Paving the way to better informed installations decisions

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The Air Force Civil Engineer Center's (AFCEC) Geospatial Integration Office (GIO) partners with the AFCEC Airfield Pavement Evaluation (APE) team to integrate Installation airfield pavement evaluation data into a geospatial information workflow; this collaboration provides new perspectives for Air Force Civil Engineering enterprise airfield pavement data visibility. The geospatial information exchange improves accountability for installation pavement assessment.

What is Airfield Pavement Evaluation (APE) data?

Modern Geographic Information System (GIS) technology enables significant improvements for efficient airfield pavement management geospatial information workflows and collaborative solutions for critical pavement issues. AFCEC GIO discovered sparse and outdated pavement data through the geospatial information. This presented several challenges including data variation, attribution loss, and inadequate airfield pavement representation, causing costly disruptions to the pavement evaluation team and Air Force operations.

In January 2021, AFCEC GIO and the APE team began reconciling Air Force pavement data because of the need for improving accuracy, maintenance, and Real Property accounting. Maintaining the link to Real Property ensures that pavement mapping is normalized into Spatial Data Standards for Facilities, Infrastructure, and Environment requirements.

Partnering for Success

The AFCEC APE team provides direct installation support for assessing airfield pavement's structural integrity, pavement condition index (PCI), runway surface friction characteristics, and anchor testing across the Air Force (AF). The APE team conducts comprehensive structural pavement evaluations in 12-year cycles for active-duty AF and AF reserve installations. Supplemental Pavement Condition Index (PCI) surveys are conducted on four-year rotations. These comprehensive structural evaluations and subsequent PCI surveys result in critical engineering assessment (EA) data such as the pavement condition index and foreign object damage (FOD) potential. GIS features provide comprehensive visualization of pavements that improve asset management decisions.

Figure 1 illustrates the hierarchy for segmentation of pavement data and the roles and responsibilities for the APE team. Engineering assessment survey data is divided into mutually exclusive geospatial features. Pavement branch and pavement section overlap but are segmented according to the following business rules.

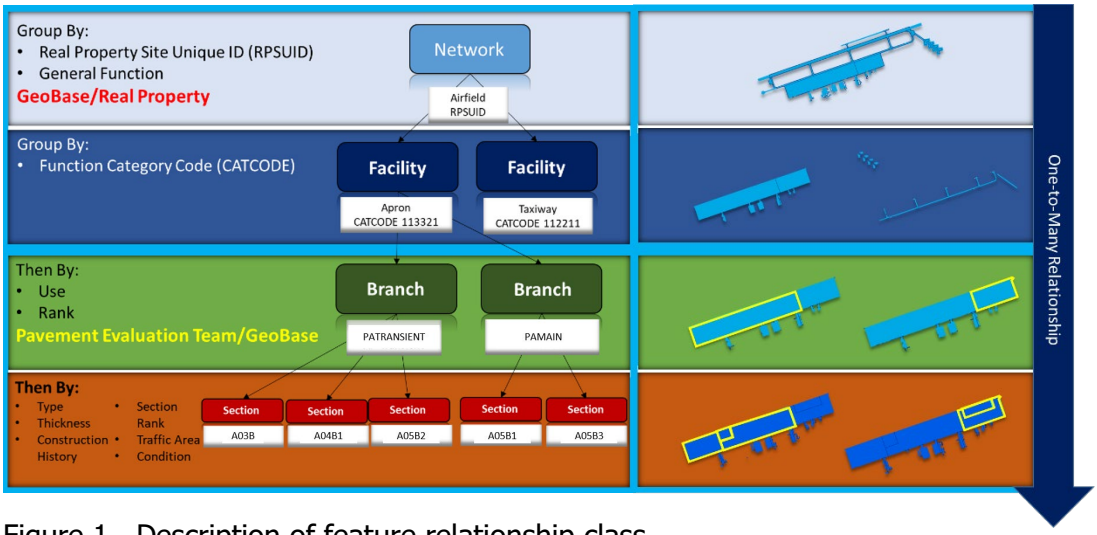

Figure 1. Description of feature relationship class.

Overcoming Enterprise Challenges

In 2021, nine installations had their airfield pavement evaluations completed. The AFCEC GIO performed an initial pavement feature analysis that revealed missing pavement section features at multiple installations and a single pavement branch feature omission. During the examination, most installations had sparsely populated PCI attributes. Due to an absent repository, access to an accurate pavement feature representation was limited—the assessment brought on laborious authentication and effort to bridge the enterprise and pavement data gap.

