

# Highway Program Planning and TPM Implementation

## 2017 TAM Peer Exchange

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# Michigan

M I C H I G A N D E P A R T M E N T O F T R A N S P O R T A T I O N

## Fast Facts 2017

The Michigan Department of Transportation (MDOT) has jurisdiction over:

<b>9,668</b> route miles (M, US and I routes) 32,045 lane miles (including ramps)	<b>4,773</b> highway, railroad and pedestrian bridges	<b>665</b> miles of state-owned railroad (126 miles as bridges)	<b>4</b> state-owned airports (Houghton Lake Heights, Linden, Plymouth, Romeo)	<b>85</b> roadside parks	<b>78</b> rest areas (including 14 Michigan Welcome Centers)
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MDOT also provides financial and/or technical assistance for portions of the transportation system owned and operated by others, including local transit systems, airports, intercity bus, trails, etc.

Bridges		MDOT	Area (SFT)	Local	Area (SFT)
	Highway Bridges	4,484	51,050,381	6,588	17,444,272
	Railroad Bridges	126	867,125	251	1,137,209
	Pedestrian Bridges	148	473,390	57	62,697
	Other Bridges	15	410,209	7	491,812
	<b>Total Bridges</b>	<b>4,773</b>	<b>52,801,105</b>	<b>6,903</b>	<b>19,135,990</b>

Roadways		Route Miles
	Interstate	1,252
	Freeway	1,944
	Non-Freeway Trunkline	7,723
	National Highway System (NHS)	6,470
	Non-Trunkline NHS	1,215
<b>Federal Aid Highways</b>	<b>36,558</b>	

Source: Highway Performance Management System (HPMS).

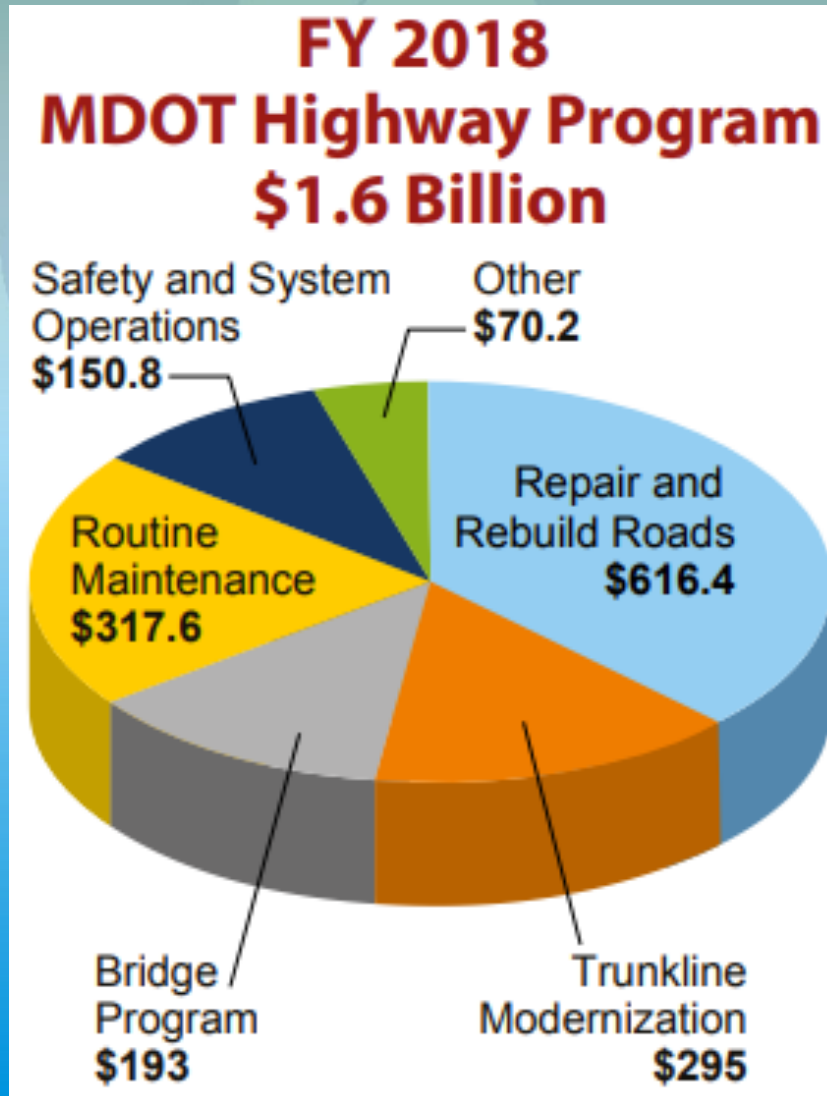
Note: Excludes bridges less than 20 feet long and those currently under construction or not yet let for construction.

