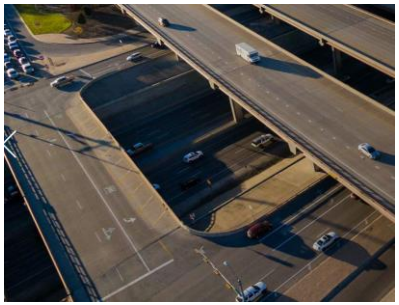
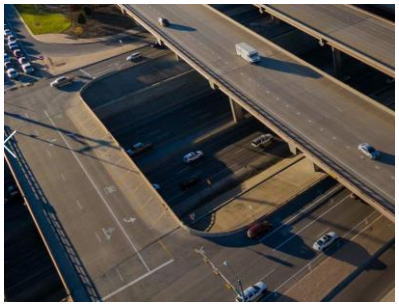


EFFECTIVE USE OF PAVEMENT CONDITION DATA FOR FORECASTING, REPORTING, AND DECISION MAKING

ADITYA RAMACHANDRAN, PAVEMENT MANAGEMENT CONSULTANT

THE KERCHER GROUP, INC. / MDOT SHA

OUTLINE



MDOT SHA Highway Network

Condition Data – State and HPMS metrics

Data Analytics – Optimization

- State Optimization
- Federal Optimization (MDOT TAMP)

Reports

- Optimization Reports
- MDOT SHA System Preservation Report
- HPMS Report

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MDOT SHA HIGHWAY NETWORK

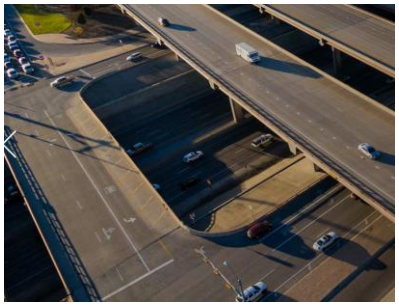
MDOT SHA maintains

- 17,210 lane miles (as of Jan 2019)
  14,837 mainline LM (7629 LM is NHS)
- 63% flexible pavements (AC only)
- 36% composite pavements (AC over PCC)
- 1% rigid pavements (JPCP/JRCP/CRCP)

Geographical divisions

- 23 Counties
- 7 Districts
- 3 Regions (Mountainous, Central, Coastal)

OUTLINE



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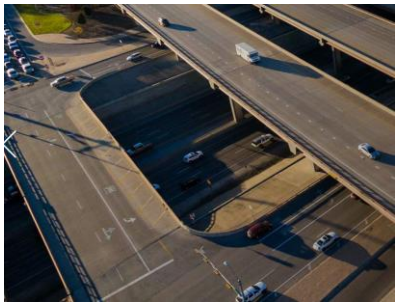
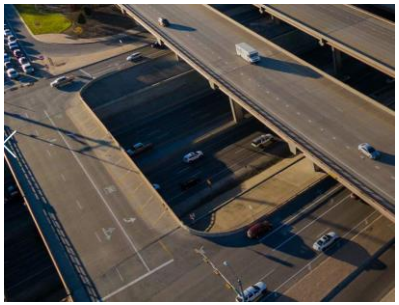
CONDITION DATA



Surface Type	State PMS	Federal Requirements
All Pavements	International Roughness Index (IRI) (average, in/mile)	IRI (average, in/mile)
Asphalt	Structural Cracking Density (extent of cracking on wp) / total area	Cracking Percent – AC (length of cracking on wp) / wp_area
	Functional Cracking Density (extent of cracking outside wp) / total area	
	Rut Depth (average, inches)	Rut Depth (average, inches)
	Friction (speed adjusted skid number)	None
Jointed Concrete	Structural Cracking Density (%cracked slabs)	Cracking Percent - JCP (%cracked slabs)
	Functional Cracking Density (faulting)	Faulting (right wp)
Continuously Reinforced Concrete	Structural Cracking Density (punchouts + long. cracking area)	Cracking Percent - CRCP (punchouts + long. cracking + asphalt and concrete patches area)
	Functional Cracking Density (asphalt and concrete patches area)	

OUTLINE



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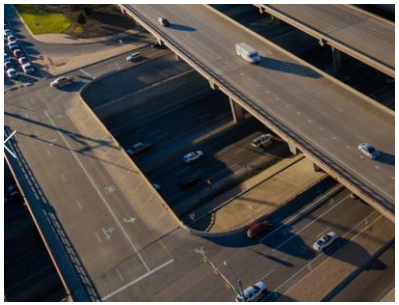
DATA ANALYTICS – OPTIMIZATION



- Why Optimization?
  - To arrive at a feasible network program that meets all input constraints at a minimum cost.
  - Data-driven decision making (right fix for the right road at the right time).
  - Enable Districts meet annual goals.
  - Provide cost-effective project suggestions to
    - extend pavement life and
    - obtain best return on investment (ROI).

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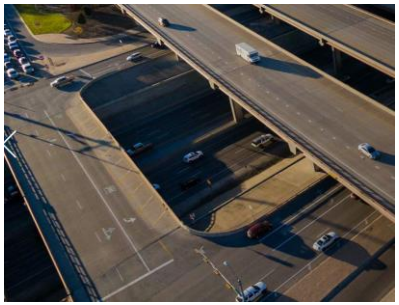
DATA ANALYTICS – OPTIMIZATION



- Optimization developed in close collaboration with the Districts.
- We seek inputs from Districts on
  - Treatment feasibility and budgets
  - Availability of Contractors and Contract authority
  - Planned projects
  - Assign Innovation Budgets
- Incentivize Districts that meet performance targets, specifically PM targets.

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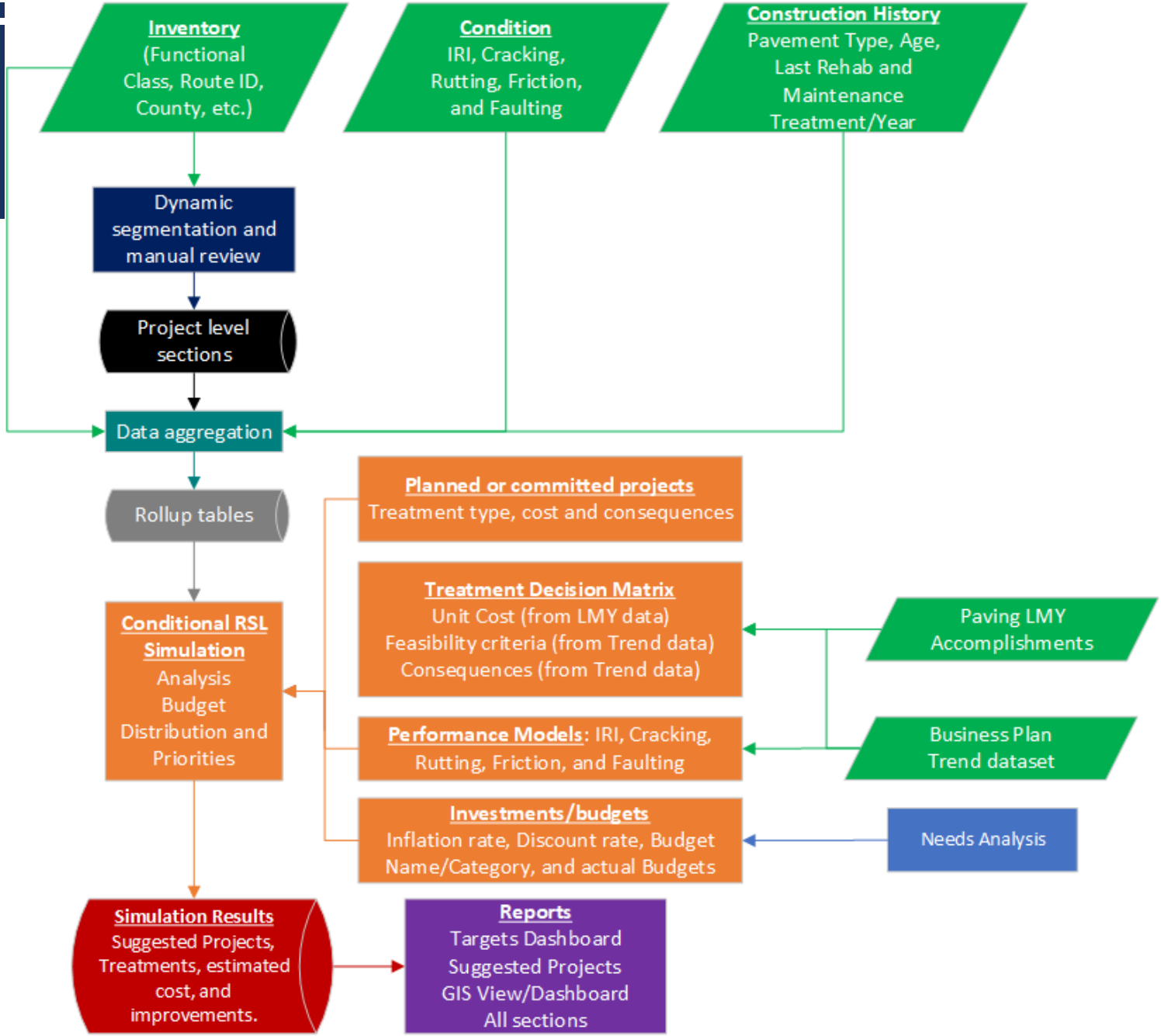
STATE OPTIMIZATION OVERVIEW



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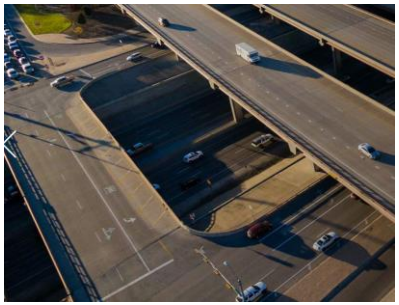
DYNAMIC SEGMENTATION



Sections with identical construction history & condition.

- split: any change in ownership
- split: any committed project
- split: any PCC (concrete sections)
- split: any long bridge (bridge >= 0.25 mile)
- split: any pavement change
- split: any significant change in cracking condition
- section length: Min 0.5 miles, Max 6 miles

Manual review follows dynamic segmentation.

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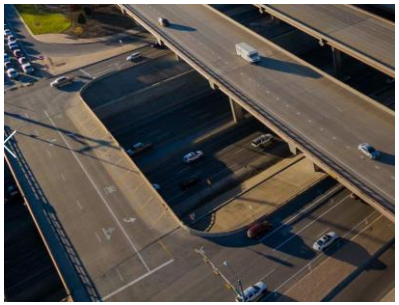
NEEDS ANALYSIS/ASSESSMENT



- Required to justify the annual construction funding allocation as revenue and budget forecasts are subject to fluctuation.
- E.g. How much money is needed to maintain current conditions?
- What is the forecasted pavement condition using reasonably available funding?
- How much money is needed to attain MDOT SHA's business plan goal in 10 years?

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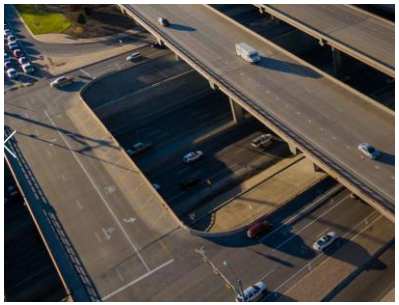
SIMULATION INPUTS



Analysis Priorities

- e.g. Min. Budget per Shop.

Investment/Budget

- System Preservation Budget by District and Treatment type.

Performance Models

Treatments

- Feasibility – defines when a treatment can occur.
- Cost – defines total project cost for a treatment.
- Consequences – what happens after a treatment is placed.

