



MAINTENANCE AND OPERATIONS COMPREHENSIVE REVIEW BRIEFING

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Kevin Gregg, Chief of Maintenance and Operations

September 14, 2021

Maintenance and Operations Comprehensive Review Update

- Pavements
- Structures
- Routine Maintenance
- Special Structures

Pavements

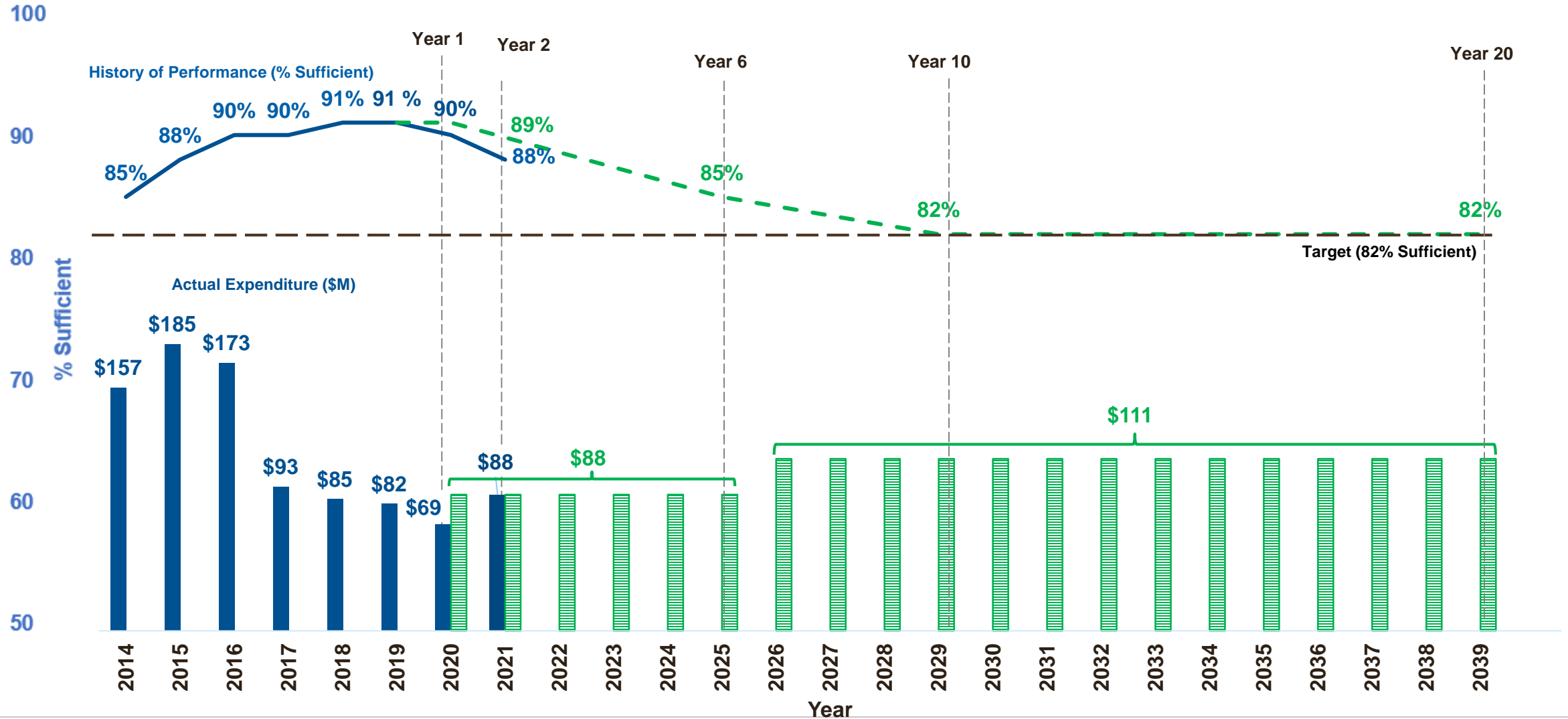
Pavements - Performance Measures

Performance Measure	Current Policy (CTB Approved December 2019) % Sufficiency
Interstate	82% No Section CCI less than 35
Primary	82% for \geq AADT 3,500 75% for $<$ AADT 3,500
Secondary	82% for \geq AADT 3,500 60% for $<$ AADT 3,500

Interstate Network – 20 Year Outlook

(Predicted & Actual Performance)