# Michigan

- **State Transportation Commission**
  - Policy making body
  - 6 appointed members
- **Asset Management since 1997**
  - Pavement and Bridge goals
- **Transportation Asset Management Council**
  - Established in 2002 by Michigan Legislature

# MDOT

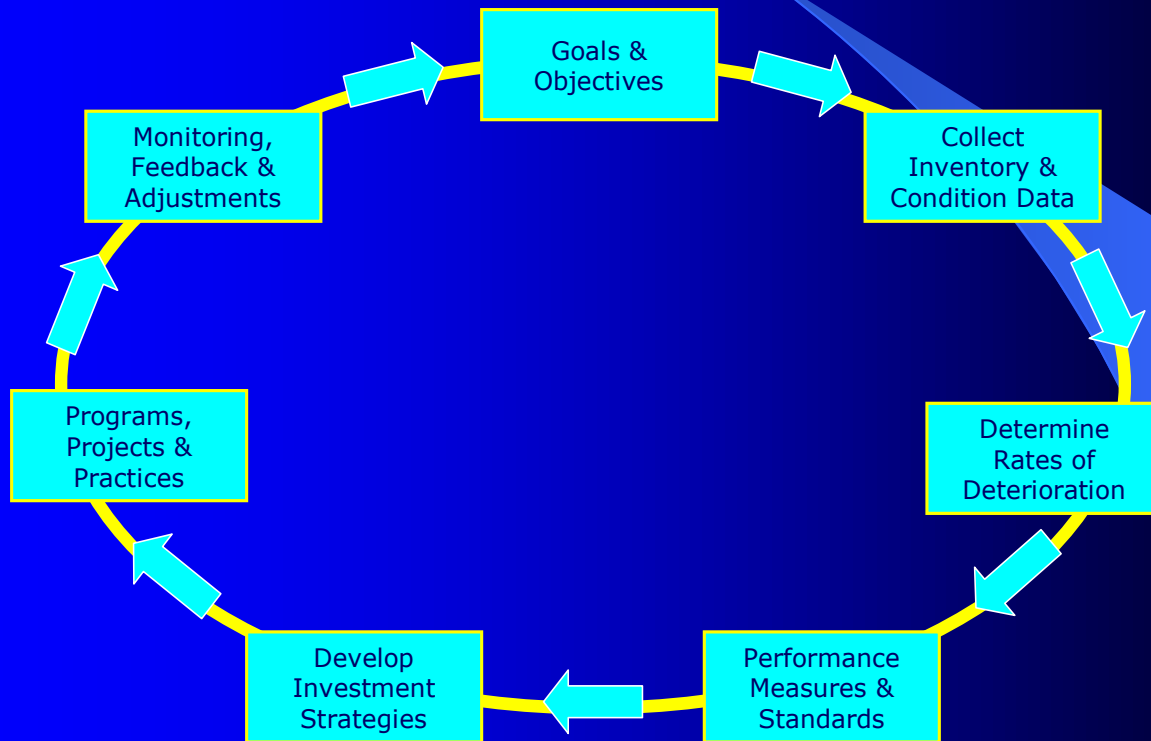
