Transportation Asset Management Webinar Series Webinar 56

TAM Tools Webinar Miniseries Webinar 3: Other TAM Tools

Sponsored by FHWA and AASHTO





May 5, 2022

FHWA/AASHTO Asset Management Webinar Series

- The TAM Webinar Series has been running since 2012
- Special miniseries on TAM Tools
 - Thursday May 12: Techniques
- We welcome ideas for future webinar topics and presentations
- Submit your questions via the webinar's chat feature



Welcome

FHWA and the AASHTO Sub-Committee on Asset Management are pleased to sponsor this webinar series

Sharing knowledge is a critical component of advancing asset management practice

Webinar Objectives

- Raise awareness of the role of TAM tools in supporting strong asset management practice
- Understand some of the TAM tools and systems currently in use at transportation agencies
- To hear from the TAM community

Webinar Agenda

2:00 Welcome and Introduction Matt Hardy, AASHTO, Tashia Clemons, FHWA and Hyun-A Park, Spy Pond Partners 2:20 **TAM Tools Presentations** Maryland DOT Climate Change Vulnerability Viewer Toria Lassiter, Maryland DOT Advancing Asset Management at INDOT Louis E. Feagans, Indiana DOT **Project Selection Tools** Rachael Pivik, Wyoming DOT **Ohio DOT Presentation** Michael Weakley, Ohio DOT West Virginia TAM and TPM Tools Gehan Elsayed, West Virginia DOT FHWA InfoBridge Shri Bhide, FHWA 3:15 **Q&A** and Dialogue Matt Hardy Wrap-Up 3:30

4

Menti Poll

Visit Menti.com and enter the code: 9771 0516

Maryland Department Of Transportation State Highway Administration

AASHTO/FHWA TAM Webinar Integrating Climate Risk and Resilience with GIS at MDOT

May 05, 2022

Toria Lassiter Assistant Division Chief Office of Planning and Preliminary Engineering



- **Coastal areas**: Expected to experience dramatic increases in tidal flooding.
 - 0.8-1.6 ft sea level rise from 2000 to 2050; 2-4 ft through 2100
- *Inland areas*: Projected 11-18% increase in the amount of rain associated with the 10% annual chance 24-hr precipitation event (around Baltimore)



CLIMATE CHANGE IN MARYLAND

- Vulnerability Assessments
 - Bridge Vulnerability
 - Roadway Vulnerability
 - Corridor Vulnerability Pilot
- Transportation Network Criticality using GIS methodology



MDOT SHA ANALYSES



- 33 of 8,588 structures highly vulnerable to sea level change.
- 172 of 8,588 structures highly vulnerable to storm surge.
- 102 of 8,588 structures highly vulnerable to precipitation change.
- Assets with high vulnerability to sea level change and storm surge are concentrated in Districts on the eastern shore of Maryland and on the bay.
- Assets with high vulnerability to precipitation change are spread across all Districts, with the highest concentration in Districts inland.



Bridge Vulnerability Assessment using VAST Tool

BRIDGE VULNERABILITY ASSESSMENT



- Nearly 100 miles of roadway is expected to be permanently inundated by 2050, mostly in Dorchester and Somerset counties.
- The numbers are even higher if you look at the amount of roadway that would be flooded at high tide (aka Mean Higher High Water). There, we go from nearly 5 miles flooded at high tide today statewide, to over 290 miles by 2050. That's a nearly 60-fold increase

Roadway Vulnerability Assessment – Hazard Vulnerability Index (HVI)



ROADWAY VULNERABILITY ASSESSMENT



Critica	lity Criter	ia	Cr	iticality F	actor		
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Redundancy	13 - 24	9 - 12	7 - 8	5 - 6	1 - 4	10.0%	

CORRIDOR RISK ASSESSMENT AND

CRITICALITY





MDOT SHA ESRGC NOAA Tidal Datums

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MDOT SHA ESRGC NOAA Tidal Datums

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CLIMATE CHANGE VULNERABILITY VIEWER



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MDOT SHA Climate Change Vulnerability

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Toria Lassiter, Assistant Chief

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- jshearer@mdot.maryland.gov







