



**IBTTA**

TOLLING. MOVING SMARTER.

# MAINTENANCE & ROADWAY OPERATIONS WORKSHOP



Maryland  
Transportation  
Authority

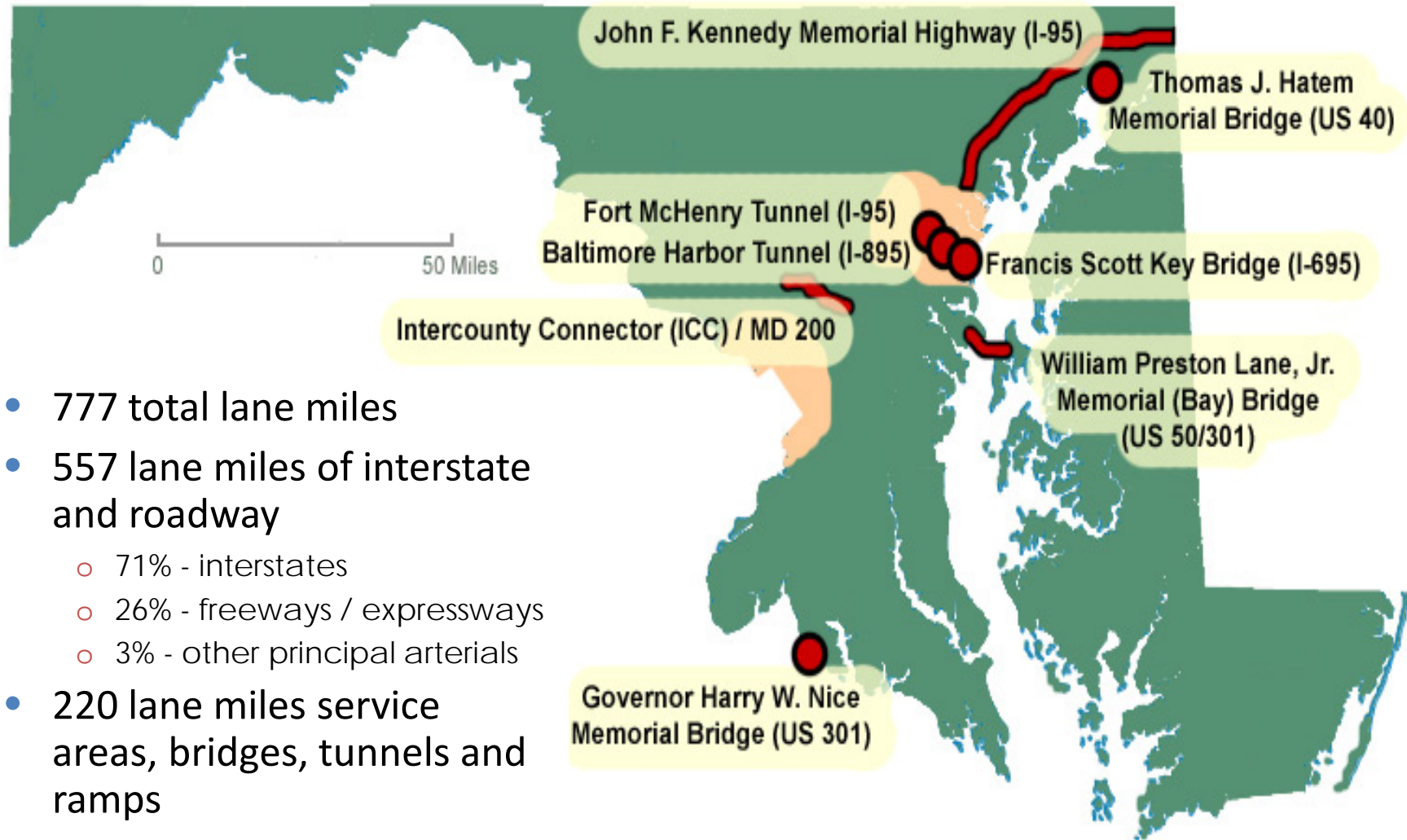
## ***Building an Effective Electronic Structures Data Management System***

*by William Pines, P.E.*

May 2016



# Who is MDTA?



- 777 total lane miles
- 557 lane miles of interstate and roadway
  - 71% - interstates
  - 26% - freeways / expressways
  - 3% - other principal arterials
- 220 lane miles service areas, bridges, tunnels and ramps





# MDTA Asset Overview

## Signature Bridges







# MDTA Asset Overview

## Workhorse Bridges



## Movable Bridges





# MDTA Asset Overview

## Tunnels



Bores



Vent Buildings / Pump Rooms



Electro-Mechanical Systems





# MDTA Asset Overview

## Sign Structures & Gantries

High Mast Light Poles



Toll Plazas







# MDTA Asset Overview

Retaining Walls



Roadway & Traffic Safety Features



Small Bridges/Drainage (< 20 ft)