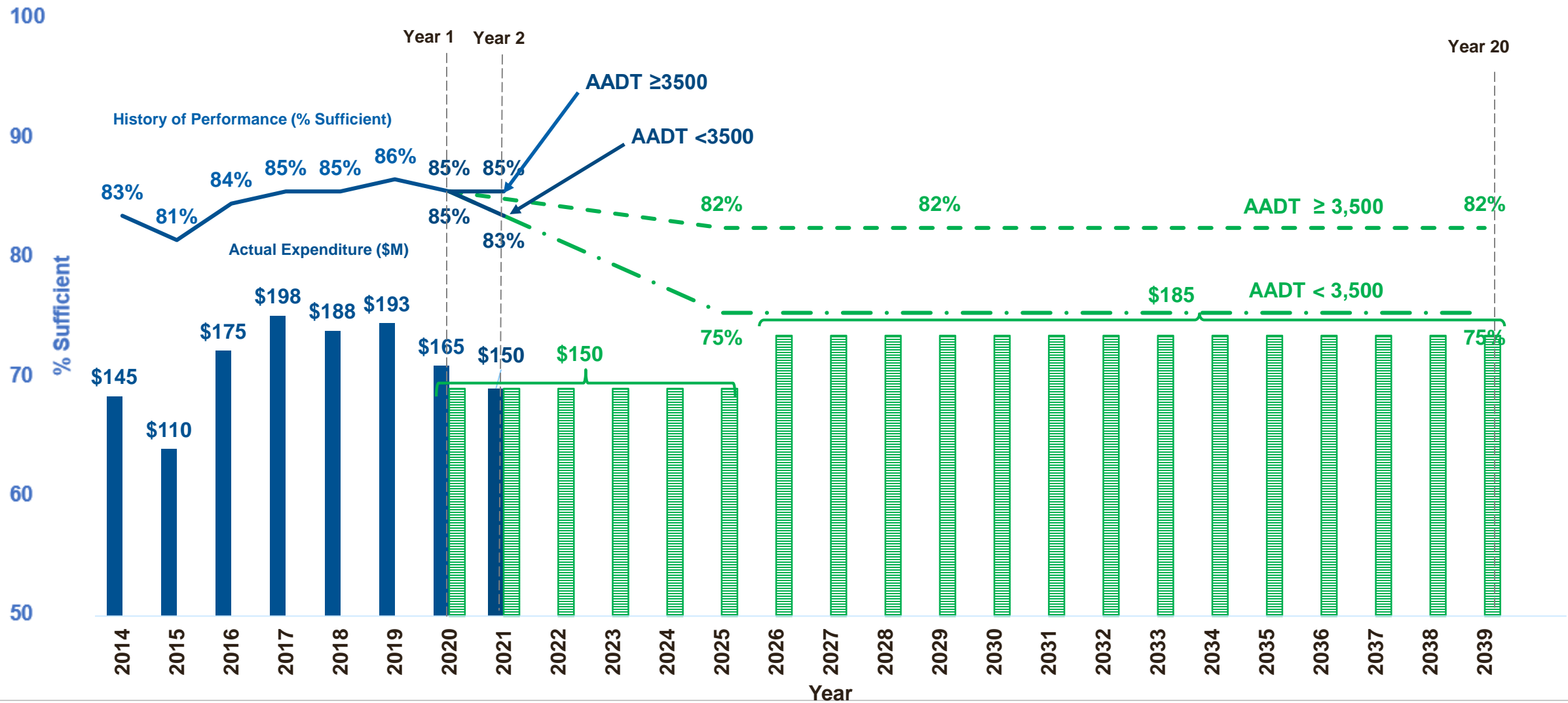
- Actual Expenditure
- Target: 82%
- Actual Performance



Primary Network – 20 Year Outlook

(Predicted & Actual Performance)

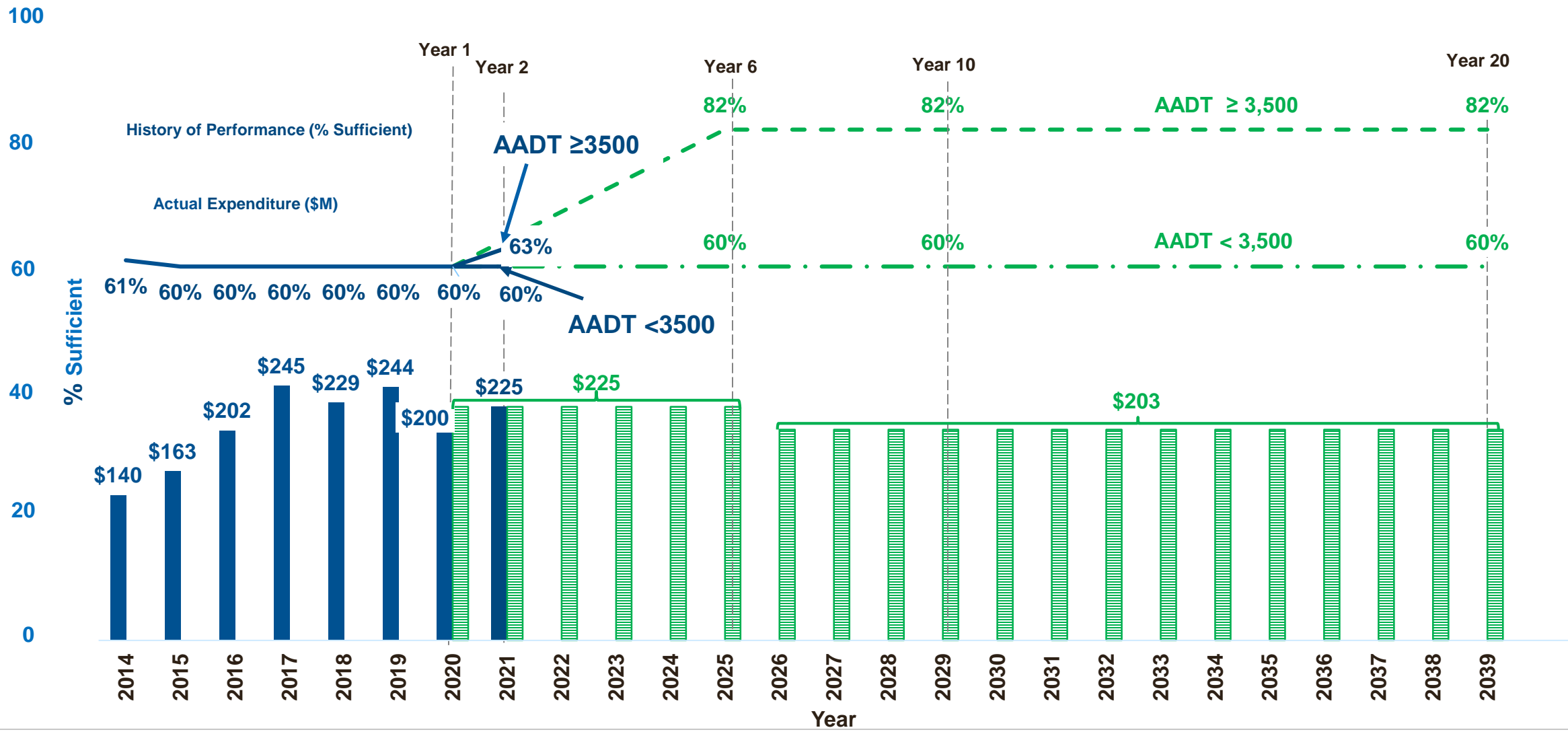
- Actual Expenditure
 - Target
 - Actual Performance
- AADT ≥ 3,500: 82%
AADT < 3,500: 75%



