ASSET MANAGEMENT IN OREGON

ROADWAY SAFETY DATA AND ANALYSIS

CASE STUDY
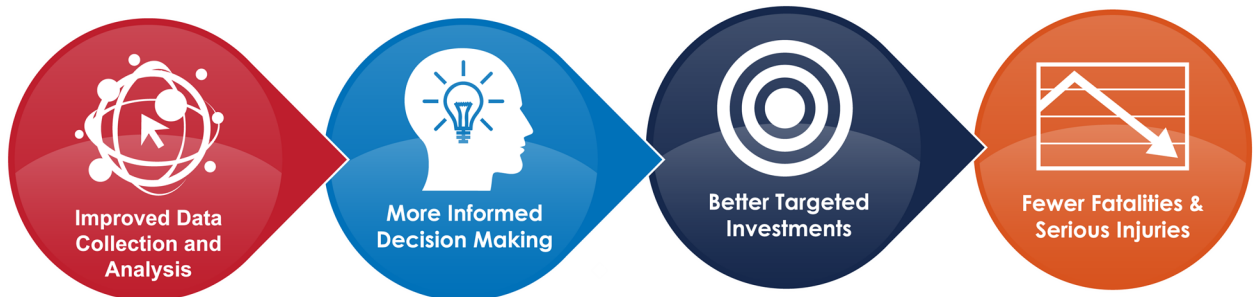## FHWA-SA-16-110

Federal Highway Administration Office of Safety

Roadway Safety Data Program
http://safety.fhwa.dot.gov/rsdp/

Improved Data Collection and Analysis

More Informed Decision Making

Better Targeted Investments

Fewer Fatalities & Serious Injuries

December 12, 2016

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16. Abstract With almost 20,000 lane miles on the Oregon highway system, the Oregon Department of Transportation (ODOT) is responsible for managing and maintaining its roadway assets. Managed assets include barriers, traffic signals, lighting, pavement markings, and signs. ODOT has developed an inventory of its assets and evaluates asset condition in order to efficiently manage maintenance efforts. Over several years, ODOT implemented two new programs to manage their roadway assets, TransInfo and the Features, Attributes, and Conditions – Statewide Transportation Improvement Program (FACS-STIP) Tool. TransInfo is a statewide asset management system. It provides ODOT asset management staff with the most up-to-date statistics on assets and other features on the State highway system. The FACS-STIP Tool is a web-based program that provides information on an asset's location, attributes, and condition to all users with internet access.			

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ACRONYMS

FHWA	Federal Highway Administration
FACS-STIP	Features, Attributes, and Conditions – Statewide Transportation Improvements Program
ODOT	Oregon Department of Transportation

EXECUTIVE SUMMARY

With almost 20,000 lane miles on the Oregon highway system, the Oregon Department of Transportation (ODOT) is responsible for managing and maintaining the roadway assets on the State-maintained roadway system. Managed assets include barriers, traffic signals, lighting, pavement markings, and signs. In order to accomplish this, ODOT has developed an inventory of its assets and evaluates asset condition in order to efficiently manage maintenance efforts. Over several years, ODOT implemented two new programs to manage their roadway assets, TransInfo and the Features, Attributes, and Conditions – Statewide Transportation Improvement Program (FACS-STIP) Tool. TransInfo is a statewide asset management system. It provides ODOT asset management staff with the most up-to-date statistics on assets and other features on the State highway system. The FACS-STIP Tool is a web-based program that provides information on an asset's location, attributes, and condition to all users with internet access.

INTRODUCTION

The Oregon Department of Transportation (ODOT) is responsible for managing and maintaining roadway assets on almost 20,000 lane miles on the State highway system. Managed assets include barriers, traffic signals, lighting, pavement markings, and signs. In order to accomplish this, ODOT has developed an inventory of its assets and evaluates asset condition in order to efficiently manage maintenance efforts. ODOT uses a statewide asset management database and sophisticated spatial data tools to track and manage its roadway assets; TransInfo and the Features, Attributes, and Conditions – Statewide Transportation Improvement Program (FACS-STIP) Tool. Oregon's efforts provide a good example of relationships between spatial data for asset management and spatial data for safety improvement. This case study also describes the benefits related to agency policy setting and data-driven decision-making.

