Transportation Asset Management Plan

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Met Council: Funding & Programming Committee

May 17th, 2018

DEPARTMENT OF TRANSPORTATION

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DRAFT Transportation Asset Management Plan

April 2018

Minnesota GO

A Collaborative Vision for Transportation

Timeline

- 2014: Pilot TAMP Completed

- April 30th 2018: Draft TAMP Submitted to FHWA (they will have 90 days to review)

- June 30th 2019: Final TAMP due to FHWA

- Annual Consistency review required, beginning September 2019

- TAMP update required at least every 4 years

Assets Included

Asset Classes			
Pavements	Bridges	Culverts	Deep Stormwater Tunnels
High Mast Light Towers	Overhead Sign Structures	Pedestrian Infrastructure	Its
Noise Walls	Signals	Lighting	Buildings

mndot.gov/

Assets Included

| Asset Sub-Classes				
Concrete Pavement	Bituminous Pavement	Large Culverts	Small Culverts	Wood Noise Walls
Concrete Noise Walls	Curb Ramps	Sidewalks	Driveways with Sidewalk	Pedestrian Bridges
Rest Areas	Weigh Stations	Small/Medium Truck Stations	Large Truck Stations	Salt Sheds
Heated Storage Sheds	Unheated Storage Sheds	Office Buildings	Miscellaneous Buildings	Fiber Communication Network
Fiber Network Shelters	Traffic Management System Cabinets	Dynamic Message Signs	Traffic Monitoring Cameras	Traffic Detector Stations
Communication Equipment	MnPASS Readers	Reversible Road Gates	Ramp Meters	Rural Intersection Conflict Warning Systems
Road Weather Information System Sites	Automatic Traffic Recorders	Weigh-In-Motion Sites	Road Closures	

Chapters

- Introduction

- Planning & Programming Framework

- Performance Measures & Targets

- Inventory & Condition

- Risk Management Analysis

- Life Cycle Planning

- Performance Gaps

- Financial Plan & Investment Strategies

- Implementation & Future Developments

Chapter 1: Introduction

- Overview

- Purpose

- Existing Plans

- Process

- Themes

- Content

Chapter 2: Planning & Programming Framework
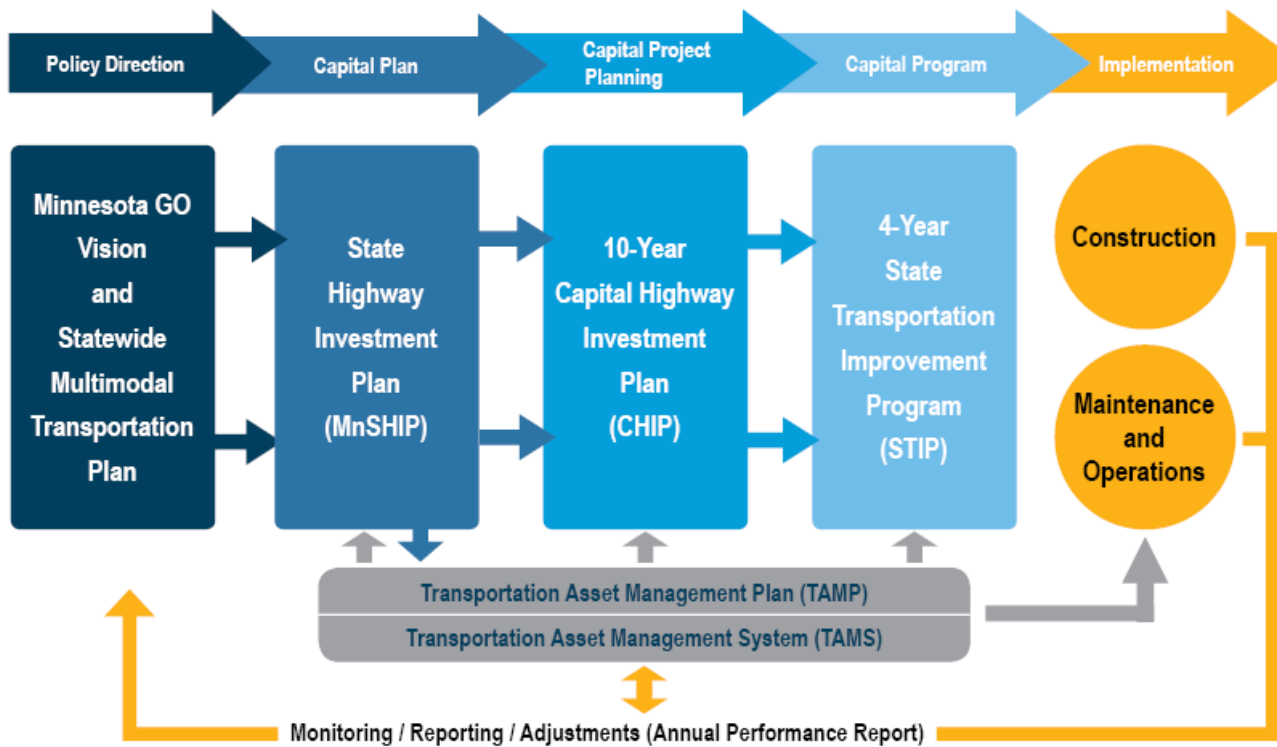
- Objectives
- Existing AM Planning
- Existing AM Management Programming
- Maintenance and Capital Integration

