



Mobile Mapping Maximizes Efficiency of Pavement Program at Houston Intercontinental

By Nicole Nelson

To better define future pavement needs and to establish more effective asset management strategies, the Houston Airport System recently completed an assessment of 100% of the runways and taxiways at three locations: George Bush Intercontinental Airport, William P. Hobby Airport and Ellington Airport.

At George Bush Intercontinental (IAH), the project team opted to go mobile, and use Light Detection and Ranging (LiDAR) technology rather than traditional, manual site inspection. LiDAR harnesses the fundamental properties of laser light to perform precise detection by using mobile instrumentation that emits and detects laser light reflected back to the unit from the objects being documented.

The technology-based approach was used at IAH due to the airport's higher density of aircraft operations and more complex airfield pavement system, explains Robert Barker, CFM, assistant director for Houston Airport

System Asset Management. Cost of the higher-tech strategy was within 10% of manual inspection costs.

The geospatial analysis of airfield pavement LiDAR data on an airport Geographic Information System (GIS) map facilitates accurate assessment of pavement surface conditions, distresses and maintenance requirements, elaborates Barker.

"The digital data and mapping created through the Mobile Mapping System process supports the Houston Airport System's strategies of serving our customers and providing opening day fresh facilities and infrastructure," he relates. "More specifically, the Mobile Mapping System approach facilitates our overall asset management goals of minimizing the total cost of ownership and maximizing effective asset service lives."



Robert Barker

Several considerations prompted Houston Airport System to choose LiDAR technology. The accuracy of airfield pavement distress data was a primary factor, explains Barker. But it was closely followed by the method's data collection speed, which limited the project's impact to ongoing airfield operations.

Working between aircraft operations, crews captured data stretching over 22 million square feet of pavement within a 12-day period. In all, they covered 286 drive-lane miles. Prime consultant Ricondo & Associates led a team that included principal sub-consultant Woolpert and APTEch.

At the Airfield

Runways and taxiways were surveyed using the Woolpert Mobile Mapping System, LiDAR, and digital still image cameras. Woolpert technicians then assessed the imagery data and mapped all visible pavement distresses on workstations following ASTM D5340 standards. Lastly, APTEch crews walked 100% of the runways and taxiways to validate and update the GIS-mapped pavement distresses.

The entire process moved on a very fast track, recalls Woolpert Project Director Kevin Shirer. "We were 'boots on the ground' in January, and we had deliverables all turned in by the 14th of April," he reports.

