Pavement & Asset Management: A State Perspective

Focusing on MAP-21

2015 TERRA Pavement Conference
February 12, 2015

We all have a stake in A to B

MnDOT Pavement Performance Measures

▸ MnDOT has had pavement condition measures and targets since 2000.

▸ Pavement measure is the Ride Quality Index (RQI) based on the left wheel path roughness

▸ Targets are based on the percent of miles in Good (RQI >= 3.0) and Poor (RQI <= 2.0) condition

▸ The system is broken into two functional class groups:
  ◦ Principal Arterial (includes Interstates)
  ◦ Non-Principal Arterial

MAP-21

▸ MAP-21, "Moving Ahead for Progress in the 21st Century" was signed into law by President Obama on July 6, 2012.

▸ FHWA will establish performance measures for pavement conditions on the Interstate and National Highway System (NHS).

▸ MAP-21 requires each State to maintain minimum standards for Interstate pavement and bridge conditions, set by FHWA.

▸ As of January 2015:
  ◦ Measures will include **roughness, rutting, faulting, and percent cracking**
  ◦ No more than **5%** of a State's Interstate system can be in **Poor** condition

MAP-21 versus MnDOT
Pavement Performance Measures

- <u>International Roughness Index</u>

- Average of <u>both wheel paths</u>

- <u>0.1 mile</u> segments

- <u>One side</u> of divided roads

- Poor:
  - IRI > 170 in/mile, population < 1M
  - IRI > 220 in/mile, population >= 1M
  - Percent Cracking > 10%
  - Rutting > 0.4 inches
  - Faulting > 0.15 inches

- <u>Ride Quality Index</u>

- <u>Left wheel path</u>

- <u>~1 mile</u> segments

- <u>Both sides</u> of divided roads

- Poor:
  - RQI <= 2.0
  - IRI > 190 inches/mile for HMA
  - IRI > 168 inches/mile for PCC

MAP–21

MnDOT

Minnesota Trunk Highway System

Before MAP–21		
System	Miles	Percent
Principal Arterial	7,633	53.3%
Non–Principal Arterial	6,674	46.7%
Total	14,308	100.0%

Since MAP–21		
System	Miles	Percent
Interstate	1,821	12.7%
Other NHS	5,812	40.6%
Non–NHS	6,674	46.7%
Total	14,308	100.0%

Targets...

Before MAP-21

System	Good Target	Poor Target
Principal Arterial	70% or more	2% or less
Non–Principal Arterial	65% or more	4% or less

Interim MAP-21 Targets

System	Good Target	Poor Target
Interstate	70% or more	2% or less
Other NHS	65% or more	4% or less
Non–NHS (old NPA)	60% or more	10% or less

MAP-21

- Meetings began in the fall of 2012 to discuss what MnDOT should do regarding MAP-21.

- It was decided to try and improve the pavement conditions prior to the actual rule making in hopes of providing more flexibility.

- $164M in new and $56M of upgraded NHS projects and $56M of new Non-NHS projects were added to the 2014-2017 STIP.

- Predicted impact was a reduction in the statewide percent of miles in Poor condition from 9.1% to 5.2% by the end of 2016.

- Two Programming Categories were established, SPP & DRMP

MnDOT Programming

- **Statewide Performance Program (SPP)**
  - Pavement management and district staff identify projects on the NHS to meet state/national targets
  - Current budget for 2019-2023 averages $155M per year

- **District Risk Management Program, DRMP**
  - Districts identify projects off the NHS based on local needs and risks
  - Pavement management estimates the outcome
  - Current budget for 2019-2023 averages $140 per year

How are projects chosen?

▸ **Initial run was done in 2012 to determine the amount of funding needed to meet the targets for ten years**

- ◦ **Interstate:** **$40M/year**
- ◦ **Other NHS:** **$115M/year**
- ◦ **Non-NHS:** **$140M/year**

▸ **The Pavement Management System (PMS) was used to create an initial list of potential projects.**

▸ **District materials engineers reviewed and modified the list.**

▸ **The final project list was plugged into the PMS to determine the expected conditions.**

Highway Pavement Management Application (HPMA)

