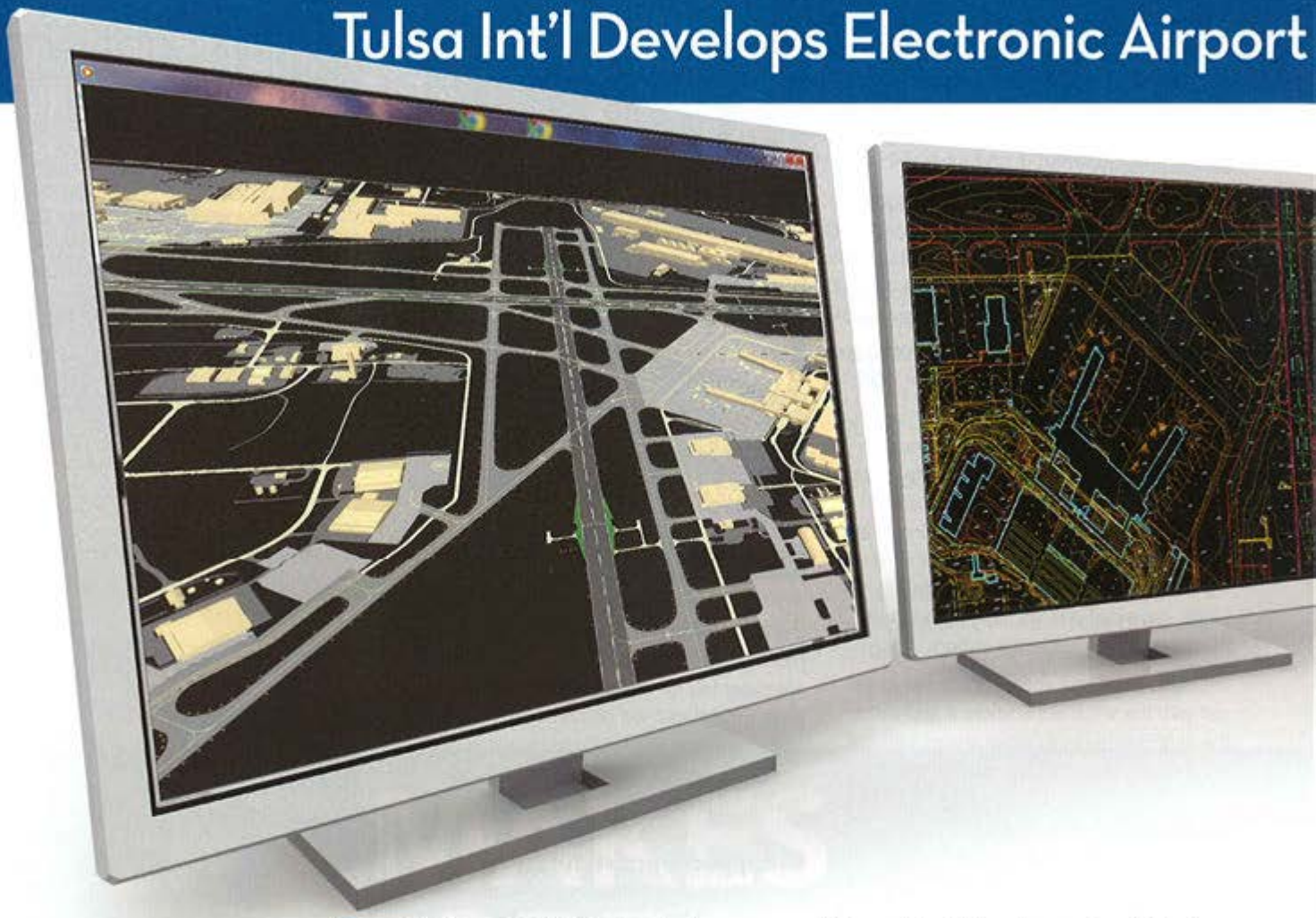
Tulsa Int'l Develops Electronic Airport



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Project: Geographic Information System Database Mapping and Electronic Airport Layout Plan

Location: Tulsa (OK) Int'l Airport

Cost: $633,000

Funding: Airport Improvement Program (95%); local match (5%)

System Design & Implementation: Woolpert

Surveying & Data Collection: Atkins North America

Surveying: Nickle & Associates

Obstruction Analysis: Planning Technology

Aerial Photography: Global Data Aviation

Data Conversion: Montgomery Consulting Group

Pertinent Advisory Circulars: AC-150-/5300-16A, -17B, -18B

Of Note: One of the first U.S. airports to include 3D roofline displays in its eALP

FAA-mandated database mapping and electronic airport layout plan (eALP) standards are ramping up for all federally funded airports throughout the country. Under these requirements, physical airport features are collected in the geographic information system (GIS) format, then submitted to Airports GIS through the FAA's web portal. eALPs can then be assembled from the data.

