

Minnesota DOT

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Peer Exchange - Integrating Risk Management in Transportation Asset Management Programs



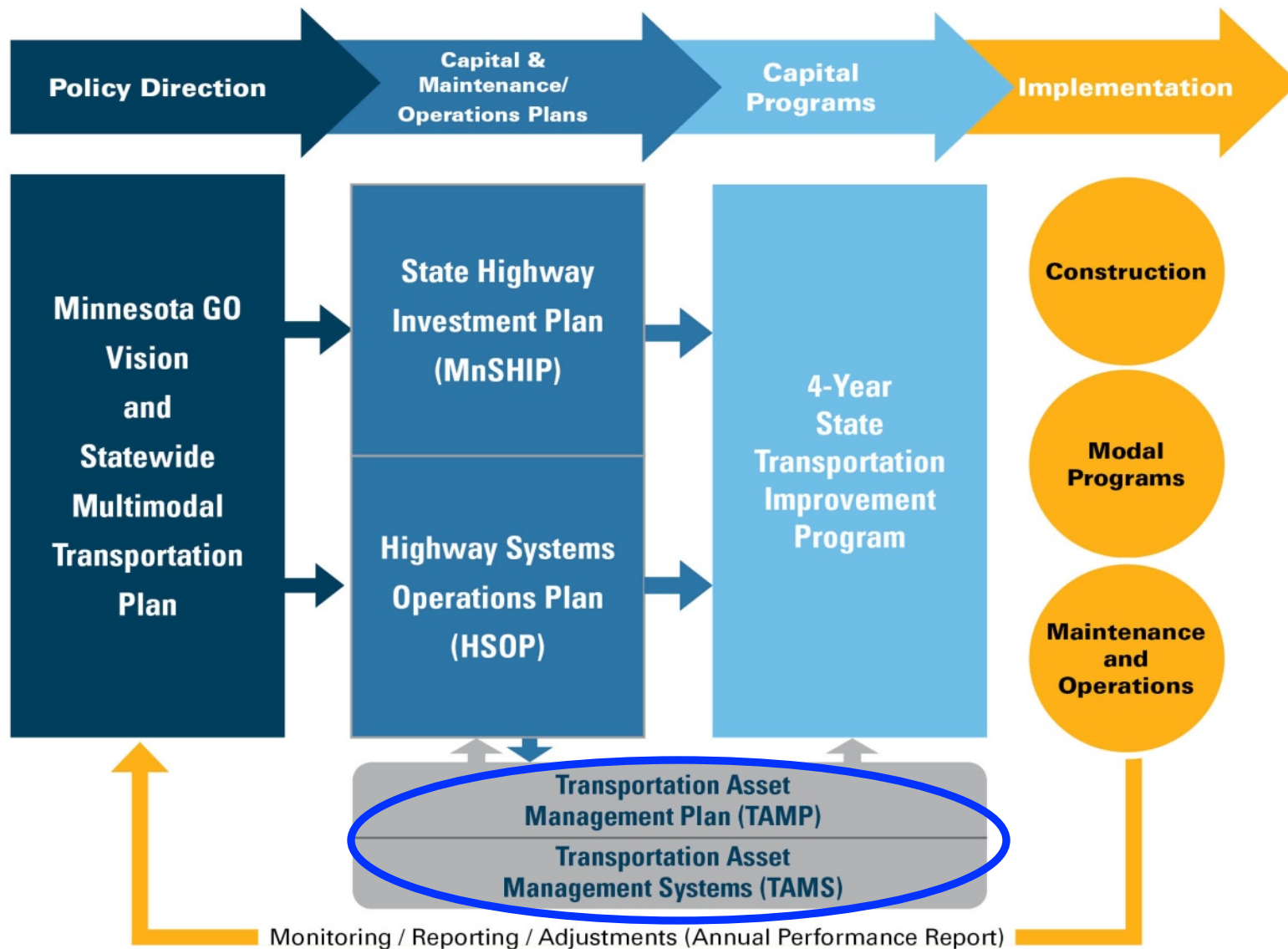
MnDOT's Risk-Based Asset Management Plan