Advancing Asset Management at INDOT

Louis E. Feagans, P.E. Managing Director of Asset Management, INDOT



INDOT Asset Management Org Chart





INDOT's 20 Year Plan

- 20-year plans for major assets like Pavement and Bridge were required as a stipulation of HB 1002 passed in ~2018
- Editing tools
 - Initially conceived and development started at ~ fall/winter 2019
 - Switched direction to Power Platform Summer 2020
 - Pavement finished development in spring 2021
 - Followed shortly after by bridge
 - Large Culvert editing tool was finished in Feb. '22
- "20-year plan" is a bit of a misnomer.
 - In some cases, it will extend beyond that horizon. 'Long-Range Asset Plan' would be more accurate
 - It will also incorporate some maintenance activities since those are critical to preservation in between capital projects.



Purpose of the Plans

- Provide a shared long-term plan for INDOT assets
 - "Plan the work work the plan"
 - Centralized and Authoritative by Asset Owners
 - Easily shared with other tools and users
 - Query the likely budgets and adjust as needed
 - Accessible for editing in the office or out in the field
 - Assets
 - Currently Pavement, Bridge, and Large Culverts
 - Next: Small Culverts
 - Eventually template could be extended to other assets like Traffic Signals

Lifecycle Strategy – Pavement Maintenance Cycles

The following table presents INDOT's planned maintenance activities for A2 roadway category pavement, depicted over a 12-year maintenance cycle, beginning and ending with resurfacing treatments. Operating interventions are depicted below the timeline graphic, and capital interventions are depicted above the timeline graphic. For detailed maintenance cycles, please refer to the Appendix.



Figure 12: Pavement Maintenance Cycles, A2

The purpose of the graphic is to depict maintenance strategies over a 12-year maintenance cycle. The graphic above is not intended to show all CAPEX and OPEX interventions over the course of the asset lifecycle. Note that beyond the first 12 years, the OPEX intervals may become more frequent than approximately every three years.

Lifecycle Strategy – Investment Diagram (Non-Interstate)

Operating and capital investments are derived from the application of the preferred lifecycle strategy for bridge assets. The following table presents INDOT's planned capital and operating interventions for an illustrative example Non-Interstate bridge in the southern portion of the State and should not be taken as indicative of all southern Non-Interstate bridges. Capital interventions are depicted above the timeline graphic. The intervals for operating interventions are provided below the timeline graphic.



Figure 12: Non-Interstate Bridge Maintenance Cycles (southern)

¹Address Scour treatment can be classified as either OPEX or CAPEX. Scour protection work is performed as-needed based on the results of inspections. For the purpose of the modeling the deterioration curves, this treatment was not included as an CAPEX treatment.

²The FHWA standard design life is 75 years. The example assumes approximately 120 years for Non-Interstate bridges; however, the actual lifespan is dependent on such factors as the material, results of inspections, and condition of the bridge, noting that the substructure must be in good condition to achieve a longer lifespan.

Purpose of the Plans (cont.)

- Easily-accessible plans from the asset owners allow stakeholders to provide feedback and adjust their own plans
- How do treatments like chip seals phase with other required work like culvert replacement?
- How many resources do we need to commit towards an asset before a capital project comes through?

- If a change-order is being considered, how will this affect existing plans?
- If we install a MOT cross-over, is Construction it likely to be reused by future projects?

Maintenance

Scoping

Design

- What other nearby assets might have work at the same time?
- How long does this scoped treatment need to last? Bandaid?
- Can we detour traffic there?

- If the project is moved up or out a year, what other plans/assets might be impacted?
- Do we need to include additional assets if the planned work type changes?

Lifecycle Strategy Financial Optimization

The following presents an illustrative asset lifecycle deterioration curve for HMA type pavement comparing the preferred, alternative, and do-nothing scenario against the impacts of each treatment scenario on the pavement's condition over the asset's lifecycle.

