

# RESEARCH SPOTLIGHT

## Project Information

**REPORT NAME:** Best Practices for Modernizing MDOT Bridge Design Manual, Guides and Policy Documentation

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## Knowledge management system enables easy access to bridge policy and design updates

The Michigan Department of Transportation (MDOT) is continuously updating its bridge design policies and standards. However, decentralized documentation of changes – often in print form – made accessing information difficult and dependent on a few key employees. A new digital knowledge management (KM) system tailored to MDOT's needs allows for quick and easy retrieval of archived revisions and future updates. The documentation strategy, along with a framework for additional KM improvements, will enable data access for years to come and promote uniformity in bridge design practices throughout the state.

### PROBLEM

MDOT's core bridge design documents are its *Bridge Design Manual* (BDM), a policy reference for design engineers, and its *Bridge Design Guides* (BDG), which provide guidance for designing and detailing bridge plans. MDOT frequently updates these documents, recording and distributing revisions and decisions through its *Monthly Updates* publications.

For each policy revision, relevant background and supporting materials may include meeting minutes, office memorandums, e-mail correspondence and other documents. With years of files archived in a variety of paper and digital formats, it has been difficult for MDOT staff to conduct a search for specific information.



This project digitized and made accessible extensive paper archives of bridge policy and design documents.

Additionally, these archived materials provide only a partial record of a policy's history. Institutional knowledge, held by a few key long-term employees, provides significant context for understanding the

*“The new workflow will give us access to the status of any bridge policy or standards update, including updates in progress and in various states of implementation, without chasing down an e-mail paper trail.”*

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reasoning behind a revision. When questions arise or when greater detail is needed, MDOT staff have relied on these employees to locate and piece together the relevant information. As these employees retire or transfer to other divisions, this critical institutional history can be lost.

## RESEARCH

MDOT sought to develop a robust KM process for bridge design documents that would allow digital access to archival information and provide a cohesive framework and strategy for documenting policy decisions and managing documents going forward. An accessible, transparent system for retention and retrieval of all documents was the goal.

Researchers investigated the best practices of large organizations with KM programs in place, and reviewed practices at 17 highway agencies that had or were developing processes to manage complex knowledge. They also examined the design manuals of four large national organizations whose publications are similar to MDOT’s bridge design documents in complexity and scope of revisions. In addition, focus group meetings helped researchers understand the underlying policies reflected in MDOT’s bridge design publications.

This information was combined with input from the project team, which

included experts in bridge design, database management, library science and document management, to develop a framework and a strategy to address MDOT’s needs.

## RESULTS

Researchers developed a customized KM system for MDOT’s bridge policy and standards updates. Central to the system is a structured framework to record every step of the BDM and BDG revision process – including documentation, notification, storage and retrieval – and to document changes to a given policy or standard over time. The system is built on Bentley Systems’ ProjectWise software, already in use at MDOT, which includes workflow functionality. The KM system also includes a hierarchy of digital folders to manage the movement of updates and revisions as they progress.

To address MDOT’s wealth of past documentation on BDM and BDG revisions, researchers digitized paper resources to make them available by topic in the KM system. Likewise, to enable access to information in monthly publications by topic or specification, researchers proposed a revision history database, also accessible through ProjectWise. This database would encompass revisions made in past years as well as new changes moving forward, streamlining access to changes across time. In addition, hyperlinks to the references would allow direct access to supporting documents and promote knowledge transfer.

## IMPLEMENTATION

MDOT has moved forward with the historical archive and a Microsoft Excel-based revision history database. The department will roll out the historical archive in the first half of 2020, with additional ProjectWise features to be released later in the year. These tools will give designers, planners and managers unprecedented access to bridge policy and standards changes.

The proposed KM workflow also includes larger goals and recommendations that MDOT is continuing to examine, such

as having an XML backbone for the BDM and BDG to make them machine-searchable and independent of any word processing program.

Steps like these to expand and standardize access to critical information not only help MDOT staff perform their jobs more efficiently today, but they help the agency retain vital information in the face of staff turnover and retirements, assuring access to knowledge for years to come.

## Research Administration

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**This final report is available online at**

[www.Michigan.gov/mdot/-/media/Project/Websites/MDOT/Programs/Research-Administration/Final-Reports/SPR-1684-Report.pdf](http://www.Michigan.gov/mdot/-/media/Project/Websites/MDOT/Programs/Research-Administration/Final-Reports/SPR-1684-Report.pdf)

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