St. Clair, MO.

After a decade of convening meetings, cutting through reams of red tape and jumping through an obstacle course of bureaucratic hoops, city leaders were finally given the go-ahead to paint Xs on the airport's 3,200-foot runway and close up shop on Nov. 17.

"It's been a long road, and it's definitely not been easy," reflects City Administrator Travis Dierker. "When the process began around 10 years ago, city officials started by contacting the FAA Central Region office and asking a simple question: 'What's it going to take to close the airport?'"

While the question may have been simple, the response was anything but. FAA personnel indicated that the agency was "not in the business of closing airports," and city officials began a long and circuitous process.

TRAVIS DIERKER

"It became obvious that we were going to need some assistance," Dierker recalls.

Why Close?

After opening in 1964, St. Clair Regional (K39) flourished as a general aviation airport, he explains. For a while there was enough traffic from local businesspeople to support a fixed-base operator, and at one point in the 1980s, the facility boasted over 20 hangars.

Over the years, the city received a variety of federal and state grants to maintain and improve the airport infrastructure. In 2002, for instance, it used FAA grant monies to purchase an additional eight acres of land, which increased the property size to 79 acres. A few years later, the city received Missouri highway and block grants to lengthen its 2,600-foot runway to 3,200 feet.

But all was not well at the airport. Over time, the public showed less and less interest in the airfield. Eventually, the fixed-base operator left and hangars fell into disrepair. In the late 1990s, it began costing the city $30,000 to $50,000 a year to maintain the airport, notes Dierker.


RON BLUM

In 2006, Mayor Ron Blum ran for office, largely on a platform of exploring ways to improve the local economy. The airport was one of the most prominent assets he pledged to investigate. In 2009, a city report concluded that the airport was costing taxpayers too much money while benefiting only a handful of residents. As a result, preliminary steps were taken to repurpose the city asset.

The airport's location—at the heavily trafficked intersection of Missouri Highway 47 and Interstate 44, with the famed old Route 66 running alongside the property—makes the land valuable for retail and other development that could expand the local tax base. In 2009, the city's board of aldermen approved a measure to include the airport land in a Tax Increment Financing District. This public financing method allows municipalities to use future gains in taxes to finance current improvements, which theoretically will create the conditions for those future gains.

Making the Case

Local officials felt that closing St. Clair Regional would not inconvenience the public because there are four other general aviation airports in the area, two of which are only a 30-minute drive away.

The airport officially closed in mid-November.

In late 2010, the city hired QED Airport and Aviation Consultants to research the situation and lead the way toward closing its airport.


RONALD PRICE

QED found that combined, the five area airports regularly served 121 aircraft, primarily general aviation planes, and fully 60% were based at two airports. "This put St. Clair in the position of competing for 40% of the remaining aircraft," notes company principal Ronald Price. "That's not a lot to go around. Further, neither St. Clair Regional nor its competing airports were financially self-sustaining."

Moreover, nearby airports offer fuel, fixed-base operator facilities and key services not available at St. Clair Regional. QED's research validated the city officials' position and concluded that closing the airport would present "a net benefit to civil aviation and would be in the best interests of the U.S. Civil Aviation System—a key factor that must be demonstrated for closure to be granted," notes Price.

He outlined the firm's findings in a comprehensive document that was sent to the Missouri Department of Transportation (MODOT) and the FAA Central Region. The Central Region office referred the matter to FAA headquarters in Washington, D.C.

In March 2012, city officials, Price, Missouri Congressman Blaine Luetkemeyer and a representative from Senator Clair McCaskill's office met with FAA's Associate Administrator for Airports and the head of FAA's Compliance Division for Airports. Price describes the posture of the FAA representatives as rather curt. "They asked, 'Why are you here; didn't you read your grant obligations? Why are we having this meeting?' They would not make a decision," he recalls.

The airport's grant obligations proved to be a particular sticking point. Even though the city had refused all FAA grants since 2006, earlier grants for capital improvements obligated the airport for 20 years after receiving the associated funds. Moreover, a 2002 grant to purchase additional land obligated the airport for perpetuity because land does not depreciate. "Perpetuity is a long way out," Price quips.

In 2012, Senators McCaskill and Blount helped get a closure proposal attached to the more encompassing federal transportation bill. But the larger bill died later the same year.

In March 2013, MODOT wrote a letter stating that it did not oppose the closure provided it was consistent with FAA closure requirements. Nevertheless, the FAA would not make a decision. "Primarily, I think they did not wish to open Pandora's Box whereby they might have other airports making a similar request," Price remarks.