Committed projects / Planned projects

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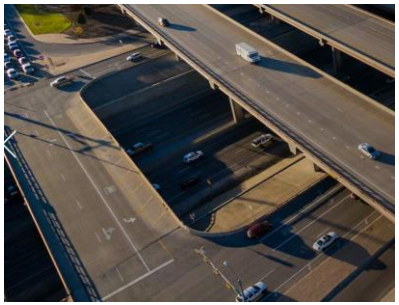
PERFORMANCE MODELS



- Model Specifications

Condition Metric	Model Specification
IRI	Exponential
Cracking Percent/Crack Density	Sigmoidal/S-shape
Friction	Linear
Rutting	Linear
Faulting	Linear

- Family Models
- Updated annually to incorporate changes in trend from most recent collected data
- Cracking is the fastest deteriorating measure

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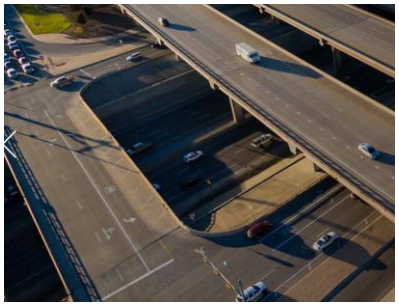
IRI MODELS

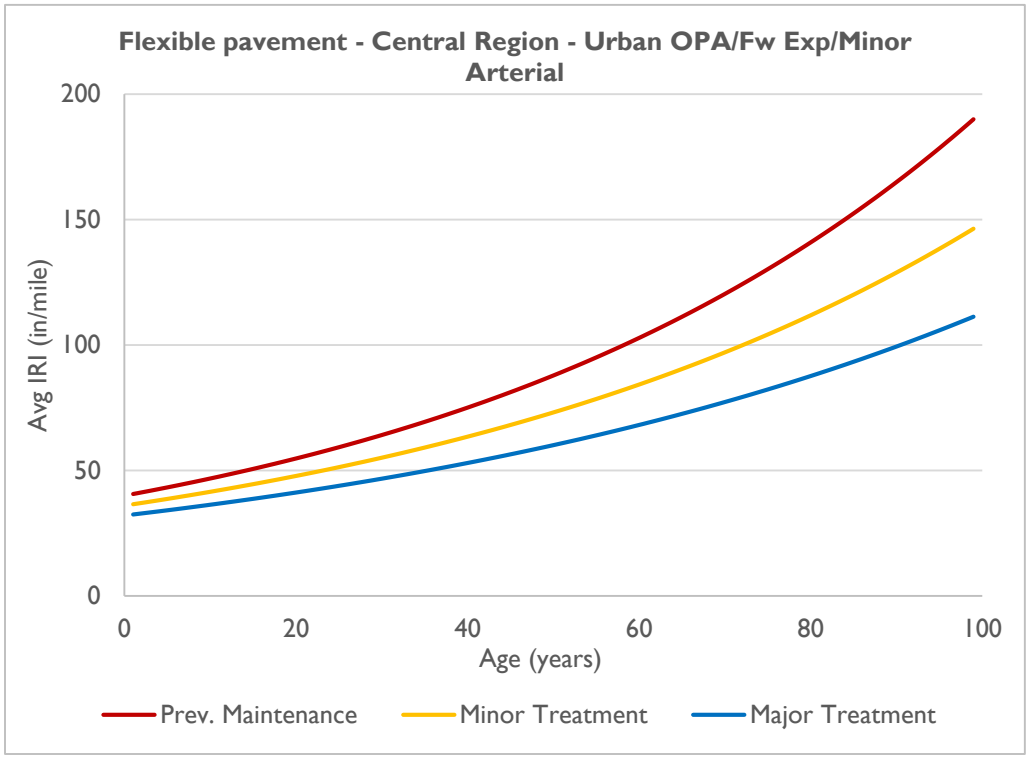


$$IRI_{predicted} = IRI_{initial}\, m_1\, e^{age\, m_1 m_2}$$

- 35 families (m_1) * 28 treatments (m_2) = 908 models

- m_1 → treatment multiplier

- m_2 → function of
  - Pavement Type
  - Region
  - Functional Class



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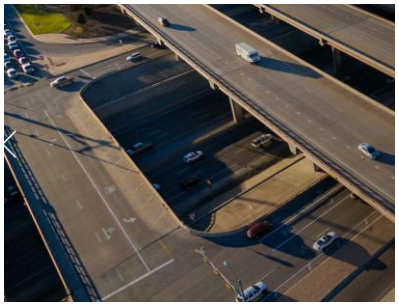
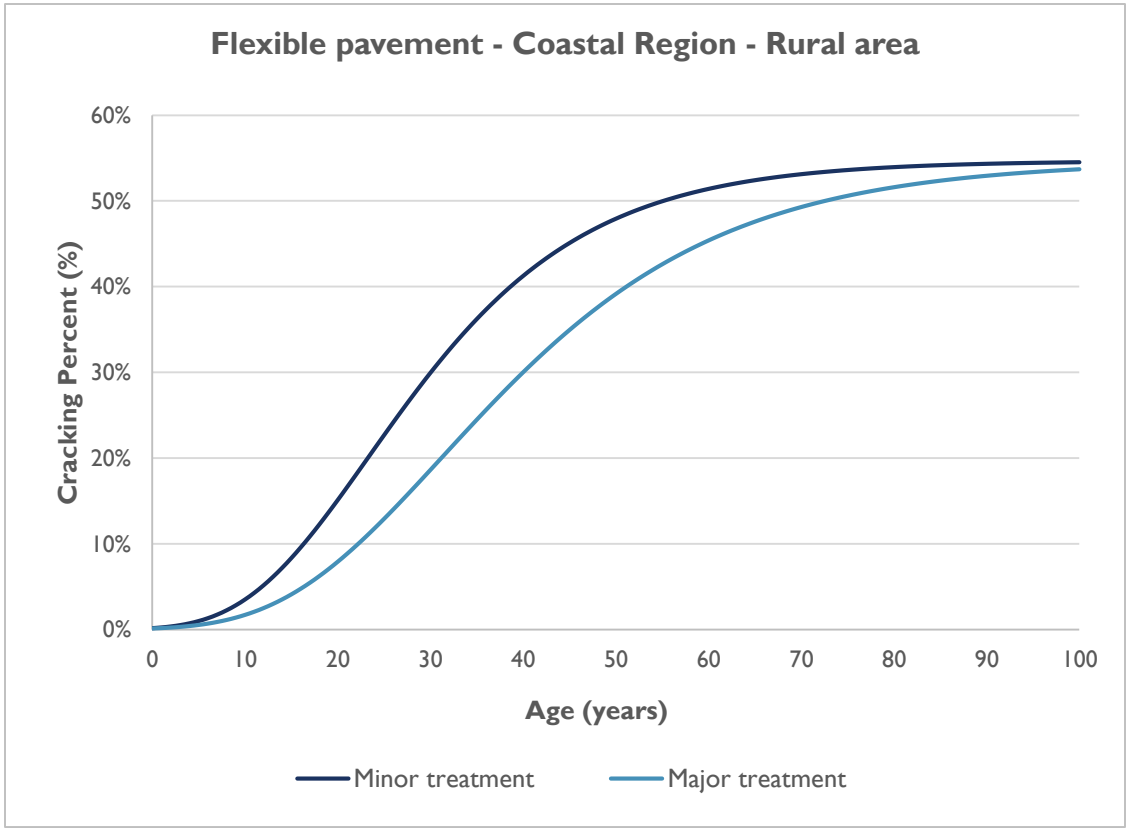
CRACKING PERCENT (ASPHALT)



$$\%Crk_{ASPHALT} = \frac{6.56 \exp(-\exp(\beta_o + \beta_1 AGE))}{W}$$

- Region
  - Coastal
  - Central/Mountain
- Area (F_System)
  - Rural
  - Urban
- Treatment
  - Preventive Maint.
  - Minor
  - Major



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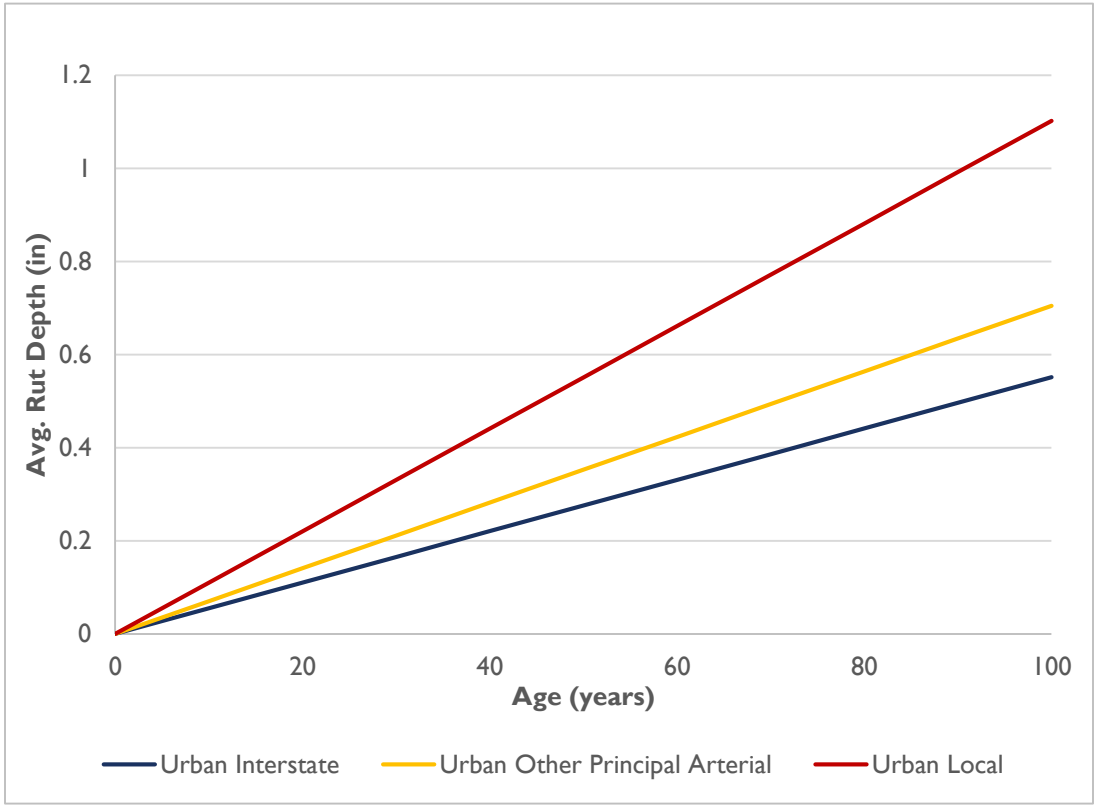
RUTTING MODELS

$$Rut_{predicted} = a_1 \, age \, Rut_{initial}$$

- a_1 is a function of
  - Functional Class
  - Pavement Type
- 34 families



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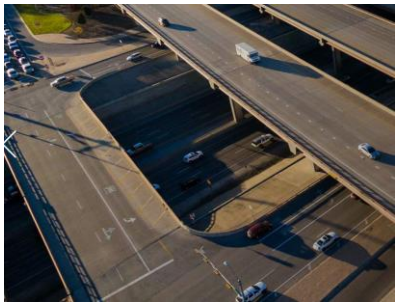
SIMULATION INPUTS



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- **Feasibility** – defines when a treatment can occur.
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Committed projects / Planned projects

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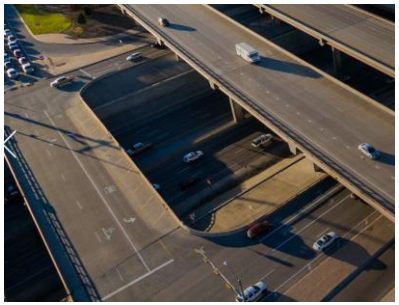
TREATMENTS



- 30+ Treatments
  - Preventive Maintenance (Patching, Crack Seal etc.)
  - Minor Rehabilitation – e.g. Overlay <=1.5” Grade Increase
  - Major Rehabilitation / Structural Overlay
  - Reconstruction
- Feasibility / Decision tree
- Cost – Unit Cost ($/Lane Mile)
- Improvements or Consequences

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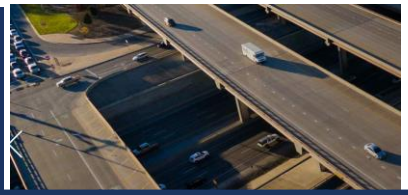
TREATMENT DECISION TREE: PAVEMENT DESIGN