## Highway Capital Program Budget



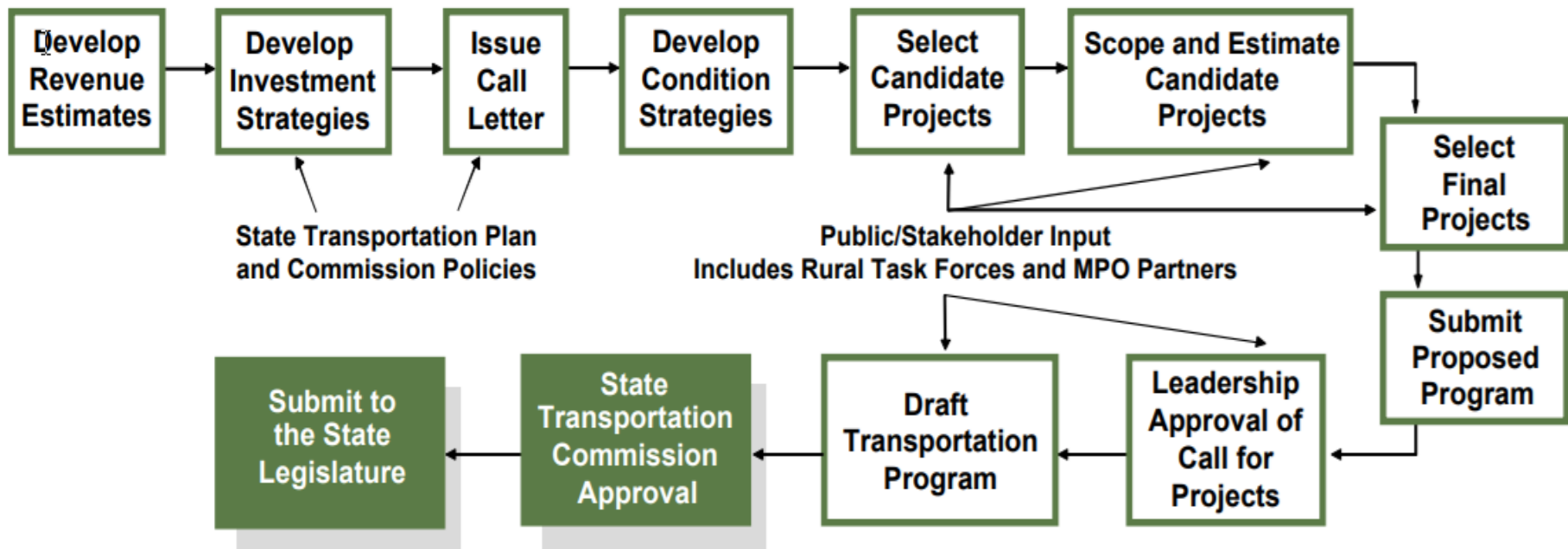
# MDOT Asset Management

## Balancing Investments

*Asset Management Approach*

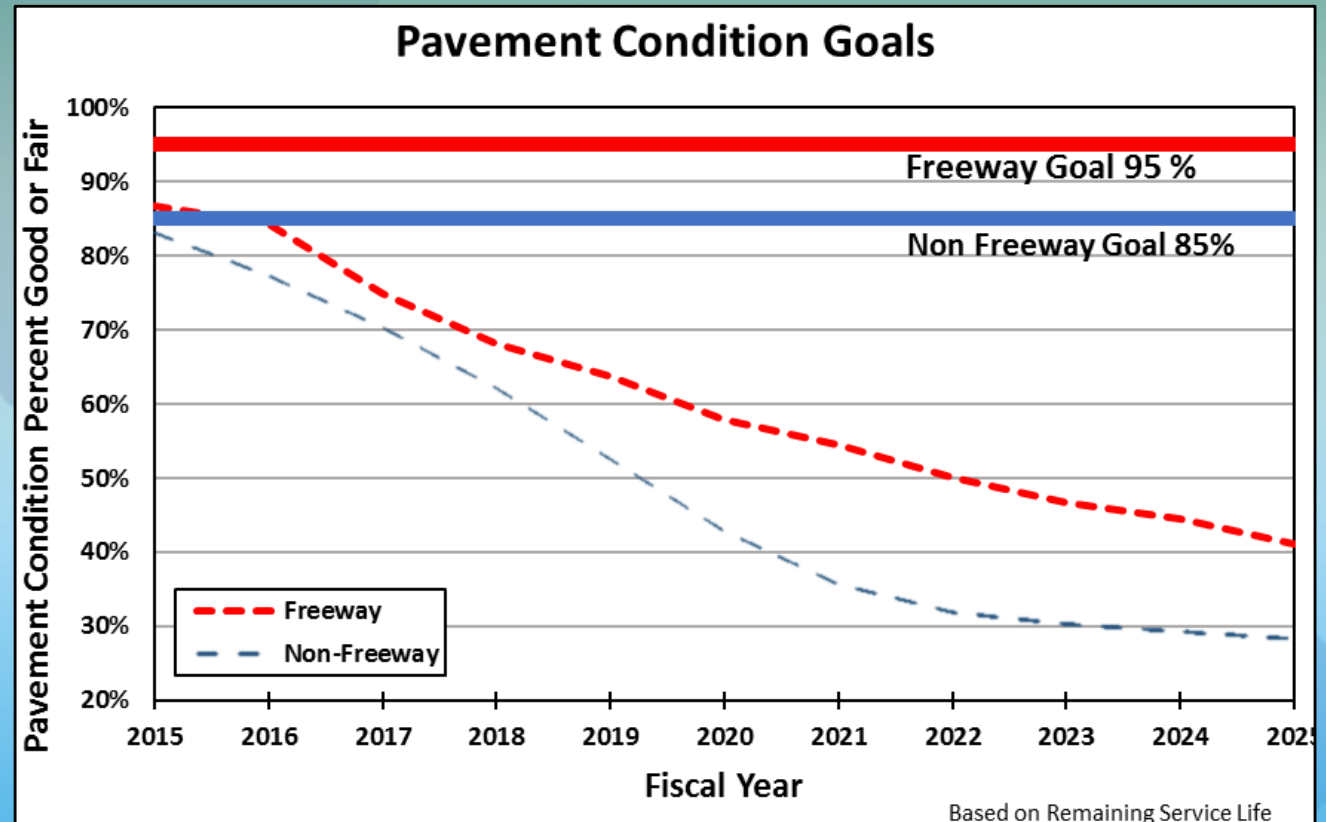


# MDOT Five-Year Transportation Program Development Process



# MDOT Asset Management

## Pavement and Bridge Goals Since 1997



- Life Cycle Planning Tools