**Peer Exchange – Integrating Risk Management in
Transportation Asset Management Programs**

3:45 P.M. - Tuesday, August 25, 2015

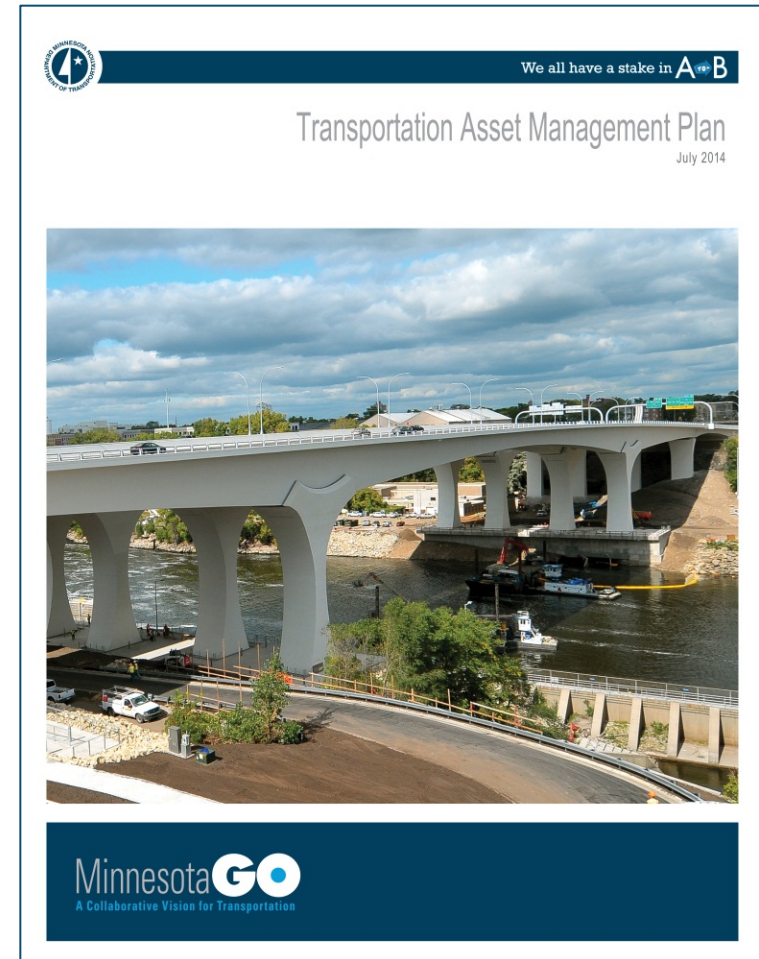


Planning Framework



TAMP Components

- Asset Inventory & Conditions
- Risk Analysis
- Life Cycle Cost Analysis
- Performance Measures & Targets
- Performance Gap Assessment
- Financial Plan & Investment Strategies
- Implementation & Next Steps



Assets Analyzed

TAMP1

- Pavements
- Bridges
- Deep Stormwater Tunnels
- High-Mast Light Tower Structures
- Highway Culverts
- Overhead Sign Structures

TAMP2

- Facilities
- Intelligent Transportation System Infrastructure
- Lighting
- Noise Walls
- Traffic Signals
- Pedestrian Infrastructure



Risk Management Analysis

- TAMP Process included Identifying, Assessing, and Managing Asset Specific Risks

- Risk Evaluation Process

- Likelihood/consequence of occurrence

| | | Likelihood Ratings and Risk Levels | | | | |
|---------------------|---------------|------------------------------------|----------|----------|---------|----------------|
| | | Rare | Unlikely | Possible | Likely | Almost Certain |
| Consequence Ratings | Catastrophic | Medium | Medium | High | Extreme | Extreme |
| | Major | Low | Medium | Medium | High | High |
| | Moderate | Low | Medium | Medium | Medium | High |
| | Minor | Low | Low | Low | Medium | Medium |
| | Insignificant | Low | Low | Low | Low | Medium |



Risk Management Analysis

- Process began with focus on “global” risks
 - Natural events or operational hazards
- Transitioned to an emphasis on “undermanaged” risks
 - Areas with clear opportunities for improvement – to better manage assets – as to avoid global risks
- Identification/Prioritization of mitigation strategies