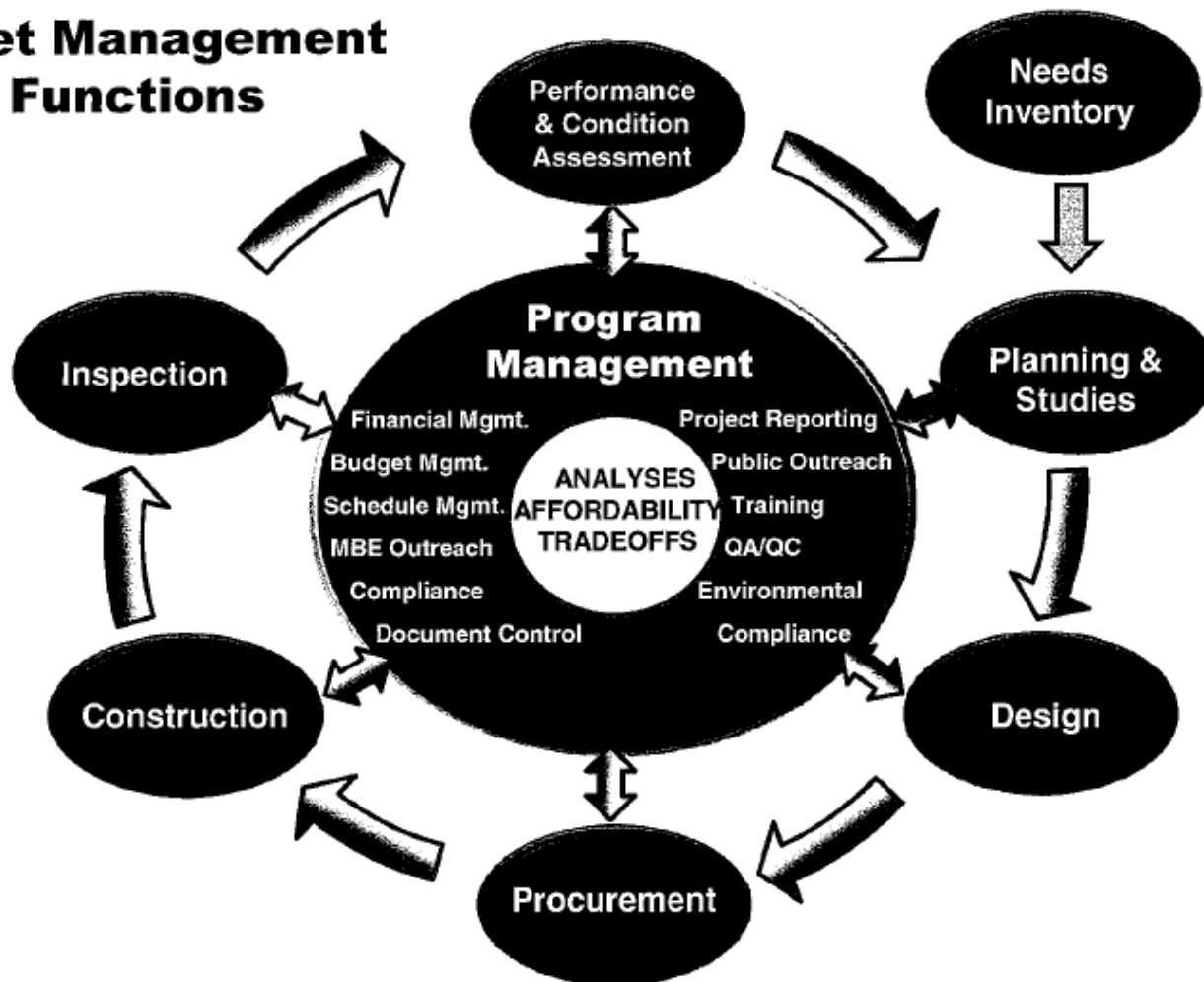
Noise Walls





# How do we manage it all?

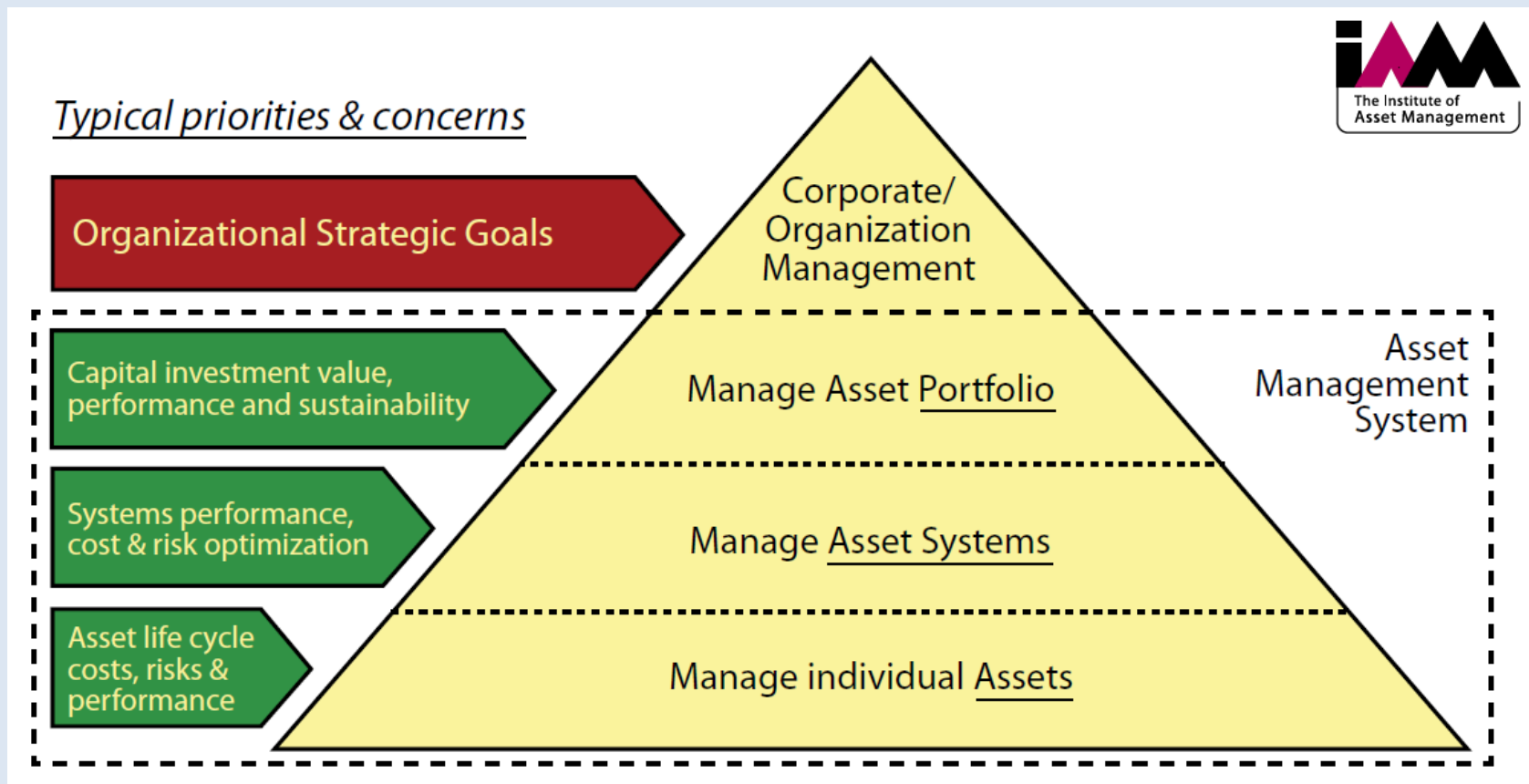
## Asset Management Functions







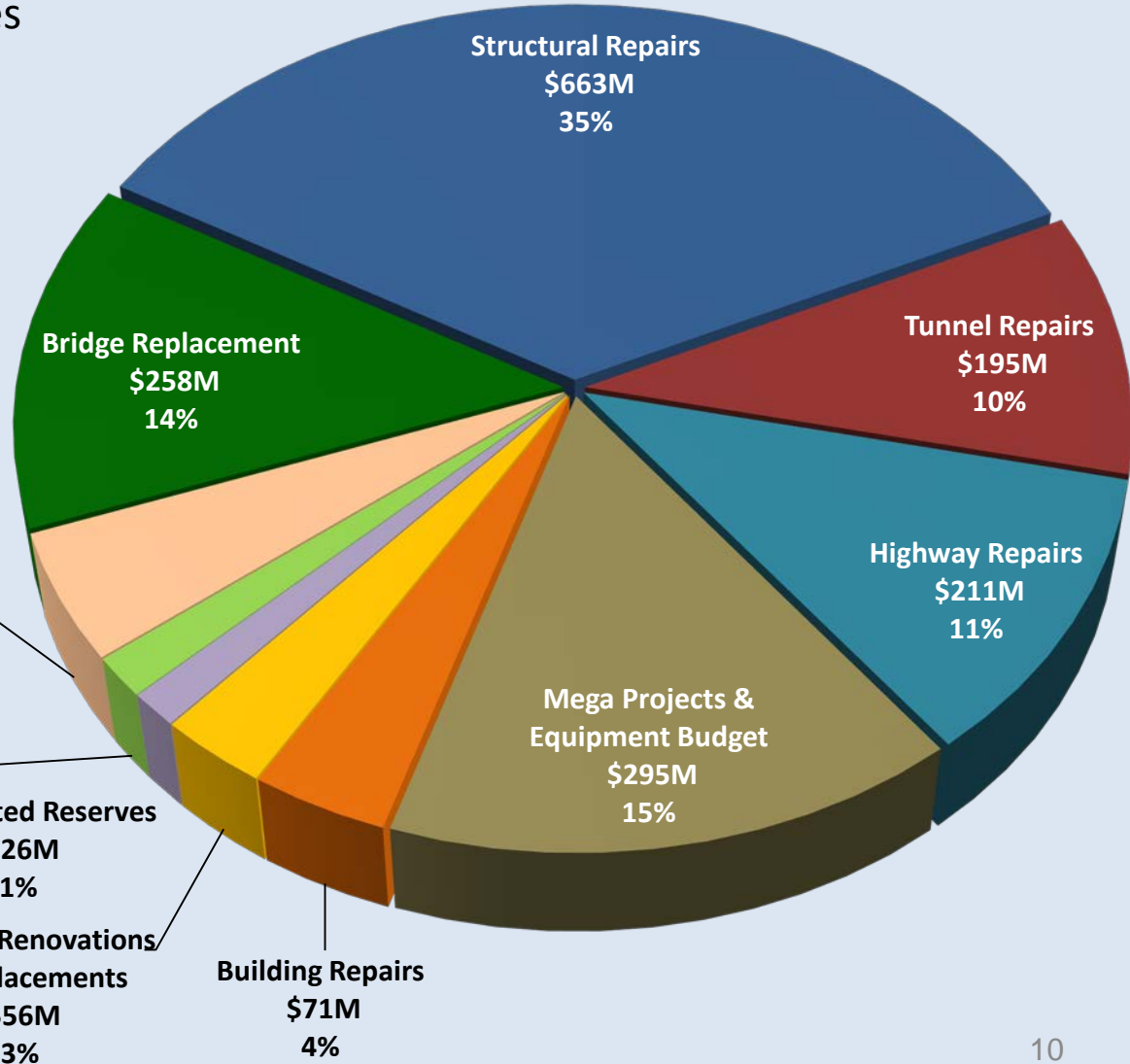