Approximately 50% of pavement features had sparse and fragmented feature geometry, and 60% were improperly segmented (See Image 1a and 1b).

1a. Improperly segmented and sparse geometry

1b. Integrated AFCEC GIO/PAVER geometry

Enterprise Solutions

Due to limited enterprise access, the AFCEC GIO created an online mapping tool to provide a comprehensive enterprise data review and retrieval solution. The AFCEC GIO created the APE Dashboard to visualize PAVER™ Sustainability Management System (SMS) data sourced by the APE team. This effort promotes the integration of comprehensive PAVER™ SMS data into the AF Enterprise Geospatial Database (EGD). The APE Dashboard provides accessibility to the standardized data for incorporation into the installation EGD across the AF. Establishing the geospatial data repository creates a single point for sharing, obtaining, and visualizing Pavement SMS data from the APE team. Thus, providing installations opportunities to validate authoritative pavement data assets.

The APE Dashboard capability improves data quality (accuracy and completeness), impacting short and long-term airfield pavement investment decisions. Integrating PAVER™ sourced feature attribution ensures that critical pavement material (pavement surface), condition (PCIvalue), Real Property, SMS data keys, and functions are 100% populated in the AF enterprise geospatial database (See Image 3). The represented feature geometry from the APE study, highlighted in images 3 and 4, resolves sparse and inappropriately segmented features, eliminating duplicates and incomplete feature representation.

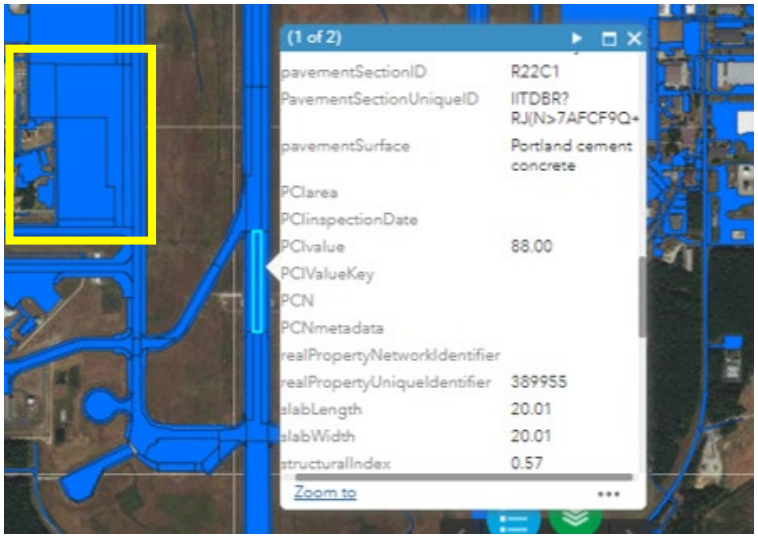

Image 3 (PavementSection_A from APE)

Image 4 (PavmentBranch_A from APE)

Conclusion (Meeting Future Needs)

Across 59 completed installations, the APE initiative increased Real Property road and airfield accuracy by 10% across all USAF and USSF installations.

The APE Dashboard is the first single access point for sharing, obtaining, and visualizing PAVER™ SMS information within an integrated geospatial information gateway. The APE Dashboard streamlines awareness and availability of PAVER™ SMS information within the standardized AF EGD. The Pavement Asset Management Program community and their clients are empowered to leverage accurate, current mission-critical airfield pavement geospatial information supporting AF Infrastructure Investment Strategy (I2S) decisions enables worldwide advanced-generation, multi-domain operations. This partnership invokes practical asset management principles and fiscal stewardship for proactive sustainment, recapitalization, and maintenance of vital Air Force pavement assets. New insights and healthier spatial predictive analysis will revolutionize how installations "pave their way" for future investment decisions.

What's Next?

- In 2022, based on previous study dates of comprehensive internal inspections, together AFCEC GIO and the APE team will continue to move forward with integrated solutions capturing an updated framework for another 11 installations.
- Routine PCI inspections and assessments will continue for seven installations.
- APE goals include verifying that PAVER modifications are audit-ready, aligning with AFCEC and Real Property.

The APE Geoportal Dashboard is available at https://maps.af.mil/geoportal/apps/sites/#/airfieldpavementsevaluation.

For questions and support, contact GeoBase Service Desk at geobasesupport@di2e.net.

(Editor's note: This article was also authored Mr. Roger Clarke (GeoBase Support Manager), James Ray (AFCEC Geospatial Integration Office Contract Support), and contributions by Shaun Moya (AFCEC/COAP).