  - Road Quality Forecasting Tool – Remaining Service Life
  - Pavement Condition Forecasting Tool – PASER
  - Bridge Condition Forecasting Tool – NBI

# Develop Investment Strategies

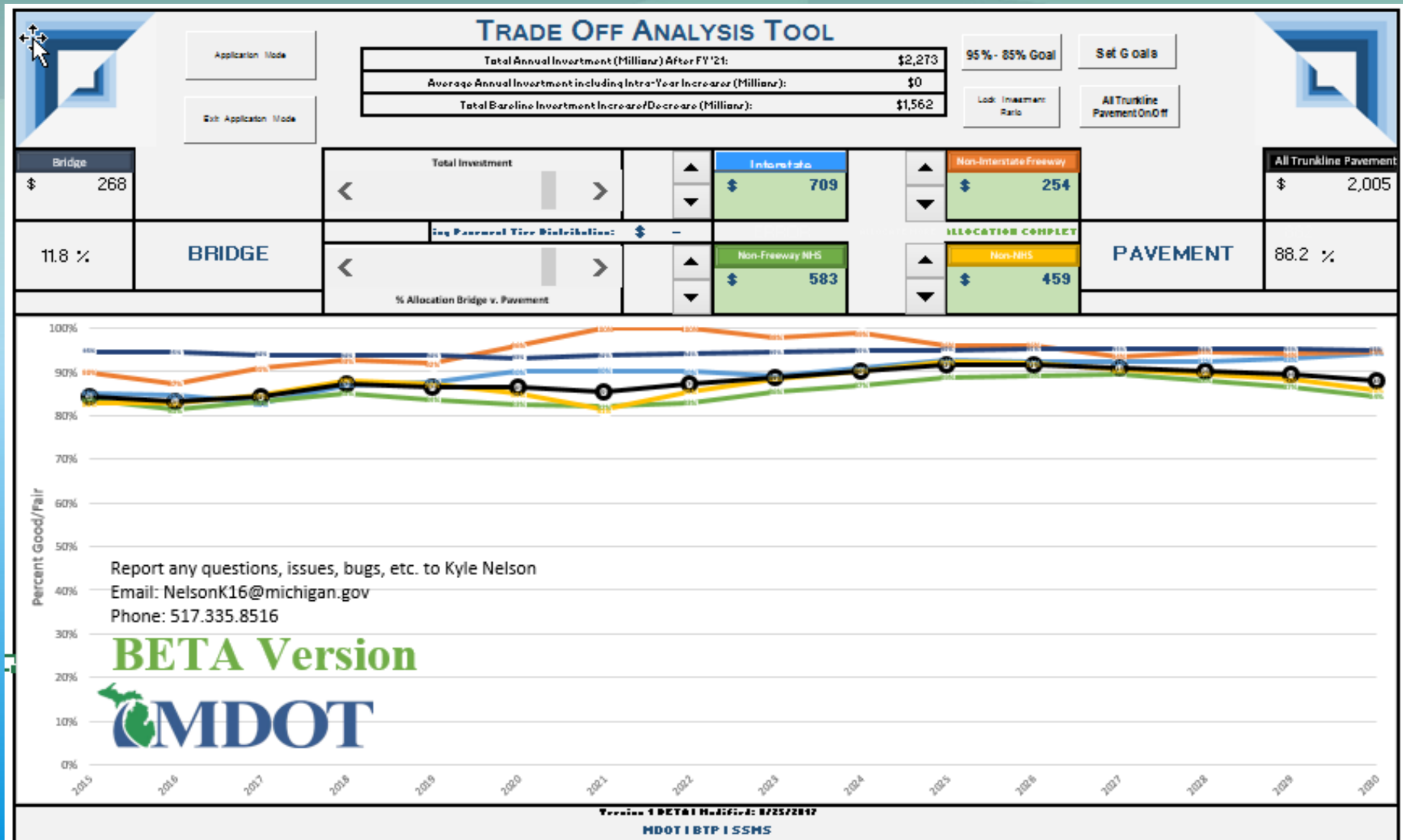
## Highway Investment Program FY 2018-2022

