

New Hampshire DOT: Bridge Preservation Assessment

Group Assessment
(w/ Individual Assessments)
General Action Plan

The New Hampshire DOT (NHDOT) was interested in improving data and information systems to enable better alignment between bridge preservation decision-making approaches with those used for bridge rehabilitation and replacement.

This assessment was conducted in anticipation of advancements in data and modeling detail and better integration of bridge asset management and bridge design systems and models. At the time of the assessment, a new bridge management system was being implemented, presenting a unique opportunity to advance data and information system practices.

Step 1: Assessment Planning

NHDOT's bridge functions are executed from the Central Office, with primary bridge preservation program responsibilities split between the Bridge Design and Bridge Maintenance Bureaus. The leadership of these bureaus formed the assessment core team, and they selected key staff from their respective units to participate in the assessment.

Step 2: Benchmarking and Improvement Selection

A 60-minute kickoff meeting introduced participants to the assessment context, framework and approach. All 51 elements were included in the assessment and participants completed individual assessments prior to group consensus building.

The time and effort required to complete individual assessments did not allow for full group discussion of each element. Instead, only elements with significant disparity of opinion or need for improvement were discussed. Three, 90 minute benchmarking meetings were required.

Step 3: Evaluation and Implementation Action Planning

Individual improvements were not evaluated. A single 90-minute meeting was used to confirm assessment outcomes and proposed actions.

Step 4: Closeout and Next Steps

A summary presentation captured the assessment context, process, outcomes and a general action plan. These materials were finalized with offline review by the assessment sponsor.

Sponsor

Nicholas Alexander
Asset Management
Administrator

Core Team

Loretta Doughty
Bridge Design Lead

Steve Johnson
Bridge Maintenance
Lead

William Duke
Consultant
Facilitator

Participants

David Scott
In-House Design

Aaron Janssen
In-House Design
(Data & Systems)

Nicholas Goulas
Existing Bridge
Section

Tim Boodey
Bridge Maintenance
(Annual Scheduling)

Dave Gaylord
Bridge Asset Eng.

Sue Guphill
CADD Design

Angela Hubbard
Bridge Design
Manual

Ken Morrison
Bridge Inspection

Assessment Experience:

The assessment was complicated by scheduling challenges, stemming from the higher-than-anticipated level of effort required to complete the individual offline assessments and subsequent group discussions. As a result, there were significant delays between meetings, which resulted in participant fatigue and some inefficiencies due to need to revisit previous group discussion outcomes.

Assessment Findings:

The assessment produced meaningful benchmark ratings, improvement recommendations, and an improvement plan that can be used to guide future actions. Assessment benchmark ratings and identified potential improvements are summarized by area.

Area A: Specify and Standardize Data	
<p>Benchmarking</p> <ul style="list-style-type: none"> • Clear bridge inventory and condition data models • Excellent location referencing • Lack of alignment between work and treatment data models • No standard methodology to identify preservation investment candidates <p>Potential Improvements</p> <ul style="list-style-type: none"> • Align bridge data models with data collection • Document lifecycle planning methodologies 	
Area B: Collect Data	
<p>Benchmarking</p> <ul style="list-style-type: none"> • NBI data collection meets base needs • Project and maintenance data collection needs improvement • Lack of clear roles and standard activities for data quality management <p>Potential Improvements</p> <ul style="list-style-type: none"> • Consider additional element-level data collection (for additional use cases) • Align work accomplishment and treatment history in various systems • Define data quality management roles, activities, and expectations 	

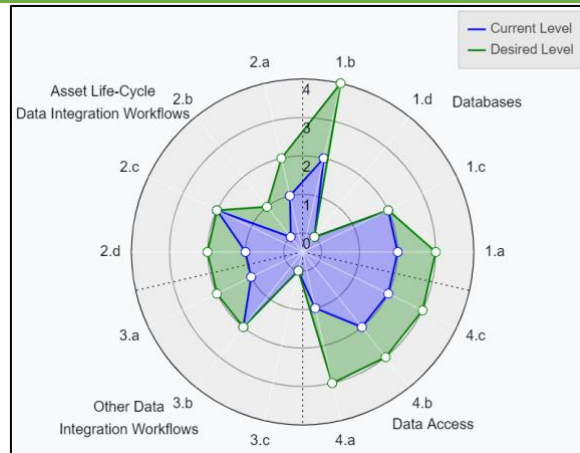
Area C: Store, Integrate, and Access Data

Benchmarking

- Barriers to access of asset databases, tools, and reporting
- Significant data integration needs across asset management and design systems
- Lack of mobile tools for field staff

