Research Summary

South Carolina Department of Transportation | Office of Materials and Research

SCDOT Asset Data Collection Assessment

Project Information

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Research Administration

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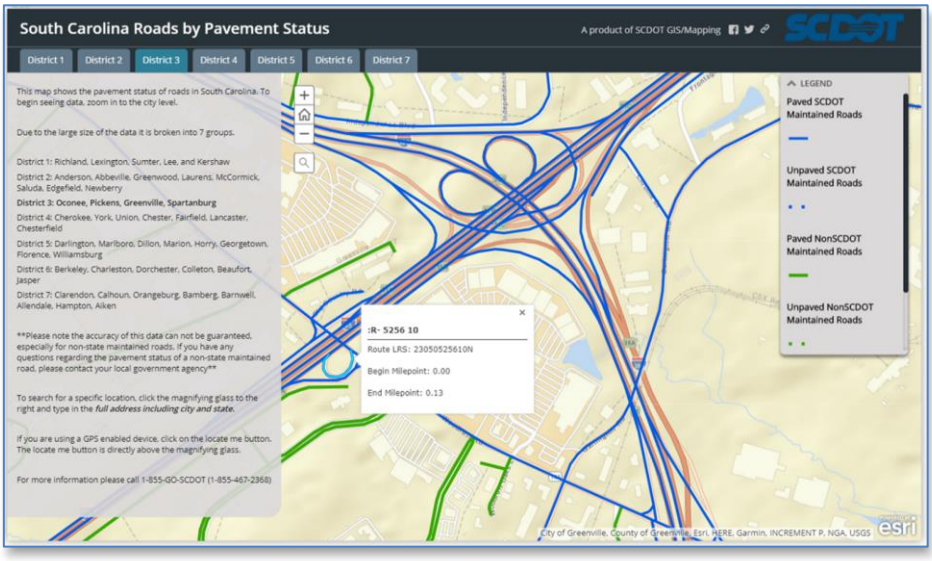
This final report is available online at:

http://www.scdot.scltap.org/projects/completed/

The MAP-21/FAST Act requires state departments of transportation to transition to data driven, performance and outcome-based programming, which has required states across the nation to revisit their data collection and maintenance efforts. This report documents research conducted to ensure that the future SCDOT database specifications and data collection efforts support federal requirements for data-driven performance-based management of transportation facilities, as well as meet the needs of SCDOT in a cost-effective manner.



The SCDOT GIS/Mapping online portal has an ARNOLD compliant basemap and a single uniform LRS that is accepted as a statewide standard

Problem

A large portion of South Carolina Department of Transportation's (SCDOT) current data is stored in the Roadway Information Management System (RIMS). SCDOT, like most states, originally developed their RIMS system to support reporting requirements for the Federal Highway Administration's Highway Performance Monitoring System (HPMS) program. Thus, the individual elements contained in the database do not always meet the needs of alternate users in other departments within the DOT. Over time, other datasets have been merged with RIMS to enable expanded data analytic capabilities including crash information, video log, and traffic counts. In addition to RIMS, SCDOT maintains several databases to support specific business operations such as maintenance (signs and roadside hardware) and traffic operations (signals and ITS equipment). The **overarching goal** of this research is to ensure that the future SCDOT database specifications and data collection efforts support the MAP-21 requirements for data-driven performance-based management of transportation facilities, as well as meet the needs of SCDOT in a cost-effective manner. To achieve this

goal, three specific objectives were established:

Obj 1 – Identify SCDOT state of practice for asset data collection/maintenance.

Obj 2 – Conduct vendor assessment of MLS to seek accuracy and efficiency.

Obj 3 – Provide recommendations for database development and related data collection methods/technologies.

Column Name	Summary	Details	SCDOT Source	Data Type	Allow Nulls	Has Domain	Count of Values	Min	Max
Median_ID	Median Type		RIMS	Integer	NO	YES	75195	0	8

Domain

Code Value	Translation	Details	Freq	% of total
0	Non-divided		65,946	87.68
1	Divided - Earth Median		2,139	2.84
2	Divided - Concrete Median		357	0.47
3	Multi-lane - Bitum Median		6,008	7.99
4	Divided - Raised Concrete & Surfaced Median		69	0.09
5	Divided - Physical Barrier		264	0.35
6	Divided - Cable Stay Guardrail		369	0.49
8	One-way street		43	0.05

MIRE Domain Codes and Translation
1. Undivided
2. Flush paved median (at least 4 ft in width)
3. Raised median
4. Depressed median
5. Two-way left-turn lane
6. Railroad or rapid transit
7. Divided, separate grades without retaining wall
8. Divided, separate grades with retaining wall
9. Other divided

Snapshot of Output from the Database Specification Tool Developed to Assess Several Critical SCDOT Database in Lieu of Data Dictionaries

Research

The review of critical and non-critical data elements from the FHWA Model Inventory of Roadway Elements (MIRE) and SCDOT databases revealed that about 60% (122 of 202) of MIRE data elements were not collected by SCDOT (i.e., gaps). This included a few MIRE Fundamental Data Elements (FDEs), mandated Highway Performance Monitoring System (HPMS) Full Extent Elements (FE), and a considerable number of Highway Safety Manual elements needed for use with SC-specific safety models. Several gaps were identified and listed below:

- SCDOT lacks more than 50% of the database elements required for HSM safety implementation on state roadways. These data elements contain information on Segment Cross Section, Segment Roadside Description, At Grade Intersection/Junctions, and Approach Descriptors (Each Approach).
- The SCDOT databases have about 88% of the MIRE FDE data elements (excluding HOV because there were none in SC).
- MIRE Fundamental Data Elements follow HPMS reporting requirements closely. Unfortunately, the HPMS coverage is biased toward the higher functional classes and only sampled for lower classes. This leaves several gaps for lower functional class roadways.
- Data gaps for primary elements include MIRE and HSM variables related to traffic control, horizontal and vertical alignment. Ramps, ramp volumes, and intersection configuration were the most critical gaps in secondary elements.
- An assessment of Mobile LiDAR System vendors and literature indicate that 70% of the SCDOT gaps in first priority data elements can be collected using LiDAR technology.

Recommendations

Three main recommendations include: 1) Raise the level of importance of data – treat it as an asset, define core principles, and develop a department-wide directive that recognizes the strategic uses of data across all business offices; 2) Implement a tiered approach to data governance, appoint a dedicated data governance coordinator, and promote structured decision-making and active oversight of the Department's data assets; and 3) Undertake a new inventory of roadway attributes using mobile LiDAR technology to replace the data inventoried 30 years ago and develop enterprise-wide plans to capitalize on additional opportunities for MLS point cloud data.

Value & Benefit

This study evaluated data needs within the department and developed recommended data specifications for a state-of-the-art enterprise data system to support the business SCDOT functions as well as meet requirements of federal reporting mandates. The analysis reported here will aid SCDOT in implementation of an asset data system that meets the department's needs without redundancies and maintaining only data elements that have positive cost-benefit for the department. Having a comprehensive roadway inventory with supporting business data will allow the SCDOT to make better decisions faster, and this should translate to improved effectiveness.

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