Secondary Network – 20 Year Outlook

(Predicted & Actual Performance)

- Actual Expenditure
- Target AADT ≥ 3,500: 82%
- Target AADT < 3,500: 60%
- Actual Performance



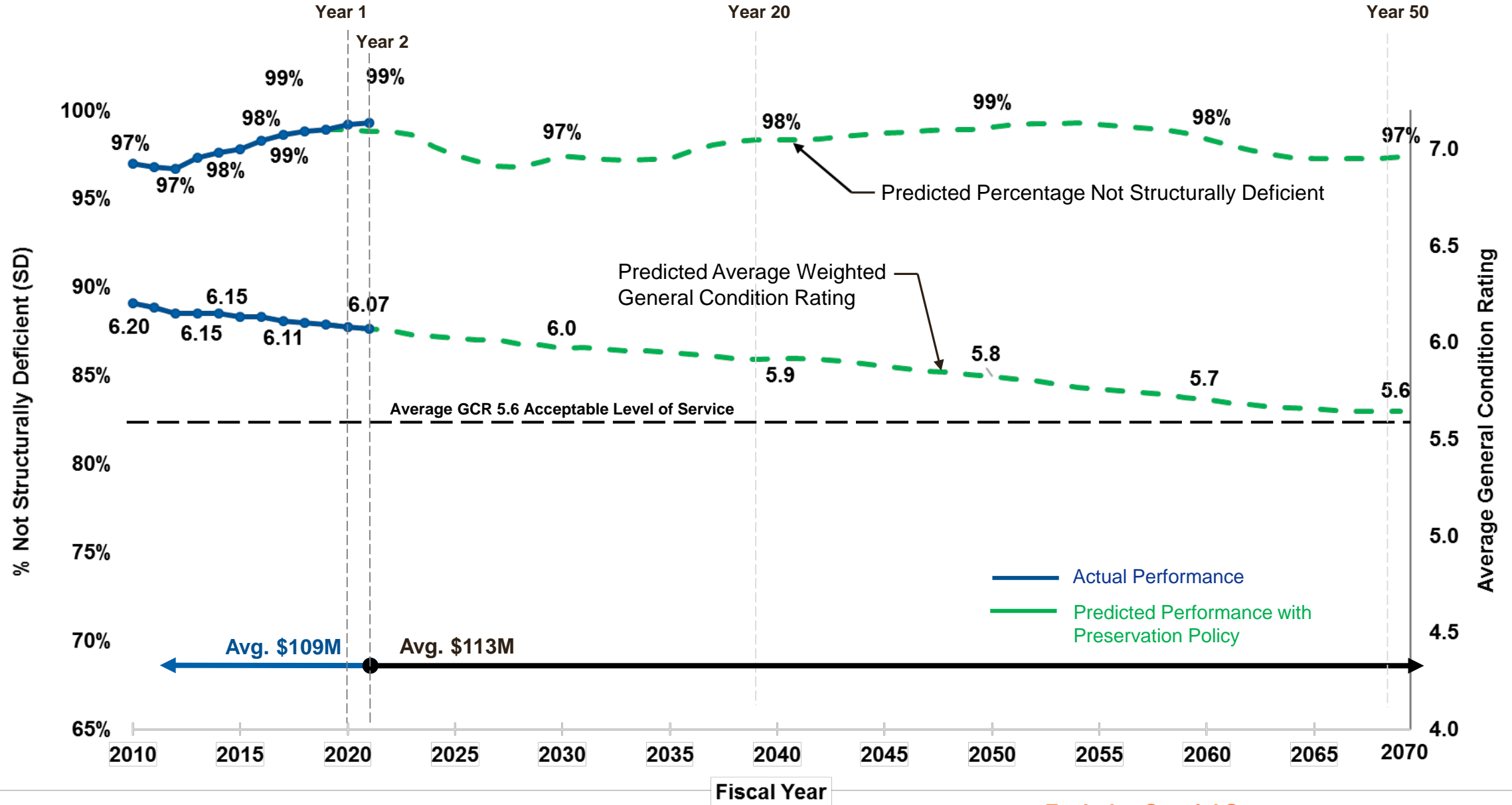
Structures

Structures - Performance Measures

Performance Measure Description	Current Policy Preservation Average GCR/(% Not-SD) (CTB Approved December 2019)			
All Systems	≥ 5.6			
Interstate			N/A	
Primary			97% No Postings	
All Systems			93%	
	90%			