Risk Management Analysis

- Two Work Group Assignments
 - Assignment #1
 - Identify risks (global, operational, etc.)
 - Identify impacts to asset, public, and MnDOT
 - Identify current risk mgmt. (current mgmt. and mitigation strategies, gaps)
 - Score risks (likelihood/consequence)
 - Assignment #2
 - Narrow risks to 1-2 most undermanaged (10 identified)
 - Define preferred and alternate risk mitigation strategies
 - Identify data, resources, tools, and/or training
 - Estimate costs to implement strategies
 - Score risk should either strategy be implemented



Risk Management Analysis

- Ten Undermanaged Risks Identified
 - Not meeting pavement quality/condition at road/corridor level
 - Not managing ramps, access roads, aux. lanes, etc.
 - Managing to lowest life-cycle cost for bridges
 - Premature bridge deterioration
 - Managing culverts to lowest life-cycle cost and to avoid failure
 - Adequate tunnel capacity
 - Managing maintenance repairs of tunnels to avoid failure
 - Proper installation of OSS/TL
 - Lack of accurate OSS/TL data to determine lowest life-cycle cost
 - Adequate work force to maintain OSS/TL



Risk Management Analysis

- Undermanaged Pavement Risks
 - Not meeting pavement quality/condition at road/corridor level
 - Not managing ramps, access roads, aux. lanes, etc.

| Risk Statement (#1) Mitigation Strategies, Impacts on Other Risks, and Costs | | | |
|---|--------------------|-------------------|--------------------|
| Risk Statement #1: | | | |
| Non-Attainment of Objectives: If public expectations for pavement quality or condition are not met, especially at the local/corridor level, then the agency's reputation may suffer, service delays and unsafe conditions may increase and the cost of maintenance may grow. | | | |
| <ul style="list-style-type: none"> • Current control/mitigation strategies: Using money to manage to lowest life-cycle cost including routine maintenance; money distributed statewide based on need; implementation of performance measures and targets; balanced funding across entire system; MAP-21 direction to allocate funding to the National Highway System; staging of more timely and appropriate treatments; and multiple fixes at each location or on each corridor. • Previously identified mitigation strategies: More timely and appropriate staging of treatments; multiple fixes at location or on corridor (only if LCC treatment intervals modified); more systematic and standardized statewide approach to fixes. | | | |
| Preferred Mitigation Strategy, Resources, and Costs: | | | |
| Annually track, monitor and identify roadway segments that have been in Poor condition greater than five years, and consistently consider this information when programming at the district level. The cost would be eight hours of staff time to run a report and coordinate with districts during annual programming activities. (<i>Process Improvement Strategy</i>) | | | |
| Effect on Other Risks: May reduce the risk of failing to comply with GASB Statement 34 requirements. | | | |
| Alternate Mitigation Strategy and Costs: | | | |
| Jurisdictional realignments, to divest maintenance responsibility onto other agencies. Divestiture could cost \$200,000 per mile to bring roads up to a standard necessary for acceptance by another agency. An outreach plan and communication strategy – at a possible cost of \$25,000 – may reduce the potential loss of reputation if the MnDOT fails to meet objectives. | | | |
| Likelihood and Consequence of Adverse Impacts | | | |
| | Consequence | Likelihood | Risk Rating |
| Original Risk Rating | Major | Likely | High |
| Preferred Strategy | Major | Possible | Medium |
| Alternate Strategy | Moderate | Likely | Medium |