- **Integrated Enterprise (Agency-wide) Asset Management**
- vs.**
- **Individual Asset Management**





# What Will the Toll Dollars Do?

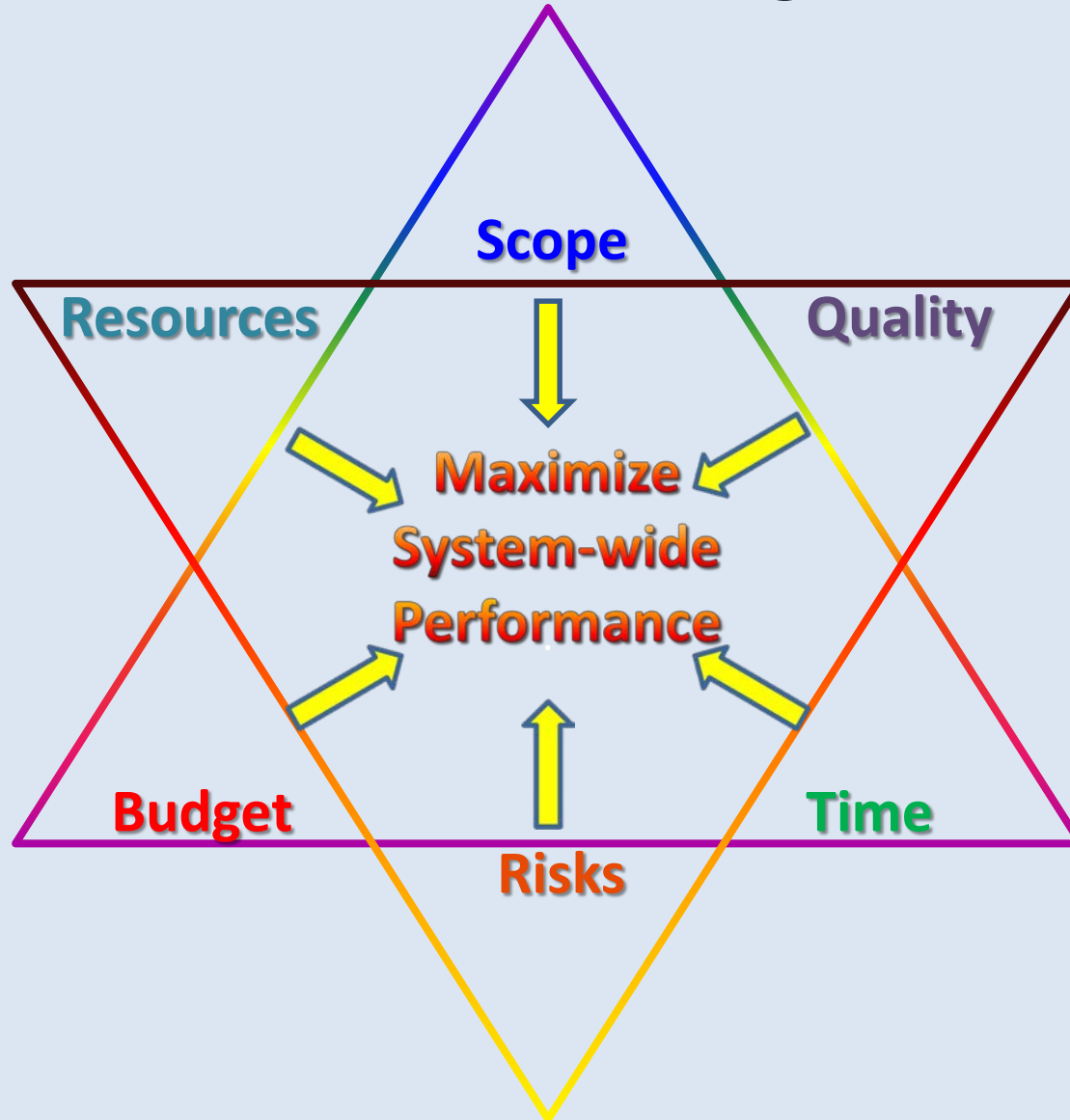
- Total CTP (FY16-FY21) Budget - \$1.9B
- Entirely funded by toll revenues