Interstate Network – 50 Year Outlook

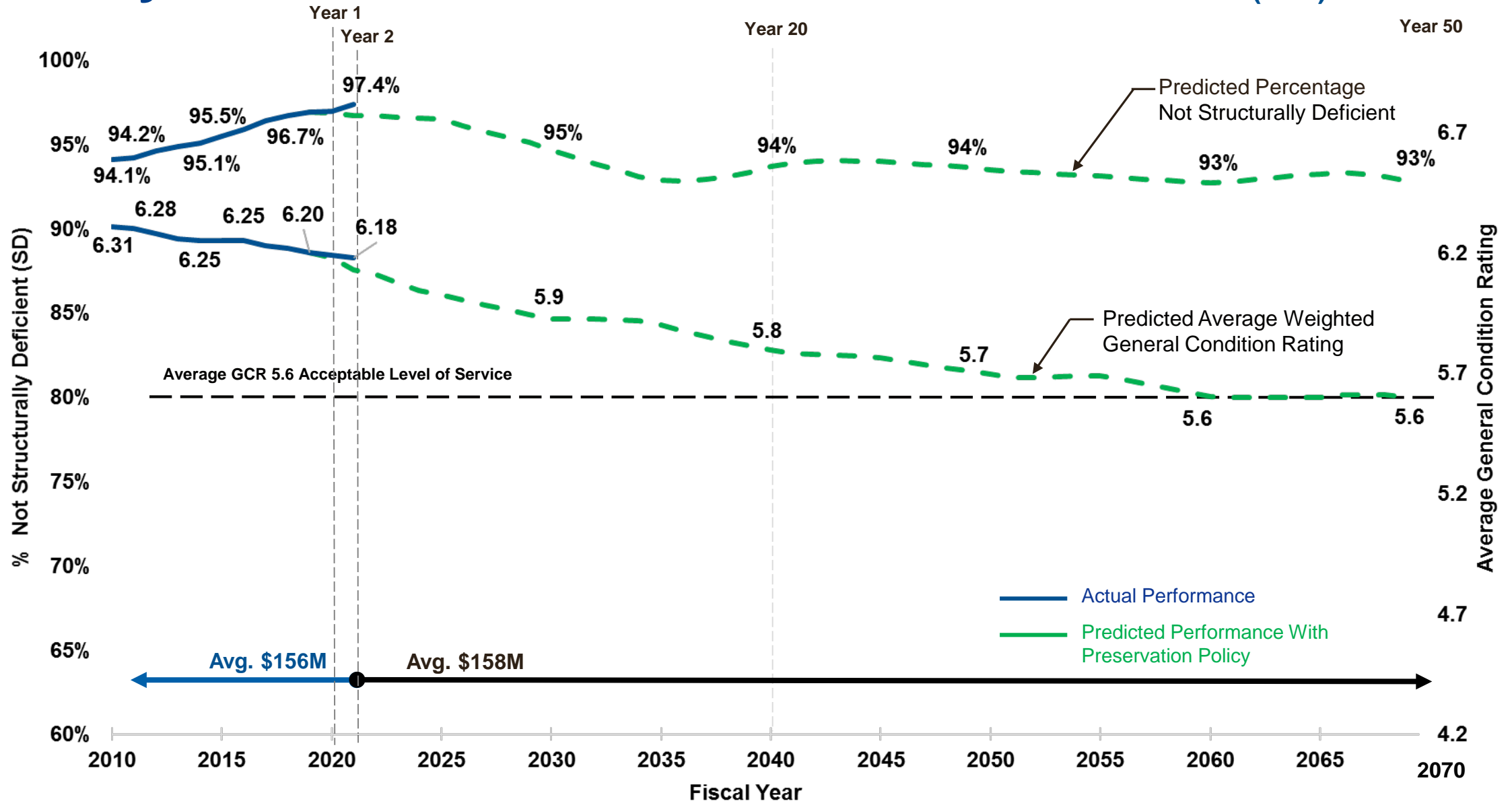
2,420 Structures (12%)
31M SF Deck Area (30%)



• Excludes Special Structures

Primary Network – 50 Year Outlook

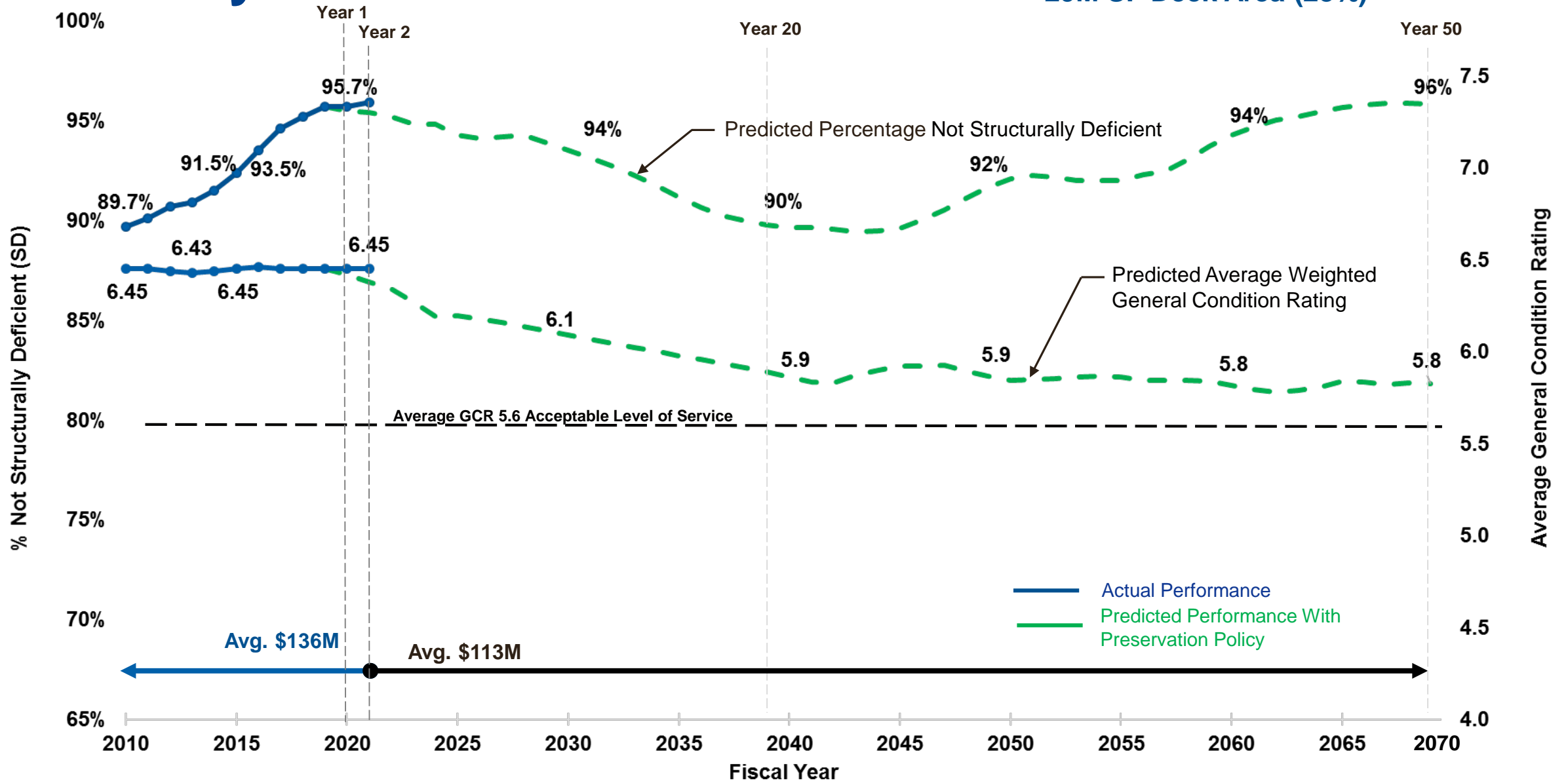
5,758 Structures (27%)
44M SF Deck Area (42%)