	Treatment	ADT	IRI	SCD	FCD	FN	RUT
A. Crack/ Joint Seal	CRACK SEAL		<=170	<5	<=10	>40	
B. Asphalt Rejuvenator	FOG SEAL	<=25000	<=100	<5	<=10	>40	
	REJUVENATOR	<=25000	<=100	<5	<=10	>40	
C. Aggregate Seals	CAPE SEAL	<=25000	<=170	<5			<=1
	CHIP SEAL	<=4000	<=100	<5			<0.5
	MICRO SURFACING		<=100	<5	<=10		<=1
	SAND SEAL	<=25000	<=100	<5	<=10		
D. Asphalt Overlay	MILL-ULTRATHIN BONDED WEARING COURSE			<5			<=1
	ULTRATHIN BONDED WEARING COURSE		<=170	<5	<=10		<0.5
	MILL-OVERLAY <=1.5IN GRADE INCREASE			<25			
	MILL-OVERLAY >1.5IN GRADE INCREASE						
	OVERLAY <=1.5IN ASPHALT		<=170	<5			<0.5
	OVERLAY >1.5IN ASPHALT		<=170				
E. PCC Overlay	BONDED PCC OVERLAY			>=25			
	UNBONDED PCC OVERLAY			<25			>=0.5
F. Spot Repair	ASPHALT PATCH ONLY			<25			
G. Surface Texturizing	DIAMOND GRINDING			<5			>=0.5
	SURFACE ABRASION		<=170	<5		<=40	<0.5
H. Major Rehab	COLD-IN-PLACE RECYCLING-OVERLAY			>=25			
	BREAK-CRACK-SEAT-OVERLAY			>=25	>10		
	RUBBILIZATION-OVERLAY			>=25	>10		
I. Reconstruction	RECONSTRUCTION			>=25			
	FULL-DEPTH RECLAMATION-OVERLAY			>=25			

TREATMENT DECISION TREE – PMS OPTIMIZATION EXAMPLE

Treatment Name	Curb	Lane Miles	Func Class	Surface Type	Pavement Type	ADT	AVG IRI	SCD	FCD	FN	AVG RUT	Min Age
ULTRATHIN BONDED WEARING COURSE	Open	>=2	All	Asphalt	Flexible & Composite	<=100,000	<=170	<=7	>2 and <=10	All	<0.5	>=5 and <=15
MILL-OVERLAY <=1.5IN GRADE INCREASE	Any	All	Not 1,11,12	Asphalt	Flexible & Composite	All	All	<25	All	All	>1	6
	Any	All	Not 1,11,12	Asphalt	Flexible & Composite	All	>170	<25	All	All	<=1	6
	Any	All	Not 1,11,12	Asphalt	Flexible & Composite	All	<=170	>=5 and <25	All	All	All	6
	Any	All	Not 1,11,12	Asphalt	Flexible & Composite	All	<=170	<25	>=10	All	All	6
	Closed	All	Not 1,11,12	Asphalt	Flexible & Composite	All	All	<25	All	All	All	6
ASPHALT PATCH ONLY	Any	All	1,2,11,12,14	Asphalt	Flexible & Composite	All	<=170	<25	All	All	All	4
	Any	All	6,7,8,9,16,17,18,19	Asphalt	Flexible & Composite	All	All	<25	All	All	All	4
RECONSTRUCTION	Any	All	All	All	All	All	All	>=25	All	All	All	8

Interstates and Urban OPA Fwys/Expwys – use Gap graded mix

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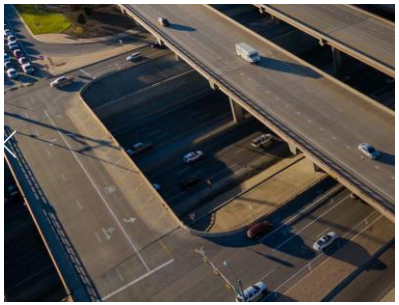
TREATMENT COST



- Treatment Cost will vary based on various parameters like District, Road Class, Functional Class category, and existing condition.
- Unit cost data is obtained from completed projects.

Treatment	Unit Cost ($/LM)
Asphalt Patch Only	$40,000
Crack Seal	$7,000
Overlay <=1.5in Asphalt	$152,000
Surface Abrasion	$21,000
Micro Surfacing	$54,000
Mill-Overlay <=1.5in Grade Increase - Gap	$300,000
Mill-Overlay <=1.5in Grade Increase	$230,000
Chip Seal	$35,000
Mill-Ultrathin Bonded Wearing Course	$160,000

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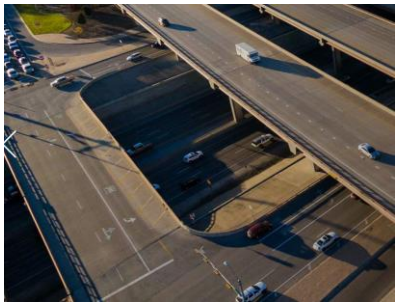
TREATMENT CONSEQUENCES



Treatment	Consequence
Crack Seal/Fill	Improves functional cracking condition; No structural benefit
Micro surfacing	Fills minor wheel ruts. Also improves friction.
Chip Seal	Low cost, improves friction, slows cracking; Cracked windshields
HMA Overlay	Moderately improves all measures, unless pavement is failed; More expensive than preventive maintenance.

MDOT SHA Pavement and Geotechnical Design Guide:
Section 2.09 Supplemental Treatment Information

https://www.roads.maryland.gov/Index.aspx?PageId=12

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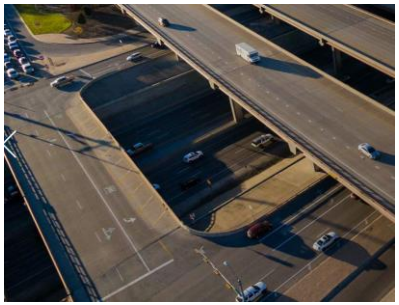
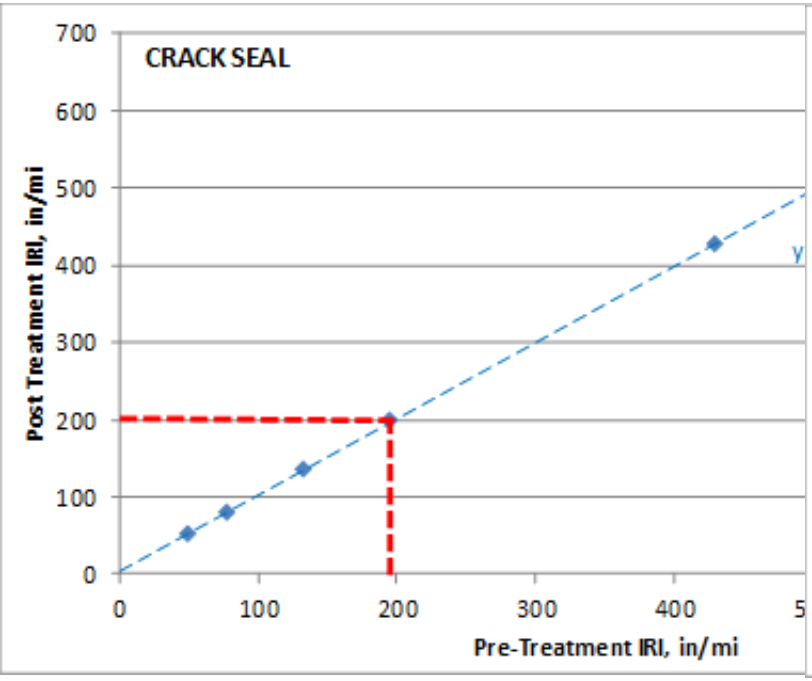
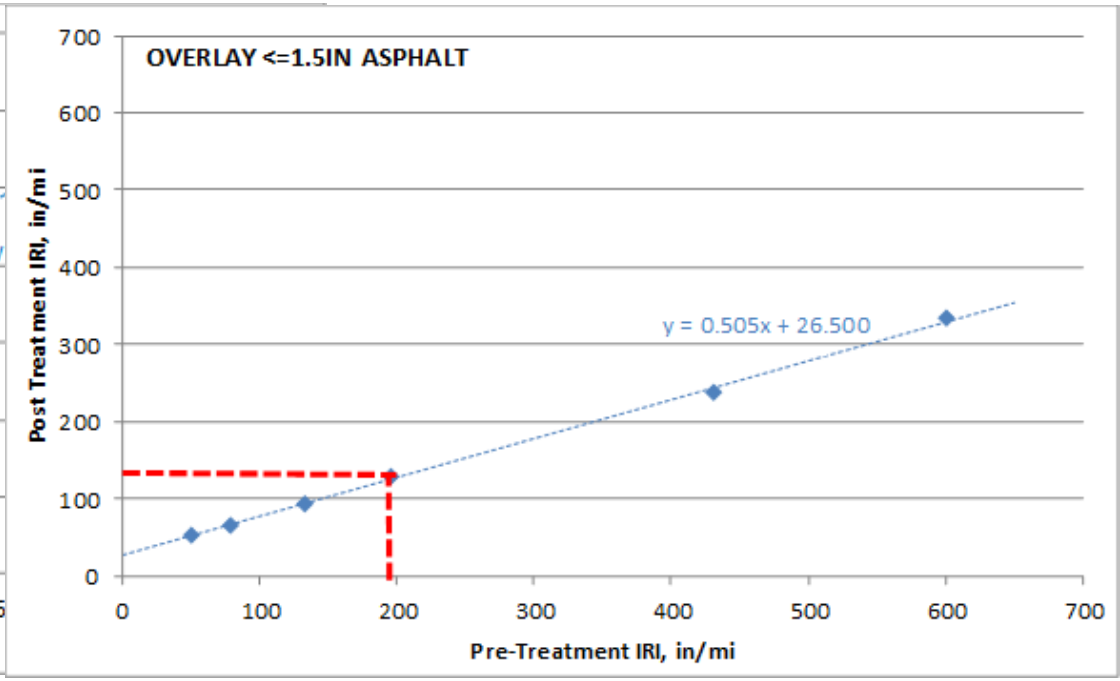
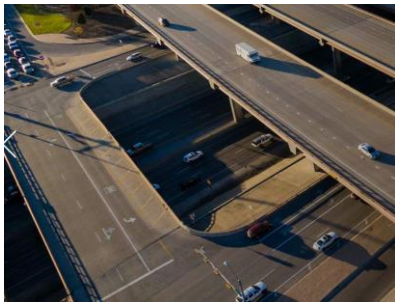
TREATMENT CONSEQUENCES – IRI







TREATMENT CONSEQUENCES/IMPROVEMENTS CRACKING & RUTTING



Crack Seal

$$FC\ Density_{after} = 0.7\ FC\ Density_{before}$$

$$SC\ Density_{after} = No\ Change$$

$$Rutting_{after} = No\ Change$$

$$Age_{after} = 1 + Age_{before}$$

Overlay <=1.5” Grade Increase

$$FC\ Density_{after} = 2.0$$

$$SC\ Density_{after} = 0.6$$

$$Rutting_{after} = 0.2842\ Rutting_{before}$$

$$Age_{after} = 0$$

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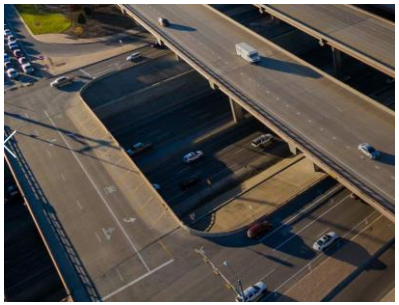
OUTLINE



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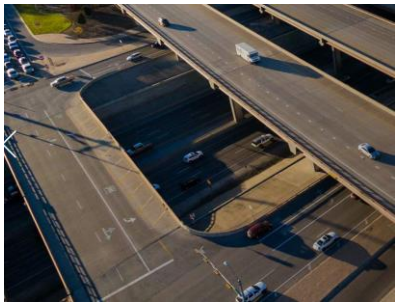
OPTIMIZATION REPORTS



- Targets and Suggested Projects
  - Statewide and by District (Set Benefit Targets)

Fund 77 FY21 Target Summary - Statewide

Targets:	Budget	Benefit (LMY)	Suggested Lane-Miles	Estimated $/LM	Average Life Extension	$/LMY	% of Overall $
	$147,030,000	12,178	1,127	$130,501	11	$12,073	
Preventive Maintenance involving UTBWC	$9,562,515	703	53	$181,054	13	$13,611	6.5%
Preventive Maintenance (other)	$20,251,927	3,127	542	$37,333	6	$6,476	13.8%
Minor Rehabilitation	$113,819,107	8,140	520	$218,750	16	$13,982	77.4%
Structural Overlay	$3,009,854	204	10	$286,905	19	$14,765	2.0%
Major Rehabilitation	$386,598	5	1	$668,855	8	$83,607	0%
Reconstruction	$0	0	0	$0	0	$0	0%

Pre Treatment RSL Categories:		Budget	Benefit (LMY)	Suggested LM	$/LM	Average Life Extension	$/LMY
40 to 50 years	A	$78,035	19	9	$8,306	2	$4,153
30 to <40 years	B	$1,744,911	247	104	$16,711	2	$7,057
20 to <30 years	C	$3,155,264	391	94	$33,503	4	$8,062
10 to <20 years	D	$32,733,074	2,526	283	$115,518	9	$12,958
<10 years	E	$66,587,542	5,002	392	$169,840	13	$13,311
0 years	F	$42,731,174	3,993	243	$175,667	16	$10,703

