Using Asset Management Planning To Demonstrate Need

11th National Conference on Transportation Asset Management

July 11, 2016

Developing and Refining The Estimate of Need

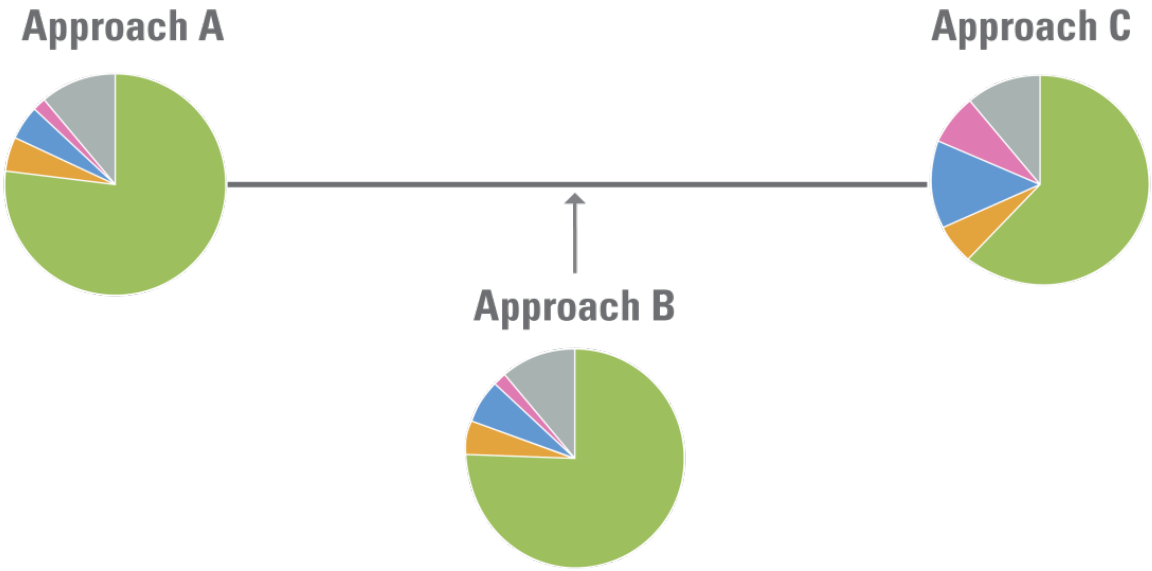
- Minnesota State Highway Investment Plan 2003 to Present.
- Transportation Finance Advisory Committee (2012)
- MAP 21 and the Transportation Asset Management Plan (2013)
- The Governor's Proposal (2015)

State Highway Investment Plan

- 20-Year Planning Horizon
- Fiscally Constrained
- Extensive Public Outreach

State Highway Investment Plan

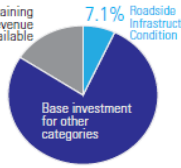
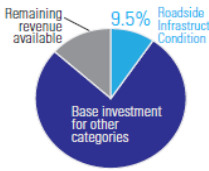
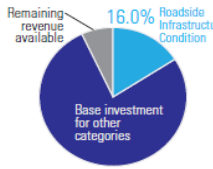
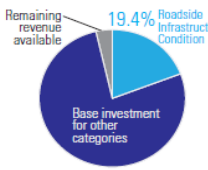
- 20-Year Timeframe
- Fiscally Constrained
- Extensive Public Outreach



Roadside Infrastructure Condition

Overarching Goal: Effectively manage non-pavement and non-bridge asset infrastructure to support a safe, accessible, and reliable roadway system.

Performance Objectives: Install, maintain, replace and upgrade critical infrastructure elements to manage performance and life-cycle costs to improve efficiency and condition, and reduce risks to the public.