	FY 2018-2022 Annual Average (millions)	Five-Year Total (millions)
<b>REPAIR AND REBUILD ROADS AND BRIDGES</b>		
<b>REPAIR AND REBUILD ROADS</b>		
Rehabilitation and Reconstruction	\$499	\$2,495
Capital Preventive Maintenance	\$135	\$673
Freeway Lighting	\$5	\$25
Freeway Resurfacing Program	\$20	\$100
Non-Freeway Resurfacing Program	\$47	\$235
Trunkline Modernization	\$197	\$987
<b>TOTAL - Repair and Rebuild Roads</b>	<b>\$903</b>	<b>\$4,515</b>
<b>REPAIR AND REBUILD BRIDGES</b>		
Bridge Replacement	\$76	\$380
Bridge Preservation	\$67	\$338
Big Bridges	\$23	\$114
Special Needs	\$22	\$108
Blue Water Bridge-Appropriated Capital Outlay Projects	\$5	\$26
<b>TOTAL - Bridges</b>	<b>\$193</b>	<b>\$965</b>
<b>ROUTINE MAINTENANCE</b>		
	<b>\$321</b>	<b>\$1,604</b>
<b>TOTAL - REPAIR AND REBUILD ROADS AND BRIDGES</b>	<b>\$1,417</b>	<b>\$7,084</b>
<b>SAFETY AND SYSTEM OPERATIONS</b>	\$165	\$824
<b>TRANSPORTATION ALTERNATIVES</b>	\$9	\$47
<b>ROADSIDE FACILITIES</b>	\$7	\$37
<b>WORKFORCE DEVELOPMENT</b>	\$7	\$35
<b>NON-FEDERALLY FUNDED PROGRAMS</b>	\$36	\$182
<b>TOTAL - FIVE-YEAR TRUNKLINE PROGRAM</b>	<b>\$1,672</b>	<b>\$8,208</b>

- The core of MDOT's planning/programming process
- Supports the asset management process
- Guides annual and multi-year investment decisions
- Result of interdisciplinary team discussions and tools analysis



