Asset Management and Planning *@ MnDOT*

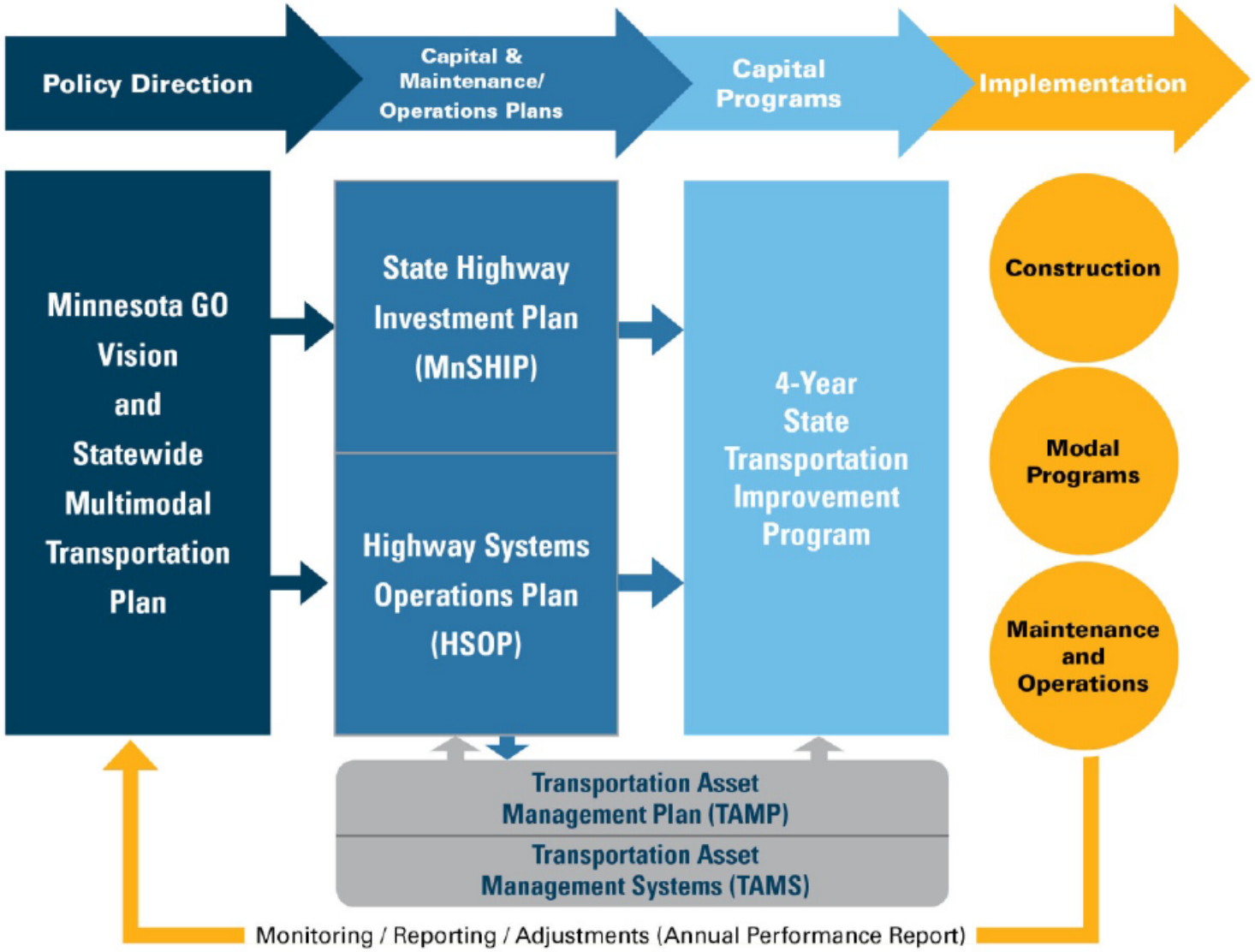
Asset Management Peer Exchange

Santa Fe, NM

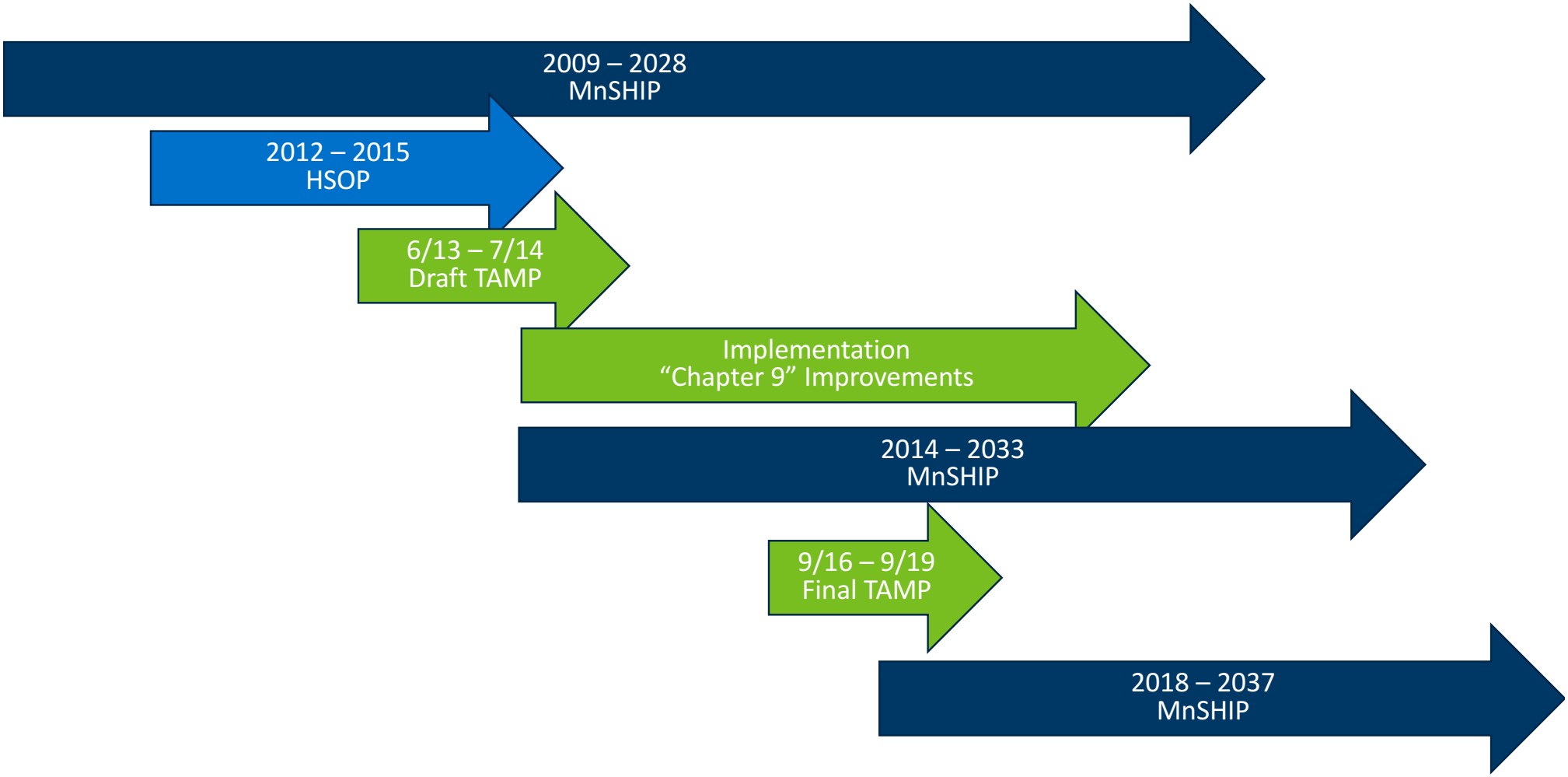
November 7th, 2017

DEPARTMENT OF TRANSPORTATION

MnDOT TAM Investment Planning



MnDOT Investment Planning



MnDOT Asset Management Coordination

Investment Planning Historically Collaborative, Integrated:

- MinnesotaGO = 50 Year Vision
- MnSHIP = Investment decisions
- Performance Based since 2003
- Financially Constrained Scenarios
- Asset Managers/Expert Offices/Tech work groups – Pavt., Bridge, Hydraulics, ITS, etc.
- Investment Planners
- Asset Management Team (maintenance implications)
- Districts Managers and Planners
- Public input – Area Transportation Partnerships, Public Forums

MnDOT Asset Management Coordination

TAMP influence on MnSHIP 2014:

- Much same for Pavement, Bridge. (Performance Based, Financially Constrained)
- Stronger “Asset Management” focus and commitment
- “Roadside Assets” New for 2014
  - Culverts, Storm Tunnels, ITS, Signage, Pavt. Markings
  - Discrete Investment Levels Set
- TAMP – Performance Measures for Roadside Assets developed

MnDOT Asset Management Coordination

TAMP influence on MnSHIP 2018:

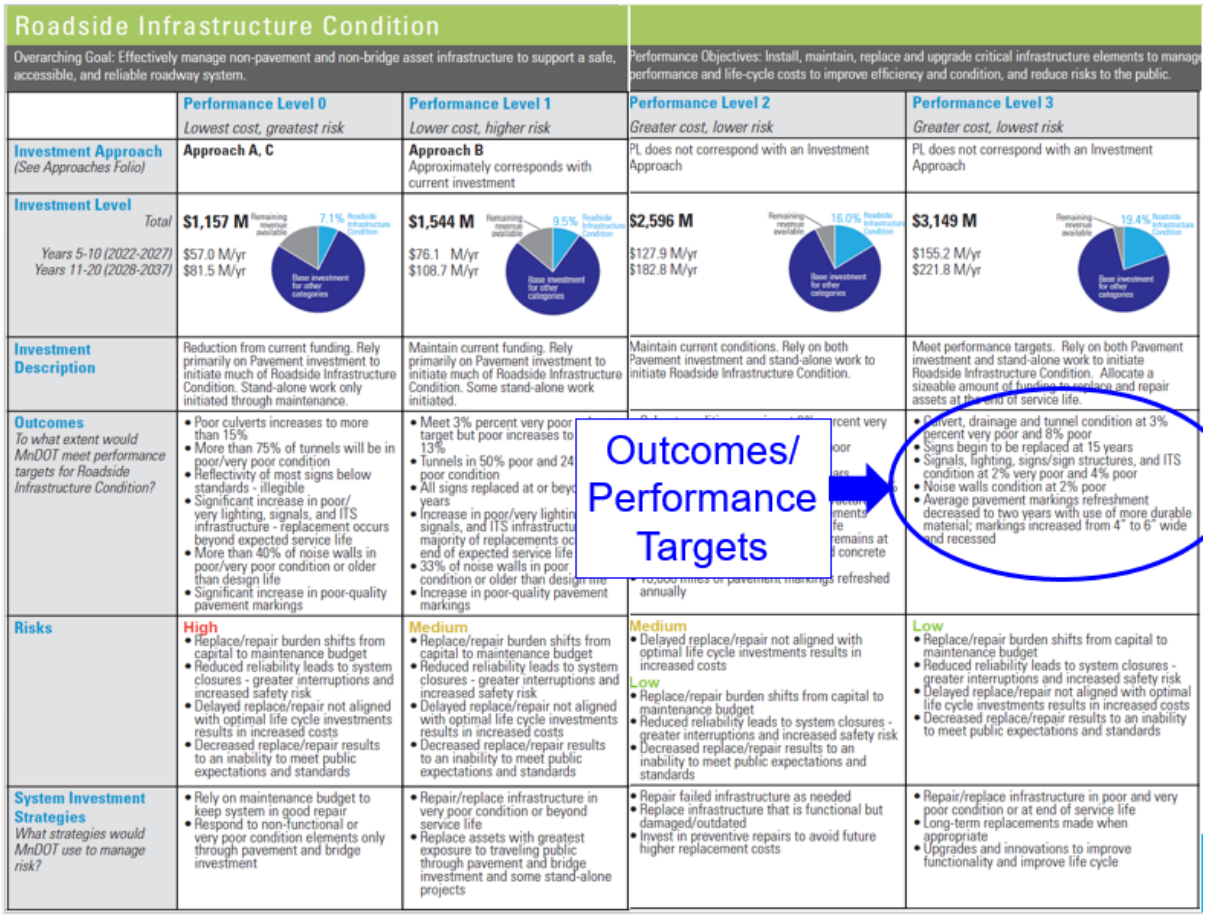
- Much same for Pavement, Bridge. (Performance Based, Financially Constrained)
- Retained “Asset Management” focus and commitment
- “Roadside Assets” for 2018
  - More data available, more robust analyses’
  - Higher confidence in investment levels, improved performance ($’s reduced slightly)
- Operational Impacts (next slide)

MnDOT Asset Management Coordination

TAMP influence on MnSHIP 2018:

- Operational Impacts:
  - First ever direct application of condition based “Maintenance” (internal) cost models
  - Pavement and Bridge forecast conditions
  - Unconstrained demand
  - Minor in Relation to Capital $’s
  - Major in Relation to Operating Budget $’s

MnDOT Asset Management
Capital Investment Scenarios Example



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 target but poor increases to 13% • Tunnels in 50% poor and 24 poor condition • All signs replaced at or beyo years • Increase in poor/very lightin signals, and ITS infrastructu majority of replacements oc end of expected service life • 33% of noise walls in poor condition or older than design life • Increase in poor-quality pavement markings	• rcent very • oor • ars • ments • fe • emains at • l concrete • 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