Potential Improvements

- Integrate systems and data
- Provide training to stakeholders



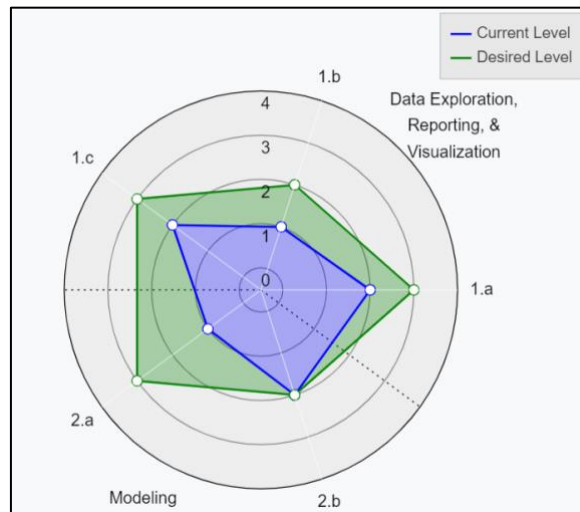
Area D: Analyze Data

Benchmarking

- Lots of data, but not in a single, easy-to-access location for analysis
- Planned and completed work is not incorporated into maintenance and preservation analysis
- Lack of trust in modeling outcomes

Potential Improvements

- Provide authoritative data for reporting and standard BI tools
- Document performance-based bridge modeling and analysis methodologies
- Provide training to stakeholders



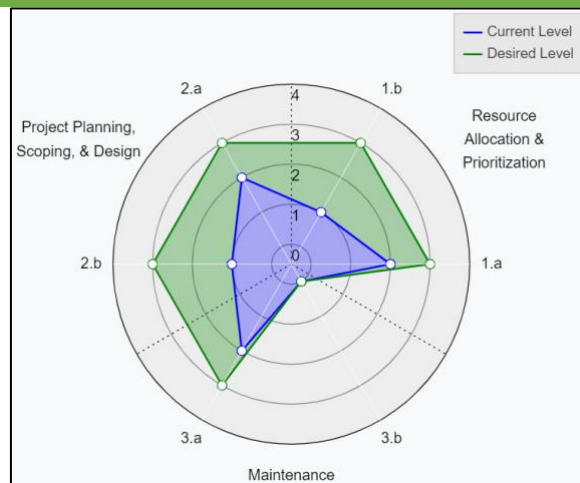
Area E: Act on Data

Benchmarking

- Lack of performance-based decision approaches accounting for work history and plans
- Desire for real-time monitoring

Potential Improvements

- Document performance-based bridge modeling and analysis methodologies
- Implement a performance-based preservation program
- Provide training to stakeholders



Proposed Actions:

Proposed Action	Description
<p>Document Current Inventory and Inspection Processes</p>	<p>Engage subject matter experts to create mid-level process documentation describing current bridge inventory and inspection practice. Identify key roles and responsibilities, as well as systems, tools, and data sources used in each step.</p> <p>Reference detailed policy, practice, and guidance documentation (e.g., Bridge inspection manual, BMS standard operating procedures) as appropriate.</p> <p>Flag gaps in formal documentation.</p>
<p>Document Current Maintenance and Preservation Accomplishment Tracking Processes</p>	<p>Engage subject matter experts to create mid-level process documentation describing current practices relating to bridge maintenance and preservation work accomplishment tracking. Identify key roles and responsibilities, as well as systems, tools, and data sources used in each step.</p> <p>Reference detailed policy, practice, and guidance documentation (e.g., Bridge Activity Log user guidance or BMS standard operating procedures) as appropriate.</p> <p>Flag gaps in formal documentation.</p>
<p>Document Current Maintenance and Preservation Planning Processes</p>	<p>Engage subject matter experts to create mid-level process documentation describing current practices relating to bridge maintenance and preservation work planning. Identify key roles and responsibilities, as well as systems, tools, and data sources used in each step.</p> <p>Reference detailed policy, practice, and guidance documentation (e.g., BMS standard operating procedures) as appropriate.</p> <p>Flag gaps in formal documentation.</p>
<p>Catalog Current Bridge Systems and Data Sources</p>	<p>Create a consolidated catalog of bridge systems, tools, and data sources. Identify what data is collected, integrated, and used in each system or data source. Identify authoritative source systems of record and authoritative sources for reporting or analysis of key data. As appropriate, share the catalog(s) or other documentation to improve awareness and access to bridge systems and data.</p>