Chapter 3: Performance Measures & Targets

TERM	MEANING	USE	HOW IS IT ESTABLISHED?	HOW OFTEN IS IT USED?
State Target	Outcome consistent with agency goals and traveler expectations	• Communicate desired outcome • Evaluate performance • Identify investment needs	Approved by senior leadership; guided by agency policies and public planning process	Less than once per planning cycle
Federal Target	Short-term expected outcome based on programmed projects	• Federal reporting	Approved by senior leadership; guided by agency policies and stakeholder/partner input	Every two years
Expected Outcome	Forecasted outcome based on predictive modeling	• Develop / manage programs • Monitor plan implementation • Promote accountability / initiate corrective action	Generated by expert offices based on performance information and planned improvements	Annually

- Existing Performance Measures and Targets

- Federal Performance Measures and Targets

- Target Terminology

Chapter 4: Inventory & Condition

- Factors Influencing Asset Condition & Performance

- Asset Folios

STATE HIGHWAY SYSTEM ASSETS	UNIT/ COUNT	CURRENT REPLACEMENT VALUE
Pavements Roadway Miles	14,331	$29.4 billion
Bridges	4,801	$14.6 billion
Highway Culverts	40,687	$1.6 billion
Deep Stormwater Tunnels	8	$372 million
Overhead Sign Structures	1,858	$175 million
High-Mast Light Towers	478	$19 million
Noise Walls	434	$374 million
Signals and Lighting (Signal systems and pole mounted lighting)	28,566	$550 million
Pedestrian Infrastructure (Curb ramps and pedestrian bridges)	21,273	$279 million*
Buildings	875	$1.2 billion
Intelligent Transportation Systems	14,310	$151 million
Total	**N/A**	**$48.72 billion**

*Includes all pedestrian infrastructure

BRIDGES (INCLUDING LARGE CULVERTS)

Bridges are large, complex and expensive assets that are custom-designed and built to satisfy a wide variety of requirements. Large culverts 10 feet and greater are also included in the bridge inventory. MnDOT's bridge inventory includes all bridge structures ten feet and greater. There are currently 3,875 bridge structures over 20 feet. The remaining 920 structures are 10 feet or greater but less than 20 feet or are non-automobile bridges.

Figure 4-11: Bridge Inventory and Replacement Value

SYSTEM / FUNCTIONAL CLASSIFICATION	BRIDGE COUNT	BRIDGE DECK AREA (SQ. FT.)	BRIDGE CURRENT REPLACEMENT VALUE	BRIDGE CULVERTS COUNT	BRIDGE CULVERTS CURRENT REPLACEMENT COST
NHS	1,621	31,444,986	$8.8 billion	745	$470 million
Non-NHS	1,377	18,504,855	$5 billion	1,058	$329 million
TOTAL (State Highway)	2,998	49,949,841	$13.8 billion	1803	$799 million

Notes: NHS do not include locally-owned NHS bridges (23); replacement values range from $50/sq. ft. to $820/sq. ft. depending on bridge type, size and complexity; MnDOT has initiated a process to collect locally-owned NHS pavement and bridge data (i.e. material type, AADT, construction and treatment history, design details), and will be developing a solicitation process that aligns with the state-owned NHS investment direction

Figure 4-12: Bridge Age Profile (by deck area in sq. ft.)