	Performance Level 0 *Lowest cost, greatest risk*	**Performance Level 1** *Lower cost, higher risk*	**Performance Level 2** *Greater cost, lower risk*	**Performance Level 3** *Greater cost, lowest risk*
Investment Approach *(See Approaches Folio)*	**Approach A, C**	**Approach B** Approximately corresponds with current investment	PL does not correspond with an Investment Approach	PL does not correspond with an Investment Approach
Investment Level *Total* *Years 5-10 (2022-2027)* *Years 11-20 (2028-2037)*	**$1,157 M** $57.0 M/yr $81.5 M/yr 	**$1,544 M** $76.1 M/yr $108.7 M/yr 	**$2,596 M** $127.9 M/yr $182.8 M/yr 	**$3,149 M** $155.2 M/yr $221.8 M/yr 
Investment Description	Reduction from current funding. Rely primarily on Pavement investment to initiate much of Roadside Infrastructure Condition. Stand-alone work only initiated through maintenance.	Maintain current funding. Rely primarily on Pavement investment to initiate much of Roadside Infrastructure Condition. Some stand-alone work initiated.	Maintain current conditions. Rely on both Pavement investment and stand-alone work to initiate Roadside Infrastructure Condition.	Meet performance targets. Rely on both Pavement investment and stand-alone work to initiate Roadside Infrastructure Condition. Allocate a sizeable amount of funding to replace and repair assets at the end of service life.
Outcomes *To what extent would MnDOT meet performance targets for Roadside Infrastructure Condition?*	• Poor culverts increases to more than 15% • More than 75% of tunnels will be in poor/very poor condition • Reflectivity of most signs below standards - illegible • Significant increase in poor/very lighting, signals, and ITS infrastructure - replacement occurs beyond expected service life • More than 40% of noise walls in poor/very poor condition or older than design life • Significant increase in poor-quality pavement markings	• Meet 3% percent very poor culverts target but poor increases to almost 13% • Tunnels in 50% poor and 24% very poor condition • All signs replaced at or beyond 20 years • Increase in poor/very lighting, signals, and ITS infrastructure - majority of replacements occurs at end of expected service life • 33% of noise walls in poor condition or older than design life • Increase in poor-quality pavement markings	• Culvert condition remains at 3% percent very poor and 10% poor • Tunnels in 23% poor and 1% very poor condition • Signs begin to be replaced at 15 years • Signals replaced to maintain 12% poor and 8% very poor condition, and ITS infrastructure • Majority of ITS and lighting replacements occurs at end of expected service life • 98 noise walls replaced; condition remains at 6% poor and 2% poor for wood and concrete noise walls • 16,000 miles of pavement markings refreshed annually	• Culvert, drainage and tunnel condition at 3% percent very poor and 8% poor • Signs begin to be replaced at 15 years • Signals, lighting, signs/sign structures, and ITS condition at 2% very poor and 4% poor • Noise walls condition at 2% poor • Average pavement markings refreshment decreased to two years with use of more durable material; markings increased from 4" to 6" wide and recessed
Risks	**High** • Replace/repair burden shifts from capital to maintenance budget • Reduced reliability leads to system closures - greater interruptions and increased safety risk • Delayed replace/repair not aligned with optimal life cycle investments results in increased costs • Decreased replace/repair results to an inability to meet public expectations and standards	**Medium** • Replace/repair burden shifts from capital to maintenance budget • Reduced reliability leads to system closures - greater interruptions and increased safety risk • Delayed replace/repair not aligned with optimal life cycle investments results in increased costs • Decreased replace/repair results to an inability to meet public expectations and standards	**Medium** • Delayed replace/repair not aligned with optimal life cycle investments results in increased costs **Low** • Replace/repair burden shifts from capital to maintenance budget • Reduced reliability leads to system closures - greater interruptions and increased safety risk • Decreased replace/repair results to an inability to meet public expectations and standards	**Low** • Replace/repair burden shifts from capital to maintenance budget • Reduced reliability leads to system closures - greater interruptions and increased safety risk • Delayed replace/repair not aligned with optimal life cycle investments results in increased costs • Decreased replace/repair results to an inability to meet public expectations and standards
System Investment Strategies *What strategies would MnDOT use to manage risk?*	• Rely on maintenance budget to keep system in good repair • Respond to non-functional or very poor condition elements only through pavement and bridge investment	• Repair/replace infrastructure in very poor condition or beyond service life • Replace assets with greatest exposure to traveling public through pavement and bridge investment and some stand-alone projects	• Repair failed infrastructure as needed • Replace infrastructure that is functional but damaged/outdated • Invest in preventive repairs to avoid future higher replacement costs	• Repair/replace infrastructure in poor and very poor condition or at end of service life • Long-term replacements made when appropriate • Upgrades and innovations to improve functionality and improve life cycle