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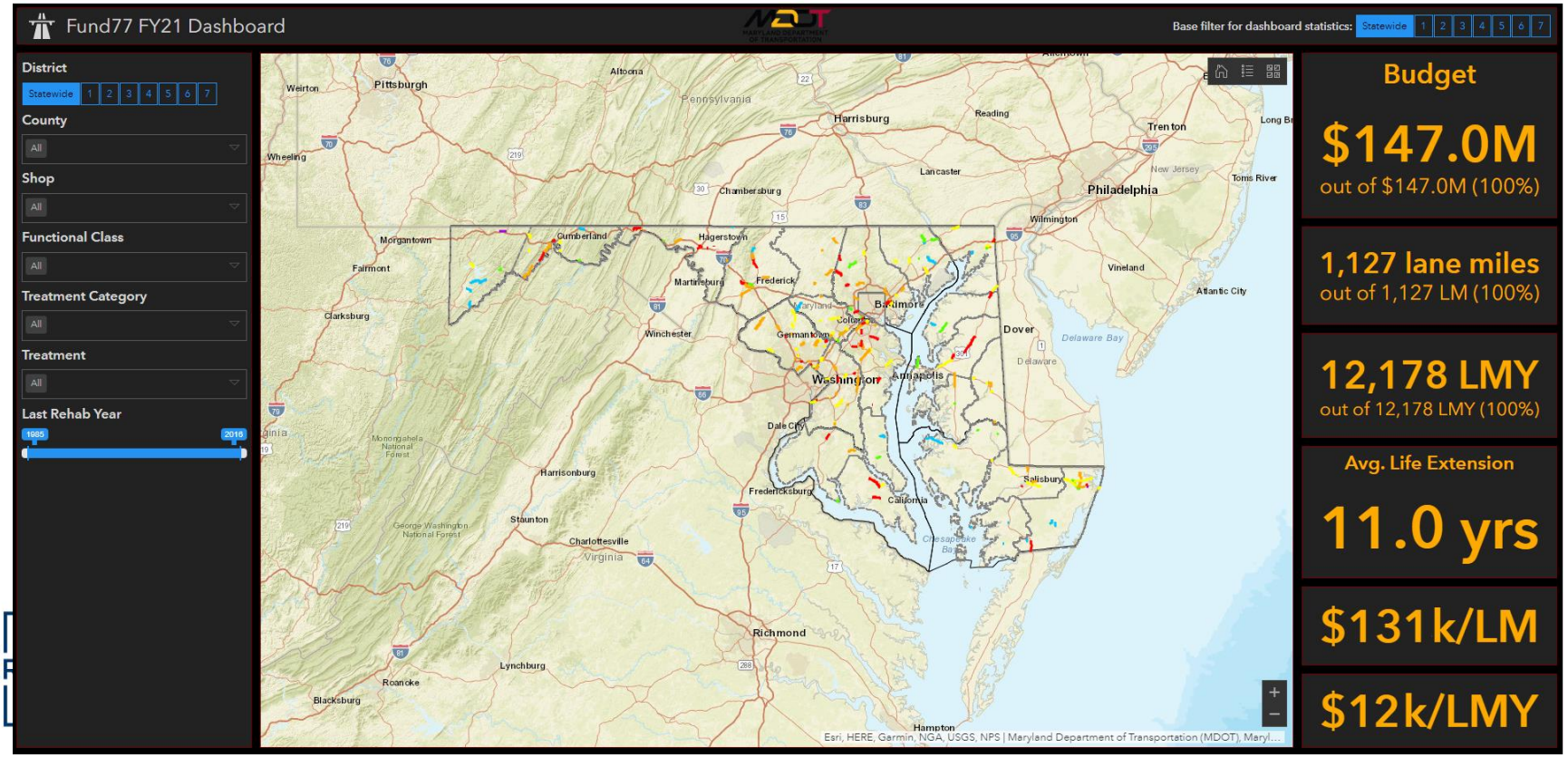
10 to <20 years	D	$32,733,074	2,526	283	$115,518	9	$12,958
<10 years	E	$66,587,542	5,002	392	$169,840	13	$13,311
0 years	F	$42,731,174	3,993	243	$175,667	16	$10,703

District	Budget	Benefit (LMY)	Suggested LM	$/LM	Average Life Extension	$/LMY
1	$14,768,554	1,622	161	$91,843	10	$9,106
2	$14,817,758	1,421	123	$120,356	12	$10,431
3	$36,685,447	2,419	262	$140,024	9	$15,164
4	$19,949,701	1,481	140	$142,364	11	$13,468
5	$27,306,827	2,473	163	$167,256	15	$11,042
6	$12,435,080	1,204	128	$97,065	9	$10,326
7	$21,066,633	1,558	149	$141,157	10	$13,518



SUGGESTED PROJECTS REPORT

Detailed Project Summary - FY20 Suggested projects

See "Lookup & Notes" worksheet for notes

Google Maps	VideoLog	District	County	Shop	Contract Type	Prefix	Route#	Suffix	Begin MP	End MP	Direction
Google Maps	VideoLog	1	DO	Cambridge	Microsurface	US	50		0.61	2.7	EB Only
Google Maps	VideoLog	1	DO	Cambridge	Asphalt Paving	MD	313		7.92	8.44	All Dir
Google Maps	VideoLog	1	DO	Cambridge	Asphalt Paving	MD	750		0	0.87	All Dir
Google Maps	VideoLog	1	DO	Cambridge	Asphalt Paving	US	50		4.65	6.71	EB Only
Google Maps	VideoLog	1	SO	Princess Anne	Asphalt Paving	MD	673	A	0	0.53	All Dir
Google Maps	VideoLog	1	SO	Princess Anne	Asphalt Paving	US	13		6.3	7.1	SB Only
Google Maps	VideoLog	1	SO	Princess Anne	Asphalt Paving	MD	920		0	0.97	All Dir
Google Maps	VideoLog	1	SO	Princess Anne	Asphalt Paving	US	13		19.58	20.17	SB Only
Google Maps	VideoLog	1	WI	Salisbury	Chip Seal	MD	350		0.18	6.63	All Dir
Google Maps	VideoLog	1	WI	Salisbury	Crack Seal	US	50		27.06	30.695	WB Only
Google Maps	VideoLog	1	WI	Salisbury	Asphalt Paving	US	13	BU	4.17	8.137	All Dir
Google Maps	VideoLog	1	WI	Salisbury	UTBWC	US	13	BU	1.34	3.87	NB Only
Google Maps	VideoLog	1	WI	Salisbury	Asphalt Paving	MD	346		0.67	1.2	All Dir
Google Maps	VideoLog	1	WI	Salisbury	Asphalt Paving	US	50		0	0.75	WB Only
Google Maps	VideoLog	1	WI	Salisbury	Asphalt Paving	MD	992	A	0	0.74	All Dir
Google Maps	VideoLog	1	WO	Snow Hill	Asphalt Patching	MD	378		0	1.49	All Dir
Google Maps	VideoLog	1	WO	Snow Hill	Crack Seal	MD	374		8.02	8.7	All Dir
Google Maps	VideoLog	1	WO	Snow Hill	Crack Seal	MD	90		7.78	8.42	WB Only

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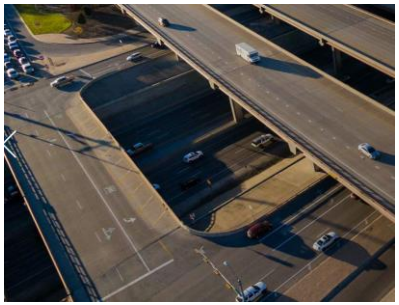
OPTIMIZATION REPORTS…



- Targets are reviewed based on the following:

Compare average treatment unit cost (UC) with historical UC data and contractor bid data.

Suggested treatment lane miles should be contract worthy.

Predicted treatment life extension should be within the range of expected values.

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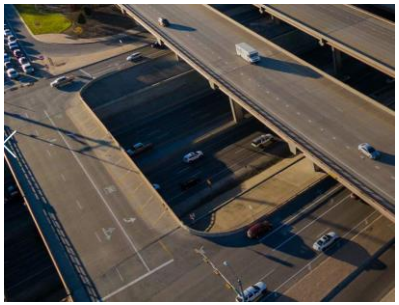
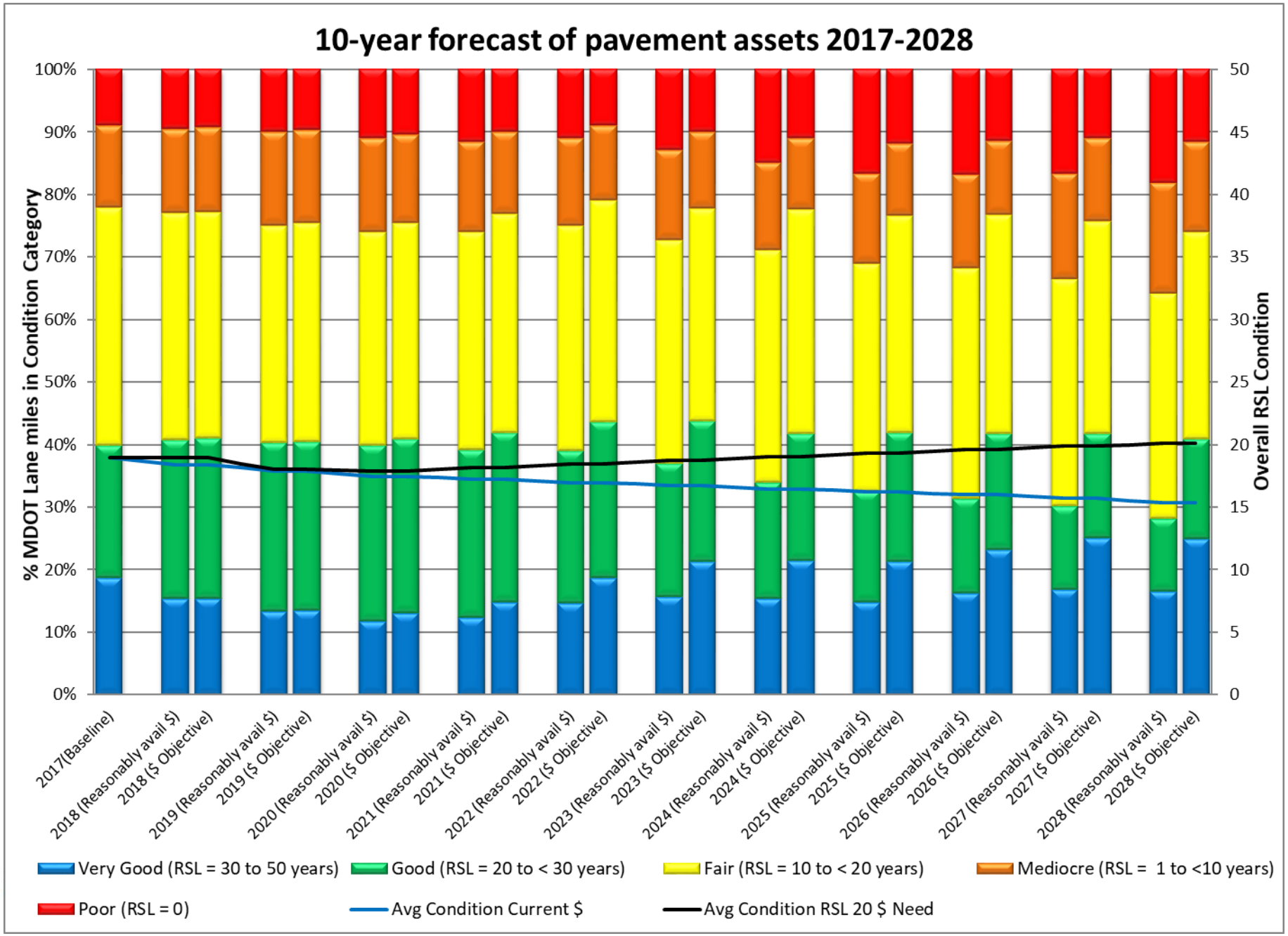
OPTIMIZATION REPORTS (ALL SECTIONS)

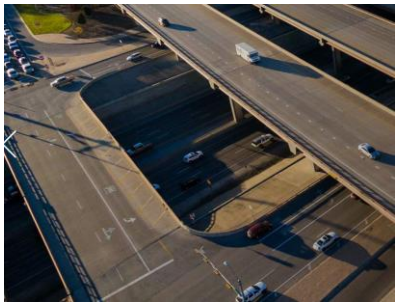


- Historical and future pavement conditions.
- Feasible treatments, cost, life extension, benefit (LMY) and cost/benefit ratio ($/LMY) by section.
- Data discovery tool to identify project candidates.