MnDOT Pavement Management System

Predicting Future Roughness

Index

Project: 2001 Thick Overlay

Project: 2004 Crack Seal
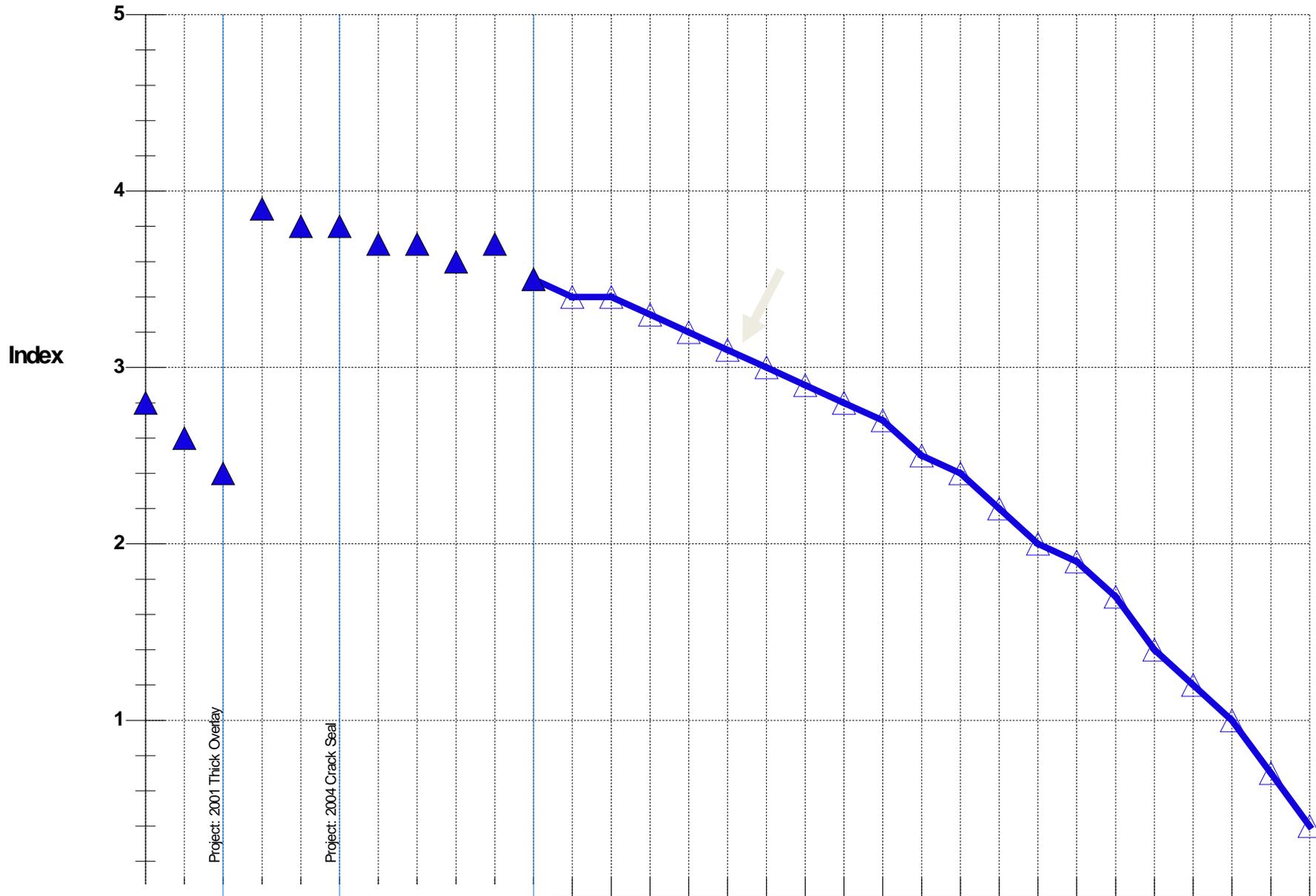
Predicting Future Cracking
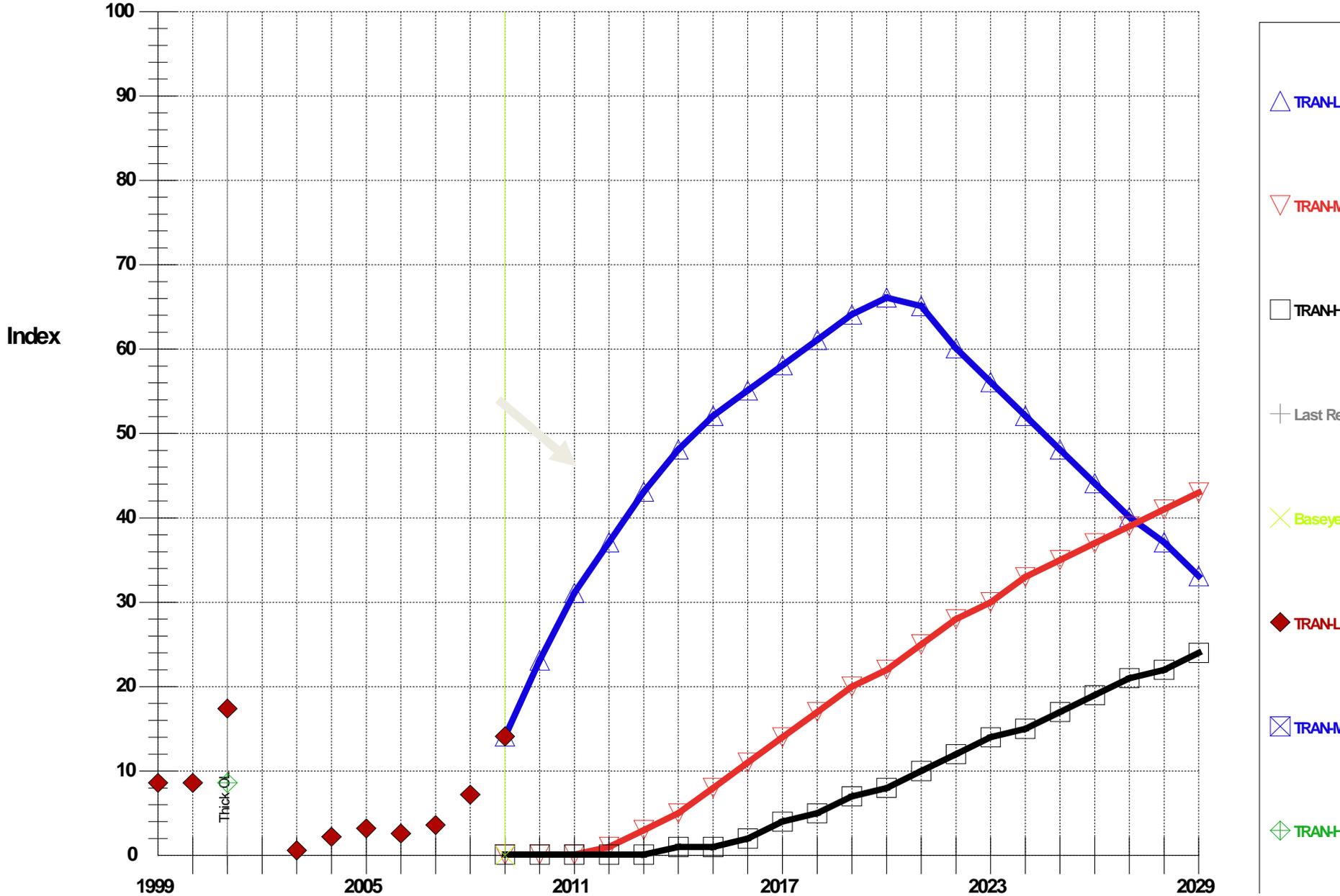
Predicting the Impact of Projects