The FAA Southwest Region took the lead in implementing these data standards in 2009, funding six of eight airports in the first phase of the GIS Data Collection Pilot. In 2010, Tulsa International Airport (TUL) in Oklahoma was selected as one of the 28 airports for the second phase of the program.

"We were looking for a diverse range of airports in terms of sophistication and complexity," explains Thomas Wade, former senior airport planner for the FAA Southwest Region Office of Airports and nationwide GIS field deployment lead. "Growing our knowledge base was an important goal ... We wanted to deploy this program carefully and logically rather than deploy it all at once throughout the country. We were excited that Tulsa showed interest in being part of Phase II. They were very knowledgeable about what GIS could do to improve their planning efforts and organizational efficiency. They hit the ground running."

Thomas **Wade**

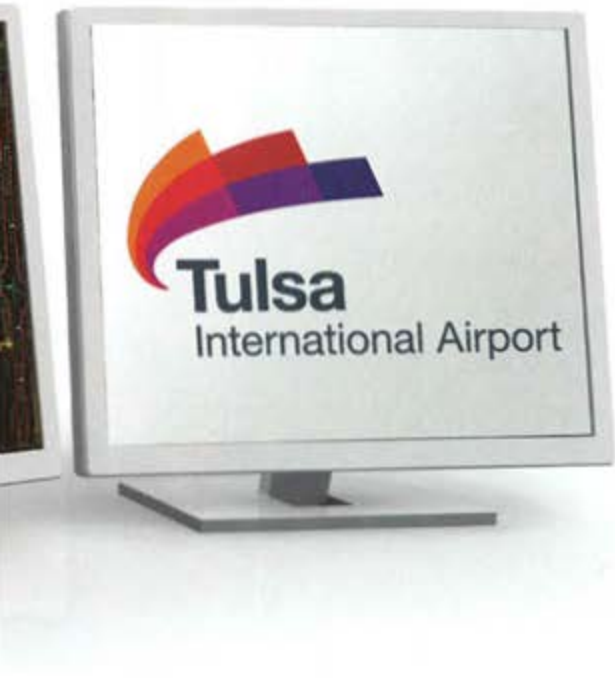
TUL's safety-critical data were evaluated and approved by the National Geodetic Survey in July; the airport expects to receive final deliverables in September. Airport Improvement Program funds covered 95% of the airport's $633,000 project.

Dual-Purpose System

The airport selected Woolpert, a company experienced in geospatial technology, to collect and submit the data, then assemble an FAA-approved eALP. The project included collection and delivery of aerial photography, topographic base mapping, validation of existing geospatial data developed in accordance with Airports GIS

Layout Plan with Extra 3D Features

By Robert **Nordstrom**



standards and conversion of existing airport data. The base mapping included contour planimetric and topographic feature extraction for 2,890 acres and aerial imagery and obstruction analysis for 43,557 acres.

The airport and FAA both use the data, but often for different purposes, notes Mark Ricketson, project director, Aviation Geospacial, Woolpert. Standardized naming and drawing requirements help ensure data is understood across the board.

FAA uses could include line-of-sight analysis for a new air traffic control tower, navigational aides and defining new flight procedures regarding obstacles or obstructions.

"Airport management and staff, on the other hand, use the data for quicker decision making in a variety of day-to-day roles and responsibilities," Ricketson elaborates. "They can pull up a map if they want to know what airline should be parked at what gate or what tenant is leasing space in a cargo facility or where the water lines are located. They might use it for sophisticated things like storm water modeling or determining cost estimates when replacing runway and taxiway lights."


Mark **Ricketson**

Woolpert focused on customizing data collection to the airport's needs, notes Kevin Shirer, the company's project manager. Developing a data set that is robust but wouldn't require a large staff to subsequently maintain it was "interesting and challenging," he reflects.