**Key**  
*Discipline, Project Budgets (\$M),  
Percentage of Total*



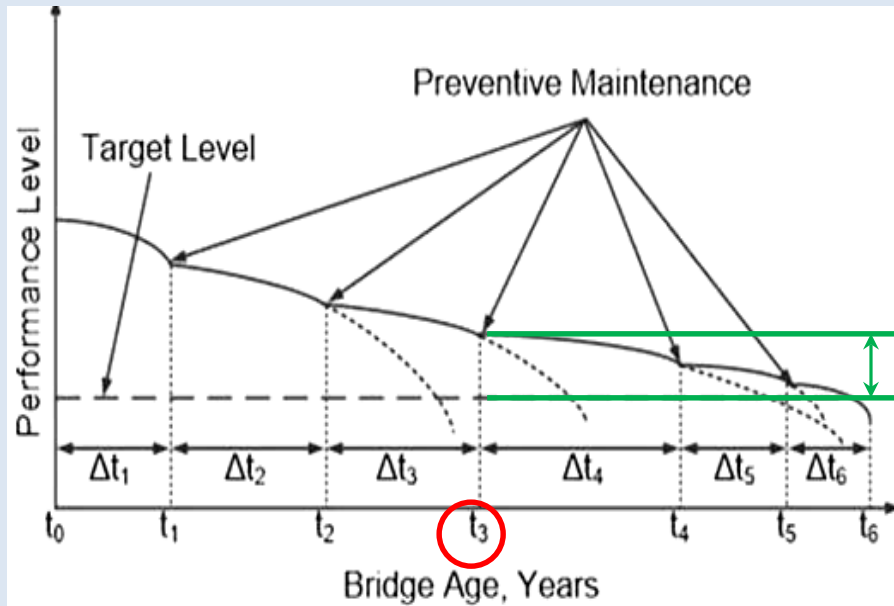
# What is Asset Management?