• Excludes Special Structures

Secondary Network – 50 Year Outlook

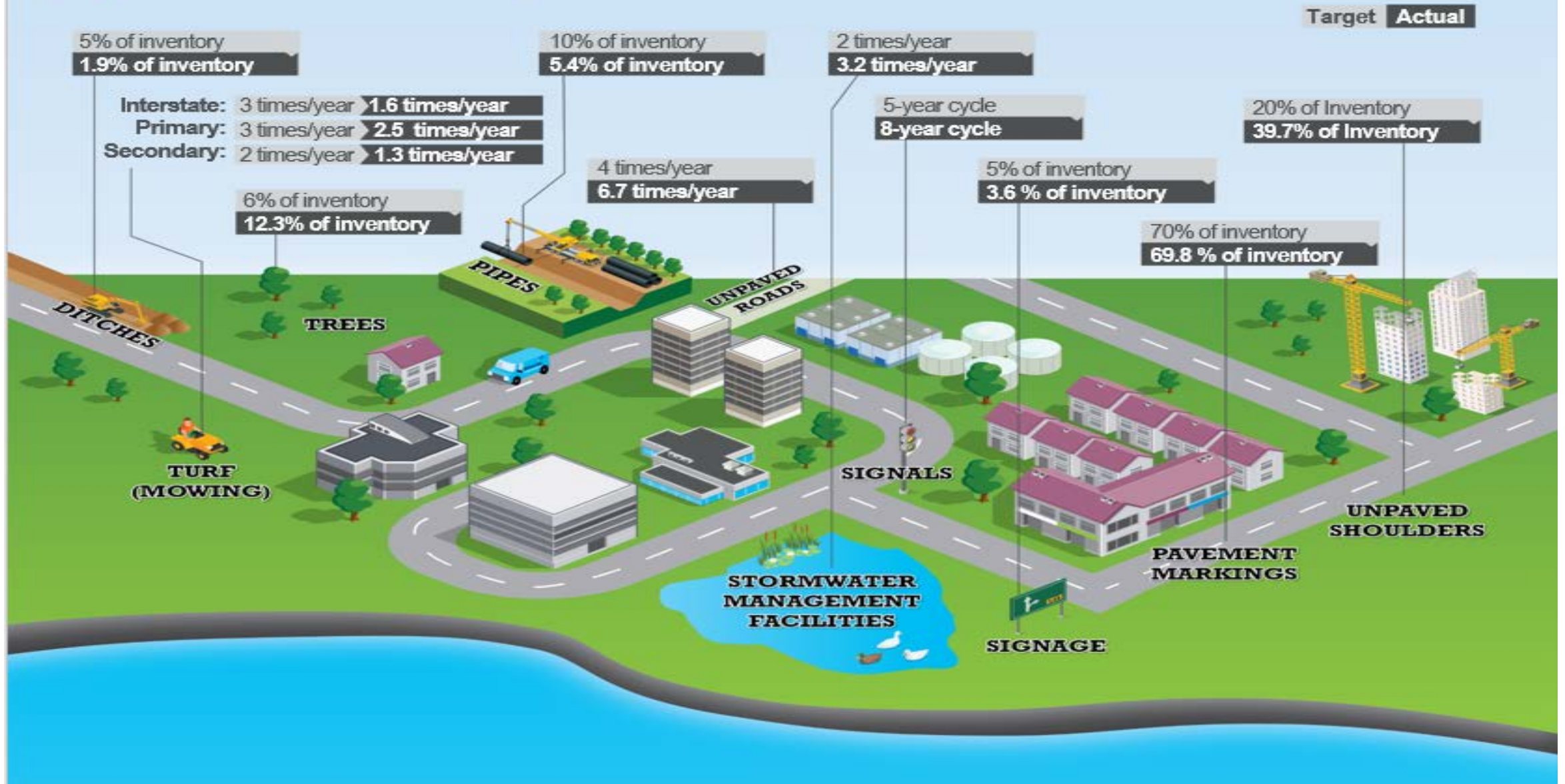
12,956 Structures (61%)
29M SF Deck Area (28%)



• Excludes Special Structures

Routine Maintenance

Routine Maintenance – Target and Actual Accomplishment (July 1, 2020 – June 30, 2021)



Special Structures

1. Health Index
2. 50-Year Long Term Plan

Special Structures – Health Index

- **Development**
 - Tunnels
 - Movable Bridges

- **Outreach efforts**
 - No examples of HI for these types of structures
 - Reviewed USACE risk assessment protocol for lessons learned
 - AASHTO Tunnel & Movable Bridge Subcommittees
 - Other DOTs