BACKGROUND

ODOT is directly responsible for the State's roadways, transportation system, and transportation program. Before the data consolidations described in this case study, asset owners stored the data in different programs in decentralized locations. As a result, not all ODOT staff could access the data on assets they were not directly responsible for, or even know if the data existed for those other assets. Over several years, ODOT implemented two new programs to manage their roadway assets. The first program, TransInfo, is a statewide asset management system. This program is design for internal ODOT users. It provides ODOT asset management staff with the most up-to-date statistics on assets and other features on the State highway system. It also provides support for other ODOT sections' efforts, including FHWA's Highway Performance Monitoring System submission and the Federal Functional Classification System. The second program is the FACS-STIP Tool. This web-based program provides information on an asset's location, attributes, and condition. This tool uses the ArcGIS Server to create maps for assets and can also generate reports in a spreadsheet format.

OBJECTIVE

ODOT implemented the two programs to achieve the following:

- Deploy a statewide inventory for all roadway assets.
- Design a system for maintenance and improvement teams to obtain roadway asset information.
- Support integration with other ODOT systems.
- Establish methods for data validation that would satisfy the data quality requirements of AASHTOWare Safety Analyst™ and make the best use of the integrated data for network screening.

AUDIENCE

This case study applies to the following audiences:

- State Departments of Transportation: Safety Engineering, Design, Planning, Maintenance, GIS, and Asset Management Units.
- State Highway Safety Offices.

OVERVIEW OF TRANSINFO

TransInfo stores data on the assets used throughout ODOT, including ADA ramps, traffic barriers, bike facilities, curbs, sidewalks, stand-alone impact attenuators, and shared use paths. TransInfo is a customized implementation of a commercial "off-the-shelf" software solution. It provides statistical information on the assets stored within the system. The TransInfo database provides mileage statistics and the status of features related to the highway system. Asset data in TransInfo can be accessed by ODOT staff in different divisions. Field inventory sheets and feature inventory summary sheets are the data inputs for this system.

The system allows for the following features:

- Maintenance of the GIS Road Network done alongside the road features.
- Add, update, retire, and query spatial and tabular interfaces.
- Review information on many assets (e.g., ADA ramps, striped lines, weigh stations, bike facilities, etc.).

The system produces reports that can support initiatives both internal and external to ODOT. TransInfo can provide extracts that support FHWA's Highway Performance Monitoring System and the Oregon Highway Monitoring system. The system can provide budget reports and custom reports on assets collected in the system.

OVERVIEW OF THE FACS-STIP TOOL

The FACS-STIP Tool is accessible from any computer connected to the internet, which provides users reliable asset data at any time. This application is designed for external users to have access to statewide asset management data and spatial mapping functions. The goal of this tool is to help users make the best decision with the most up-to-date information available. FACS-STIP serves as the single location for users to access asset information stored at ODOT. The solution is a GIS implementation with a map-based user interface. Analysis and data management tools appear in a simple, one-menu user interface design.

There are two components within the FACS-STIP Tool: the Map Tool and Data To Go. The Map Tool uses ArcGIS Server to create user-determined geo-spatial maps with different base layers, such as aerial imagery, streets, and topography. Users have the ability to select assets, obtain attribute information, and print out the query. Data To Go also allows users to retrieve asset information for an area of interest whether that is a specific highway point or a highway segment. Reports are output in Excel worksheet format suitable for export to the user's local machine. Users can also query assets based on a set of user defined parameters selected from the attributes stored in the system's database. Data To Go allows for customizable views and commenting on assets and/or locations. Users can collect data on handheld devices and upload to FACS-STIP, which will then update in real time.

Table 1 shows the assets stored in the FACS-STIP Tool.

Table 1. Assets Stored in the FACS-STIP Tool.

Data To Go	Map Tool
- ADA Ramps - Approaches - Auto Traffic Recorder (ATR) Sites - Bicycle Facilities - Bicycle Facility Needs - Bridges - Culverts (DFMS, District, MS4 Permits) - Fish Barriers (ODFW) - Fish Passage (DSL) - Intelligent Transportation Systems (ITS) - Pavement - Retaining Walls - Safety (Crashes, SPIS, Crash Rates) - Sidewalks - Sidewalk Needs - Sound Barriers - Traffic AADT - Traffic Barriers - Traffic Posted Speed - Traffic Signals - Traffic Support (Signs) - Tunnels - Unstable Slopes - Weigh-in-Motion (MCTD) Sites	- Roadbed - Pavement, Number of Lanes, Right Shoulder, Left Shoulder, Roadway Composition - Structures - Bridges, Weight Restricted Bridges, Retaining Walls, Major Structures, Tunnels - Roadside - Sidewalks, ADA Ramps, Bicycle Facilities, Approaches, Traffic Barriers, Sound Barriers - Drainage (Culverts) - Highway Equipment - Signs, Signals, ITS Systems, Weigh-in-Motion Sites, Automatic Traffic Recorder Stations - Land & Environment - Aggregate Sites, Fish Barriers, Fish Passage, Unstable Slopes, Wetlands, PLSS - Freight - Freight System Highways, No Reduction of Capacity, High Clearance Routes - Road Network - Highway Network, Highway Network by LRS, Off-highway Local, Signed Routes, Milepoints, Mileposts - Functional Class - Functional Class, Non-State Functional Class - Highway System Class - Expressways, Highway Class, NHS - Traffic Data - AADT, Projected AADT, Posted Speed, Traffic Flow, Truck Flow - Crashes - SPIS, Crash Rates - Boundaries - City Limits, Districts, Regions - Political Boundaries - Congressional House, Senate Districts - Project Needs - Bridge, Pavement, Safety, STIP, Bicycle Facility, Sidewalk - Comments - Point, Line