- 80+ — 5%
- 60-79 — 10%
- 40-59 — 26%
- 20-39 — 33%
- 0-19 — 26%
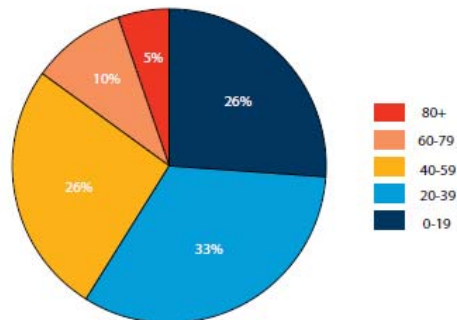
Data Collection, Management, and Reporting Practices

Data Collection:

- Data collection based on National Bridge Inspection Standards (NBIS), AASHTO and MnDOT requirements
- Most bridges are inspected every other year in Minnesota (some more or less frequently based on inspection results)
- Districts perform/supervise inspections with some centralized management and Quality Assurance/Quality Control of data collected

Data Management:

- Structure Information Management System (SIMS) used to enter, submit and manage inspection data
- Bridge Replacement and Improvement Management (BRIM) tools used to analyze data

Data Reporting:

Bridge inspection and inventory reports available through MnDOT's website and the SIMS application

Figure 4-13: Bridge Condition Rating Scale (Based on NBIS Rating Scale)

9	8	7	6	5	4	3	2	1	0
Good 7 - 9			Satisfactory 6	Fair 5	Poor 0 - 4				

Figure 4-14: Bridge Current Condition, Targets, and Investment to Achieve Targets in 2027 Based on State Performance Measures

SYSTEM	2017 CONDITION (% POOR)	TARGETS (% POOR)	INVESTMENT REQUIRED TO ACHIEVE TARGETS
NHS	4.7%	≤ 2%	$1.1 billion
Non-NHS	2.1%	≤ 8%	$430 million
TOTAL	4.3%	NA	$1.5 billion

Note: NHS does not include locally-owned NHS bridges (23)

Federal Bridge Performance Measures and Targets

The federal performance bridge measures are based on NBI condition ratings.

Figure 4-15: Bridge Current Condition, Targets, and Investment to Achieve Targets in 2027 Based on Federal Performance Measures

SYSTEM	2017 CONDITION (% GOOD)	2017 CONDITION (% POOR)	TARGET (% GOOD)	TARGET (% POOR)	INVESTMENT REQUIRED TO ACHIEVE TARGETS
NHS	47.4%	1.5%	TBD	TBD	TBD
TOTAL	NA	NA	NA	NA	TBD

Chapter 5: Risk Management Analysis

Figure 5-1: Key Transportation-Related Risk Factors

RISK FACTOR
Natural events (e.g. floods, storms, earth movement)
Operational hazards (e.g. vehicle and vessel collisions, failure or inadequacy of safety features, construction incidents)
Asset aging effects (e.g. steel fatigue or corrosion, advanced deterioration due to insufficient preservation or maintenance)
Adverse conditions in the economy (e.g. shortage of labor or materials, recession)
Staff errors or omissions in facility design, operations, or provision of services; or defective materials or equipment
Lack of up-to-date information about defects or deterioration, or insufficient understanding of deterioration processes and cost drivers