# Trade Off Analysis Tool





# Pavement Funding Allocation Process – Formula Driven

	weight		Bay	Grand	Metro	North	Southwest	Superior	University	Statewide
<b>Cost</b>										
25%	10.0%	% Lanemiles - Urban over 50K Pop.	7.0%	6.1%	72.1%	0.0%	6.4%	0.0%	8.4%	100.0%
	10.0%	TAMP (I & II) Cost	13.9%	10.4%	17.7%	13.6%	13.3%	13.4%	17.6%	100.0%
	5.0%	TAMP (III & IV) Cost	12.5%	11.6%	19.7%	13.3%	14.0%	12.2%	16.6%	100.0%
<b>Condition</b>										
50%	6.0%	% IRI >=95 TAMP I	15.5%	12.5%	28.6%	2.1%	15.1%	0.1%	26.2%	100.0%
	3.5%	% IRI >=95 TAMP II	15.0%	18.5%	28.1%	0.1%	12.3%	0.0%	26.1%	100.0%
	3.5%	% IRI >=95 TAMP III	15.7%	10.3%	36.5%	7.6%	10.3%	6.2%	13.4%	100.0%
	2.0%	% IRI >=95 TAMP IV	24.4%	16.0%	4.3%	12.8%	19.1%	8.1%	15.3%	100.0%
	12.0%	% RSL <=7 - TAMP I	13.7%	4.4%	31.2%	7.4%	17.8%	1.0%	24.5%	100.0%
	7.0%	% RSL <=7 - TAMP II	24.8%	20.6%	13.7%	6.4%	7.8%	0.0%	26.7%	100.0%
	7.0%	% RSL <=7 - TAMP III	18.9%	7.4%	24.5%	13.6%	8.0%	15.2%	12.5%	100.0%
	4.0%	% RSL <=7 - TAMP IV	24.8%	11.1%	2.1%	19.7%	13.1%	16.1%	13.0%	100.0%
	3.0%	PASER<=6 TAMP I & II	17.6%	12.8%	22.7%	11.7%	10.3%	1.7%	23.2%	100.0%
2.0%	PASER<=6 TAMP III & IV	16.9%	8.8%	21.0%	14.6%	6.7%	20.5%	11.5%	100.0%	
<b>Usage</b>										
25%	5.0%	% VMT RSL<=7	14.8%	8.7%	35.7%	5.6%	10.7%	2.7%	21.8%	100.0%
	7.0%	% Commercial VMT RSL <=7	11.5%	8.1%	24.3%	4.2%	20.3%	2.6%	28.9%	100.0%
	7.0%	% Lanemiles RSL <=7 Comm AADT 5,000+	1.1%	2.4%	38.9%	0.0%	24.1%	0.0%	33.5%	100.0%
	6.0%	% Lanemiles RSL <=7 AADT 50,000+	4.6%	2.5%	64.4%	0.0%	3.4%	0.0%	25.1%	100.0%
100.0%										
100.0%										
100.0%										
		Resulting 2023 New Target with updated data	\$ 80.88	\$ 54.00	\$ 187.46	\$ 41.20	\$ 75.77	\$ 29.24	\$ 122.95	\$ 591.50
\$ 591.50		Resulting 2023 % of Total Distribution before redistribution	13.7%	9.1%	31.7%	7.0%	12.8%	4.9%	20.8%	100.0%
		2022 Target approved	\$72.39	\$51.87	\$191.26	\$49.74	\$69.08	\$35.46	\$121.71	\$591.5
			11.7%	4.1%	-2.0%	-17.2%	9.7%	-17.5%	1.0%	
		Difference (2022 to 2023)	\$8.5	\$2.1	(\$3.8)	(\$8.5)	\$6.7	(\$6.2)	\$1.2	\$0.0
		<b>Final '23 After Metro re-distribution</b>	<b>\$ 90.26</b>	<b>\$ 60.26</b>	<b>\$ 140.60</b>	<b>\$ 45.98</b>	<b>\$ 84.56</b>	<b>\$ 32.64</b>	<b>\$ 137.21</b>	<b>\$ 591.50</b>
			15.3%	10.2%	23.8%	7.8%	14.3%	5.5%	23.2%	100.0%

# Pavement Funding Allocation Process – Formula Driven

## Factors and Weights

+ Cost			+ Condition		
25%	10.0%	% Lanemiles - Urban over 50K Pop.	50%	6.0%	% IRI >=95 TAMP I
	10.0%	TAMP (I & II) Cost		3.5%	% IRI >=95 TAMP II
	5.0%	TAMP (III & IV) Cost		3.5%	% IRI >=95 TAMP III
		2.0%		% IRI >=95 TAMP IV	
		12.0%		% RSL <=7 - TAMP I	
		7.0%		% RSL <=7 - TAMP II	
		7.0%		% RSL <=7 - TAMP III	
		4.0%		% RSL <=7 - TAMP IV	
		3.0%		PASER<=6 TAMP I & II	
		2.0%		PASER<=6 TAMP III & IV	
+ Usage					
25%	5.0%	% VMT RSL<=7			
	7.0%	% Commercial VMT RSL <=7			
	7.0%	% Lanemiles RSL <=7 Comm AADT 5,000+			
	6.0%	% Lanemiles RSL <=7 AADT 50,000+			