At that point, the city worked with Senators McCaskill and Blount, as well as Congressman Luetkemeyer, to draft a standalone bill for closure. Senate Bill 2759 was filed in July 2014, and was passed unanimously by the Senate and House in early December. President Obama signed Public Law 113-285 on Dec. 18, 2014, to permit closure of the airport.

Done deal, one might think. Get out the spray paint to mark Xs on the runway. In the end, it took nearly three more years to close the airport.

Making it Happen

In May 2015, city officials and Price held a conference call with FAA to identify the specific steps needed for final closure. An official document had to be updated to show the owners of the property, property boundaries and how the property would be transferred. The airport land had to be appraised, and the city and MODOT had to agree on items that would be salvaged and subsequently transferred to the state agency's possession. Details on how the closing would occur and how much money would be reimbursed to MODOT, which administers FAA grant funds for distribution among the state's general aviation airports, were also determined.

As another part of the closure process, the airport land had to meet requirements outlined in the National Environmental Policy Act of 1969. An environmental assessment was completed in 2015/2016 to evaluate the property for wetlands, artifacts, endangered species, hazardous waste, etc.; and the FAA subsequently issued a finding of no significant environmental impact.

Although the city used grant money to purchase eight acres of land in 2002, the FAA required the city to reimburse MODOT for the appraised value of all 79 acres of airport property. The FAA calculated the unamortized value of the outstanding grants, some of which had expired after 20 years and no longer had to be repaid. The city also had to return all the money it held in its airport accounts.

After closing and other costs were deducted from the total, the city reimbursed about $540,000 to MODOT.

Future of GA Airports

Not surprisingly, Dierker and Price characterize closing St. Clair Regional as a long and arduous process. "It really helped to have someone with airport expertise to lead the way," Dierker reflects. "You have to maintain a cooperative approach with the FAA because closing an airport is, for the most part, new for them, too. In short, it requires a lot of patience."

"The FAA wasn't happy about closing an airport," Price adds. "In fact, the St. Clair closure is the first effort to close a federally obligated airport in many years."

That said, he feels the story needs to be told and the process explained because other general aviation airports around the country may soon face the same situation. With FAA projections regarding the population of active general aviation pilots remaining flat until the year 2036, airports will be competing for the same number of customers—about 200,000, he explains. "FAA rules for general aviation airports were promulgated in the 1960s when general aviation was growing. Today it's a mature industry, and FAA rules governing general aviation airports have not kept pace with changes."

Price also cites results from a 2011 FAA study that analyzed the nearly 3,000 general aviation airports, heliports and seaplane bases in its National Plan of Integrated Airport Systems (NPIAS). The study, *General Aviation Airports: A National Asset*, identified close to 500 airports that didn't have any substantial reason to be in the system, Price informs.

The agency's 2014 follow-up study titled *Asset 2: In-Depth Review of the 497 Unclassified Airports* narrowed the number of airports with "no clearly defined federal role" down to 281. That group included 227 publicly owned airports with little-to-no activity, 19 privately owned relievers that do not meet minimum activity levels for continued designation as relievers and 35 airports that do not meet the statutory requirements for inclusion in the NPIAS because they are privately owned general aviation airports.

"I believe the FAA is beginning to realize that it can no longer continue to fund the system of general aviation airports as it exists today, especially given the fact that 281 of them do not fill the national role they were intended to fill," says Price. "Congress does not provide enough money to satisfy the demands of the system. The success at St. Clair can serve as a model for other grant-obligated airport owners contemplating the closure and repurposing of the land resource to a higher and better use. The process can be shortened now that St. Clair has broken the ice."

While the larger jury may still be out regarding the future of other general aviation airports, St. Clair city officials are celebrating the closure of their once-prosperous facility.

"We're beginning to work with developers to come up with a plan of attack to attract major development to the community and increase our tax base," reports Dierker. "We've had conversations with developers over the years, but we were never able to determine how long this process would take. Now it's time to kick things into high gear."

Can American Airports Continue to Soar?

Promising growth of global tourism and passenger volume has allowed U.S. airports to fly high. But how long can it last? Amid threats of disruption from rapidly changing consumer trends, operators may need to adapt their models and reinforce their competitive positions.

MAR BELTRAN

Mar Beltran is the senior director, infrastructure sector lead for Europe, the Middle East and Africa at S&P Global Ratings. She previously worked at Australia-based Global Infrastructure Hub, where she led policy work to identify reforms in infrastructure markets. Beltran has also advised governments in both developed and emerging markets on governance, regulatory frameworks, planning and delivery of infrastructure projects..