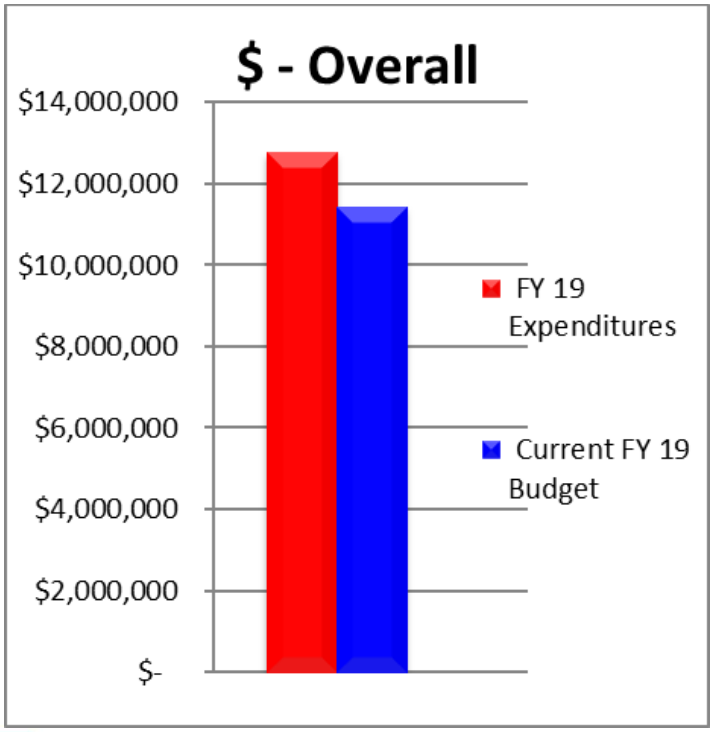
YEAR	VIDEOLOG	GOOGLE MAPS	ROUTE	BMP	EMP	DIR	IRI RSL	FCD RSL	SCD RSL	RUT RSL	SKID RSL	RSL OVERALL	TREATMENT_RANK_1
2011	VideoLog	Google Maps	DO-MD 14	0	3.7	ALL	43	40	40	41	49	40	
2012	VideoLog	Google Maps	DO-MD 14	0	3.7	ALL	42	32	44	33	44	32	
2013	VideoLog	Google Maps	DO-MD 14	0	3.7	ALL	43	37	46	41	41	37	
2014	VideoLog	Google Maps	DO-MD 14	0	3.7	ALL	43	30	43	40	50	30	
2015	VideoLog	Google Maps	DO-MD 14	0	3.7	ALL	42	32	41	37	43	32	
2016	VideoLog	Google Maps	DO-MD 14	0	3.7	ALL	42	36	37	42	50	36	
2017	VideoLog	Google Maps	DO-MD 14	0	3.7	ALL	41	34	33	41	50	33	CHIP SEAL
2018	VideoLog	Google Maps	DO-MD 14	0	3.7	ALL	40	30	28	40	50	28	CHIP SEAL
2019	VideoLog	Google Maps	DO-MD 14	0	3.7	ALL	40	27	21	39	50	21	MILL-OVERLAY <=1.5IN GRADE INCREASE
2020	VideoLog	Google Maps	DO-MD 14	0	3.7	ALL	39	22	19	38	50	19	MILL-OVERLAY <=1.5IN GRADE INCREASE
2021	VideoLog	Google Maps	DO-MD 14	0	3.7	ALL	38	20	17	37	50	17	MILL-OVERLAY <=1.5IN GRADE INCREASE
2022	VideoLog	Google Maps	DO-MD 14	0	3.7	ALL	37	19	15	37	50	15	MILL-OVERLAY <=1.5IN GRADE INCREASE
2023	VideoLog	Google Maps	DO-MD 14	0	3.7	ALL	36	18	13	36	49	13	MILL-OVERLAY <=1.5IN GRADE INCREASE
2024	VideoLog	Google Maps	DO-MD 14	0	3.7	ALL	35	16	10	35	49	10	MILL-OVERLAY <=1.5IN GRADE INCREASE
2025	VideoLog	Google Maps	DO-MD 14	0	3.7	ALL	33	15	6	34	48	6	UNBONDED PORTLAND CEMENT CONCRETE OVERLAY
2026	VideoLog	Google Maps	DO-MD 14	0	3.7	ALL	32	13	1	33	48	1	UNBONDED PORTLAND CEMENT CONCRETE OVERLAY
2027	VideoLog	Google Maps	DO-MD 14	0	3.7	ALL	31	11	0	32	47	0	UNBONDED PORTLAND CEMENT CONCRETE OVERLAY


10-year forecast of pavement assets 2017-2028
% MDOT Lane miles in Condition Category
Overall RSL Condition
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
50
45
40
35
30
25
20
15
10
5
0
2017(Baseline)
2018 (Reasonably avail $)
2018 ($ Objective)
2019 (Reasonably avail $)
2019 ($ Objective)
2020 (Reasonably avail $)
2020 ($ Objective)
2021 (Reasonably avail $)
2021 ($ Objective)
2022 (Reasonably avail $)
2022 ($ Objective)
2023 (Reasonably avail $)
2023 ($ Objective)
2024 (Reasonably avail $)
2024 ($ Objective)
2025 (Reasonably avail $)
2025 ($ Objective)
2026 (Reasonably avail $)
2026 ($ Objective)
2027 (Reasonably avail $)
2027 ($ Objective)
2028 (Reasonably avail $)
2028 ($ Objective)
Very Good (RSL = 30 to 50 years)
Good (RSL = 20 to < 30 years)
Fair (RSL = 10 to < 20 years)
Mediocre (RSL = 1 to <10 years)
Poor (RSL = 0)
Avg Condition Current $
Avg Condition RSL 20 $ Need

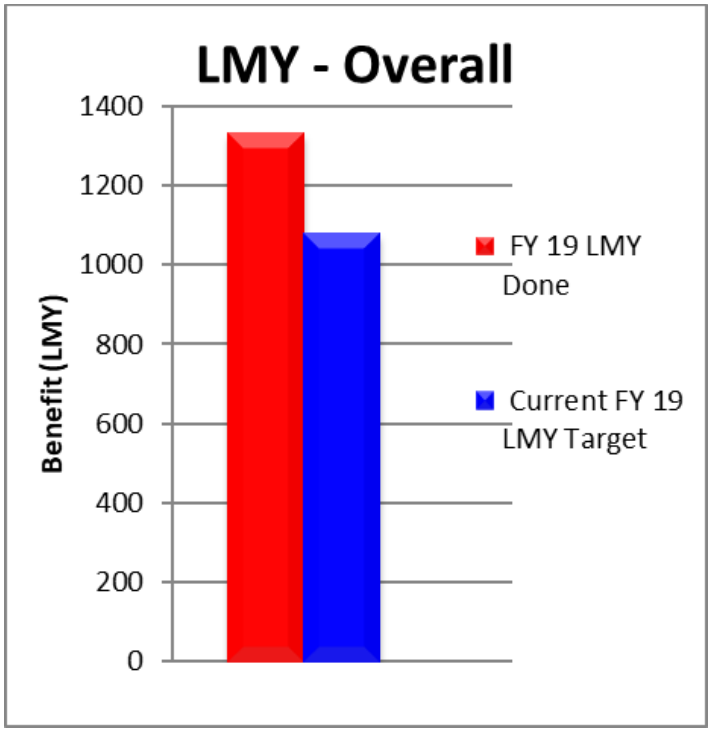
TRACK $ & PAVING ACCOMPLISHMENTS



112% of Budget spent



124% of Target Met



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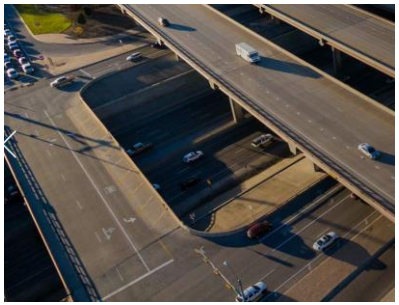