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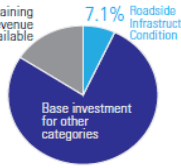
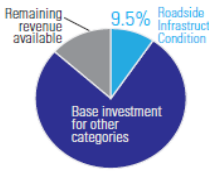
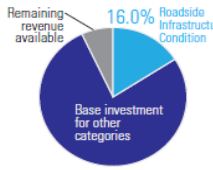
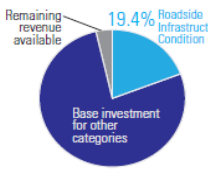
Investment Level *Total* *Years 5-10 (2022-2027)* *Years 11-20 (2028-2037)*	**$1,157 M** $57.0 M/yr $81.5 M/yr 	**$1,544 M** $76.1 M/yr $108.7 M/yr 	**$2,596 M** $127.9 M/yr $182.8 M/yr 	**$3,149 M** $155.2 M/yr $221.8 M/yr 
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Outcomes/ Performance Targets

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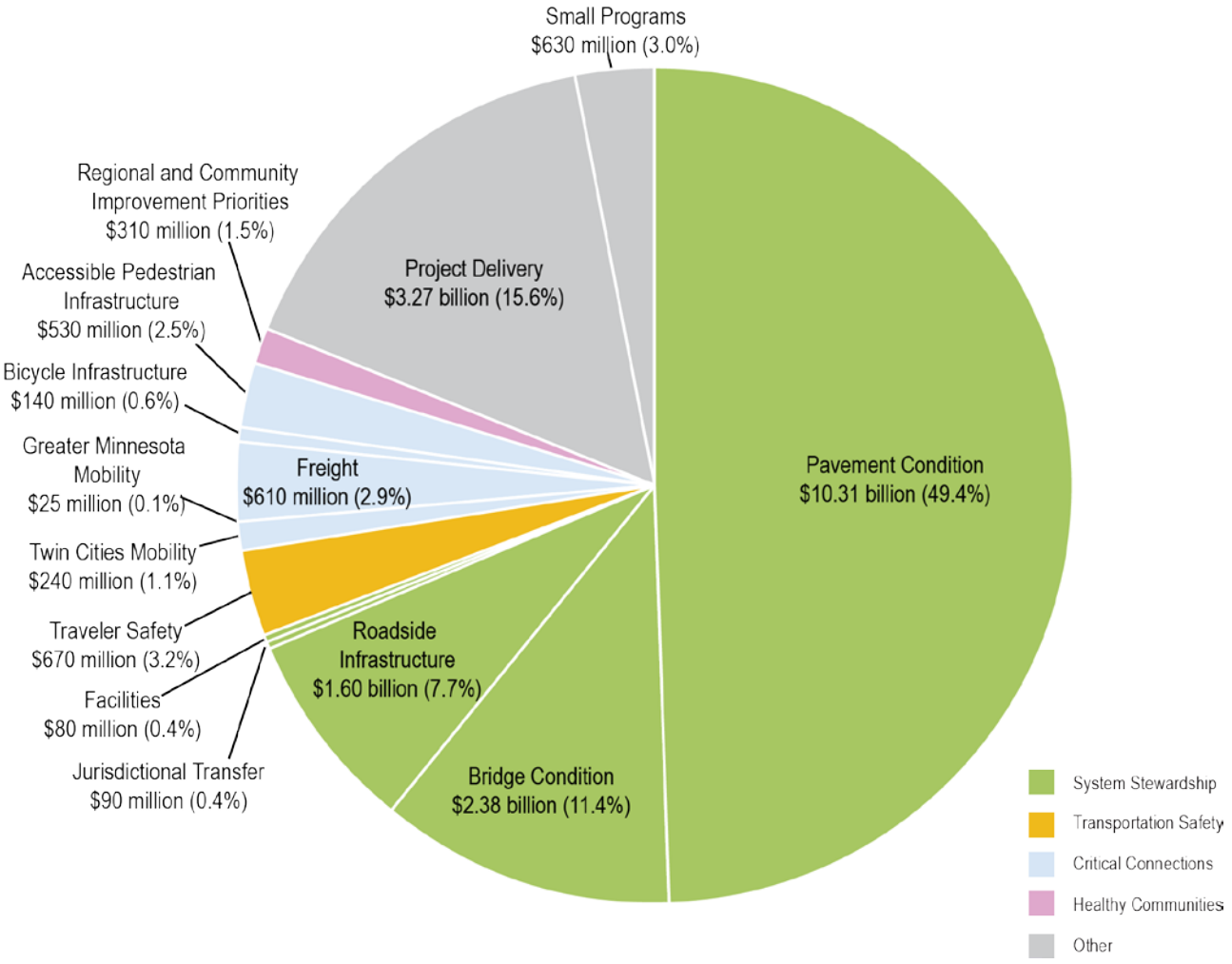
State Highway Investment Plan