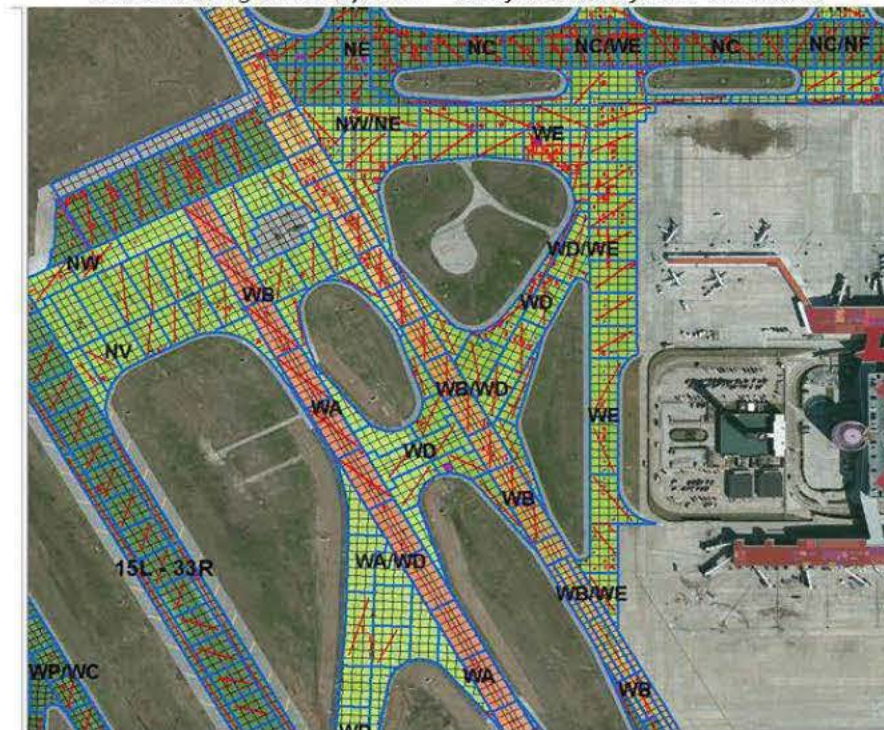


Kevin Shirer

The precise information collected — both distress data and geospatial data — provides an opportunity for IAH to reduce long-term maintenance costs and potentially extend the useful service life of its pavement systems, Barker explains. The Mobile Mapping System data allows the airport system to effectively manage airfield maintenance and renewal requirements on an individual panel and slab basis vs. wholesale rehabilitation or renewal.

"The individual panels of pavement were mapped into GIS using a combination of record drawings and high-resolution aerial photography," Barker explains, noting that panels were validated and corrections were applied from the intensity images from the mobile LiDAR data collection. "Each pavement slab is entered into our Enterprise Asset Management System as an individual asset. The slab actual condition value changes when work orders are issued and repairs are made. A GIS map is color-coded based on the current slab actual condition — reflecting near real-time pavement conditions on a continuing basis."

Houston Airport System – George Bush Intercontinental Airport Asset Management System – Certificated Airfield Pavements



Graphical Depiction – Pavement Condition By Panel and Slab

Data Analysis

Pavement distress data were input into the airport's PAVER™ pavement maintenance management system, where it was used to develop Capital Improvement Programs for pavement replacement with a lifespan of five years or less, Shirer notes. It's also used to determine maintenance and repair cost data in conjunction with cost data appropriate for the region.

The cost and condition data were then used to generate the airport system's Financial Condition Index and Actual Condition Index. Repairs were prioritized into three categories: Priority, to be completed in three years; Near-Term, for completion in four to seven years; and Long-Term, to be completed in eight or more

factsfigures

Project: Digital Data Collection & Airfield Pavement Mapping

Airport: George Bush Intercontinental Airport

Authority: Houston Airport System

Primary Technology: Light Detection & Ranging; Mobile Mapping System Contractors: Ricondo & Associates; Woolpert; APTEch

Integrated Systems: Infor™ Enterprise Asset Management Systems; Geographic Information System; PAVER™

Cost: 1.9 cents/sq. ft. of certificated pavement

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Runways and taxiways at Houston Intercontinental were surveyed using the Woolpert Mobile Mapping System, LiDAR and digital still image cameras.



years. The condition assessment of entire runway/taxiway "systems" were developed as a whole to aid in capital improvement program planning, as well as condition assessment of each individual element and larger pavement sections, which was possible because data were collected for 100% of the pavement.

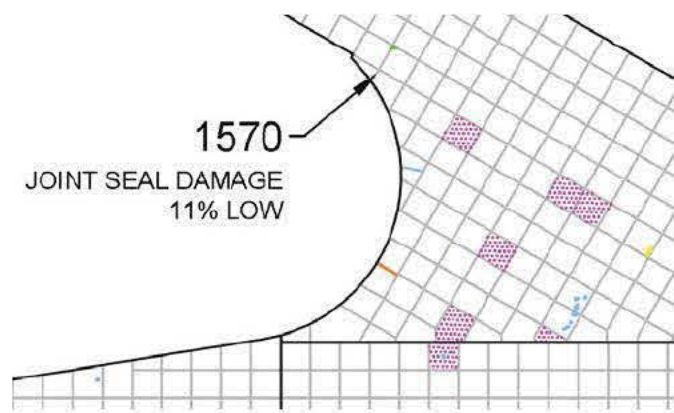
"The system is unique in that it will allow Houston to compare buildings and pavements and roadways all on the same scale," Shirer explains. "It also gives them the ability to determine if the asset is better to be replaced versus maintained from a condition standpoint using the Financial Condition Index."