Illustrative Asset Decay Curves, HMA A1 Preferred Scenario Do Nothing Scenario Preventive Maintenance Treatment Minor Structural Treatment Major Structural Treatment 10 15 55 60 20 25 65

Year

PAVEMENT LIFECYCLE INVESTMENT PLANNING



GIS/Mapping Components

- Upcoming projects map
 - Shows Programmed Contracts and 20-yr Plan Locations
 - Can be filtered in different ways, but most importantly by fiscal year as a range
 - Data is updated nightly from SharePoint list using FME





20 Year Road and Bridge Plans

• HEA 1002 (2017 Transportation Bill) required INDOT to establish a 20 Year plan

- Years 1-5 = Programmed/STIP
- Years 6-10 = Near term plan (not funded, no DES)
- Years 11+ = Long term plan (no funded, no DES)
- dTIMS Modeling used to
 - Validate
 - Fiscally constrain
 - Optimize

Business Intelligence (BI)

- Data is presented in various reports in Power BI
- Data is either pulled from the Data Warehouse or SharePoint.

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Project Scoping Application Overview

INDOT has developed a project scoping application (PW4) to develop scopes for bridge and pavement projects

- Reduce data entry time
- Improve the accuracy of data going into SPMS
- Features an ESRI Collector interface to collect field notes and pictures on site
- Desktop interface to fully develop abbreviated engineering reports



Project What/Where/Why/When

Project Scoping Application

- Collector Application on iPad
 - Field notes, pictures, geo-located
 - Programmed projects visible



C Maps	ScopingWebMap	Q
Bridge Line (Inventory a 501.5 m	GPS device not	connected
NBI 042210		
ASSET NAME 170-079-02416 A		
FACILITY CARRIED		
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FEATURES INTERSECTED WEST, MISSOURI STS	and	1.70.00
MAIN STR TYPE ENGL 402 - Steel continuous St		
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Party Duran and Sand Summaria Sandara	Additional Commands and Completes		
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Last Edited Date	2/12/2020	Work Type	C116-Bridge Thin Deck Overlay +
Last Updated By	System, DTIMS	Work Category	District Bridge Project (Rehabilitation)
Proposed FY	2025	Score	80
Record ID	10585	NBI #	080336
Call Status	Interfaced to SPMS Call		
ridge Project Details			
CN Cost dTIMS		CN Cost Modified	\$505,000
Year dTIMS		Year Modified	2025
WorkType dTIMS		Work Type Modified	BMS Thin Deck Overlay
C Bridge Attributes			
AADT	9,605	AADT Truck	1,046
On NHS	1 - Is on the NHS	Functional Class	1 - Interstate
District	VINCENNES	Sub	LINTON
County	14 - Daviess	Route	1.69
Reference Post	63	Offset	14
Latitude	38.899	Longitude	-86.992
Existing Structure	169-083-09444 58	Structure Type	604 - Prestressed concret

Tablet/Web Map Layers

Programmed Projects Proposed (scoped) Projects Emergency Repairs (23 CFR 667)



Field info may be cleaned up/modified before transferring to project scope

Limits can be seen in map view •

Route Map Details Measure Project Details Project Info

Messages

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Field info may be cleaned up/modified before transferring to project scope

Limits can be seen in map view •

Route Map Details Measure Project Details Project Info

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Field data transferred to project scope

- Various attributes automatically pulled/computed from authoritative sources
 - Reference Post + offset
 - ADT/ADTT
 - Functional Class
 - County, District, Sub
 - Pvmt Conditions/Attributes
 - Bridge Conditions/Attributes

Roadway Information		
0		
AADT	2,704	AADT Truck 318
AADT Year	2019	Pavement Type Composite v
Project Length	0.61	County(s) 42 - Knox
Number of Through Lanes	2	Subdistrict(s) LINTON
Number of Lanes Miles	1.22	Functional Class 4 - Minor Arterial
Pavement Area	9152 sq yd	On NHS 0 - Not on the NHS
Underdrains Present	No v	Estimated Number of Large Culverts (>48" - 20') Along Section
Curbs Present	No v	Estimated Number of Small Culverts (12-48") Along Section
Known ADA deficiencies	No v	

elated Record			
Object Id	79421	FA Text	Is on the NHS
Alt Name	U_231	Direction	Inc
IRI LWP	45.5667749	IRI RWP	55.98303038
RUT LWP	0.23121564	RUT RWP	0.13325947
Lane	1	Date Collected	8/16/2019
Comments		District	1
AU AVG	0	DBA HMA	0.11164486
DBA Concrete	0.11164486	MAX RUT	0.23121564
MAX RUT RAT	Low	IRI RWP RAT	Excellent
tamp Id	Road	Pavement Area Sqyd	708.6667