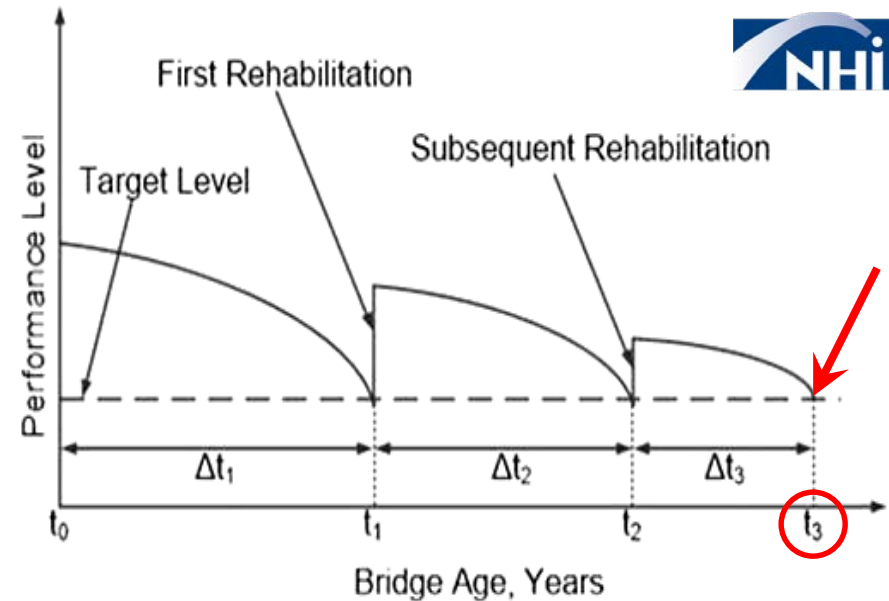




# What do we mean by structures performance?



Preventive Maintenance Only

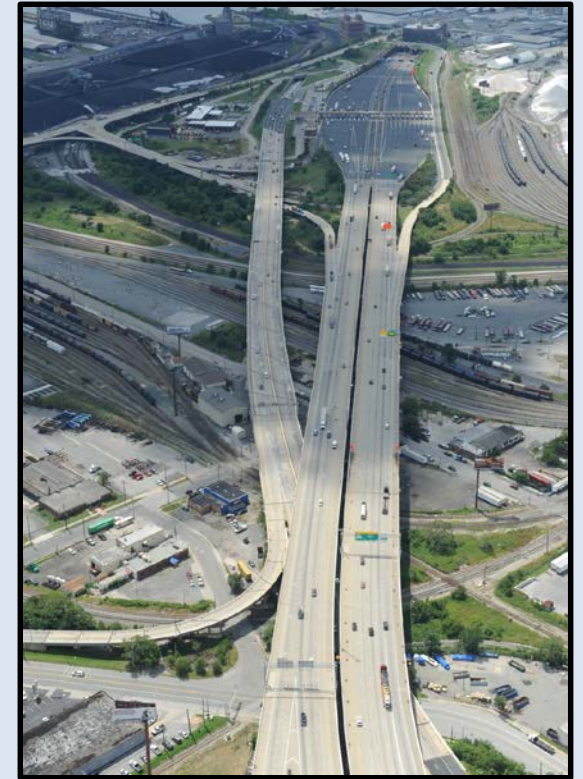


Major Repairs/Rehabilitation Only



# What are our Performance Goals?

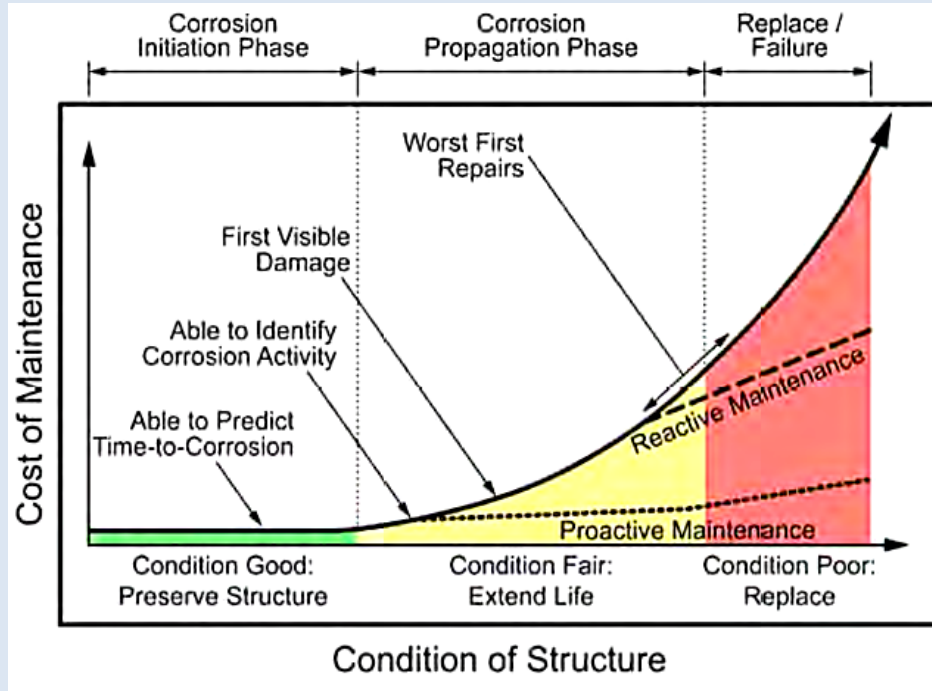
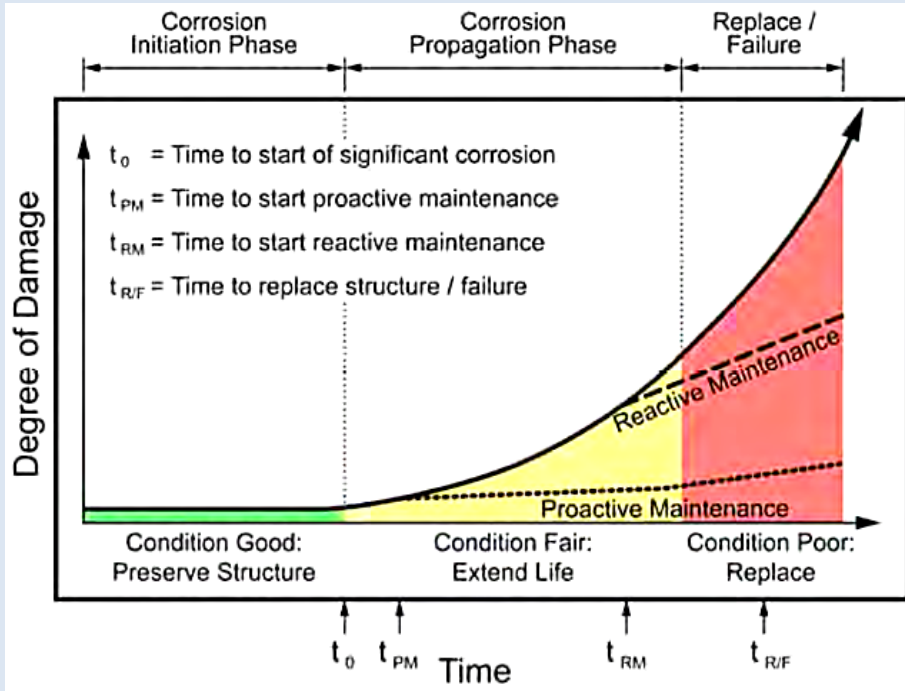
- ***Maintain a State of Good Repair***
- ***“Proactive” Goal:***
  - *Maximize the number of bridges with NBI 58, 59, 60 Ratings of Satisfactory “6” or better*
- ***“Reactionary” Goals:***
  - *Minimize the number of structurally deficient bridges,*
  - *Address Priority 1 defects within 1 year,*



Replace I-895 Canton Viaduct



# Why do we need to proactively manage structures assets?





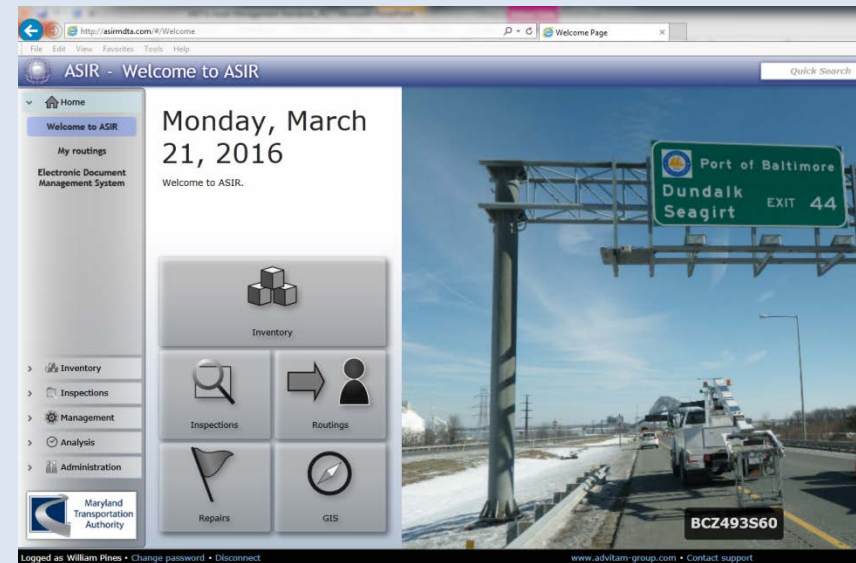
# How does MDTA manage structures assets?

## Agency Evolution:



### Prior to 2004:

- Paper Reporting
- Lots of spreadsheets



### Present:

- All electronic, web-based
- Performance Measurement & Reporting

# GIS Based System for Structures, Inventory & Appraisal Data

The screenshot displays the ASIR-GIS web application. The main map shows a region of Maryland with various infrastructure assets highlighted in green and blue. A text overlay on the map states: "103 asset(s) do not have coordinates in t".