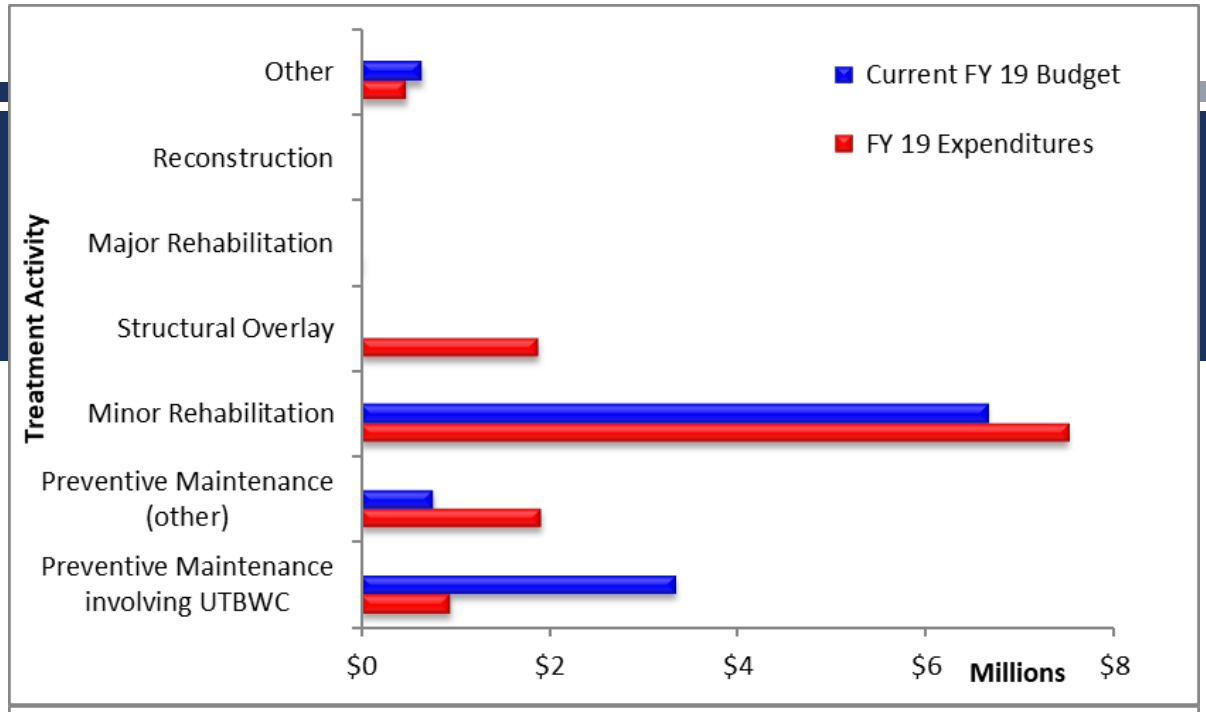

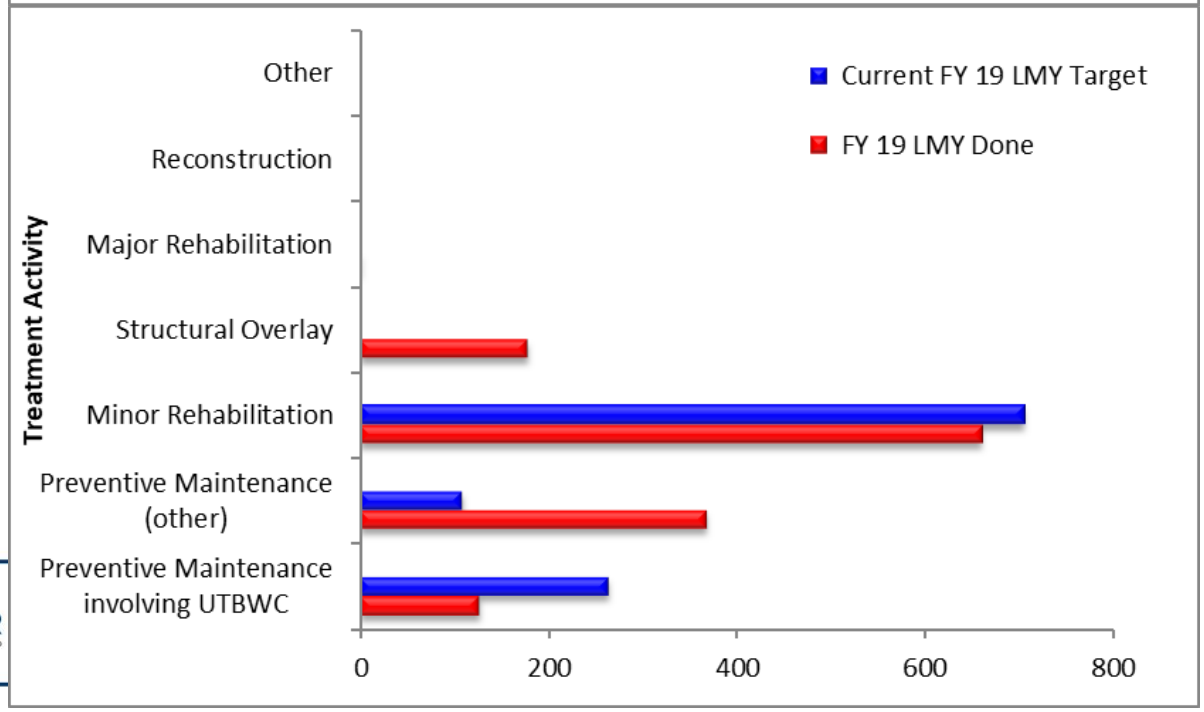

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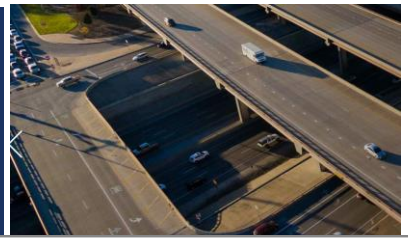
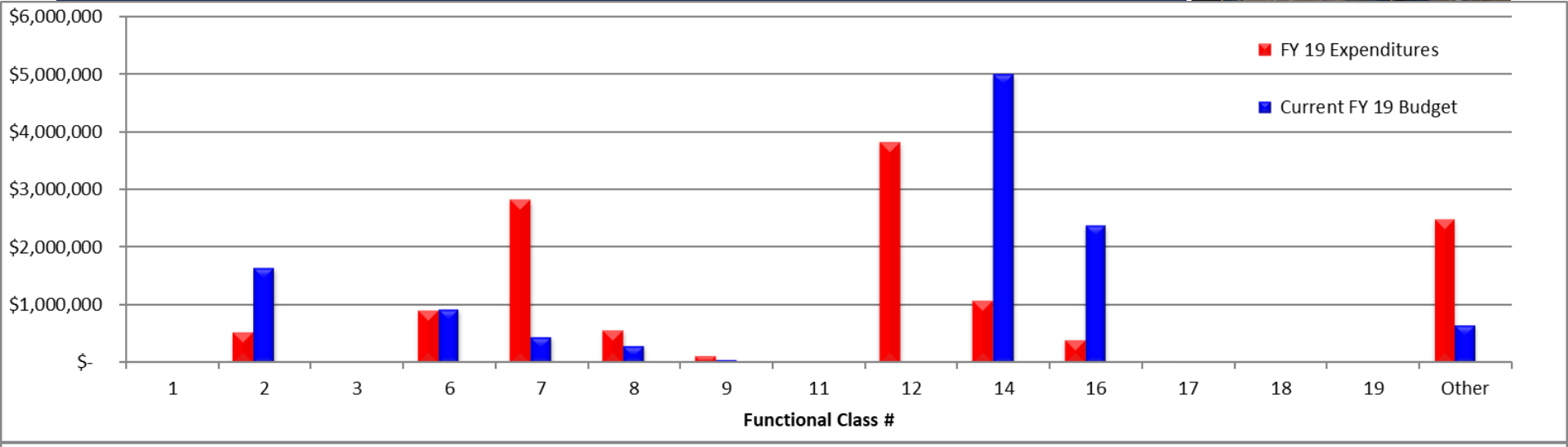
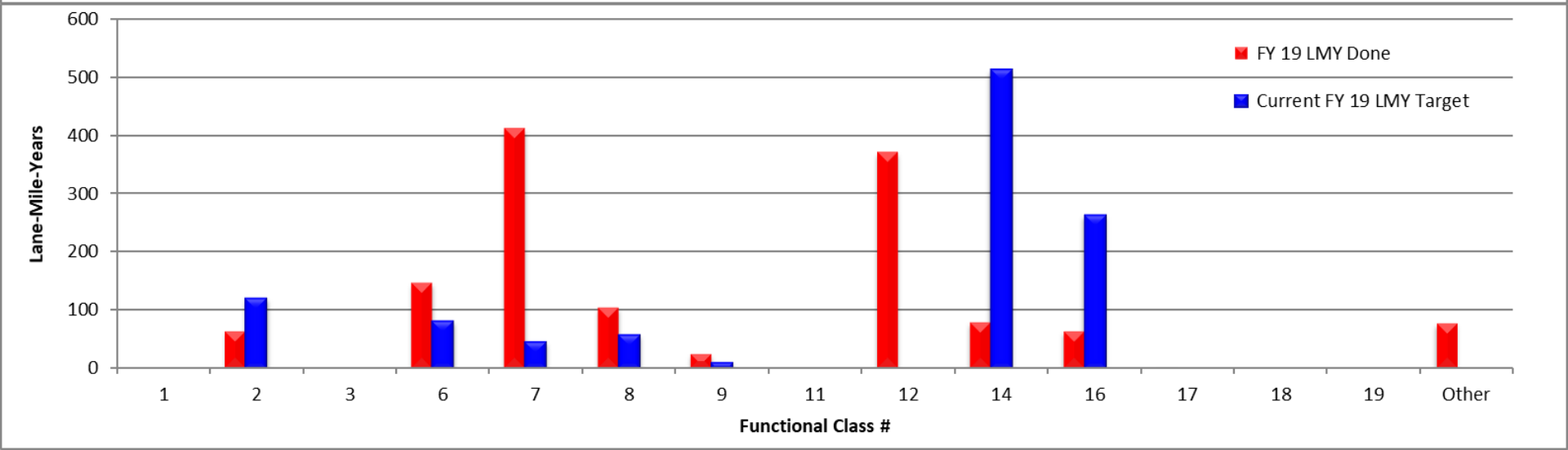
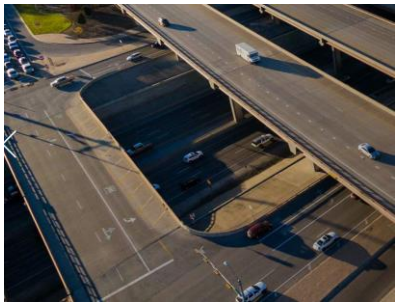
TRACK $ & PAVING ACCOMPLISHMENTS







OUTLINE



MDOT SHA Highway Network

Condition Data – State and HPMS metrics

Data Analytics – Optimization

- State Optimization
- Federal Optimization (MDOT TAMP)

Reports

- Analytics (Optimization) Reports
- MDOT SHA System Preservation Report
- HPMS Report

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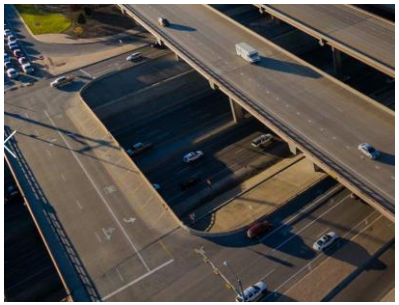
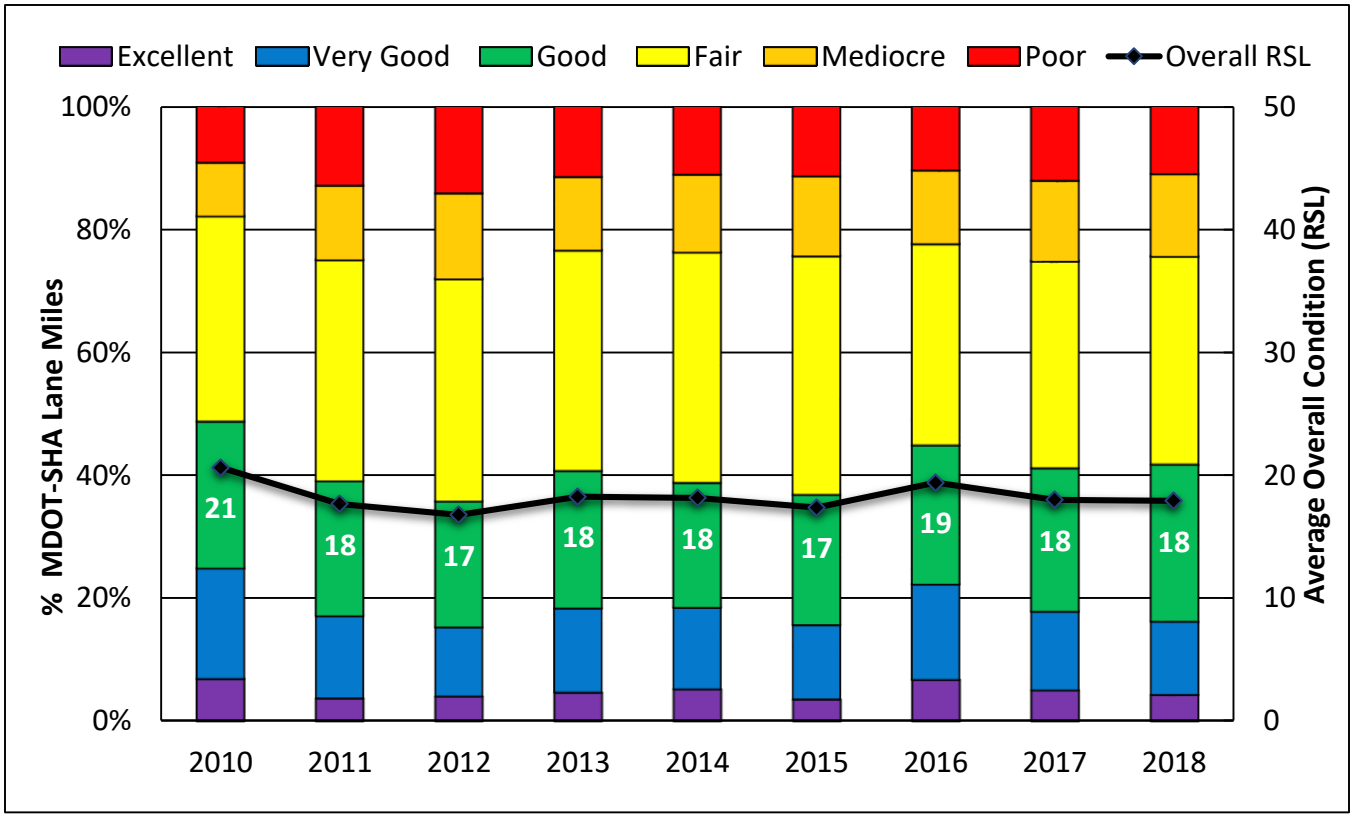
MDOT SHA SYSTEM PRESERVATION REPORT



- Documents condition and paving accomplishments
- Published annually – Statewide & District reports