| Risk Statement (#2), Mitigation Strategies, Impacts on Other Risks, and Costs | | | |
|--|--------------------|-------------------|--------------------|
| Risk Statement #2: | | | |
| Exclusion of Auxiliary Roads: If MnDOT does not include ramps, access roads, auxiliary lanes and frontage roads in its pavement inventory and use their condition in its pavement model, then these assets will not be included in pavement management decisions and cannot be managed to achieve the lowest life-cycle cost for all highway pavements. | | | |
| <ul style="list-style-type: none"> • Current control/mitigation strategies: None. • Previously identified mitigation strategies: Increased indefinite-quantity or blanket-type projects to address localized distresses, with better tracking of deterioration and condition. | | | |
| Preferred Mitigation Strategy, Resources, and Costs: | | | |
| <ol style="list-style-type: none"> 1. Collect additional data in the Metro District with the use of the old Material Office pavement van, at an estimated cost of \$100 per mile. (<i>Process Improvement Strategy</i>) 2. Build a stand-alone database that will house pavement data and allow for better tracking, with a cost range of \$2,000 to \$20,000. (<i>Process Improvement Strategy</i>) | | | |
| Alternate Mitigation Strategy and Costs: | | | |
| Collect data in Greater Minnesota districts by hand, using maintenance staff. Visually collect images through video capture or windshield survey. These would cost around \$100/mile to collect data and additional cost/time to enter information into the database. | | | |
| Likelihood and Consequence of Adverse Impacts | | | |
| | Consequence | Likelihood | Risk Rating |
| Original Risk Rating | Minor | Possible | Low |
| Preferred Strategy | Minor | Unlikely | Low |
| Alternate Strategy | Minor | Unlikely | Low |



Risk Management Analysis

| Priority | Priority Description | Expected Timeframe | Status |
|----------|--|---------------------------|--|
| 1 | Annually track, monitor, and identify road segments that have been in Poor condition for more than five years and consistently consider them when programming. | 1-2 years (to develop) | TBD |
| 2 | Address the repairs needed on the existing South I-35W deep stormwater tunnel system. | 1-2 years | Repairs underway/almost complete |
| 3 | Investigate the likelihood and impact of deep stormwater tunnel system failure. | 1-3 years | Combined with priority #10. Pressure transducers installed in several tunnels |
| 4 | Develop a thorough methodology for monitoring highway culvert performance. | 1-2 years | Currently underway |
| 5 | Develop and adequately communicate construction specifications for overhead sign structures and high-mast light tower structures. | 1 year | Construction specs developed |
| 6 | Track overhead sign structures and high-mast light tower structures in a Transportation Asset Management System (TAMS). | 2-4 years | TBD |
| 7 | Collect and evaluate performance data on ramps, auxiliary lanes, and frontage road pavements for the highway system in the Twin Cities Metro Area. | 1-3 years | TRS underway |
| 8 | Augment investment in bridge maintenance modules and develop related measures and tools for reporting and analysis. | 1-3 years | Currently underway |
| 9 | Include highway culverts in MnDOT's TAMS. | 2-4 years | TBD |
| 10 | Place pressure transducers in deep stormwater tunnels with capacity issues. | 1-2 years | Pressure transducers installed in several tunnels |
| 11 | Incorporate the deep stormwater tunnel system into the bridge inventory. | 1-2 years | Communication meeting held. Determined to keep inspection and inventory separate |
| 12 | Develop a policy requiring a five-year inspection frequency for overhead sign structures, as well as related inspection training programs and forms. | 1 year | Complete - Policy developed |
| 13 | Repair or replace highway culverts in accordance with recommendations from the TAMS (once it is implemented). | 10 years | TBD - contingent on priority #9 |



Implementation & Next Steps

- Asset Management Steering Committee (Governance)
- 2015 Asset Management Priorities
 - Collect TAMP asset maintenance costs to refine LCCA
 - Develop/implement a Transportation Asset Management System (TAMS)
 - Deep stormwater tunnel capacity and inspection initiatives
 - Pressure transducers and inspection protocols
 - Define maintenance vs. operations
 - Move forward with 2nd set of assets for TAMP-like assessment
 - Identify next TAMS assets
 - Asset responsibility matrix
 - Asset management research (3 synthesis - literature review and expert surveys)
 - Managing Ancillary Pavements
 - Quantifying the Impact of Bridge Maintenance Activities on Deterioration
 - Managing, Maintaining, and Operating Culverts: Review of Deterioration Curves and Tools
 - Total cost of ownership
 - Performance measures and target policy



Moving Forward

TAMP

Enhancements

- Enhance existing business processes
- Build on existing information, plan, and processes

Capital Plan (MnSHIP)

- Incorporate risk, life-cycle analysis and performance
- Adding detailed information about “other roadside infrastructure”

Operations Plan (HSOP)

- Requirements for maintenance by asset type
- More strategic
- More data-driven





Thank You!

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Or visit

<http://www.dot.state.mn.us/assetmanagement>