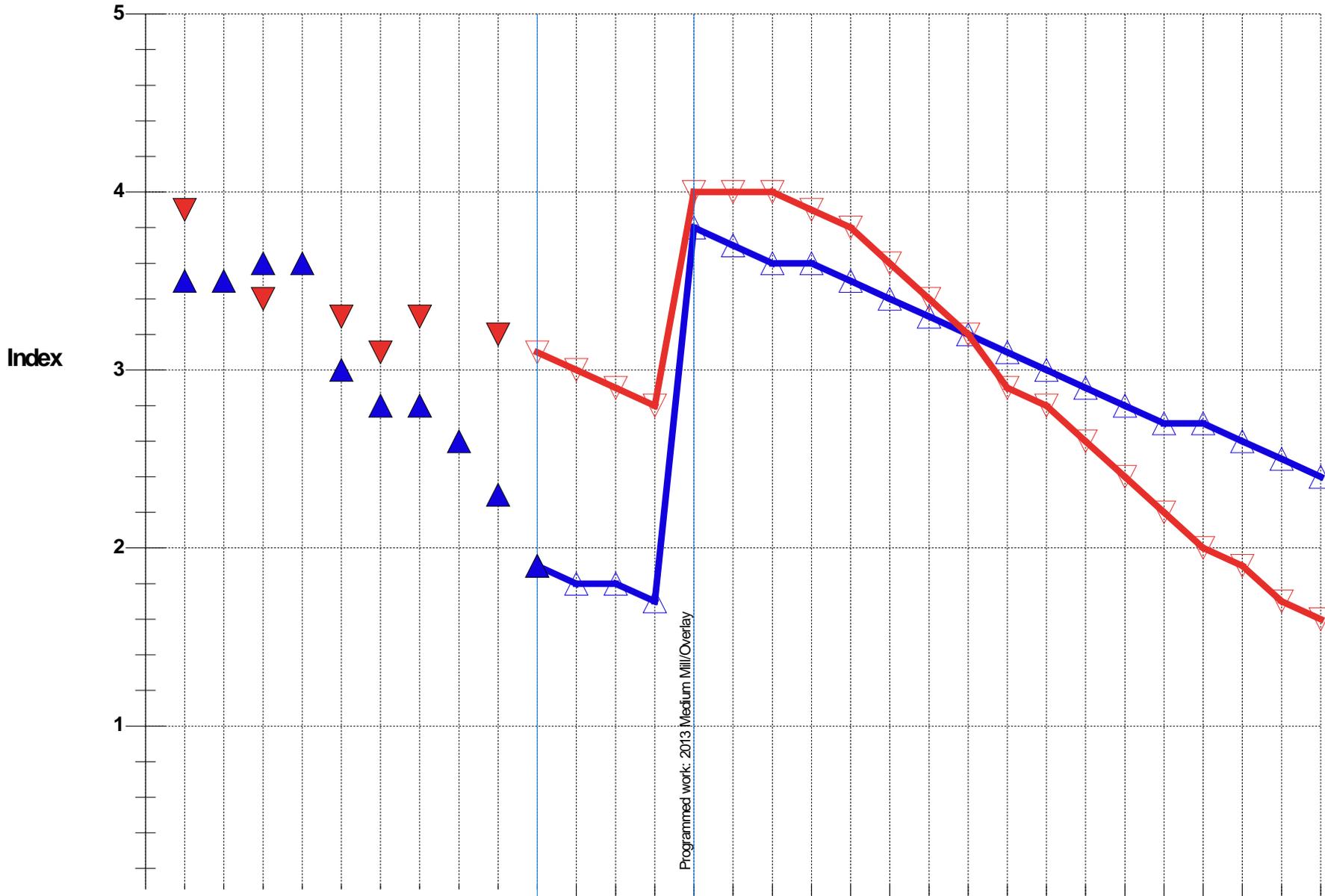
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Programmed work: 2013 Medium Mill/Overlay
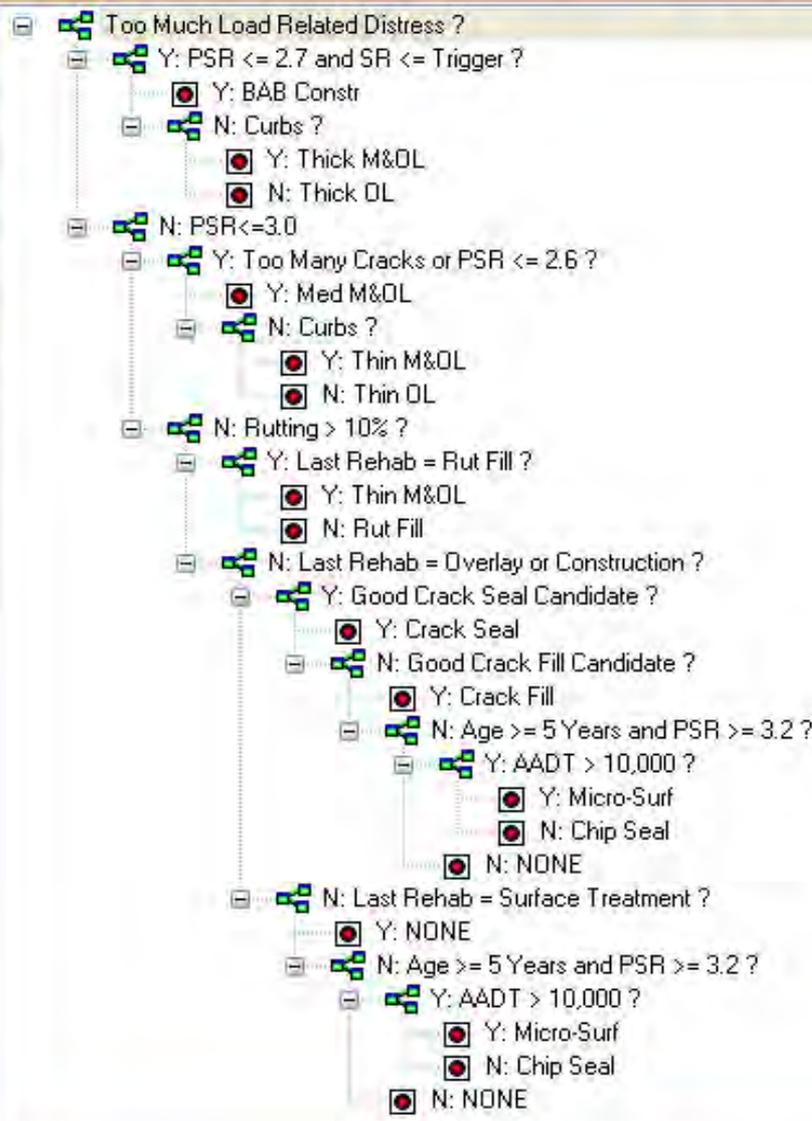
Decision Trees use the predicted conditions to identify projects