The right-hand panel shows the attribute table for asset B-X649001. The table includes the following data:

Attribute	Accepted - C
<b>MDTA Fields</b>	
(N/A) Facility	JFK - John F. Kennedy Memorial Highway
(N/A) Old Bin:	
(N/A) Is a SubUnit	No - No
(N/A) Is a secondary asset	N - No
Deadline Start Date	1/17/2015
Deadline Finish Date	3/3/2015
<b>NBI-1-Generalities</b>	
(98a) Border state (Help)	
(3) County code (Help)	005 - BALTIMORE
(2) District code (Help)	04 - Baltimore, Harford, Baltimore City
(6b) Feature intersected b (Help)	INTERSTATE 95
(5e) Inspection route (directional suffix) (Help)	0 - Always coded 0
(5a) Inspection route (record type) (Help)	1 - Route carried "on" the structure
(5d) Inspection route (route number) (Help)	04189
(5b) Inspection route (route type) (Help)	4 - County Route
(5c) Inspection route (service type) (Help)	1 - Mainline
(28a) Lanes (on) (Help)	2
(28b) Lanes (under) (Help)	8
(16A) Latitude-SegmentA (Help)	39213570392134203921347839213596
(17A) Longitude-SegmentA (Help)	076284881076284489076284450076284837
(11) Mile point (Help)	64860

Below the map, two legend panels are shown. The left legend lists the following types: NOISE WALL, TUNNEL, SBRIDGE, UNDERGROUND, RETAINING WALL, Waterfront structures, BRIDGE, HML, and SIGN. The right legend lists: NOISE WALL, TUNNEL, SBRIDGE, UNDERGROUND, RETAINING WALL, Waterfront structures, BRIDGE, HML, and SIGN. A red arrow points from the 'BRIDGE' entry in the left legend to the 'BRIDGE' entry in the right legend.

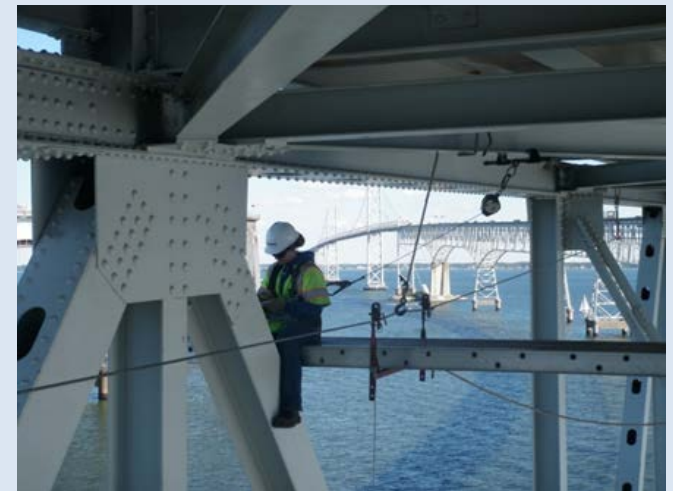






# Inspections

- National Bridge Inspection Standards
- MDTA Facilities Inspections Manual
- Perform Inspections Annually:
  - Biennial Year
    - Hands-on technique
    - Non-Destructive Testing
  - Interim Year
    - Risk-based





# Inspection Data automatically creates preformatted reports

ASIR - Inspections 462 asset(s)

Home | Inventory | Inspections | Photos | Documents

Hide filters 1 Active Filters

Type:  Not filtered | Status:  Final

From: <M/d/yyyy> [15] To: <M/d/yyyy> [15] Team: Not filtered


Is active:  Not filtered

Apply | Clear Filters

Picture	Name	Inspection type	Status	Initial team	Team leader	From
	AAY056011	Bridge - Biennial	Final	Transtech Engineering Consultants, Inc.	Dennis Dempsey	10/5/2015
	AAY056021	Bridge - Biennial	Final	Transtech Engineering Consultants, Inc.	Dennis Dempsey	10/12/2015
	AAY060001	Bridge - Biennial	Final	Transtech Engineering Consultants, Inc.	Dennis Dempsey	10/5/2015
	AAZ050031 (G1-G10)	Bridge - Interim	Final	RKK	Karl Stegmann	9/16/2015
	BCW526002	Bridge - Biennial	Final	AECOM	David Lynch	9/9/2015
	BCW532001	Bridge - Biennial Sounding	Final	Whitman, Requardt & Associates, LL	Andrew Cooklin	9/16/2015
	BCZ472001(S01-S16)	Bridge - Interim	Final	RKK	Joe Chalk	1/5/2016

**MARYLAND TRANSPORTATION AUTHORITY**  
 BIN: **AAY056011** Date: **10/29/2015**  
 I-895 B NB OVER MD 170

**MARYLAND TRANSPORTATION AUTHORITY**  
 BHT-Baltimore Harbor Tunnel  
 2016 Biennial Inspection Report  
 FOR  
 STRUCTURE No. AAY056011  
 I-895 B NB OVER MD 170



Firm Performing the inspection:		Transtech Engineering Consultants, Inc.	
Inspection Team Leader	Dennis Dempsey	ASIR E-Signature	44161
QC Engineer:	Umesh Murthy	ASIR E-Signature	20227
	Name	Signature	PE Number

Reports denoted with an "ASIR E-Signature" in the signature column have been reviewed and approved by the Inspection Team Leader and QC Engineer denoted in the name column.

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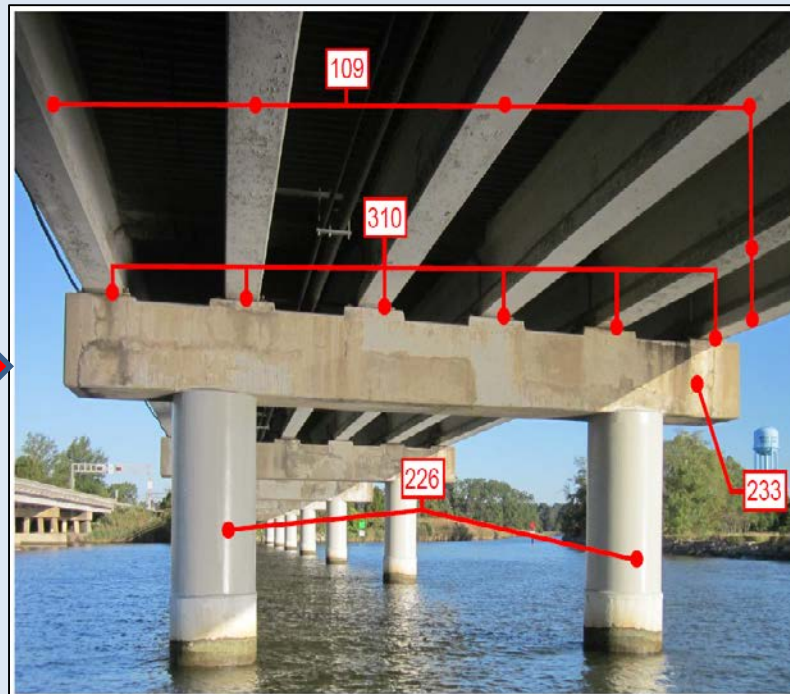


