



Project Summary

Texas Department of Transportation

0-6389: Framework for Comprehensive Bridge Management and Information System (BMIS)

Background

There are over 50,000 bridges in the state of Texas. TxDOT uses several different systems that are not interlinked to store different information on these bridges, and as a result information essential to the optimal management of these bridges is not readily available to TxDOT engineers and decision makers. Information on bridge-related maintenance expenditures is also extremely limited to the most basic of categories, and links to SiteManager are effectively nonexistent with the current system.

TxDOT needs an architecture for the development of a comprehensive, reliable Bridge Management Information System (BMIS) that will effectively encompass currently available datasets. An effective BMIS system would serve the needs of the districts, those responsible for developing and monitoring statewide letting of bridge projects, and TxDOT management personnel. This system should be user-friendly, accessible to a wide variety of users, and GIS enabled.

The purpose of this research project was to provide a framework for the development of a BMIS. TxDOT personnel plan to use the study results for identifying and defining the necessary BMIS development resources.

What the Researchers Did

Researchers developed a synthesis of current BMIS development activities and identified sources of data available to develop a BMIS. Researchers also developed a short-term BMIS architecture with a proof-of-concept prototype, which links bridge-related data sources at TxDOT, enabling the production of queries and reports needed for a variety of analytical purposes.

For development of a long-term enterprise-wide BMIS architecture, researchers presented features of a proposed BMIS to TxDOT personnel in the Bridge Division and six districts. Researchers obtained feedback from those presentations to help identify user and data needs for a BMIS.

Researchers compiled findings, conclusions, tools, and recommendations into two products:

- **Prototype Database Application: *Use of Existing Information Systems and Data to Support Bridge Management at TxDOT*** – the proof-of-concept prototype allows extraction of summary bridge statistics and data for producing bridge cost estimates and related quality control checks. Researchers also provided a report with the prototype that reviews existing bridge-related data sources at TxDOT, describes the development of the prototype, and includes an installation and user guide.

Research Performed by:

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- Research Report: *Framework for Comprehensive Bridge Management and Information System (BMIS)* – this report presents the results of the research and contains recommendations for developing a BMIS at TXDOT.

What They Found

Researchers found that Pontis, which is the main bridge management software developed by AASHTO for the Federal Highway Administration, is used by several states but mostly implemented at the database level (i.e., storing National Bridge Inventory and element level data), with more sophisticated tools such as forecasting having lower levels of implementation. Sixteen states are not using Pontis at all.

In order to develop the short-term BMIS proof-of-concept prototype, researchers produced a system diagram that shows high-level relationships between several bridge-related systems at TxDOT. In general, the Design and Construction Information System, the Bridge Inventory, Inspection, and Appraisal System, Pontis, PonTex, and BridgeLog information systems provide core data for bridge infrastructure management. Other systems, notably the Maintenance Management Information System, Main Street Texas, and the Financial Information Management System, provide supplemental or supporting data for bridge infrastructure management.

What This Means

In particular, the researchers recommend the following items be developed for TxDOT's BMIS:

- Inventory system with elemental descriptions in graphical format.
- Mechanisms for districts to interact with the system (possibly a revision to PonTex). The system would allow districts to update cost and inspection information.
- Bridge project prioritization scheme that is easy to understand and is easy for TxDOT to incorporate.
- Budget forecasting system.
- Additional database attributes and multimedia capabilities.
- Additional functions to store, enter, query, report, and track attributes and multimedia from these databases.
- More effective coordination and integration between information systems.
- Mechanisms to streamline production of reports.
- Coordination with bridge owners and entities responsible for maintenance.

In addition, the final report for the project includes:

- A description of a prototype web based interface to manage district level information.
- Recommendations for updates to the TEBSS prioritization system to bring it in line with elemental inspections and recent PONTIS developments.
- A methodology for the development of Markovian deterioration curves for budget forecasting.

The conclusions, recommendations and concepts presented in the report can be used by TxDOT personnel to identify what will be needed to develop an effective BMIS.

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