MNSHIP Performance Gap

Investment Required to Meet Performance Targets within an Investment Category

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Investment Planned for Investment Category

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Peformance Gap or Unmet Need

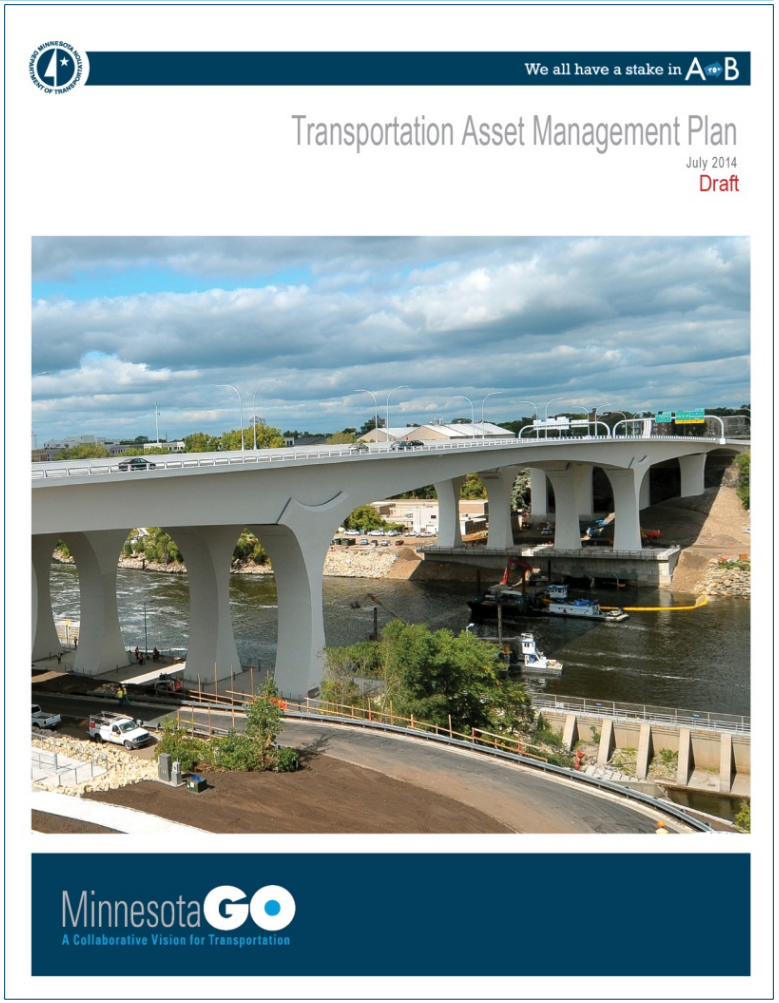
Transportation Finance Advisory Committee