While increasing passenger volume on low-cost carriers (LCCs) is boosting airport revenues from parking and food/beverage concessions, operators are simultaneously discounting aeronautical charges and posting less retail sales. Such yields have suffered two years of lackluster growth.

Furthermore, there are additional challenges ahead: The industry can expect a raft of disruptive forces from ride-hailing apps and online shopping outlets, which could cannibalize parking and commercial revenues, respectively. Further down the line, electric and autonomous vehicles could markedly change airports' business models. That said, industry disruptions also bring substantial growth opportunities. And this should encourage airport operators to find ways to future-proof their business models.

LLCs & Aeronautical Revenue

Airport performance has generally trended upward for the past 30 years, thanks to increasing passenger volumes. What's more, annual growth in North America's passenger traffic should remain level. Data from the International Civil Aviation Organization show that North American airlines' international revenue passenger kilometers increased by 4.3% in the first half of 2017—up from 2.1% in 2016. This could secure airports stable returns for the next 24 months.

Benefiting from lower fuel prices, U.S. airlines have increased passenger volumes via the LCC model. In America, LCCs represent almost 30% of the total domestic market, with four airlines controlling 83% of domestic capacity. An ultra-LCC class is even expanding: The likes of Spirit Airlines serve over 59 destinations in the U.S., Caribbean and Latin America. We believe these LCCs and ultra-LCCs could provide carrier diversity in certain markets, but they are unlikely to influence airport credit quality. To date, increased network carrier concentration has not negatively affected airport credit ratings.

Yet, with airline charges falling to accommodate this lower-cost market, aeronautical revenues are trending downward, too—creating concerns regarding airports' longer-term revenue forecasts. The Airports Council International reports that last year, average per passenger revenues fell to $20, from $21.22 in 2014. Further, it found that the average revenue split remained stable at 60% aeronautical/40% commercial—implying that the decrease in growth is happening for both commercial and aviation revenues.

Risks & Opportunities

Pressure on commercial operations is on two fronts: retail and ground transportation. First, the consumer shift toward online shopping is largely responsible for the decline in global duty-free and travel retail sales—which contracted in 2015 and flattened in 2016, despite buoyant tourism figures.

Secondly, consumer behavior regarding ground transportation appears to be evolving, too. Today, parking and ground transportation fees (including applicable taxi, bus and car rental operators) represent 41% of non-aeronautical revenues for U.S. airports, with origin and destination airports seeing higher parking revenue per passenger ($6.50) than hub airports ($3.60). Car rentals, meanwhile, account for 19% of non-aeronautical revenues. Thanks to initiatives to improve concession yields, we anticipate non-aeronautical revenues to grow more or less in line with passenger traffic. These revenue streams may not be secure in the longer term, however.

For airport drop-offs, more passengers are using ride-hailing apps, such as UberX and GoCar, instead of taxis or their own vehicles. The potential

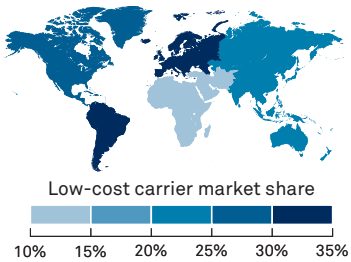
Air traffic

4.3%

Year-on-year growth in North American air traffic from 2015 to 2017, up from **2.7% in 2014.**

29%

Low-cost carriers (LCC) share of the North American short haul market



North American airport revenues

Aeronautical revenues
landing fees & terminal rentals

54%

46%

Non-aeronautical revenues
parking and concessions

41%

Proportion of **commercial revenues** that come from parking and ground transportation fees

Average parking revenue per passenger

Origin and destination airports **$6.50** versus Hub airports **$3.60**

Global airport revenues

$1.22

Fall in global airport revenue per passenger from 2014 ($21.22) to 2017 ($20)

2

Years of lackluster growth for global duty free and travel retail yields

ramifications are clear: Increased use of ride-hailing apps could threaten airport ground access revenues, forcing operators to provide cheaper car parking options and/or dedicated waiting areas, where drivers hailed via apps can pick up passengers.

In the longer term, operators will face a dilemma: With commercial revenues falling, aeronautical tariffs will need to rise. Again, disruption brings with it a host of revenue-generating opportunities. In retail, for instance, revenues in the food/beverage sector and recreational services remain robust.

Then there are openings for the early movers on electric and autonomous vehicles. Although investments in electric charge points and adaptation will be required, technologies such as assisted parking could optimize asset utilization of parking garages.