# Inspections

## NBI Ratings



## MAP-21 Element Level



**Element Level Inspection Data**

Element Number	Element Description	Unit of Measure	Total Quantity	Condition State 1	Condition State 2	Condition State 3	Condition State 4
109	Prestressed Concrete Beam	ft	369	300	50	19	
310	Elastomeric Bearing	each	12	10	2		
226	Prestressed Concrete Pile	each	2	2			
233	Prestressed Concrete Pier Cap	ft	40	30	8	2	

**Units & Quantities of Elements  
(No Generalities)**

# Individual Defects Recorded

M-V125001 - Bridge - Biennial - Final [Show details](#)

Info Inspection Repairs Photos Inspection documents Audits Routings Summaries Reviews Warnings Element level data

+ New Edit Show details Delete Dynamic - Repairs - Maintenance Report Print Group by Don't group Repair History

Task orders Add all to task order Create task order for all Add selection to task order Create task order for selection

MDTA Id	Type	Routing	Repair status	Last priority evolution	Date	Components	Comments
Current inspection (Bridge - Biennial - M-V125001 9/14/2015)							
2016-M-V125001-00001	Repair	Repair/LOC created	OPEN	3 - Medium	12/7/2015	Span 02 > Deck 58 > Curbs & Sidewalks 02	Seal the 1/8" wide x 4'-0" long crack in the east...
2014-M-V125001-00001	Repair	Repair/LOC created	OPEN	3 - Medium > 3 - Medium	11/30/2015	Begin > Approach 58 > Slab & Pavement 10	Seal 1/8" wide crack near inlet in west sidewalk.
2011-M-V125001-00013	Repair	Repair/LOC created	OPEN	M - Maintenance M - Maintenance	11/23/2015	Begin > Abutment 60 > Joint 15	Remove debris from South Joint.
2011-M-V125001-00012	Repair	Repair/LOC created	OPEN	M - Maintenance M - Maintenance	11/23/2015	End > Abutment 60 > Joint 23	Remove debris from North Joint.

# Element Condition States Recorded

M-V125001 - Bridge - Biennial - Final [Show details](#)

Info Inspection Repairs Photos Inspection documents Audits Routings Summaries Reviews Warnings Element level data

Display mode  Percentage  Quantity

Number	Name	Unit	Quantity	*QuantityCalculate	*PercentageCalculate	CS 1	CS 2	CS 3	CS 4
300	Span 01 > Strip Seal (LF)	LF - linear foot	47	47	100	21.28	78.72		
8307	Span 01 > Strip Seal (LF) > Neoprene or Fiberglass Joint Trough (LF)	LF - linear foot	47	47	100	100			
311	Span 01 > Movable (roller, sliding, etc.) (EA)	EA - Each	5	5	100	60	40		
515	Span 01 > Movable (roller, sliding, etc.) (EA) > Steel Protective Coating (SF)	SF - Square foot	20	20	100	60	40		
313	Span 01 > Fixed (EA)	EA - Each	5	5	100	100			
515	Span 01 > Fixed (EA) > Steel Protective Coating (SF)	SF - Square foot	71	71	100	100			
331	Span 01 > Reinforced Concrete Bridge Rail (LF)	LF - linear foot	237	237	100	100			
8342	Span 01 > Fencing (LF)	LF - linear foot	237	237	100	100			
12	Span 02 > Reinforced Concrete Deck (SF)	SF - Square foot	5236	5236	100	100			
321	Span 02 > Reinforced Concrete Deck (SF) > Reinforced Concrete Approach Slab	SF - Square foot	847	847	100	100			
8062	Span 02 > Reinforced Concrete Deck (SF) > Reinforced Concrete Approach Slab	LF - linear foot	224	224	100	100			
107	Span 02 > Steel Girder/Beam (LF)	LF - linear foot	557	557	100	100			







# Defect Repair Assignment, Tracking and Queries

ASIR - Repairs 123 asset(s) filtered Clear Filters Quick Search Saved filters Manage filters

Home Inventory Inspections Management Task orders **Repairs** Audits Scheduling Contracts

List GIS

Hide filters 1 Active Filters

Internal Id Contains

MDTA Id Contains

Date >= <M/d/yyyy>  Date <= <M/d/yyyy>

Is active Active

Task order Yes

Type Equals  Not filtered

Routing Equals  Not filtered

Repair status Equals  OPEN

Comments Contains

Previous iteration priority Equals  Not filtered

Current priority  First Priority  High Priority  Medium  Maintenance  Emergency

Apply Clear Filters

+ New Edit Show details Delete Dynamic - Repairs - Maintenance Report Print Group by Don't group

Task orders Add all to task order Create task order for all Add selection to task order Create task order for selection

MDTA Id	Asset name	Type	Routing	Repair status	Last priority evolution	Date	Components	Comments	Task order
2014-B-X717001-00009	B-X717001	Repair	Repair/LOC created	OPEN	3 - Medium	1/10/2014	Bearings	Consider a programmed replacement of the rocker bearings at Pier 2 with priority given to Girder 6.	Linked to task order KH 2852
2014-CEX979011-00002	CEX979011	Repair	Repair/LOC created	OPEN	2 - High Priority	1/7/2014	Scuppers	Repair the damaged scupper grate and clean out the clogged drain.	Linked to task order KH2783
2014-CEX979011-00006	CEX979011	Repair	Repair/LOC created	OPEN	1 - First Priority	1/8/2014	Bearings	Shim and reset bearing 7 at Pier 1 in Span 1.	Linked to task order 999 R1

### Task order

Properties Documents Repairs **Routing**

Number 999 R1 - CEX979011

Status  TC

Assignment date 11/19/2014

Due date <M/d/yyyy>

Duration  MDTA Project manager

Real cost  Estimated cost

Comments TO 999R1 is for additional bearing repairs on CEX979011.