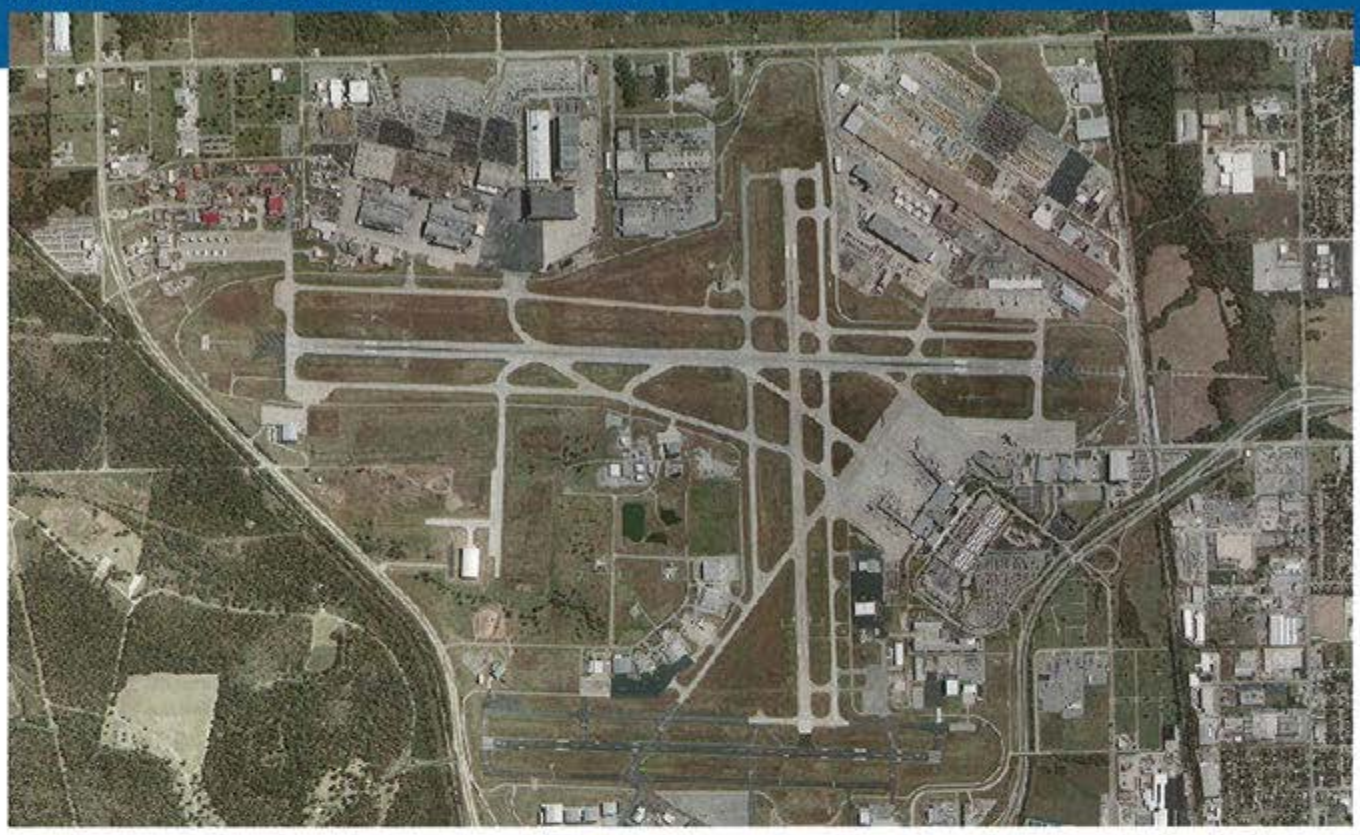
True Believers

TUL hired Engineering Graphics Coordinator Michael Kerr to incorporate its GIS software into all areas of the airport's operations in 1998. "As a staff of one, it was a daunting task," recalls Kerr. After he conducted a basic GIS lease analysis and identified more than $250,000 of potential lease revenue, TUL added another staff member.