Effectiveness = Area Between Curves
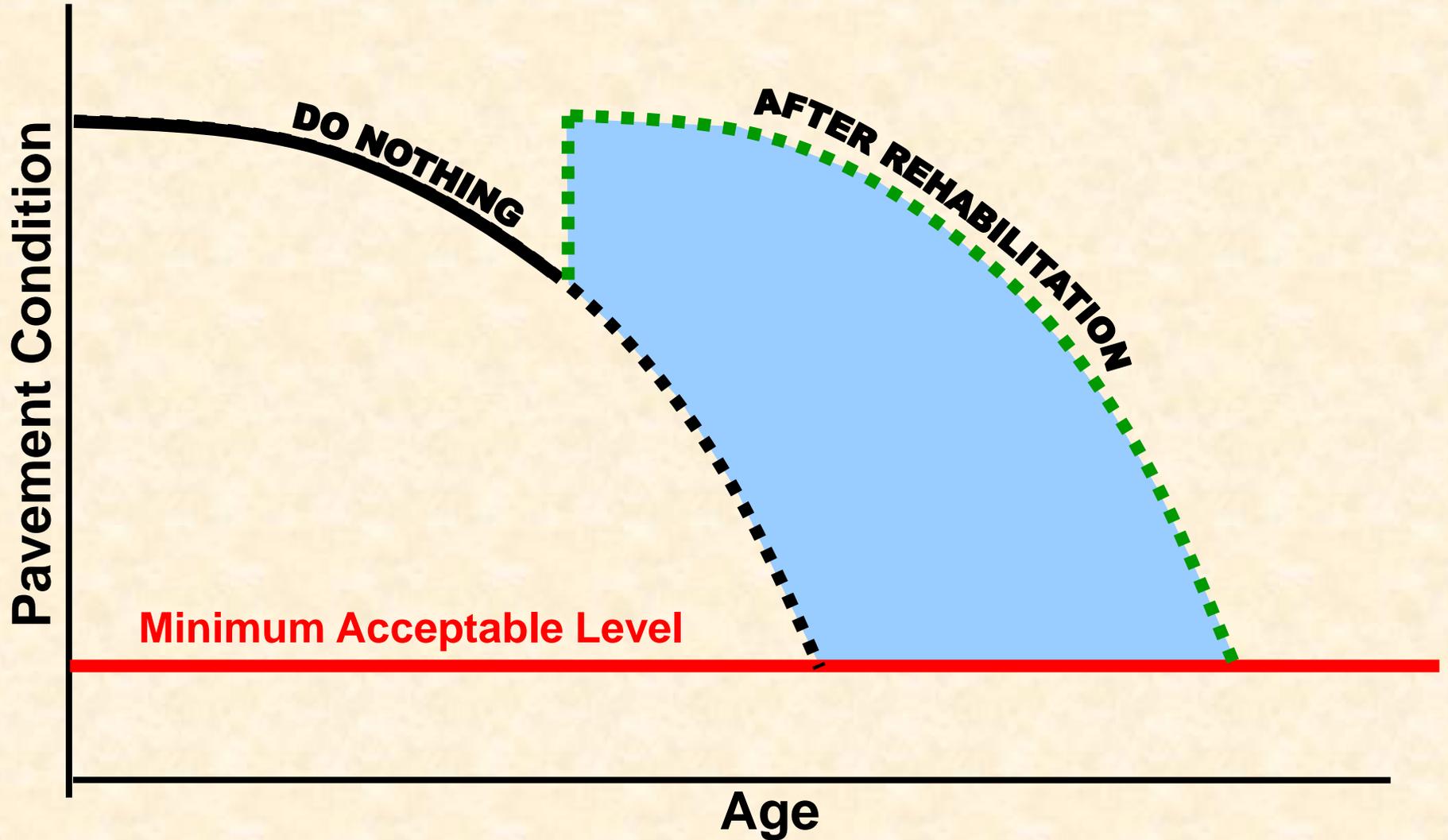
Sample Results