Special Structures – Health Index

- **Measures the Overall Health from 0 to 100**
 - **Assesses individual structures and systems within a structure**
- **Data Collection and Inspection**
 - **Each element on each structure evaluated**
 - **Assigned “condition states”, which can vary from Good to Severe**
 - **Inspected every 2 years**
- **Health Index Calculated by Weighting Elements by Safety & Risk**

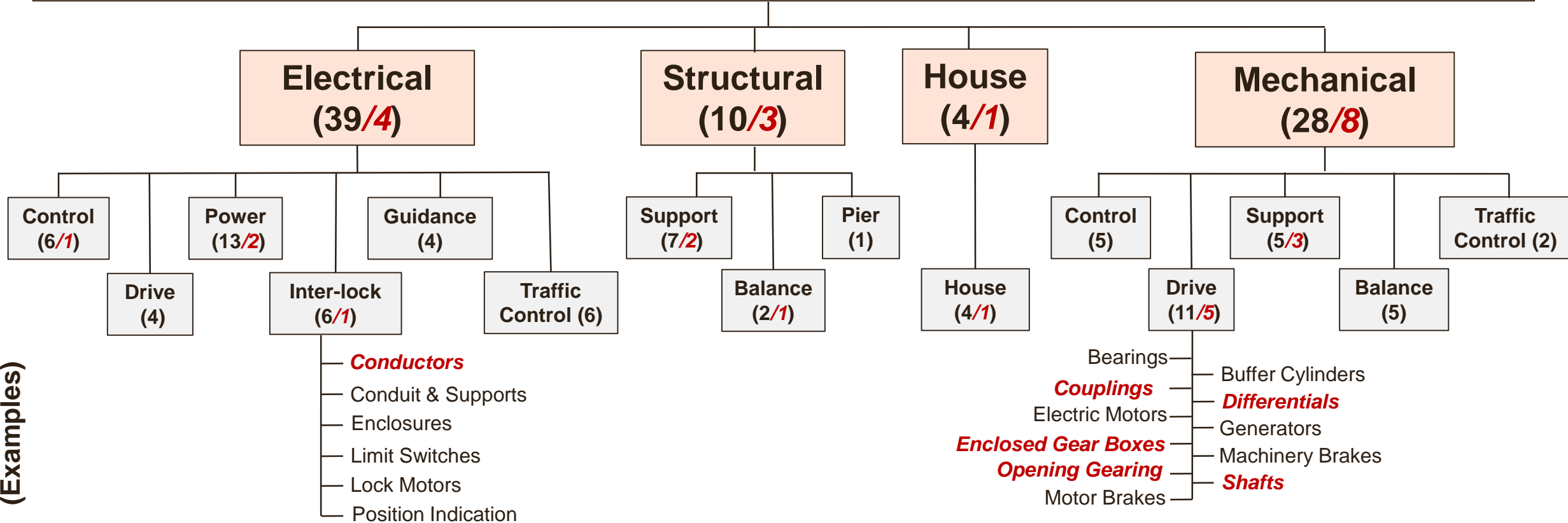
Special Structures - Movable Bridges Health Index

Movable Bridge Example
(4 Systems, 15 Subsystems, 81 Elements & 16 Critical Elements)

System Bridge

Sub-System

Elements
(Examples)



Special Structures - Movable Bridges Health Index

Health Index for Movable Bridges (CURRENT)					
Bridge	Electrical	House	Mechanical	Structural	Overall HI/Bridge
Benjamin Harrison	Orange	Yellow	Orange	Yellow	Orange
Berkley EBL	Orange	Yellow	Yellow	Yellow	Yellow
Berkley WBL	Orange	Yellow	Orange	Orange	Orange
Chincoteague	Green	Green	Yellow	Yellow	Green
Coleman	Yellow	Green	Yellow	Orange	Yellow
Eltham	Yellow	Green	Green	Green	Yellow
Gwynn's Island	Orange	Yellow	Orange	Red	Orange
High Rise	Orange	Green	Yellow	Yellow	Yellow
James River	Orange	Yellow	Yellow	Yellow	Yellow

Current: Percentage & Number of Systems in Each Condition Category	
Good	19% (7)
Fair	47% (17)
Poor	31% (11)
Severe	3% (1)

Special Structures - Movable Bridges Health Index

Health Index for Movable Bridges (CURRENT)					
Bridge	Electrical	House	Mechanical	Structural	Overall HI/Bridge
Benjamin Harrison	Orange	Yellow	Orange	Yellow	Orange
Berkley EBL	Orange	Yellow	Yellow	Yellow	Yellow
Berkley WBL	Orange	Yellow	Orange	Orange	Orange
Chincoteague	Green	Green	Yellow	Yellow	Green
Coleman	Yellow	Green	Yellow	Orange	Yellow
Eltham	Yellow	Green	Green	Green	Yellow
Gwynn's Island	Orange	Yellow	Orange	Red	Orange
High Rise	Orange	Green	Yellow	Yellow	Yellow
James River	Orange	Yellow	Yellow	Yellow	Yellow

Current: Percentage & Number of Systems in Each Condition Category	
Good	19% (7)
Fair	47% (17)
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Severe	3% (1)