- A Bi-Partisan Task Force Convened in 2011 to Assess Need and Recommend A Path Forward.

- TFAC Reaffirmed Needs as Defined by MnSHIP Without Agreement on How to Address the Need

MAP 21 and Transportation Asset Management Plan

- Asset Inventory/Conditions
- Objectives/Measures
- Performance Gap Assessment
- Lifecycle Cost
- Risk Analysis



Asset Management plan scope

- Pavement
- Bridge
- Drainage structures
  - Highway culverts
  - Deep storm water tunnels
- Guardrails
- Traffic signals
- Signs
- Overhead sign structures
- Pavement markings
- ITS
- Pedestrian ramps
- Lighting
- High-mast light tower structures
- Land
- High-mast light tower structures
- Land
- Rest areas
- Sidewalks
- Retaining walls
- Tunnels
- Noise barrier
- Fencing
- Weigh stations
- ADA infrastructure
- Modal infrastructure
- Transit vehicles

Asset folios: Pavements example

PAVEMENTS

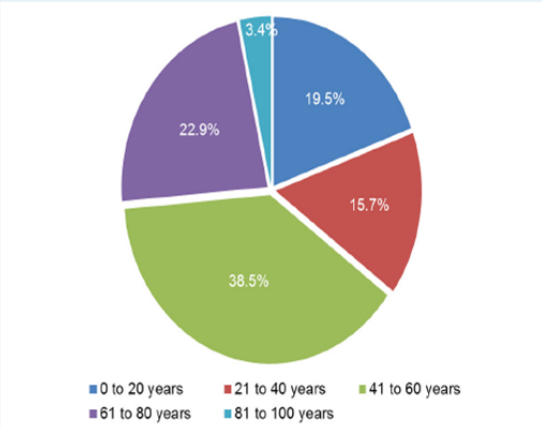
Pavements are a critical part of MnDOT's transportation network, providing mobility and access to a wide range of users. MnDOT's system consists of two types of pavements: flexible and rigid. Flexible pavements are often referred to as bituminous or black top, while rigid is commonly referred to as concrete. The state system consists of Interstates (e.g. I-94, I-35), non-Interstate NHS (e.g. Hwy 14, Hwy 169), and non-NHS highways (e.g. Hwy 75, Hwy 218). The entire state highway system is considered in all of the analyses (life-cycle cost analysis, risk management, financial plan and investment strategies) performed as a part of this TAMP.

INVENTORY AND REPLACEMENT VALUE

SYSTEM / FUNCTIONAL CLASSIFICATION	FLEXIBLE ROADWAY MLES	RIGID ROADWAY MILES	TOTAL ROADWAY MILES	TOTAL LANE-MILES	CURRENT REPLACEMENT VALUE
Interstate	925	896	1,821	4,036	$4.04 billion
Non-Interstate NHS	4,660	1,114	5,774	11,759	$11.76 billion
Non-NHS	6,569	167	6,736	13,567	$13.57 billion
TOTAL	**12,154**	**2,177**	**14,331**	**29,362**	**$29.36 billion**

Notes: Interstate and Non-Interstate NHS do not include locally-owned NHS roadways (232 roadway miles); current replacement value based on $1 million per lane-mile

PAVEMENT AGE PROFILE (BY LANE-MILE)