ATP	District	Rtype	Rnum	Aux	Dir	Year	Description	From	To	Activity	Cost
3	3	IS	94		D	2020	STEARNS/WRIGHT CO LINE	178+0.173	192+0.520	Unbonded Overlay	$ 13,000,000
3	3	IS	94		I	2021	STEARNS/WRIGHT CO LINE	178+0.173	192+0.520	Unbonded Overlay	$ 13,000,000
4	4	IS	94		D	2022	Ottertail/Grant Co Line to TH-79	71+0.426	83+0.070	Major CPR/Grind	$ 6,000,000
6	6	IS	35		D	2019	.1 MI N TH-21	59+0.177	62+0.769	Medium Mill/Overlay	$ 1,461,508
6	6	IS	90		D	2019	NEAR TH-61/DAKOTA	271+0.233	275+0.475	Medium Mill/Overlay	
6	6	IS	90		I	2019	NEAR TH-61/DAKOTA	271+0.233	272+0.259	Medium Mill/Overlay	$ 4,038,451
6	6	IS	90		I	2022	EB from CSAH 46 to MN 105	166+0.218	175+0.812	Medium Mill/Overlay	$ 4,700,000
6	6	IS	90		D	2019	TH-13	154+0.568	166+0.218	Medium Mill/Overlay	$ 4,900,000
7	7	IS	90		I	2019	RP 58	58+0.000	65+0.541	Medium Mill/Overlay	$ 3,664,672
7	7	IS	90		D	2022	TH-15/FAIRMONT	102+0.166	113+0.705	Thick Mill/Overlay	$ 11,608,002
7	7	IS	90		I	2022	TH-15/FAIRMONT	102+0.166	113+0.783	Thick Mill/Overlay	
7	7	IS	90		D	2022	0.2 MI E CSAH-1	113+0.705	117+0.911	Medium Mill/Overlay	$ 3,870,858
7	7	IS	90		I	2022	0.2 MI E CSAH-1	113+0.783	117+0.911	Medium Mill/Overlay	
M	M	IS	35	W	D	2019	Portland to Washington	16+0.360	18+0.100	Thin Mill/Overlay	$ 2,274,232
M	M	IS	35	W	I	2019	Portland to Washington	16+0.360	18+0.100	Thin Mill/Overlay	
M	M	IS	35	W	D	2019	0.5 MI N CR J to Sunset	31+0.212	34+0.850	Unbonded Overlay	$ 13,837,303
M	M	IS	35	W	I	2019	0.5 MI N CR J to Sunset	31+0.212	34+0.850	Unbonded Overlay	

MAP-21 Process

10 Year Plan

**2015-2018
STIP**

**2019-2024
Work Plan**

MAP-21 Process for NHS

Districts review the project scope and cost estimate for Year-5 projects → Adjustments are made based on the budget → Remaining projects in the 10-year plan are reviewed using the latest data

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Make adjustments and run the predictions ← District reviews/edits the list ← Run analysis to generate a new Year-10 list