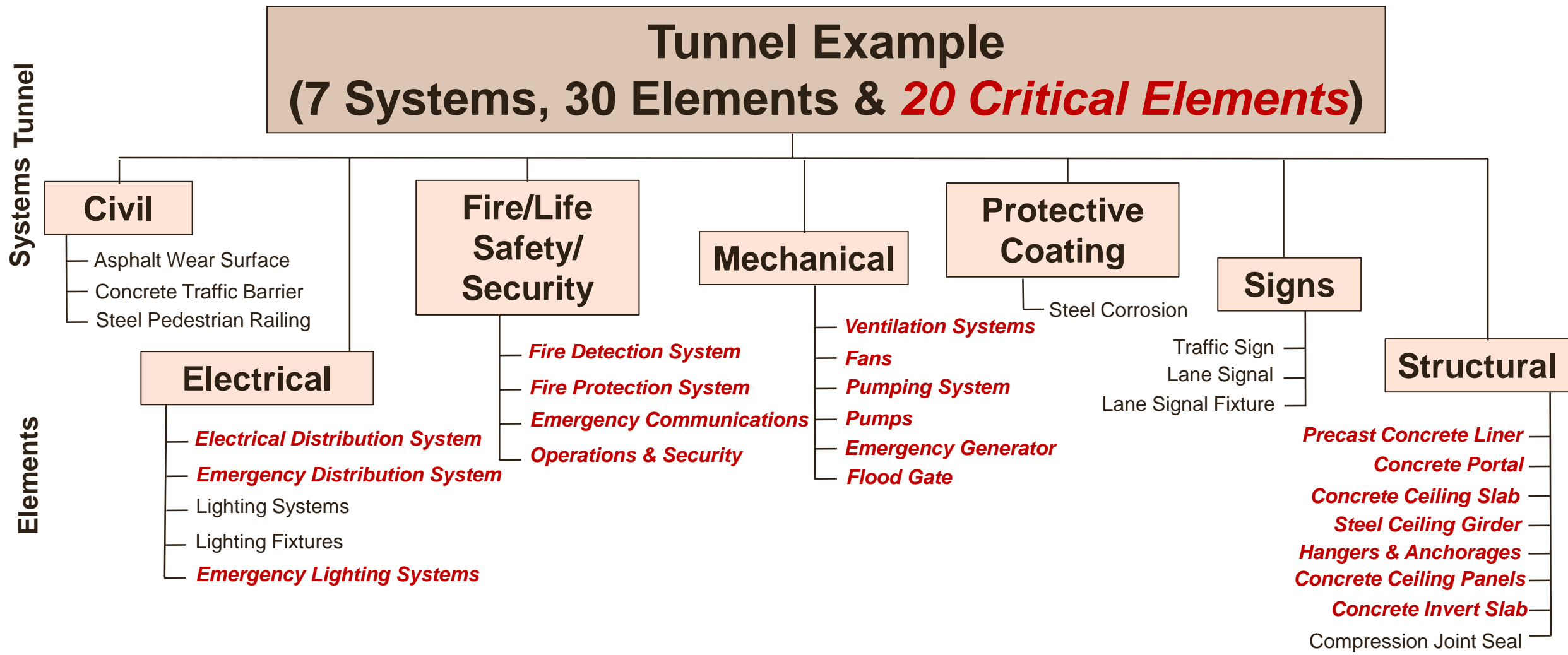
Health Index for Movable Bridges (10 YEAR PREDICTION)					
Bridge	Electrical	House	Mechanical	Structural	Overall HI/Bridge
Benjamin Harrison	Green	Yellow	Yellow	Yellow	Green
Berkley EBL	Green	Yellow	Green	Yellow	Green
Berkley WBL	Green	Yellow	Green	Yellow	Green
Chincoteague	Green	Green	Yellow	Yellow	Yellow
Coleman	Green	Green	Green	Orange	Green
Eltham	Yellow	Green	Yellow	Yellow	Yellow
Gwynn's Island	Green	Green	Green	Green	Green
High Rise	Yellow	Yellow	Yellow	Yellow	Yellow
James River	Green	Yellow	Green	Yellow	Green

Predicted in 10 Years: Percentage & Number of Systems in Each Condition Category	
Good	47% (17)
Fair	50% (18)
Poor	3% (1)
Severe	0% (0)

Movable Bridges Health Index: Benjamin Harrison Bridge

- **Currently 9 critical elements in need of repair or replacement**
 - **Electrical system (5 critical elements)**
 - **Mechanical system (4 critical elements)**
- **All 9 will be improved with the 10 year plan**
- **Will stabilize condition but will not end necessary work**
- **In 10 years, electrical, mechanical, & house systems will still be in fair condition (yellow). Remaining work includes:**
 - **Mechanical: Span guides; Pinions/sheave Gears; Open Gearing**
 - **Electrical: Gate motors control system**
 - **House: Structure; Weatherproofing**
- **Elements will be replaced or improved on a planned schedule**
 - **Generator & Drives (30 years)**
 - **Span lock (20 years)**

Special Structures - Tunnels Health Index



Special Structures - Tunnels Health Index

Health Index for Tunnels (CURRENT)						
Tunnel	Civil*	Electrical	Fire/Life Safety/Security	Mechanical	Structural*	Overall HI per Tunnel
Big Walker	Good	Fair	Fair	Fair	Good	Fair
East River	Good	Poor	Poor	Poor	Good	Fair
Hampton Roads Eastbound	Good	Good	Fair	Fair	Fair	Fair
Hampton Roads Westbound	Good	Good	Fair	Fair	Fair	Fair
Monitor Merrimac	Good	Fair	Fair	Fair	Good	Fair
Rosslyn	Good	Fair	Fair	Poor	Fair	Fair

Current: Percentage & Number of Systems in Each Condition Category	
Good	33% (10)
Fair	53% (16)
Poor	13% (4)
Severe	0% (0)

Special Structures - Tunnels Health Index

Health Index for Tunnels (CURRENT)						
Tunnel	Civil*	Electrical	Fire/Life Safety/Security	Mechanical	Structural*	Overall HI per Tunnel
Big Walker	Green	Yellow	Yellow	Yellow	Green	Yellow
East River	Green	Orange	Orange	Orange	Green	Yellow
Hampton Roads Eastbound	Green	Green	Yellow	Yellow	Yellow	Yellow
Hampton Roads Westbound	Green	Green	Yellow	Yellow	Yellow	Yellow
Monitor Merrimac	Green	Yellow	Yellow	Yellow	Green	Yellow
Rosslyn	Green	Yellow	Yellow	Orange	Yellow	Yellow