P	SCOPE Data Flow	Estimated Total Project Costs
•	Cost estimates are prepared Near pay item level Anticipated MOT described Mobility significant determination Environmental factors considered Supporting documents attached Scope "signed" by the System Asset Manager	Project Phase Right of Way Purchase Right of Way Services Preliminary Engineering 1 Railroad PE 1 Utilities PE Utilities CN Construction Total = autocalculated by summing the following indented items Construction ADA Sidewalks/ Multi Use Paths Other Considerations

Submittal Year	•	
Signature		
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Amount

\$35,000

\$350,000

\$0

\$0

\$0

\$50,000

<mark>\$4</mark>,711,000

\$4,538,000

\$173,000

\$0

\$0

District approved project scopes are then brought into the asset team "Deliberation Areas"

- Projects are deliberated
- Approved projects are pushed to SPMS Call area
- Once activated in SPMS, project geometry is automatically drawn in FMIS/DES Detail



Bundles and Corridors

- Bundle
 - Grouping of different projects with similar work types into 1 contract
 - Similar letting FY
 - All are projects approved through normal asset team deliberations
- Corridor
 - Doing all required work on major assets within a section of road
 - Could be "sacrificing" life
 - Doing a bridge deck overlay a few years early to match with major road work MOT
 - 2025 was the first year we specifically deliberated a "corridor"
 - I-70 Added Travel Lanes through Richmond
 - 3 PK's
 - 46 Structures (bridges + large culverts)
 - >\$300,000,000



Bundles and Corridors

- Working on a bundling application to help pick these
 - Will look at both
 - Bundles based on geography and work types
 - Corridors
 - Estimates overall savings from bundling







Questions???

Louis Feagans, INDOT Ifeagans@indot.in.gov 317-412-1670













5/5/2022

Asset Management Candidates

- Bridge/Pavement provide candidate list.
- BMS/PMS



1

Scope Statement

- Decision documentation
- Early stakeholder input
- Requires access to data





State Planning and Operational Database (SPOD)

- Homegrown APEX tool
- Oracle tables
- WYDOT wide use



Project Builder

- Pulls data for
 Scope
 Statements
- APEX tool
- Crystal Report



A	Δ	A
Project Description	Project Structures	Project Map Link
Manage Description of Project	Manage Project Structures	Manage Project Map Link
A		A
Project Prerequisites	Highway Data	Surfacing Work
Manage Project Prerequisites	View Highway Data	Manage Surfacing Work
A	Δ	A
Safety Work	Traffic Data	Ancillary Work
Manage Safety Work	View Traffic Data	Manage Anciliary Work
A		
Improvement History	Costs	
View Improvement History	Manage Costs	

Thank you!



Questions?

Rachael Pivik Wyoming Department of Transportation <u>Rachael.Pivik@wyo.gov</u>

Ohio DOT Presentation

Michael Weakley

 Completion of 2050 WVDOT LRTP (2021) and establish "Family of Plans"
 Develop new pavement &

- bridge management systems and SOPs supporting TAM
- Development of integrated TAM/ TPM tools
 - » Performance Connection
 - » Trade-off-analysis Tool ("Planning for Performar





Overview

TAM & TPM Tools Performance Connection





- Planning partner and stakeholder access to information, dashboards, data downloads
- Focus on FHWA measures, but designed to expand into FTA/NHTSA measures and WV specific measures
- 2017 through 2020 performance data, process to update annually with finalized data
 - 32

TAM & TPM Tools Performance Connection

WVDOT PERFORMANCE CONNECTION



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Welcome to the WVDOT Performance Connection

Main Page Introduction to TPM Dashboards Download Data

his site is a one-stop Transportation Performance Management (TPM) application to support investment and policy decisions to achieve national and state performance goals. The Performance Connection is an online system to track system performance consistent with the 2050 LRTP goals.







Main Page



Transportation Performance Management in West Virginia

How are we performing?

WVDOH asset management principles are helping to comprehensively manage bridge condition, focusing on addressing poor bridges while also extending the lifecycle of good and fair bridges, resulting in declines in poor bridges since 2018

• The percent of bridge deck area in poor condition has declined over the past two years, from 15.3 percent poor in 2018 to 13.4 percent in 2020. Bridge deck area in good condition has also declined since 2018 (from 13.1 percent to 8.8 percent) as good condition bridges move to fair condition based on the results of annual inspections.