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Revise as needed → STIP and Work Plan finalized
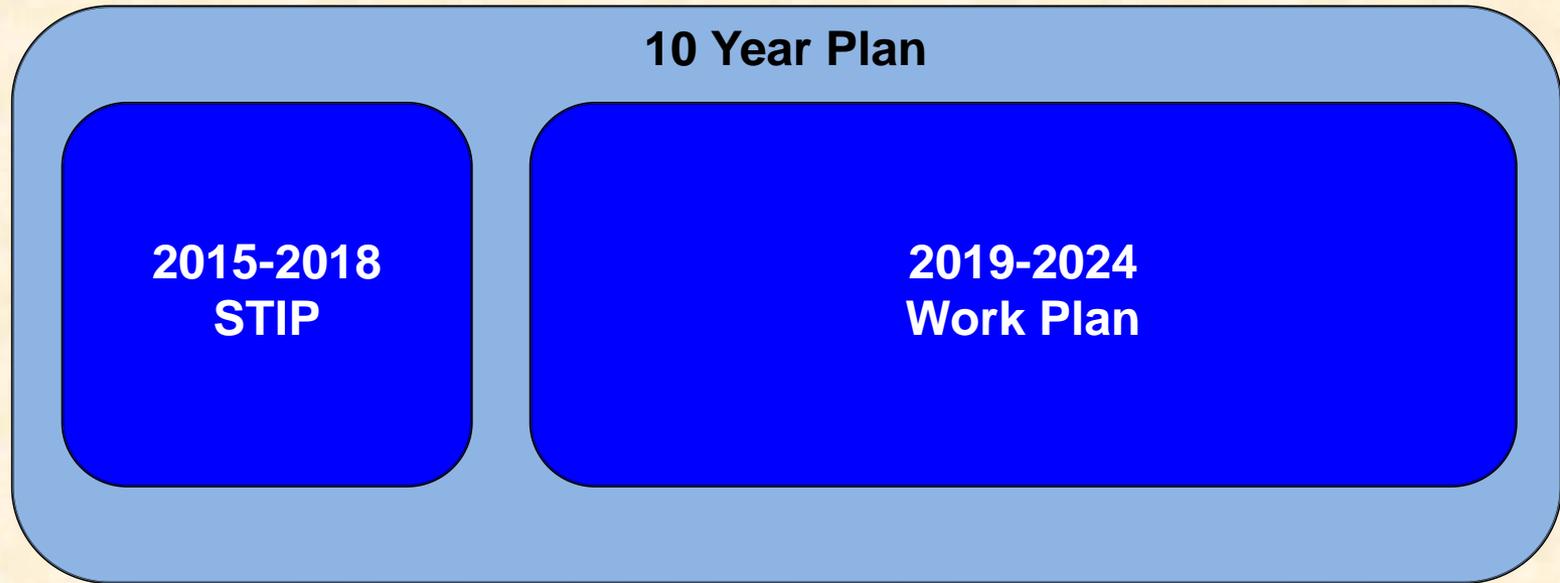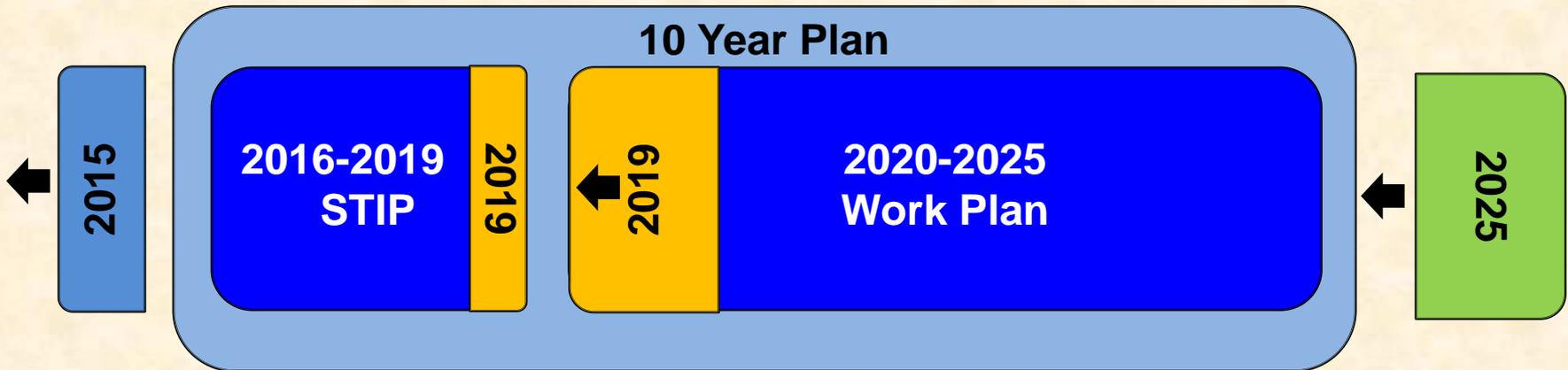