DATA COLLECTION, MANAGEMENT, AND REPORTING PRACTICES

Data Collection:

- Automated data collection performed annually on all state highways
- Ride condition and surface distresses collected
- Shoulders and ramps not surveyed
- Office of Road Research responsible for data collection

Data Management:

- Highway Pavement Management Application (HPMA) used to managed inventory and condition data
- Pavement condition deterioration models, project selection handled through HPMA

Data Reporting:

- Pavement condition report published annually by MnDOT Pavement Management Unit
- Data available on MnDOT's website

CONDITION RATING SCALE BASED ON RIDE QUALITY INDEX (RQI)

Good: 3.0 < RQI ≤ 5.0	Fair: 2.0 < RQI ≤ 3.0	Poor: RQI ≤ 2.0

CONDITION, TARGETS, AND 10-YEAR INVESTMENT LEVELS

SYSTEM	2012 CONDITION (% POOR)	TARGETS (% POOR)	INVESTMENT REQUIRED TO ACHIEVE TARGETS IN 2023
Interstate	2.4%	≤ 2%	$392 million
Non-Interstate NHS	4.3%	≤ 4%	$1.1 billion
Non-NHS	7.5%	≤ 10%	$1.4 billion
TOTAL	NA	NA	$2.9 billion

Note: Interstate and non-interstate NHS do not include locally-owned NHS roadways (232 roadway miles)

The Governor's Proposal

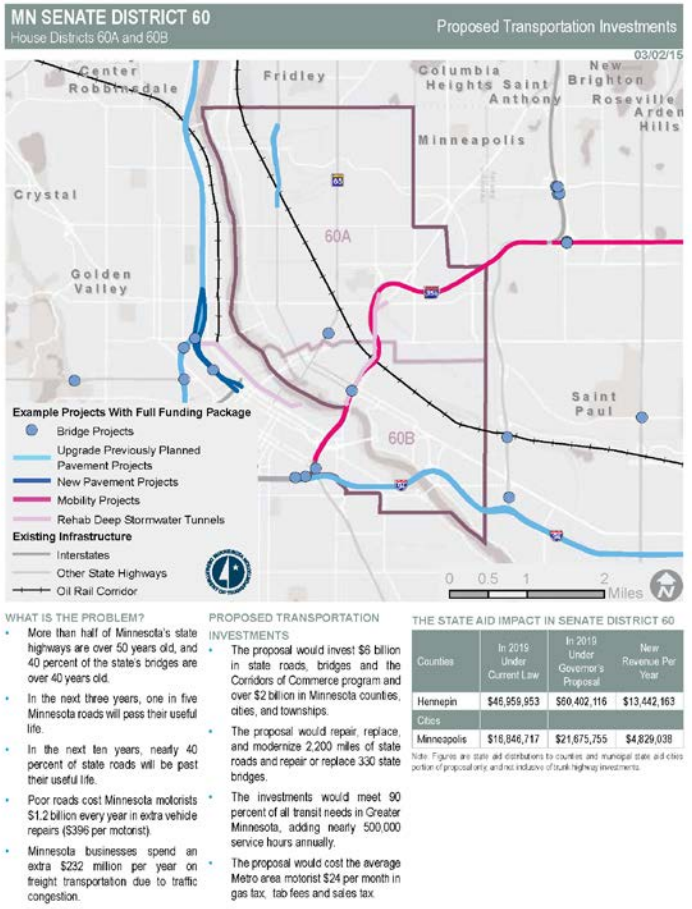
- Publish an Illustrative 10-Year List of Projects
- Include Enhancing Planned Projects and Adding New Projects
- Present Outcome of Investments

Credit: Star Tribune

The Governor's Proposal

- Projects and Outcomes Mapped at the Legislative District Level

- To Be Continued…



Lessons Learned

- Asset Management Planning is an Iterative and Long Term Pursuit

- Asset Management Planning Provides Quantified and Specific Answers to the Question of Need

Thank you

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