- Transportation Risks

- MnDOT Risks

- TAMP Risk Assessment

- Emergency Response Events

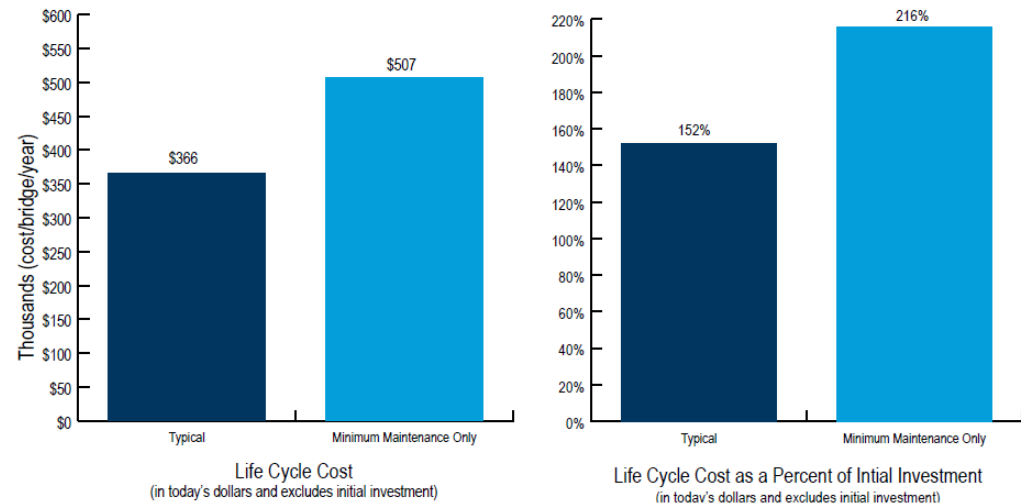| CONSEQUENCE RATINGS	LIKELIHOOD RATINGS AND RISK LEVELS				
	RARE	UNLIKELY	POSSIBLE	LIKELY	ALMOST CERTAIN
CATASTROPHIC	Medium	Medium	High	Extreme	Extreme
MAJOR	Low	Medium	Medium	High	High
MODERATE	Low	Medium	Medium	Medium	High
MINOR	Low	Low	Low	Medium	Medium
INSIGNIFICANT	Low	Low	Low	Low	Medium

Chapter 6: Life Cycle Planning

- Process

- Performance Based Long Range Planning

- Life Cycle Cost Based Project Alternative Selection

- Life Cycle Management Strategies

- Improving Life Cycle Management

Figure 6-10: Life Cycle Management Strategy for Rigid Pavements

TYPICAL PAVEMENT AGE* (YRS)	AGE RANGE** (YRS)	TREATMENT	TYPICAL CONDITION WHEN APPLIED	TYPICAL COST ($/ LN-MI)***	COST RANGE ($/ LN-MI)***
0	0	Initial Construction	-	$450,000^	$450,000-$2,000,000
10	6-20	Reseal joints and partial depth repair	Good	$10,000	$5,000-$15,000
16	13-31	Minor CPR (some full depth repairs)	Fair	$80,000	$55,000-$80,000
26	8-26	Major CPR (and grinding)	Fair	$230,000	$135,000-$230,000
50	46-54	Unbonded Overlay/Reconstruction	Poor	$450,000^	$450,000-$2,000,000
60	56-70	Reseal joints and partial depth repair	Good	$10,000	$5,000-$15,000
66	63-81	Minor CPR (some full depth repairs)	Fair	$80,000	$55,000-$80,000

Figure 6-14: Life Cycle Results (Bridges)

Life Cycle Cost
(in today's dollars and excludes initial investment)

Life Cycle Cost as a Percent of Intial Investment
(in today's dollars and excludes initial investment)

Chapter 7: Performance Gaps

Figure 7-2: Pavement Condition State Targets

System	2017 Condition (% Poor)	Target (% Poor)	10-year Expected Outcome (% Poor)
Interstate	1.1%	≤ 2%	5.3%
Non-Interstate NHS	1.7%	≤ 4%	6.8%
Non-NHS	4.4%	≤ 10%	9.1%

- Federal Targets and Gaps

- Existing Targets and Expected Outcomes

Figure 7-3: Bridge Condition Targets

System	2017 Condition (% Poor)	Target (% Poor)	10-year Expected Outcome (% Poor)
NHS	4.7%	≤ 2%	2.6%
Non-NHS	2.1%	≤ 8%	3.7%