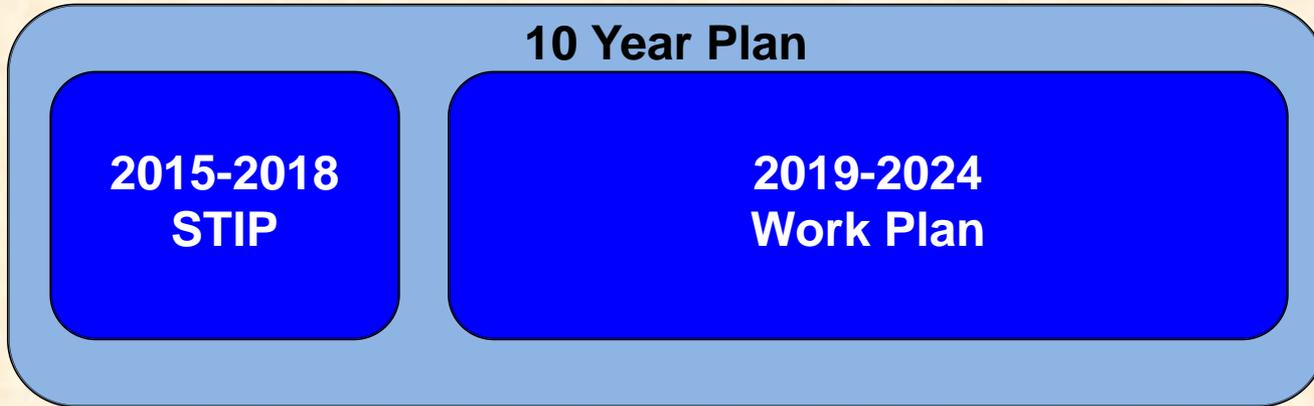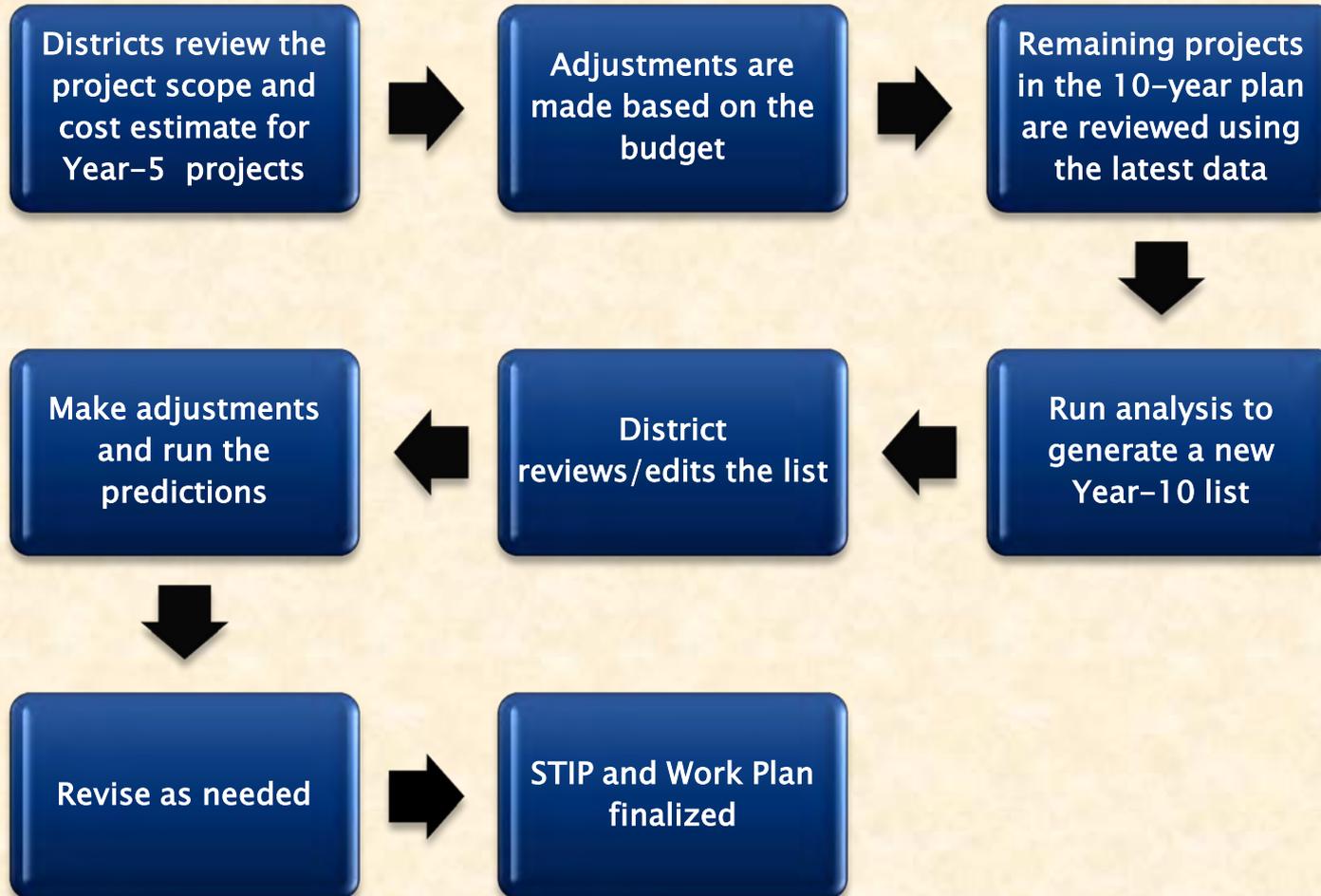
Statewide "Good" Ride Quality Index
(Miles with RQI > 2.0)
Actual 2005-2014, Predicted 2015-2022