• In 2020, WVDOT reviewed progress for each bridge and pavement measure and adjusted bridge targets to be consistent with policy and strategies in the Transportation Asset Management Plan (TAMP) within a mid- performance period report submitted to FHWA. Details on that report and the rational for adjusted targets and determination of progress is available here.

The following charts show NHS bridge conditions and respective targets as submitted to the FHWA:









Number of serious injuries

Main Page

- Serious injury rate (per 100 million VMT)
- Number of nonmotorized fatalities and serious injuries

poor condition % of pavements on the non-Interstate NHS

- 8. in good condition
- % of pavements on the non-Interstate NHS in poor condition
- 10. % of NHS bridges classified as in good condition
- 11. % of NHS bridges classified as in poor condition

- NHS that are reliable
- 14. % of Interstate mileage providing for reliable truck travel times
- 15. Annual hours of peak-hour excessive delay per capita
- 16. Percent of non-single occupant vehicle travel
- 17. Total emissions reduction (CMAQ projects)





Experimentation Transportation Performance Management in West Virginia

WORK AHEAD

O.

RUAD

PM1 Measures (Safety)

In compliance with 23 CFR Part 490 FHWA, WVDOT sets Safety Performance Management Measures (SPMs) through the development of safety targets for the number and rate for fatalities, the number and rate for serious injuries, and the number of fatalities for non-motorized users (pedestrians and bicyclists). The Governor's Highway Safety Program, West Virginia's Highway Safety Office, established a goal of zero fatalities and identified the state's most serious traffic safety problems along with strategies and actions to solve them in the Strategic Highway Safety Plan (SHSP). West Virginia's MPOs were involved in the SHSP update and the identification of state safety measures and targets.

What do we measure?

Annual fatalities and serious injuries for motor vehicle occupants, the rate of those fatalities and serious injuries per 100 million vehicle miles traveled (VMT), and the annual fatalities and serious injuries for cyclists and pedestrians.

 Data is tracked for all public roads and reported to the Federal Highway Administration (FHWA) and the National Highway Transportation Safety Administration (NHTSA) on an annual basis to estimate a five-year rolling average for each measure.





PM 2 Measures (Bridge and Pavement Conditions)

What do we measure?

Bridge and pavement condition on the National Highway System (including interstates and designated U.S. highways)

• WVDOT tracks performance on an annual basis through Highway Performance Management System (HPMS) and National Bridge Inventory (NBI) submissions to FHWA and is required also to review targets and report performance biennially to FHWA.

• **Pavement measures** cover the National Highway System (including Interstates and other designated U.S. routes) and represent the percent of lane miles of pavement in good or poor condition.

• **Bridge measures** focus on NBI bridges on the National Highway System and represent the percent of bridge deck area in good or poor condition.





PERFORMANCE Transportation Performance Management in West Virginia

Setting and tracking performance measures creates:

Improved communications between decision makers and transportation stakeholders,

Provides key information to help decision makers understand the consequences of
investment decisions across asset types and mode, and

Allows targets and measures to be developed in cooperative partnerships based on data and objective information.



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Transportation Performance Management in West Virginia

How is WVDOT Addressing the Federal Requirements?

WVDOTs TPM approach started in 2016 through the assistance of a FHWA Strategic Highway Research Program (SHRP) 2 Program grant within the PlanWorks program. WVDOT collaborated with FHWA and the MPOs in 2016, 2017 and 2018, leading up to submission of the FHWA required Baseline Performance Report and targets in October 2018. This graphic depicts the overall steps within Phase I (2016-2017) where WVDOT focused on improving and standardizing data:





Main Page

Introduction to TPM

WVDOT Dashboards

Make your selection below to be taken to the corresponding performance measure's unique interactive dashboards

FHWA Measures







Non-Federal Measures

Other Federal Measures





Safety





Download Data

WVDOT Pavement Performance Measures

State and MPO Level

Download Data

Clear All Selection





Road Condition in Year 2020

tate Lane-Miles 2020	Route ID	LM Good	LM Fair	LM Poor	LM Missing	Lane-Miles	Year	^
6,126	40100640000EB	27.15	1.75	0.00	0.00	28.90	2020	
IC, Lane-Miles 2020	40100640000WB	25.47	3.88	0.00	0.00	29.35	2020	
755	40200350000NB	11.27	45.33	1.27	0.00	57.87	2020	
	4030817000000	1.20	2.58	0.00	0.00	3.78	2020	Ľ