## Results

+ Bay	Grand	Metro	North	Southwest	Superior	University	Statewide
\$ 80.88	\$ 54.00	\$ 187.46	\$ 41.20	\$ 75.77	\$ 29.24	\$ 122.95	\$ 591.50
13.7%	9.1%	31.7%	7.0%	12.8%	4.9%	20.8%	100.0%

# Develop Condition Strategies

- RQFS and BCFS used to forecast pavement and bridge condition
- Each MDOT region develops pavement & bridge condition strategies (lane miles/number by proposed fix type)
- Strategies are constrained to funding targets
- Subcommittee's review and approve the strategies



# TAMP and TPM Implications

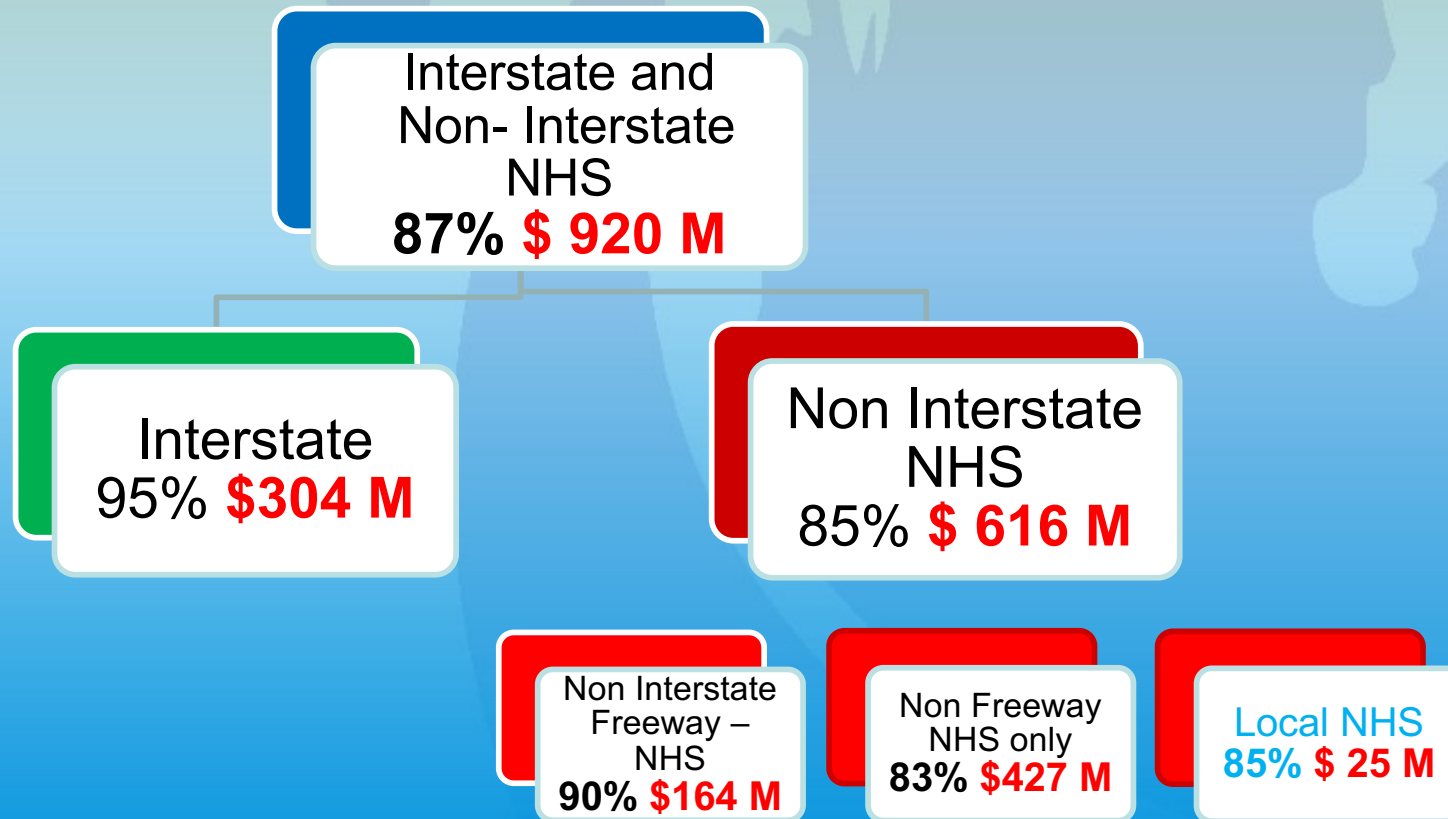
Transportation Performance Management



# TAMP Investment Strategy Scenarios

1. National Goal
2. SOGR

3. Maintain Current
4. Constrained



## TAMP SOGR Investment Strategy

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	10 Year Total
	millions										
<b>Revenue for NHS</b>											
Revenue Available for NHS Trunkline Capital Program (less Maintenance)	\$893	\$850	\$899	\$960	\$1,026	\$1,154	\$1,163	\$1,195	\$1,196	\$1,207	\$10,543
<b>Expected Cost of Future Work - Constrained Target</b>											
Maintenance	\$311	\$314	\$316	\$317	\$319	\$320	\$327	\$334	\$341	\$348	\$3,247
Non 'Pavement/Bridge' Preservation Program	\$237	\$229	\$219	\$303	\$287	\$316	\$315	\$347	\$348	\$359	\$2,959
Bridge	\$182	\$182	\$161	\$159	\$152	\$161	\$161	\$161	\$161	\$161	\$1,639
Pavement	\$474	\$440	\$519	\$498	\$587	\$677	\$687	\$687	\$687	\$687	\$5,944
<b>Pavement STATE OF GOOD REPAIR (SOGR) Expected work</b>											