While operators are delivering returns for the time being, the future could be awash with disruptive factors that require attention. How U.S. airports position themselves ahead of these challenges and opportunities will be crucial to remaining profitable. By boasting a diverse range of airlines and high capacity levels—alongside favorable regulatory conditions and a willingness to embrace consumer changes—they can continue to thrive.

Graph Sources: S&P Global Ratings, Airports Council International, Aviasolutions, International Air Traffic Association.

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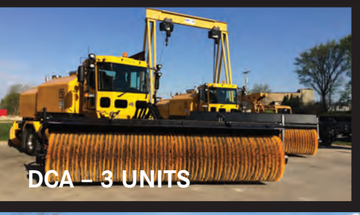
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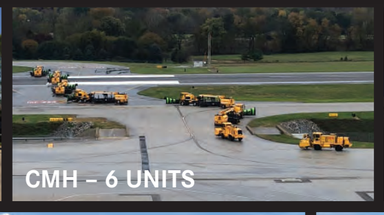
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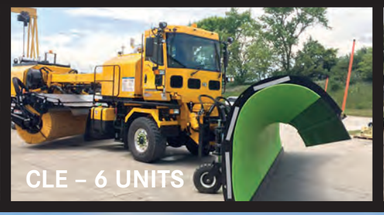
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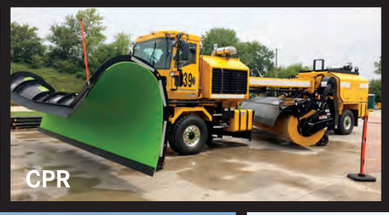
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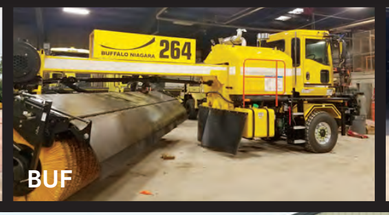

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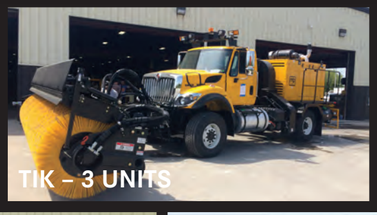
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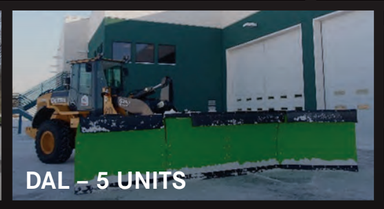
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DAL


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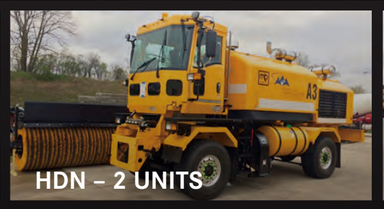
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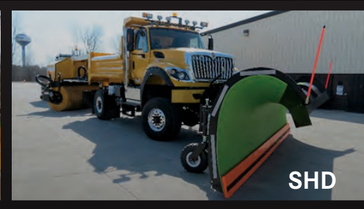
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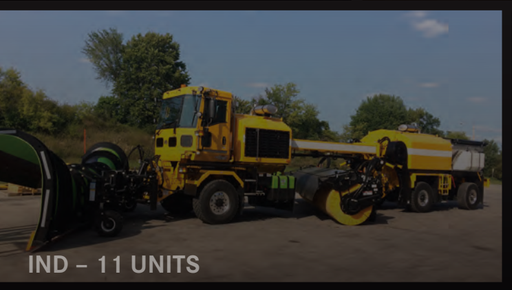
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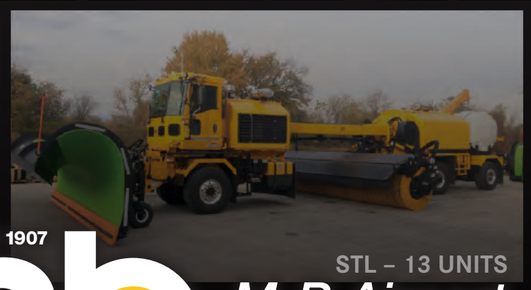
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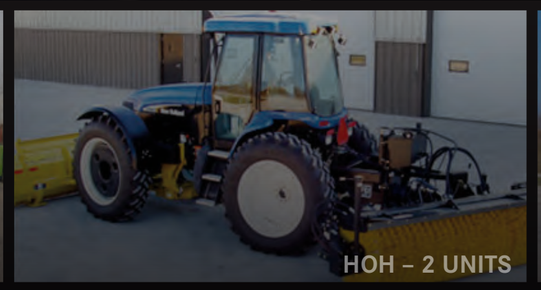
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