Chapter 8: Financial Plan & Investment Strategies

- Revenue Sources

- Revenue Trends

- Revenue and Inflation

- Funding Program Overview

- Investment Priorities and Direction

- Asset Investment Strategies (by asset and work type)

5/14/2018

Figure 8-9: Yearly Pavement Investment by Work Type
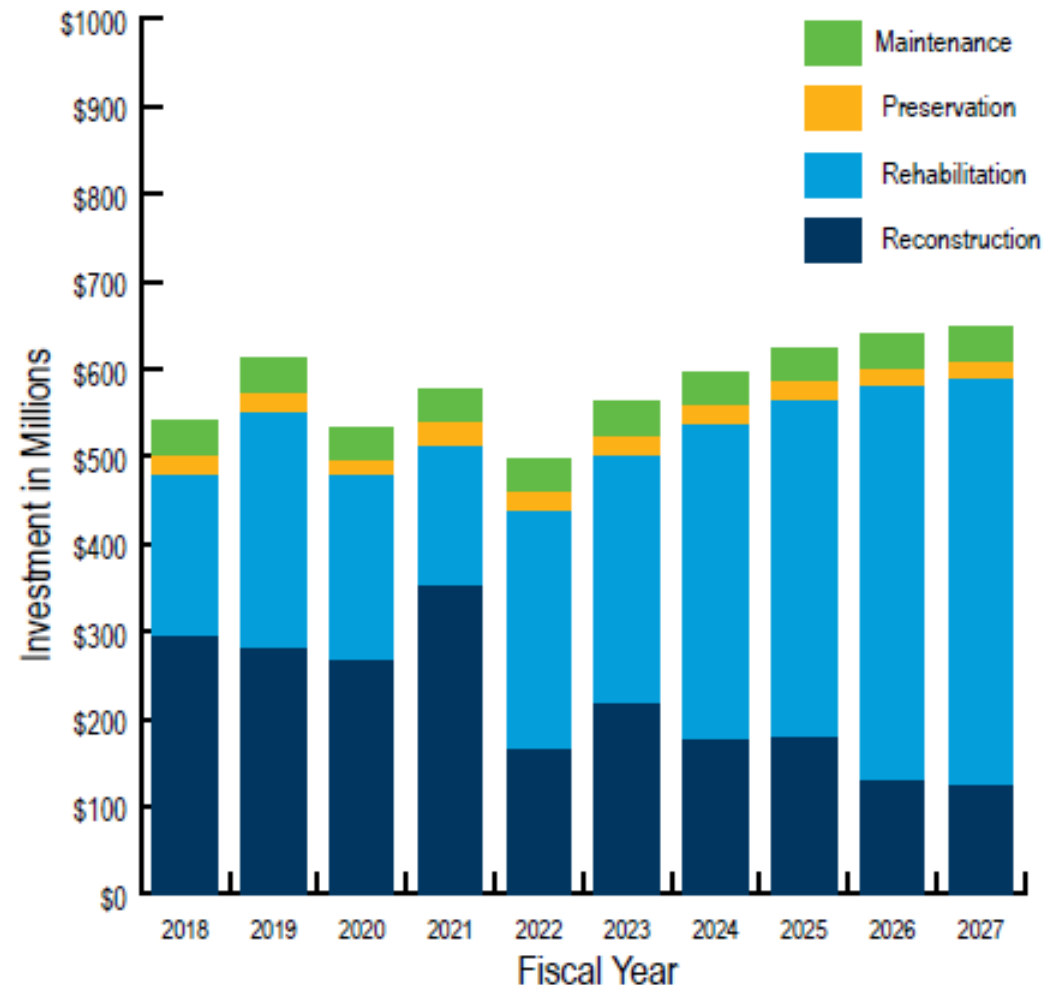
Chapter 9: Implementation & Future Developments

- TAMP Governance

- Implementation Priorities

- Lessons Learned

- Moving Forward

Next Steps

- Risk & target workshops

- Communications plan

- Complete analysis for TAMP2 assets

- Include federal pavement & bridge targets

- Update investment direction from STIP & CHIP

- Asset valuation

Thank You

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