% Lane-Miles by Overall RSL Performance



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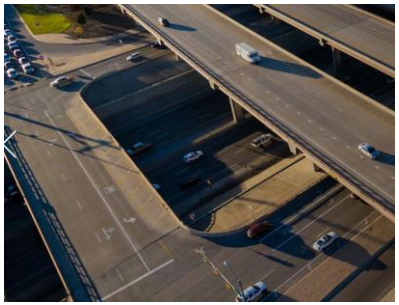
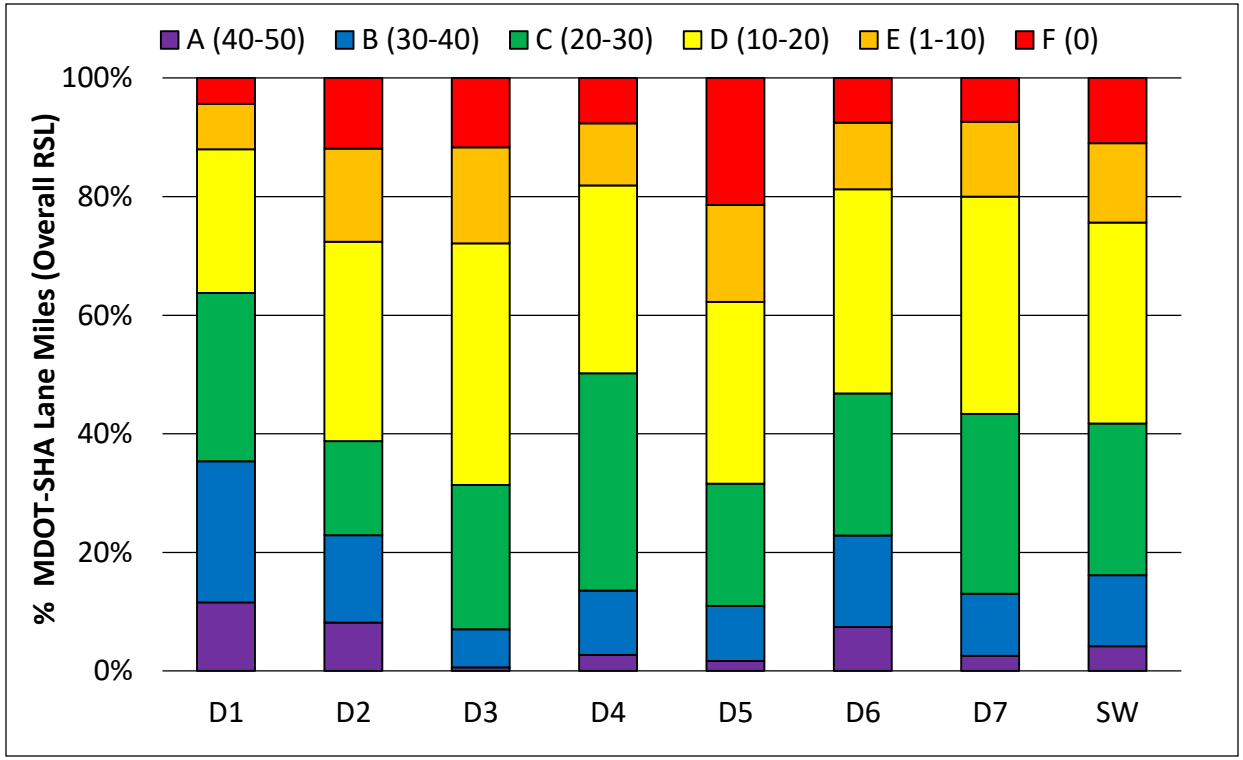
MDOT SHA SYSTEM PRESERVATION REPORT…



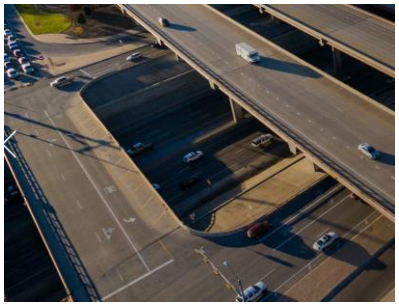
% Lane-Miles by Overall RSL Performance

District

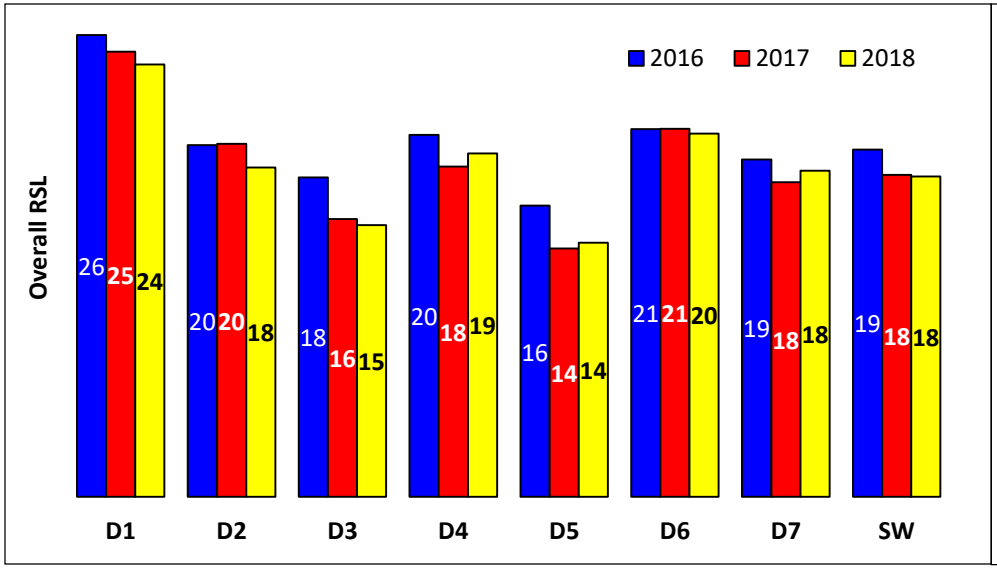
& Statewide



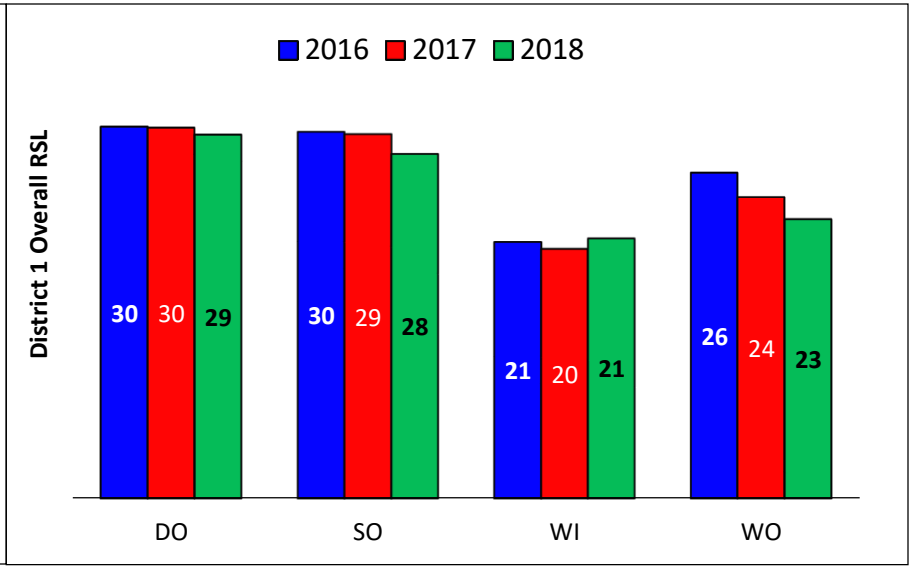
MDOT SHA SYSTEM PRESERVATION REPORT…



Overall RSL by District
&
Overall Statewide RSL



Overall RSL by County



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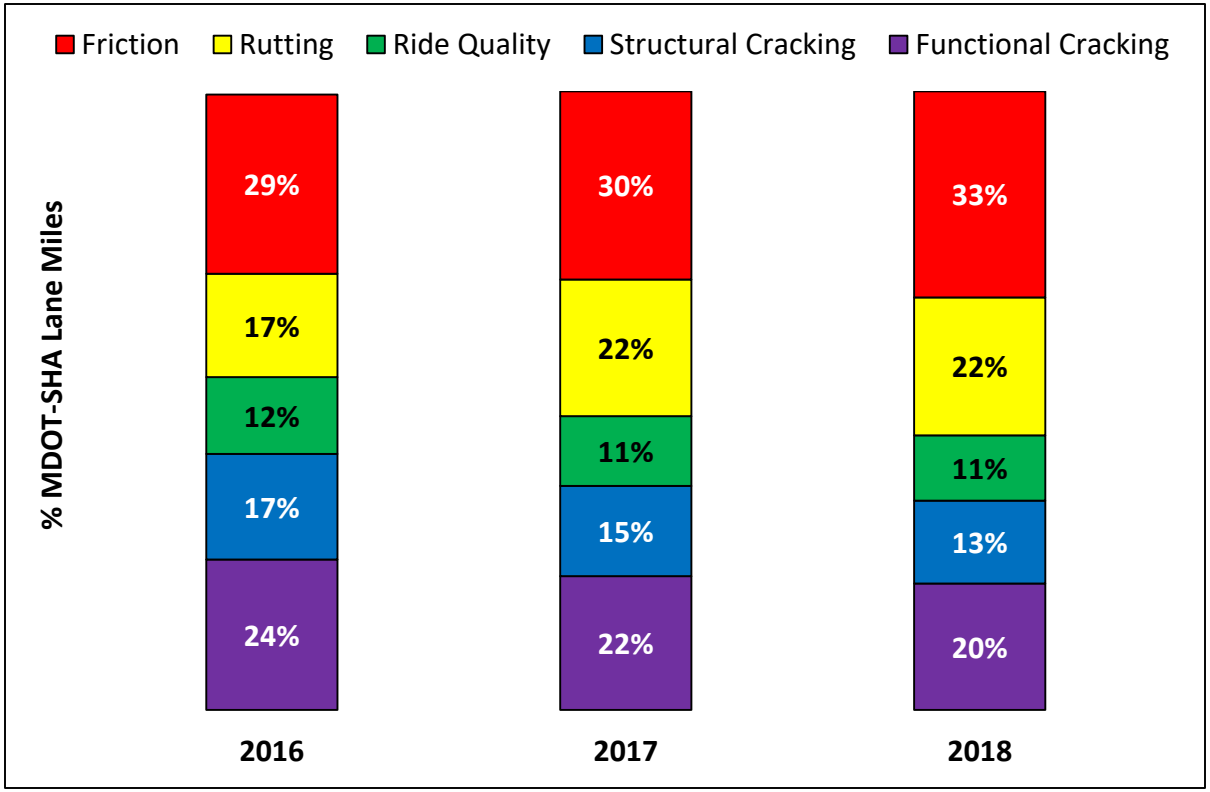
MDOT SHA SYSTEM PRESERVATION REPORT…

Distribution of controlling performing measures



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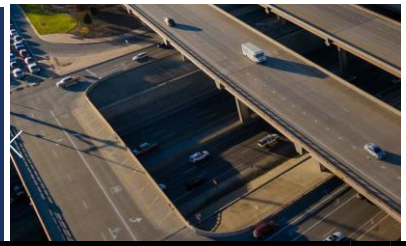
CONDITION DATA REPORTING: AGOL WEB APPLICATION



MDOT SHA 2018 Pavement Condition for internal review only

Filter

Filter MDOT SHA Pavement Condition 2018

DISTRICT is any of
0 selected

COUNTY is any of
0 selected

SHOP_NAME is any of
0 selected

ROUTE_STRING is any of
0 selected
e.g. AA-IS 195 RP5-2 (ramp#-exit#), AA-MD 70A

DIRECTION is any of
0 selected

BEGIN_MILEPOINT is at least

END_MILEPOINT is at most

FUNC_CLASS is any of
0 selected

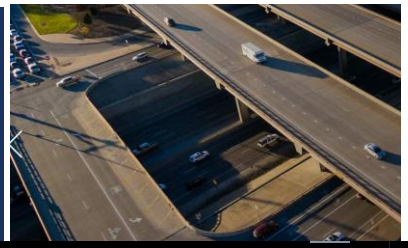
NHS_CODE is any of
0 selected

RSL is between
and

RSL_CATEGORY is any of
0 selected

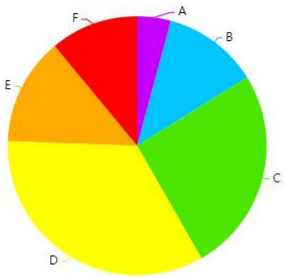
Esri, HERE, Garmin, FAO, USG

CONDITION DATA REPORTING : AGOL WEB APPLICATION…



MDOT SHA 2018 Pavement Condition for internal review only

Overall Condition Distribution by Lane Miles



Legend

MDOT_SHA_Pavement_Condition_2018

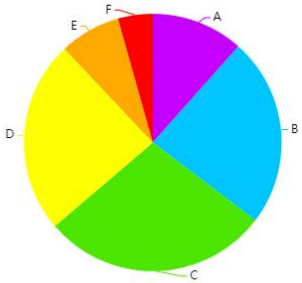
- A (Excellent - 40 to 50 yrs)
- B (Very Good - 30 to <40 yrs)
- C (Good - 20 to <30 yrs)
- D (Fair - 10 to <20 yrs)
- E (Mediocre - 1 to <10 yrs)
- F (0 yrs)