Proposed Action	Description
<p>Map Data Flow and Identify Integration Recommendations</p>	<p>Build from process documentation and the bridge system and tool catalog to map how key data flow from initial collection through various systems, access points, analysis tools, and reports.</p> <p>Identify opportunities to standardize and integrate data across these systems, tools, and data collections, with particular consideration of potential integrations to:</p> <ul style="list-style-type: none"> - Streamline manual business processes to update asset inventory and condition data based on project and maintenance work accomplishments (e.g. BMS and Bridge Activity Log integration) - Capture bridge related work/treatment history, project costs and bridge IDs on multi-bridge projects - Ensure data is available in key analytical systems (e.g. DTIMS, WOFI, BMS) to support expert analysis and reporting - Streamline maintenance treatment and preservation project candidate selection and prioritization
<p>Align Bridge Data Models and Collection</p>	<p>Update asset inventory, condition, and work/treatment data models in key systems to ensure alignment and support integration. Update or create data dictionary and/or glossary documentation necessary to support understanding and use. Adjust data collection practices accordingly.</p> <p>Inventory and Condition Data Models: Consider detailed element-level data needs (e.g., on joints, bearings, criticality of certain defects). Evaluate opportunities to incorporate conditions captured as part of Bureau of Bridge Maintenance studies (e.g., deck evaluations). Consider dTIMS / WOFI implementation needs.</p> <p>Work and Treatment Data Model: Ensure alignment of work history / treatment data models between ProMIS, BMS and Bridge Activity Log to support consistent capture of key treatment and work history related data elements (e.g., capture bridge related project costs and accurately associate bridge IDs and work accomplished on multi-bridge projects). Consider dTIMS / WOFI implementation needs.</p>
<p>Integrate Project and Maintenance Treatment Data Across Systems</p>	<p>Create business requirements and supporting IT requests for integration of project and maintenance treatment data and systems, including:</p> <ul style="list-style-type: none"> - ProMIS with Bridge Activity Log: improve capture of work/treatment history - Bridge Activity Log with BMS: incorporate key work history data into BMS - WOFI with BMS: incorporate maintenance work into work/treatment history - DTIMS: integrate systems necessary to support expert analysis and reporting

Proposed Action	Description
Master Bridge Data of Enterprise Interest	Document enterprise use cases for critical bridge data, including high-level Bridge Preservation program reporting or analysis. Establish easy to understand and analyze data formats meeting key enterprise use cases. Work to extract, transform, and load data from authoritative sources into to the enterprise data warehouse for enterprise access and use. Document as appropriate per broader agency policy and practice.
Develop Performance-Based Bridge Deterioration Models	Utilize available data, internal subject matter experts, available research, and case studies/examples from other dTIMS implementations to develop NHDOT bridge deterioration models suitable to available tools and identified needs. Ensure alignment of deterioration model with Bridge Inventory and Condition Data Models (and associated asset breakdown structure). Document analysis and decision-making related to model development.
Develop Performance-Based Bridge Treatment Models	Utilize available data, internal subject matter experts, available research, and case studies/examples from other dTIMS implementations to develop NHDOT bridge treatment cost/benefit and treatment selection models suitable to available tools and identified needs. Ensure alignment with Bridge Treatment and Work Data Models as well as Bridge Inventory and Condition Data Models (and associated asset breakdown structure). Document analysis and decision-making related to model development.
Implement Bridge Performance Models in dTIMs	Configure DTIMS to incorporate developed models. Test modeling and performance prediction outcomes for validity and reasonableness. Adjust models as appropriate or necessary, incorporate changes into modeling development documentation and update system configuration documentation.
Document Lifecycle Planning Analysis Methodology	Document how DTIMS can be used to conduct network-level lifecycle planning analysis, compliant with key state, federal, or other needs. Establish approach where key analysis parameters and factors are applied to develop meaningful outcomes. Document sources for analysis parameters and factors (e.g., performance constraints, financial constraints, planned/completed work). Ensure outcomes are useful to identify optimal bridge maintenance and preservation investments.
Plan Implementation with Stakeholder Engagement	Develop an implementation plan, which will progressively incorporate and formalize a performance-based, lifecycle planning approach to the Bridge Preservation program. This may include a pilot implementation to generate lessons learned and develop practical experience to support stakeholder engagement.
Implement a Full-Scale, Performance-Based Preservation Program	Execute the develop plan to progressively incorporate and formalize the lifecycle planning and performance-based decision-making into the Bridge Preservation program.

Optional Actions:

Optional Action	Description
<p>Close Current Documentation Gaps</p>	<p>Engage subject matter experts to create detailed documentation necessary to close documentation gaps identified through the inventory, inspection, and maintenance and preservation planning and accomplishment tracking process documentation activities.</p> <p>As detailed documentation is developed, adjust process documentation to reference the new materials.</p>
<p>Develop Bridge Preservation Data Mart</p>	<p>Create a Bridge Preservation Data Mart to serve as a "one-stop-shop" for enterprise reporting and/or analysis of the Bridge Preservation program (e.g., summary of needs, performance measures and targets, and accomplishments as well as other identified use cases). Implement necessary data transformation, aggregation, summary, etc. and provide standard reporting. Support with necessary training materials to raise awareness and understanding of the Data Mart's use.</p>
<p>Develop a Public Facing Website or Dashboard</p>	<p>Develop a consolidated, public, bridge program website that meets program needs for public data access. Incorporate preservation program as appropriate.</p>
<p>Align Project-Level Preservation Decisions with Lifecycle Planning</p>	<p>Establish standard approach and expectations for application of network-level DTIMS lifecycle planning analysis to project level decision-making. Consider future target setting and monitoring needs as part of initial implementation.</p>
<p>Pilot the Performance-Based Preservation Approach</p>	<p>Apply DTIMS tools and the identified methodologies to pilot practical application of bridge lifecycle planning analysis in bridge preservation resource allocation, project-level investment decisions and program performance targeting. Adjust methodologies to support practical applications, document lessons learned, create supporting training and communication materials leveraging lessons from the pilot.</p>