Progress

Priority  1

Assigned to Koudjo Amouzou

Contract MA 2803

Abey Tamrat



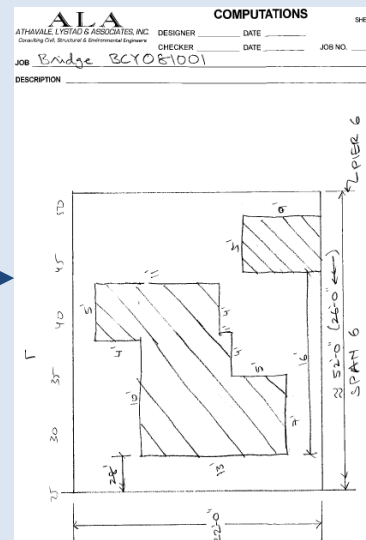
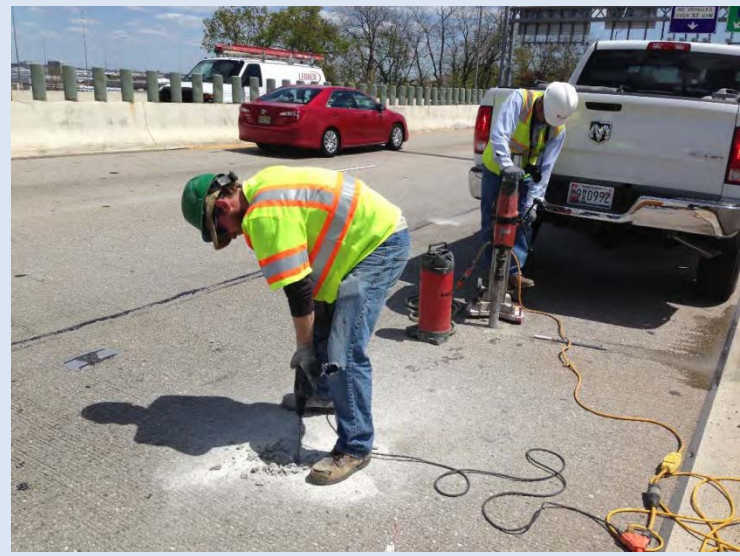
# Performance Reports → Supplemental Info → Bridge Tour

Reports <http://asirmdta...requestedFile=>

asirmdta.com/ReportPage.aspx?requestedReportId=9a2a2a5c-b6b1-4305-8bee-290db35e823a&requeste

Maryland Transportation Authority **Wearing Surface Ratings**

Asset Name	Date To	Master Element	Rating		
BCY080001	05/08/2014	B	6		
		C	6		
		D	6		
	05/09/2016	A	6		
		B	4		
		C	3		
	02/01/2013	D	4		
		F	4		
		G	3		
		H	4		
			4		
	07/12/2014	A	6		
		B	4		
		C	3		
		D	4		
		E	5		
		F	4		
		G	3		
		H	5		
		BCY081001	11/12/2014	A	4
				B	3
C	3				
D	4				
E	3				
F	3				
G	3				
H	4				
	12/08/2015			A	4
				B	2
		C	3		
		D	3		
		E	4		
		F	2		
		G	4		
		H	3		





# Bridge Tour → 25 Yr. Long Range Needs → 6 Yr. Capital Program

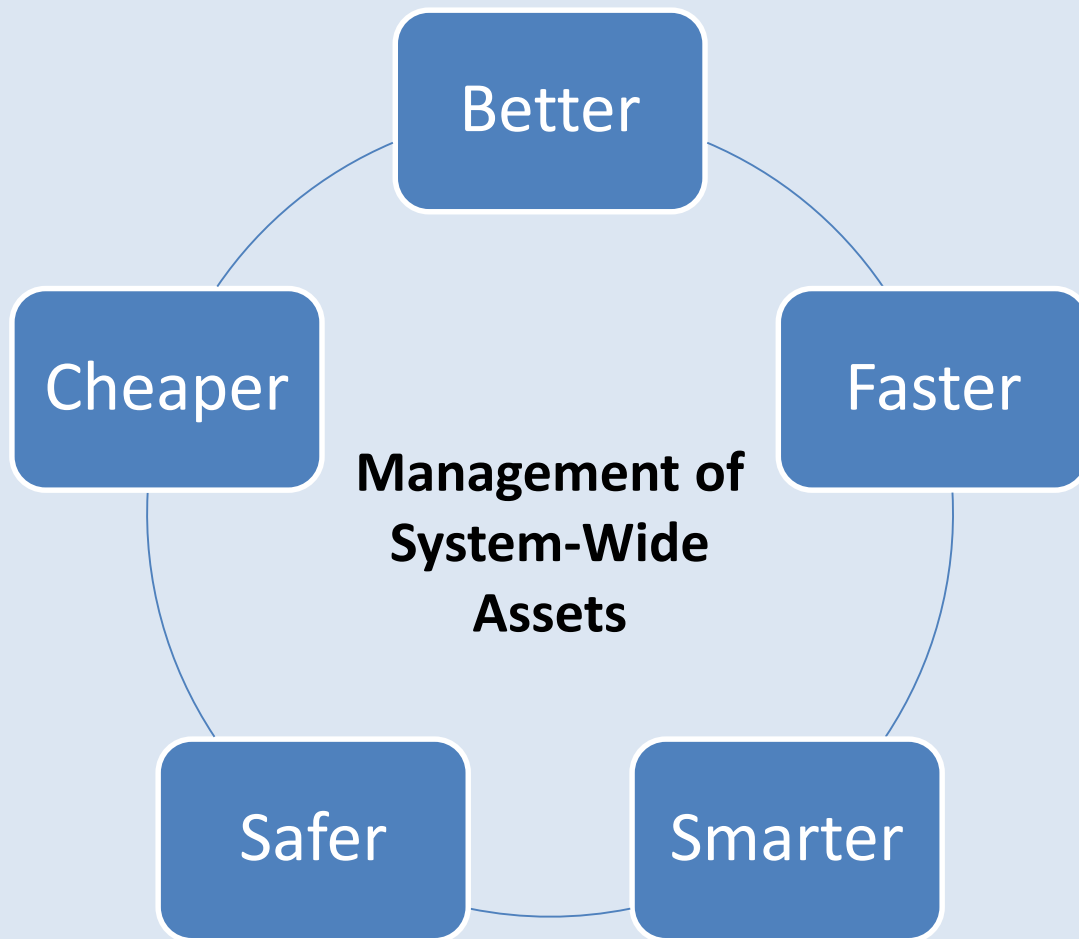
## CTP Sample

	B	C	D	E	F	J	K	L	M	N	O	P	AI
	CTP PIN	PM	Description	Facility	Priorit ..	2016	2017	2018	2019	2020	2021	2022	2016-2022
41	2325	GEC	Substructure and Superstructure Repairs to Various Bridges on JFK (Construction)	KH	1		2,000	8,000	6,336				16,336
42	2325	GEC	Repair and/or Seal Decks - Facility wide	KH	1			3,178	3,176	3,691			10,045
44	2325	GEC	Three (3) Bridge Deck Overlays on I-95 (over MD-824, MD-45 and MD-279)	KH	2				3,000	2,000			5,000
45	2325	GEC	One (1) I-95 Mainline Deck Replacement (over Little Northeast Creek)	KH	2				5,000	5,000			10,000





## Effective Structures Management Systems drives:







Maryland  
Transportation  
Authority

# QUESTIONS?

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