In addition to providing an integrated platform for airport operations to accurately record day-to-day airfield pavement observations, the Mobile Mapping System data improves Houston Airport System operations and management by providing a seamless integration of data contained in multiple software platforms for specific needs. Accessibility and transparency of asset management data to all system users is achieved through PAVER for capital-level pavement management tasks; the Infor™ Enterprise Asset Management Systems for maintenance tracking and work order management; and the GIS for graphical representation and accessibility of airfield features and related record drawings.

In total, the systems integration was completed in approximately 180 days from start to finish — including data collection via LiDAR and the development of Mobile Mapping System data. Total costs for collecting and integrating the data averaged approximately 1.9 cents per square foot of certificated pavement.

"This cost compares favorably with, and is within 10% of, the pavement assessment cost using traditional 'manual' site inspection approaches," Barker concludes.

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But it's not just about the outside exhibits – there are also a substantial number of industry suppliers, GSE manufacturers and service providers that can be visited within the climate-controlled covered area that comprises over 20,000 square feet of display area.

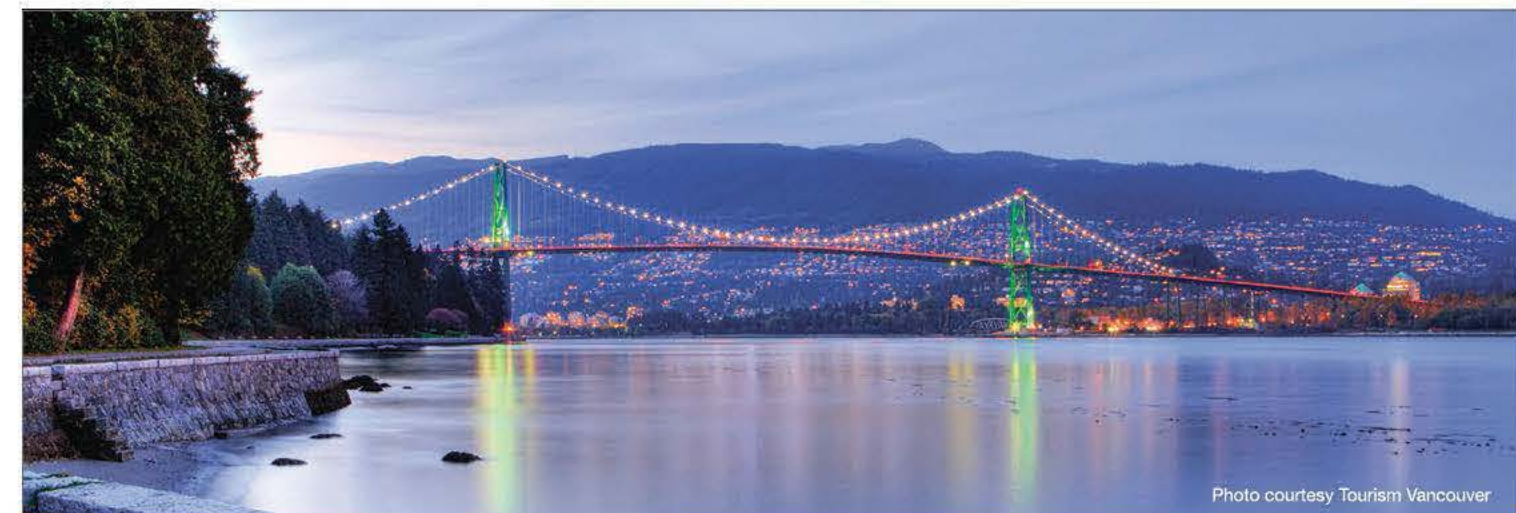


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