MD_MDOTSHADistrictBoundaries

MDOT SHA District Boundaries

MDOT SHA 2018 Pavement Condition for internal review only

Overall Condition Distribution by Lane Miles



Filter

Filter MDOT SHA Pavement Condition 2018

DISTRICT is any of: 1 selected

COUNTY is any of: 0 selected

SHOP_NAME is any of: 0 selected

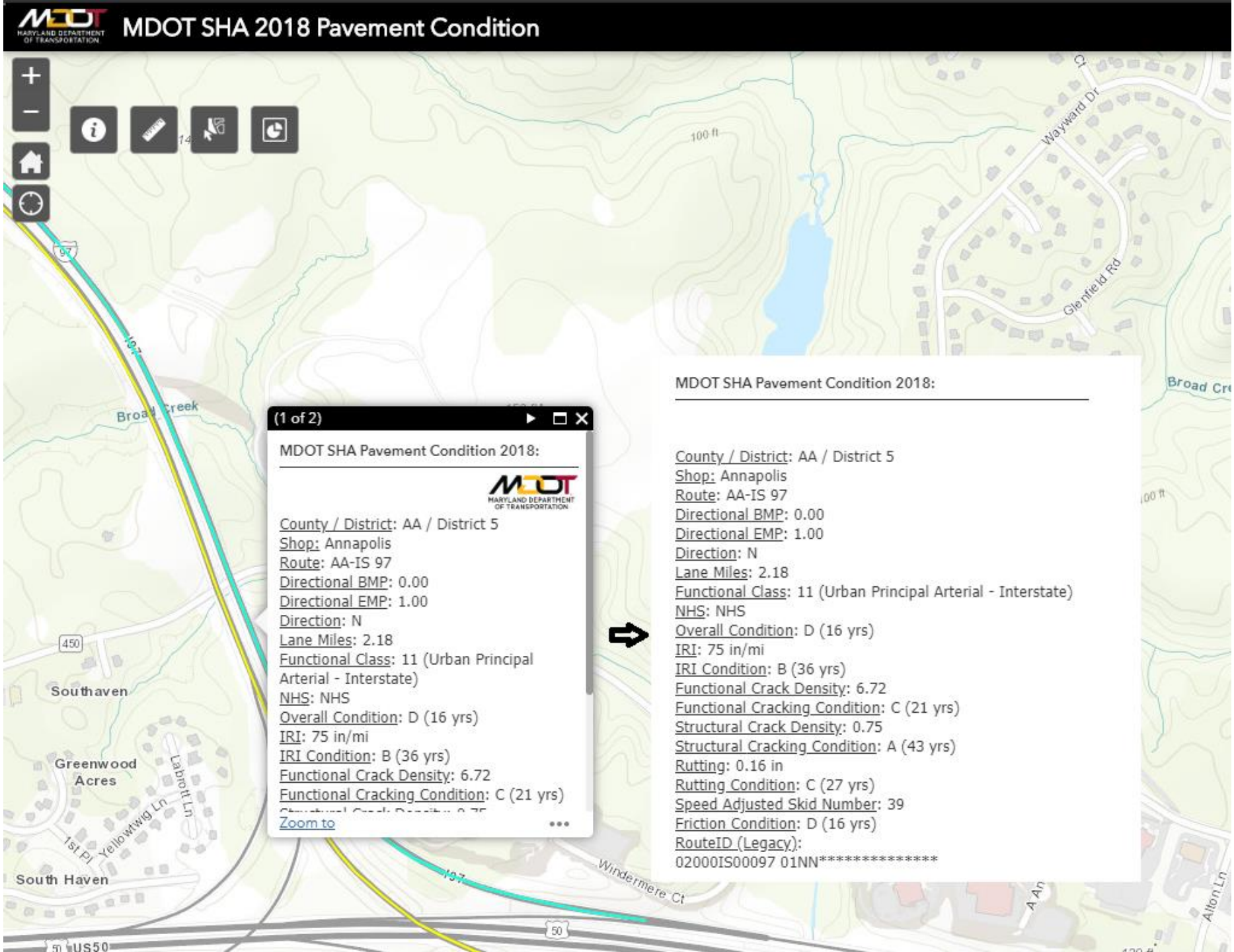
ROUTE_STRING is any of: 0 selected

e.g. AA-IS 195 RP5-2 (ramp#-exit#), AA-MD 70A

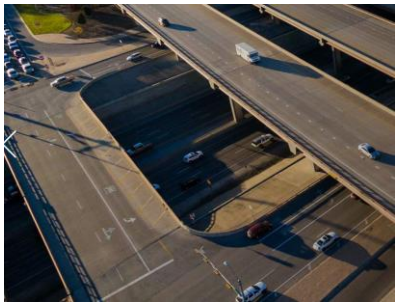
DIRECTION is any of: 0 selected

BEGIN_MILEPOINT is at least

Esri, HERE, Garmin, FAO, USG


MDOT SHA 2018 Pavement Condition
MARYLAND DEPARTMENT OF TRANSPORTATION
Wayward Dr
Glenfield Rd
Broad Creek
Southaven
Greenwood Acres
South Haven
Windermere Ct
Labrott Ln
Yellowwig Ln
1st Pl
US50
(1 of 2)
MDOT SHA Pavement Condition 2018:
County / District: AA / District 5
Shop: Annapolis
Route: AA-IS 97
Directional BMP: 0.00
Directional EMP: 1.00
Direction: N
Lane Miles: 2.18
Functional Class: 11 (Urban Principal Arterial - Interstate)
NHS: NHS
Overall Condition: D (16 yrs)
IRI: 75 in/mi
IRI Condition: B (36 yrs)
Functional Crack Density: 6.72
Functional Cracking Condition: C (21 yrs)
Zoom to
MDOT SHA Pavement Condition 2018:
County / District: AA / District 5
Shop: Annapolis
Route: AA-IS 97
Directional BMP: 0.00
Directional EMP: 1.00
Direction: N
Lane Miles: 2.18
Functional Class: 11 (Urban Principal Arterial - Interstate)
NHS: NHS
Overall Condition: D (16 yrs)
IRI: 75 in/mi
IRI Condition: B (36 yrs)
Functional Crack Density: 6.72
Functional Cracking Condition: C (21 yrs)
Structural Crack Density: 0.75
Structural Cracking Condition: A (43 yrs)
Rutting: 0.16 in
Rutting Condition: C (27 yrs)
Speed Adjusted Skid Number: 39
Friction Condition: D (16 yrs)
RouteID (Legacy):
02000IS00097 01NN**********

OUTLINE



MDOT SHA Highway Network

Condition Data – State and HPMS metrics

Data Analytics – Optimization

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- Federal Optimization (MDOT TAMP)

Reports

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- HPMS Report

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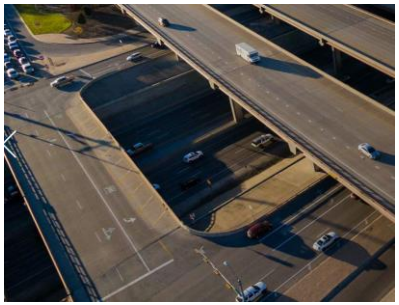
HPMS REPORT – INTERSTATE

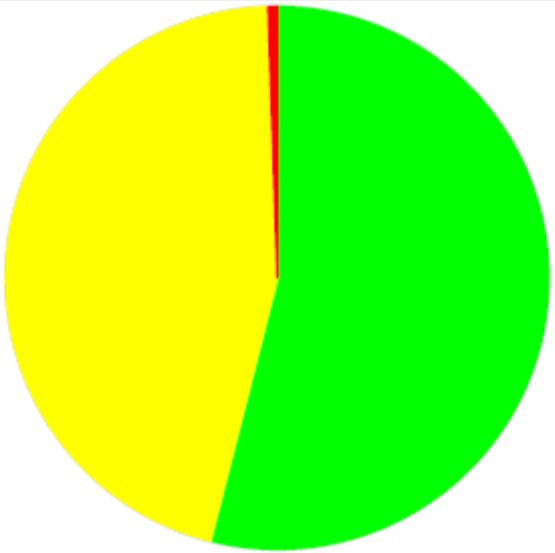


HPMS 8.0.1

FULL EXTENT LANE MILES RATING
(INTERSTATE)

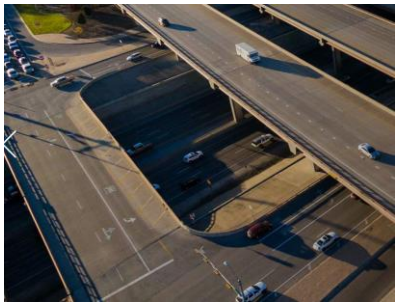
Stage: Submit
Year: 2018
State: 24 - Maryland
Date: 06/07/2019

LANE MILES FULL EXTENT GOOD	1,425.818
LANE MILES FULL EXTENT FAIR	1,201.663
LANE MILES FULL EXTENT POOR	14.375
TOTAL LANE MILES GOOD, FAIR OR POOR	2,641.856
ESTIMATED TOTAL INTERSTATE LANE MILES MISSING OR INVALID DATA	4.943
TOTAL LANE MILES GOOD, FAIR, POOR, MISSING OR INVALID DATA	2,646.799
% ESTIMATED TOTAL INTERSTATE LANE MILES MISSING OR INVALID DATA - LIMIT 5%*	0.2 %



- LANE MILES FULL EXTENT GOOD (54.0%)
- LANE MILES FULL EXTENT FAIR (45.5%)
- LANE MILES FULL EXTENT POOR (0.5%)

HPMS REPORT – NON INTERSTATE NHS

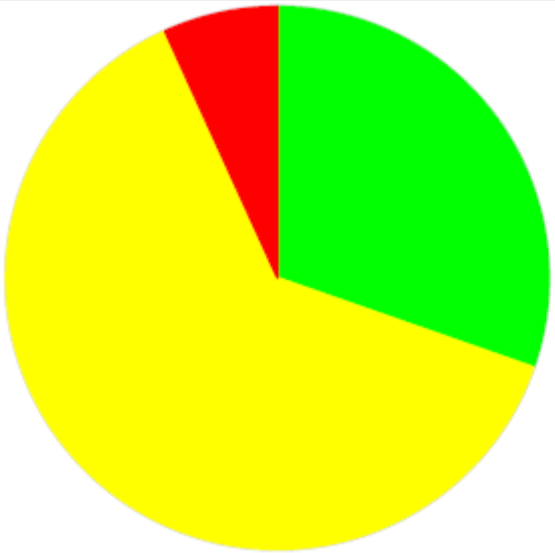


HPMS 8.0.1

FULL EXTENT LANE MILES RATING
(NON-INTERSTATE NHS)

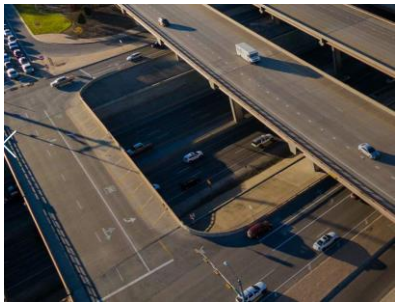
Stage: Submit
Year: 2018
State: 24 - Maryland
Date: 06/07/2019

LANE MILES FULL EXTENT GOOD	1,923.393
LANE MILES FULL EXTENT FAIR	3,982.474
LANE MILES FULL EXTENT POOR	431.214
TOTAL LANE MILES GOOD, FAIR OR POOR	6,337.081
ESTIMATED TOTAL NON-INTERSTATE NHS LANE MILES MISSING OR INVALID DATA	85.446
TOTAL LANE MILES GOOD, FAIR, POOR, MISSING OR INVALID DATA	6,422.527
% ESTIMATED TOTAL NON-INTERSTATE NHS LANE MILES MISSING OR INVALID DATA - LIMIT 5%*	1.3 %



- **LANE MILES FULL EXTENT GOOD (30.4%)**
- **LANE MILES FULL EXTENT FAIR (62.8%)**
- **LANE MILES FULL EXTENT POOR (6.8%)**

PLANNED EFFORTS



- Promote Pavement Preservation Acceptance.
- Continue to Incentivize Districts that meet performance targets, specifically PM targets.
- Just-in-Time (JIT) trainings, educational and training materials for Districts.
- Update specifications based on lessons learned, implementation of best practices in construction and design, feedback from peer exchanges.

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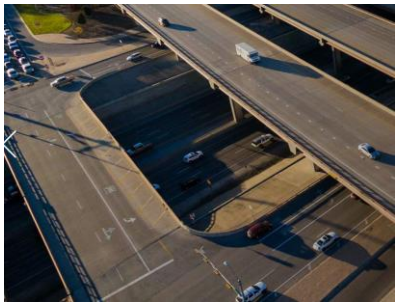
QUESTIONS?



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STATE HIGHWAY ADMINISTRATION