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Interstate	59.6%	64.7%	64.1%	61.9%	62.0%	73.1%	69.8%	72.9%	75.2%	75.9%	74.1%	76.3%	75.3%	76.5%	77.7%	76.7%	74.8%	73.4%
Other NHS	69.2%	70.3%	67.0%	68.7%	64.2%	69.3%	66.5%	68.1%	71.0%	70.9%	68.9%	67.6%	67.3%	66.8%	67.7%	66.9%	64.8%	63.3%
Non-NHS	60.1%	61.1%	59.1%	60.2%	55.3%	59.8%	58.6%	61.7%	62.5%	67.2%	65.0%	63.1%	62.9%	62.7%	64.7%	66.0%	66.7%	66.6%

Predicted Condition based on 2015-2018 STIP Projects

Predicted Condition based on 2019-2022 Work Plan Projects

Statewide "Poor" Ride Quality Index
(Miles with RQI <= 2.0)
Actual 2005-2014, Predicted 2015-2022

Predicted Condition based on 2015-2018 STIP Projects

Predicted Condition based on 2019-2022 Work Plan Projects

Percent of Roadway Miles

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Interstate	4.0%	4.1%	2.9%	5.0%	7.0%	3.4%	3.9%	2.4%	2.4%	1.9%	2.2%	2.9%	3.9%	4.2%	4.4%	4.1%	4.6%	4.6%
Other NHS	2.1%	1.9%	2.6%	2.9%	5.0%	3.8%	5.1%	4.3%	2.9%	3.0%	2.9%	3.6%	3.9%	3.9%	4.2%	5.0%	5.5%	6.4%
Non-NHS	4.8%	5.2%	6.5%	5.9%	8.5%	6.8%	8.6%	7.5%	6.8%	4.4%	5.3%	6.9%	8.4%	10.3%	9.7%	9.3%	9.5%	8.9%
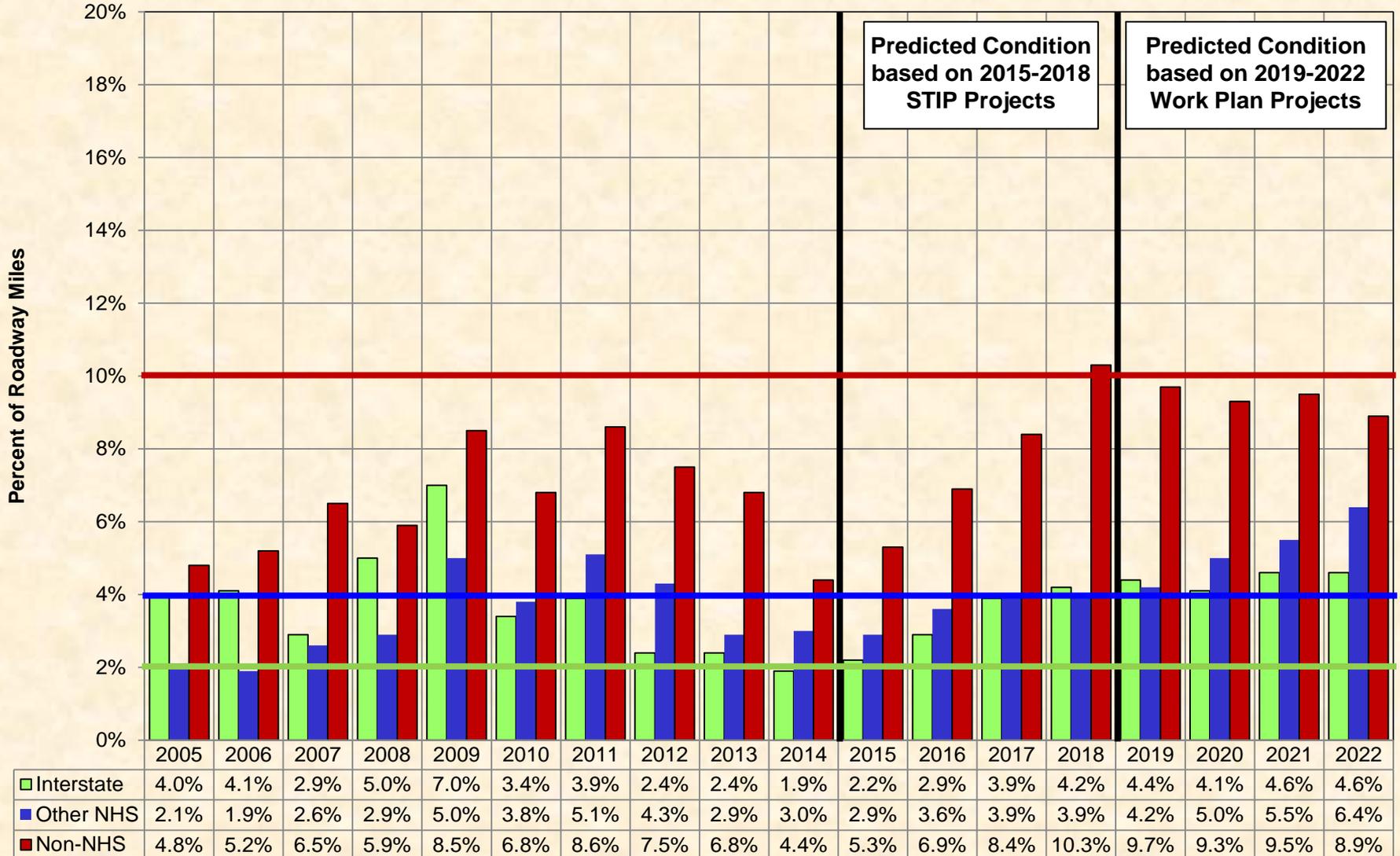
A work in progress…

▸ **FHWA is still getting comments on the pavement and bridge performance measures and targets.**

▸ **This is our first full year using the new process to move projects into the STIP and add projects into Year 10 of the work plan**

▸ **What if the current funding does not achieve the desired results?**

▸ **Predicted conditions are greatly affected by things like "NexTen" and/or other funding proposals**

Summary...

▸ **MnDOT has implemented a new process for pavement project selection to comply with MAP-21**

▸ **District input/expertise is critical**

▸ **Each year, projects will move into the STIP and the 10-year work plan will be adjusted based on the MAP-21 analysis.**

▸ **The process alone will not ensure we meet the MAP-21 targets. Adequate funding is also needed.**

THANK YOU

- **<u>MnDOT District Material Engineers</u>**
  - **Rod Garver (D-1, Duluth)**
  - **Jim Bittman (D-2, Bemidji)**
  - **Darren Nelson (D-3, Baxter)**
  - **Graig Gilbertson (D-4, Detroit Lakes)**
  - **Tom Meath (D-6 Rochester)**
  - **John Hager (D-7, Mankato)**
  - **Lowell Flaten (D-8, Willmar)**
  - **Chris Kufner, Tim Clyne, Jerry Geib (Metro)**

Questions?

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