Kevin **Shirer**

"With 4,388 acres of land available, if tenants lease land where no one is next to them and their parking lot slowly expands over the years, they may end up using land they are not paying for," Kerr explains. "With long-term leases, that can end up being several acres over a 20-year span. That's lost revenue for the airport. GIS quickly identifies these errors. By overlaying surveys with aerial photography and lease boundaries, you can see what tenants are using and adjust leases accordingly.

Tulsa Int'l benefits from 3D details on its runway and terminal maps.



Michael **Kerr**

"By the same token," he continues, "if a tenant is leasing a parcel but not fully utilizing all of it, we can adjust the lease and make the additional land available for other potential tenants. It's a win-win for the customer and the airport."

GIS data is also expected to help during construction projects. "Currently, some airports have data standards and some do not," Kerr explains. "Engineering consultants have to modify their data standards to the individual airport. With standardization of the data (as required under the new system), that's no longer an issue. It's more efficient for engineering firms, which lowers costs. Also, as we get data from various consultants, we don't have to spend the time converting their data into our system, which saves time and money for the airport."

In addition, TUL uses its GIS data to evaluate environmental concerns — everything from water runoff to flora and fuel spills to tree obstructions, Kerr notes.

No Glasses Needed

With Woolpert's help, TUL pushed the envelope and became one of the first airports in the country to incorporate 3D roofline analysis into its GIS dataset.

"It made perfect sense that if we had the x, y, z value of an item to display it in a 3D model," Kerr explains. "If a roof line has multiple roof heights or pitches, most airports will take the tallest point and display the building as a rectangle. It's a little bit less costly and for pilots it does indicate obstructions.

"But if you're trying to obtain an accurate view from, say, a control tower, the view is not realistic. If the building has a peak, maybe

Work in Progress

Following FAA requirements for collecting and maintaining airport and aeronautical data is key to properly uploading information into the Airports GIS database, emphasize agency officials.

The new processes are designed to meet the demands of the NextGen National Airspace System (NAS), which requires accurate survey information for obtaining and maintaining airport data. The data are used to develop satellite-based approach procedures and to better utilize and manage the NAS.

In Phase II, airports are collecting existing and planned airport data and uploading it on the Airports GIS website for use by the FAA. Each airport will also be able to pull its information from the website to create obstruction charts and to assemble eALPs. The ultimate goal is to integrate multiple versions of the airport data — preliminary, current, planned and temporary — to share with other FAA systems. With the FAA's common aeronautical systems in place, reporting and processing times for airport changes are expected to be dramatically reduced. Currently, they can take up to a year.

"The overall objective of the program is to kick the tires on the software specifications and to learn from the actual test loading of the systems how the process works," explains Thomas Wade, former senior airport planner for the FAA Southwest Region Office of Airports. ■

tower personnel can still see through areas where the roofline slopes downward. Hangars can be over 200 feet long, but the view obstructed for only 20 feet."

TUL has had several tenants whose proposed hangars appeared to block the tower's view based on rectangular representations. Models using 3D roof-lines, however, showed that they wouldn't actually obstruct the view.

"One tenant wanted to put up a new hangar that was ten feet higher than the old one," adds Kerr. "We plugged in the specs for the new hangar and discovered that it would obstruct the tower's view to the end of the runway." GIS data helped determine that moving the building 12 feet to the east would solve the problem.

Under the old system, the airport dispatched crews in a bucket truck to detect potential view obstructions. "It was a very cumbersome and time-consuming process," Kerr recalls. "Now, we know instantly." Analysis that used to take weeks to complete is now completed in days.

Worth the Effort

TUL officials reason that having 3D GIS data improves safety and security, because every element and obstruction on the airport is mapped: buildings, fence lines, airfield entry points, utilities, etc.

Its benefits span many areas, notes Kerr: The legal department uses the data for leases and the airport's noise abatement program; operations uses the system to identify tenants and analyze obstructions and signage; the engineering department uses it during construction.

While most staff members use portions of the data, only a select few have access to information describing baggage screening and TSA equipment, security camera locations, airfield entry points and the location of utilities.

Reflecting on the airport's experience developing a GIS dataset, Kerr emphasizes the need for a "champion" to support the process.

"There has to be strong commitment at the executive level," he reflects. "To realize the full benefits of the system, it has to be implemented enterprise-wide. Information and data needs to be consolidated and standardized across departments for the airport to realize a proper return on investment. If data are reserved for the engineering or planning departments only, the full benefits of the system will not be achieved."

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