ELECTRONIC DATA COLLECTION FOR SIGNS

As an example, the following describes ODOT's sign management processes using the FACS-STIP tool. ODOT's field operations are organized into five Regions. The Regional staff are responsible for collecting sign data. The Regions are able to use an electronic mobile device to input sign (and other asset) data. The electronic data collection device has GPS capabilities and can collect and populate some data elements automatically. This mobile data collection and management effort increases data collection efficiency, saving time and money. There is also the added environmental benefit from eliminating the use of hard copies. Because the electronic tool improves field staff efficiency, Regions are able to accomplish their work with fewer personnel. ODOT's asset managers assist the Regions by offering training on using the electronic device for field data collection. ODOT also has a program in place to ensure signs are meeting MUTCD standard for retroreflectivity. At least once a year, maintenance crews drive all the roads to test the retroreflectivity levels of signs. The asset management data are collected by the staff who maintain the assets.

RESULTS

BENEFITS

ODOT experienced a number of benefits by implementing these two systems. The systems' data are updated more frequently and the timeliness of the data has substantially improved in comparison to the old single asset, paper-based systems. Other benefits from the efforts include:

- Accessing all asset data through a single, uniform asset management system, which has data shared to all users from one source.
- Using the mobile collection portion of the FACS-STIP Tool allows for maintenance crews to collect data electronically.
- Linking asset data to performance management review.
- Simplifying user interfaces so that users are able to view and assess information based on geo-located assets.
- Integrating data in the future into other systems that will use the data collected within TransInfo and FACS-STIP.
- Combining asset maintenance logs and update histories to support the Agency's response to information requests and TORT cases.

BARRIERS AND HOW THEY WERE OVERCOME

One of the largest barriers ODOT faced was funding. With limited resources, Oregon needed to be strategic about what asset management efforts were most important. In order to successfully facilitate that discussion, the State needed a project champion. Laura Wipper, the Asset Management Integration Program Coordinator from the Strategic Services and Data Management Section was the project lead who helped move these projects along. Laura guided the State to establish an asset management program by working alongside ODOT senior leadership. Senior-level support provided a springboard to create the Asset Management Steering Committee. Once this body was in place, the State was able to have strategic discussions on how to apply funding. Worker productivity, especially at the Region level, played a major role in these discussions as it was clear that staff reductions would adversely affect work flow unless the State could produce major efficiency gains.

LESSONS LEARNED

ODOT recommends completing pilot projects prior to full system implementation. This fosters a better environment for learning from errors in the early releases, and creates a better level of confidence for the intended users.

ODOT used interns in developing the FACS-STIP Tool. The interns were responsible for gathering input from all the Districts, whose staff is responsible for asset maintenance. This resulted in a better user interface, and created a sense of ownership among the users, reducing perceptions of State-mandated processes.

NEXT STEPS

The next steps in development will provide interfaces to other ODOT systems that can use the data collected and provided within TransInfo and FACS-STIP. One of ODOT's goals is for TransInfo to become the fully integrated data system for all assets. This does not necessarily mean that TransInfo would store all the data, but could rather interface with larger asset-specific databases (e.g., PONTIS stores all the asset information for bridges and TransInfo would bring in data from PONTIS as needed).

REFERENCES

The following resources were used in development of this case study:

1. Oregon Department of Transportation website: http://www.oregon.gov/odot/pages/index.aspx
2. NCHRP 7-21 Case Study: Oregon Department of Transportation
3. CRITIGEN ODOT FACS-STIP Tool Presentation
4. ODOT TransInfo Presentation

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