TAM & TPM Tools Trade-off Analysis





- Enables management level review of performance impacts of program-level investment policy
- Relies on outcomes from BMS/PMS scenarios to develop investment-performance curves
- Reports TPM measure performance for selected years
- 43

TAM & TPM Tools Trade-off Analysis



Select a Plan Year	In Year Enter year		forma	ince	STE ST WEST DITCH	Plan		
Your Plan Total	\$0	2020 Target		Plan	TOF TRANSPOS	Your Scenario	Today's Funding	
Pavement Conditi	on		5					
Turnniko	% Good	73.4%			0% 20% 40% 60% 80% 100%			
I urnpike	% Poor	0.1%			0% 20% 40% 60% 80% 100% Enables view of tool outcome	Enter		
Non-Turnpike NHS	% Good	40.9%	Enter future	Tool outcome	(performance) on white line,	average annual	Base year	
	% Poor	1.2%	year target	in Plan Year	error bars (red/blue/green	funding (in current	funding (2020)	
	% Good	0.0%			0% 20% 40% bars) % 80% 100%	dollars)		
	% Poor	0.0%			0% 20% 40% 60% 80% 100%			
						\$0	\$0	
Bridge Condition								
	% Good	10.0%			0% 20% 40% 60% 80% 100%			
Turnpike	% Poor	11.9%			0% 20% 40% 60% 80% 100%	Enter		
Non-Turnpike NHS	% Good	10.0%	Enter future year target	Tool outcome	(performance) on white line,	average annual	Base vear	
	% Poor	10.0%		in Plan Year	established target (black line), error bars (red/blue/green	funding (in current	funding	
Off-NHS WVDOT-Owned	% Good	0.0%	target		0% 20% 40% bars) , 80% 100%	dollars)	(2020)	
	% Poor	0.0%			0% 20% 40% 60% 80% 100%			
						\$0	\$0	

TAM & TPM Tools Trade-off Analysis



\$154

\$108

Select a Plan Year	2042	Per	A LOS WEST UND						Plan			
Your Plan Total	\$404	2020	2042 Target	2042 Plan					NOLLE		Your Scenario	Today's Funding
Pavement Conditi	on											
	% Good	73.4%	75.0%	98.7%	0% 2	20%	40%	60%	80%	100%	*•••	\$ 22
Turnpike	% Poor	0.1%	4.0%	0.0%	0% 2	20%	40%	60%	80%	100%	\$28	\$28
	% Good	40.9%	45.0%	63.0%	0% 2	20%	40%	60%	80%	100%	.	\$136
Non-Turnpike NHS	% Poor	1.2%	5.0%	1.6%	0% 2	20%	40%	60%	80%	100%	\$130	
Off-NHS WVDOT-Owned	% Good	0.0%	20.0%	6.1%	0% 2	20%	40%	60%	80%	100%	\$92	\$107
	% Poor	0.0%	5.0%	36.7%	0% 2	20%	40%	60%	80%	100%		
											\$250	\$271
Bridge Condition												
Turnpike	% Good	10.0%	10.0%	1.5%	0% 2	20%	40%	60%	80%	100%	-	
	% Poor	11.9%	10.0%	33.7%	0% 2	20%	40%	60%	80%	100%	\$24	\$17
Non-Turnpike NHS	% Good	10.0%	10.0%	4.9%	0% 2	20%	40%	60%	80%	100%	\$175	
	% Poor	10.0%	10.0%	41.2%	0% 2	20%	40%	60%	80%	100%		\$112
Off-NHS WVDOT-Owned	% Good	0.0%	16.0%	8.0%	0%	20%	40%	60%	80%	100%	\$130	\$91
	% Poor	0.0%	10.0%	37.1%	0% 2	20%	40%	60%	80%	100%		

Conclusion



West Virginia Division of Highways

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Transportation Performance Management in West Virginia

Scroll down for Introduction

FHWA's InfoBridge

Shri Bhide

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#4. Thursday May 12, 2p EDT: Techniques

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