Reconstruction	\$323	\$261	\$767	\$771	\$737	\$735	\$764	\$803	\$843	\$876	\$6,880
Rehabilitaion	\$217	\$175	\$636	\$881	\$698	\$973	\$1,042	\$1,220	\$555	\$578	\$6,974
Preservation	\$187	\$151	\$179	\$125	\$149	\$93	\$96	\$100	\$104	\$108	\$1,292
Total	\$726	\$586	\$1,582	\$1,777	\$1,584	\$1,801	\$1,903	\$2,123	\$1,502	\$1,562	\$15,146
<b>Pavement Revenue Gap - SOGR</b>	<b>(\$252)</b>	<b>(\$146)</b>	<b>(\$1,063)</b>	<b>(\$1,279)</b>	<b>(\$996)</b>	<b>(\$1,124)</b>	<b>(\$1,216)</b>	<b>(\$1,436)</b>	<b>(\$815)</b>	<b>(\$875)</b>	<b>(\$9,202)</b>

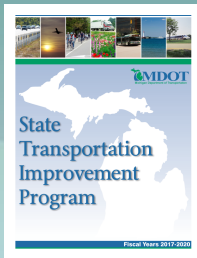


# TAMP Development Issues

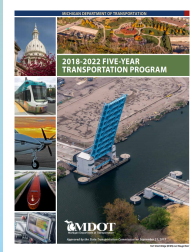
- Performance Measures and Forecasting
  - Legacy Measures (RSL, PASER)
  - New Federal Measures (IRI, Cracking, Rutting, Faulting)
- Excluding Non-NHS Assets
  - Adjusting Revenue Forecasts
- Including Local NHS Assets
  - How are the local's investing in their assets?
- 5YP Investment vs. Template Targets

# Aligning Plans & Programs

## Revenue Forecasts & Investment Strategies



State Transportation Improvement Program (STIP) **4** years



Five-Year Transportation Program (5YTP) **5** years

TAMP  
In Development

Transportation Asset Management Plan (TAMP) **10** years



State Long-Range Transportation Plan (SLRTP)

**20** years

# Federal Rules & Program Development Implications

- Stratified pavement network
- Developed new SOGR goals
- Reporting conundrum
- Investment strategy scenarios
- Revise formula allocation?

# Questions