Can now associate future maintenance cost with predicted conditions/scenarios

MnDOT Asset Management Coordination

Asset Management Governance:

- Asset Management Steering Committee (AMSC)
  - Envisioned in 2012 by department leadership
  - Codified in “Chapter 9” of Draft TAMP
  - Cross –divisional membership by Assistant Division Directors
  - Cross-functional leaders
    - Investment planners
    - Maintenance Business
    - Engineering Services

MnDOT Asset Management Coordination

TAMS (Transportation Asset Management System)

- Application Focused on Roadside Assets
  - Traffic Barrier, Hydraulics, Sign, Noise Walls, Pavt. Markings, (everything not Pavt. and Bridge)
  - Integration with existing Pavt. And Bridge sytems
  - Maintenance Management
- Information Available Across Silos
  - Asset Managers/Expert Offices
  - Operations Managers
  - Planners (Central and District)
  - Others?

What Else Needs to be done…

- MnDOT Recently completed a “GAP” study. 6 Recs:
  1. Formalize AM Policy
  2. Modify Pavement Measures to Incentivize PM
  3. Establish/Document Maintenance Priorities
  4. ID data needed for TAMS
  5. Develop a Maintenance Plan for TAMS Data
  6. Develop Robust Asset Valuation/Remaining Service Life

What Else Needs to be done…

- Tradeoff Approach
  - Still quite a ways off from project based tradeoff
  - Investment Category tradeoffs within reach
    - Measures, Targets, Investment Scenarios, Pairwise Ranking
- More formal Capital vs Maintenance relationship
  - Broader Maintenance Cost Modeling
  - Outputs affect decisions (vs for information only)

What Else Needs to be done…

- TAMP and MNSHIP
  - Determine Overlaps, reduce redundancies
  - Internal discussions starting, need to work with Division
- More formal application of lowest LCC best practices
  - Development of tools and data for maintenance work planning:
    - Pavement, Bridge, Culverts, Signals, ITS, Noise Walls all subject to PM

MnDOT TAM Investment Strategies

Statewide - 14,330 Roadway Miles

Investment Category		2014	2015	2016	2017	STIP Total	% Total
Asset Management	Pavement Condition	$352.2 M	$292.9 M	$251.8 M	$266.2 M	**$1,163.1 M**	**37%**
	Bridge Condition	$193.7 M	$177.1 M	$148.7 M	$238.2 M	**$757.7 M**	**24%**
	Roadside Infrastructure Condition	$77.6 M	$84.6 M	$81.9 M	$48.9 M	**$292.9 M**	**9%**
Traveler Safety		$30.6 M	$24.9 M	$22.3 M	$38.5 M	**$116.2 M**	**4%**
Critical Connections	Interregional Corridor Mobility	$0	$0	$0	$0	**$0**	**0%**
	Twin Cities Mobility	$38.3 M	$34.8 M	$45.1 M	$48.1 M	**$166.3 M**	**5%**
	Bicycle Infrastructure	$7.5 M	$11.0 M	$7.3 M	$6.4 M	**$32.1 M**	**1%**
	Accessible Pedestrian Infrastructure	$12.0 M	$9.9 M	$15.4 M	$10.2 M	**$47.5 M**	**2%**
Regional + Community Improvement Priorities		$71.3 M	$55.4 M	$14.4 M	$17.1 M	**$158.3 M**	**5%**
Project Support		$144.9 M	$103.4 M	$97.7 M	$67.7 M	**$413.8 M**	**13%**
Total		**$928.1 M**	**$793.9 M**	**$684.5 M**	**$741.3 M**	**$3,147.8 M**	

MnDOT TAM Investment Strategies

Where are we headed?

System	2016 Actual Pavement Condition (2016 data)	2021 Predicted Pavement Condition (2018-2021 STIP)	2027 Predicted Pavement Condition (2022-2027 CHIP)
Statewide (14,316 miles)	3.5% Poor **503 miles**	7.2% Poor **1,034 miles**	7.6% Poor **1,091 miles**
Interstate (1,820 miles)	1.5% Poor **28 miles**	3.9% Poor **72 miles**	5.3% Poor **95 miles**
Other NHS (5,819 miles)	2.0% Poor **115 miles**	5.9% Poor **350 miles**	6.8% Poor **399 miles**
Non-NHS (6,677 miles)	5.5% Poor **366 miles**	9.3% Poor **610 miles**	9.1% Poor **597 miles**