

Smooth Connection

The new PHX Sky Train® enhances customer experience at America's friendliest airport

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For Phoenix Sky Harbor International Airport (PHX), one of the 10 busiest airports in the U.S., projected growth had the potential to stand in the way of both airport operations and happy customers. After all, no traveler wants to face gridlock on the way to catch a flight.

Already challenged with traffic congestion, the airport's existing landside transportation system would not be able to handle its future ground transportation needs. On a typical day, PHX accommodates 1,200 aircraft, 100,000 passengers, and 800 tons of cargo. "Projections indicated that future growth would bring significant traffic congestion

to our roadways. It was important to evaluate our options in a timely manner and make improvements to accommodate Sky Harbor's future customers," said Judy Ross, Phoenix Deputy Aviation Director for Planning and Environmental.

Evaluating the options

The city had envisioned a transit system to connect its key facilities since the development of Terminal 4 more than 20 years ago. However, a study was needed to examine the factors surrounding the decision to move forward. Gannett Fleming was engaged to conduct a landside transportation planning study.

"The study looked at city and airport needs, explored how growth would impact daily operations, and suggested ways to improve capacity. Without a doubt, the roadway and terminal curb system was quickly reaching its limits. To sustain airport growth, a secondary ground transportation system was imperative," said Mark Pilwallis, P.E., Gannett Fleming's senior project manager for the PHX Sky Train®, who is based in the firm's Phoenix, Arizona, office.

Concurrently, transit systems consultant Lea+Elliott conducted a lifecycle cost analysis, looking at options ranging from expanding roadways and adding bus services to building an automated people mover (APM) system.

The elevated people mover system weaves seamlessly through the airport's 3,000-acre grounds. (Photography by © Bob Perzel)



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Despite the large upfront capital investment, the APM was the most cost-effective option when considering overall lifecycle costs. This option provided an opportunity to run the system seamlessly through the landlocked, 3,000 acres of airfields, terminals, and roadways. Ultimately, the APM would transform ground transportation at PHX and create a world-class level of service and convenience for passengers.

Multimodal experience

Designed by Gannett Fleming and HOK, the initial 1.92-mile-long PHX Sky Train segment includes three elevated passenger stations and links the Phoenix region's 44th Street Valley Metro light rail station with the airport's economy parking area and the 88-gate Terminal 4. The system was opened to the public in April 2013.

Going over, instead of under, existing infrastructure created flexibility and led to one challenge that had never been tackled anywhere in the world. To provide an optimal alignment into the Terminal 4 Station, the guideway crosses over Taxiway Romeo (Taxiway R).

First in the world

While the team first considered going under the taxiway, a complex underground environment of utilities and adjacent facilities meant that the underground option would be disruptive and costly. In addition, locations for the Terminal 4 Station were limited. Plans were underway for the station to be elevated.

“Going above Taxiway R would result in the right geometry, allowing for a clean connection for Terminal 4

passengers,” noted Pilwallis. “Once we made the decision to go up, as opposed to under, we had to approach the Federal Aviation Administration [FAA].” The team worked for six months to develop acceptable design criteria, involving the FAA, control tower personnel, and airline representatives in the process.

“With the appropriate approvals in hand, the main challenge became creating a design that could be built in this congested environment,” Pilwallis said. The team used cast-in-place concrete to eliminate the logistical challenges of moving large precast segments to the site and developing a large staging area for the segments.

Ultimately, a 340-foot-long bridge was designed with a vertical clearance height of more than 75 feet—tall

enough for a Boeing 747 to pass underneath!

Vision takes flight

Today, the award-winning automated PHX Sky Train operates 24 hours a day, arriving at stations approximately every three minutes during peak periods, and delivering passengers to their destinations within five minutes of boarding. The layout and operation of the system is designed to be intuitive and easy to use.

With goals for sustainability and long-term flexibility, the electrically-powered, automated PHX Sky Train encourages patrons to utilize alternative transportation by connecting Terminal 4 to Valley Metro light rail and Valley Metro buses. It is expected to reduce the airport's greenhouse gas emissions by nearly 6,000 tons per year, and the three stations will use 30 percent less power than established normal baselines. The project is LEED® Gold certified by the U.S. Green Building Council, making it the only LEED-certified public transportation campus in the world.

“We alleviated roadway congestion while enhancing customer service,” Pilwallis said. “The team’s sustainable design solution positions Sky Harbor for success. Roadway and curbside congestion is alleviated, passengers experience easier connections to the surrounding community, and green building features exemplify the airport’s commitment to the environment,” he added.

All aboard to Terminal 3

An extension of the PHX Sky Train went into service in December 2014, just prior to the busy holiday season and the Arizona-hosted Super Bowl XLIX. This phase added a .7-mile section of guideway and a single



The development of the PHX Sky Train required several unique design features, including the world's first transit bridge over an active taxiway.

station serving Terminal 3 with a walkway to Terminal 2, meaning all airport terminals are served by the automated train. With this extension, all inter-terminal connection buses were eliminated, providing further roadway and curbside congestion relief. A future phase of the PHX Sky Train program will add an additional 2.5 miles of guideway and connect to the rental car center. The full PHX Sky Train system will create a modern and efficient transportation system capable of serving the needs of the airport, its passengers, and the local community far into the future.

Interested in learning more? Check out the “Achieving New Heights at Phoenix Sky Harbor International Airport” session during the 2015 APWA International Public Works Congress & Exposition. The session takes place on Sunday, Aug. 30, at 3:00 p.m.

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PHX Sky Train Fast Facts

- 13,000 average daily passengers
- 24/7 service, 365 days a year
- Free to the public
- Opened in April 2013

Teamwork!

The overall program delivery required partnerships with multiple contractors and suppliers to support the development of the extensive enhancements at PHX. On Phase 1, Hensel Phelps served as the facilities construction manager and was supported by numerous subcontractors. For the new PHX Sky Train Maintenance & Storage Building and supporting system infrastructure, the Weitz Company served as general contractor for Bombardier, the train supplier. For Phase 1A, McCarthy Kiewit Joint Venture, a joint venture of McCarthy Building Companies, Inc., and Kiewit Infrastructure West Co., served as facilities construction manager and were supported by numerous subcontractors.