Current: Percentage & Number of Systems in Each Condition Category	
Good	33% (10)
Fair	53% (16)
Poor	13% (4)
Severe	0% (0)

Health Index for Tunnels (10 YEAR PREDICTION)						
Tunnel	Civil	Electrical	Fire/Life Safety/Security	Mechanical	Structural	Overall HI per Tunnel
Big Walker	Green	Green	Green	Green	Green	Green
East River	Green	Green	Green	Green	Green	Green
Hampton Roads Eastbound	Green	Green	Green	Green	Yellow	Green
Hampton Roads Westbound	Yellow	Green	Green	Green	Green	Green
Monitor Merrimac	Green	Green	Yellow	Yellow	Green	Yellow
Rosslyn	Green	Green	Green	Yellow	Green	Yellow

Predicted in 10 Years: Percentage & Number of Systems in Each Condition Category	
Good	73% (22)
Fair	27% (8)
Poor	0% (0)
Severe	0% (0)

Tunnel Health Index: Monitor Merrimac Memorial Tunnel

- **Currently 3 critical elements in need of repair or replacement**
 - Mechanical system (1 element)
 - Fire/life safety system (1 element)
 - Electrical system (1 element)
- **All 3 will be improved with the 10 year plan**
- **In 10 years, mechanical, fire/life safety systems will still be in fair condition (yellow). Remaining work includes:**
 - Mechanical: Drainage & Pumping
 - Fire/Life Safety System: Detection; Emergency Communications
- **Elements will be replaced or improved on a planned schedule**
 - Pumps (20 year cycle)
 - Fire Main Piping (10 year cycle)

Special Structures - Health Index - Conclusion

1. Completed Tunnels and Movable Bridges

2. Develop Complex Structures HI

- (Spring 2022) With an Update for the Board in Fall 2022

3. Implement HI

- Use it to monitor, optimize, and adjust the program on an annual basis
- Will provide updates to the board regularly

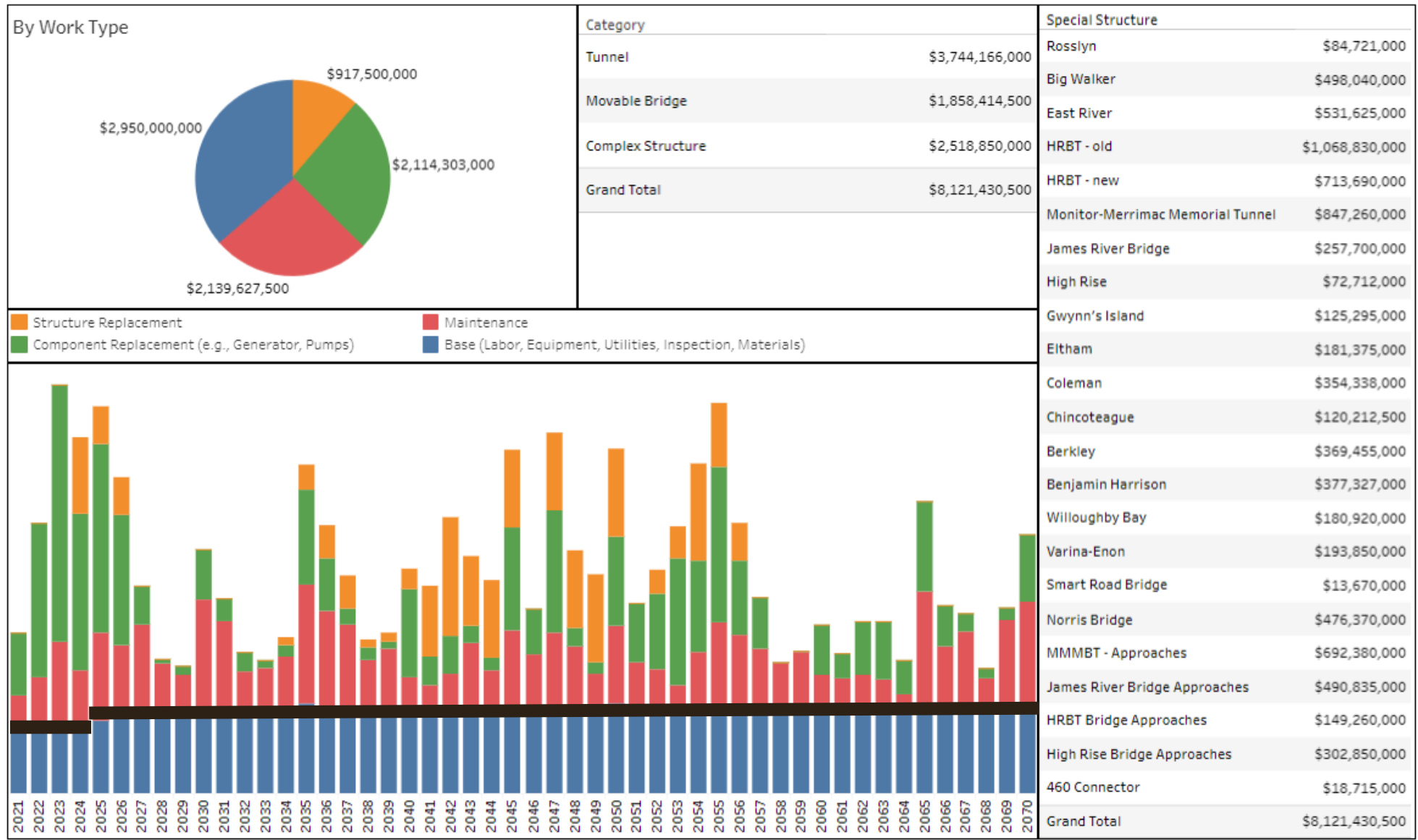
4. Share Knowledge with Others

- NCHRP
- FHWA
- AASHTO

Special Structures – 2019 50-Year Long Term Plan

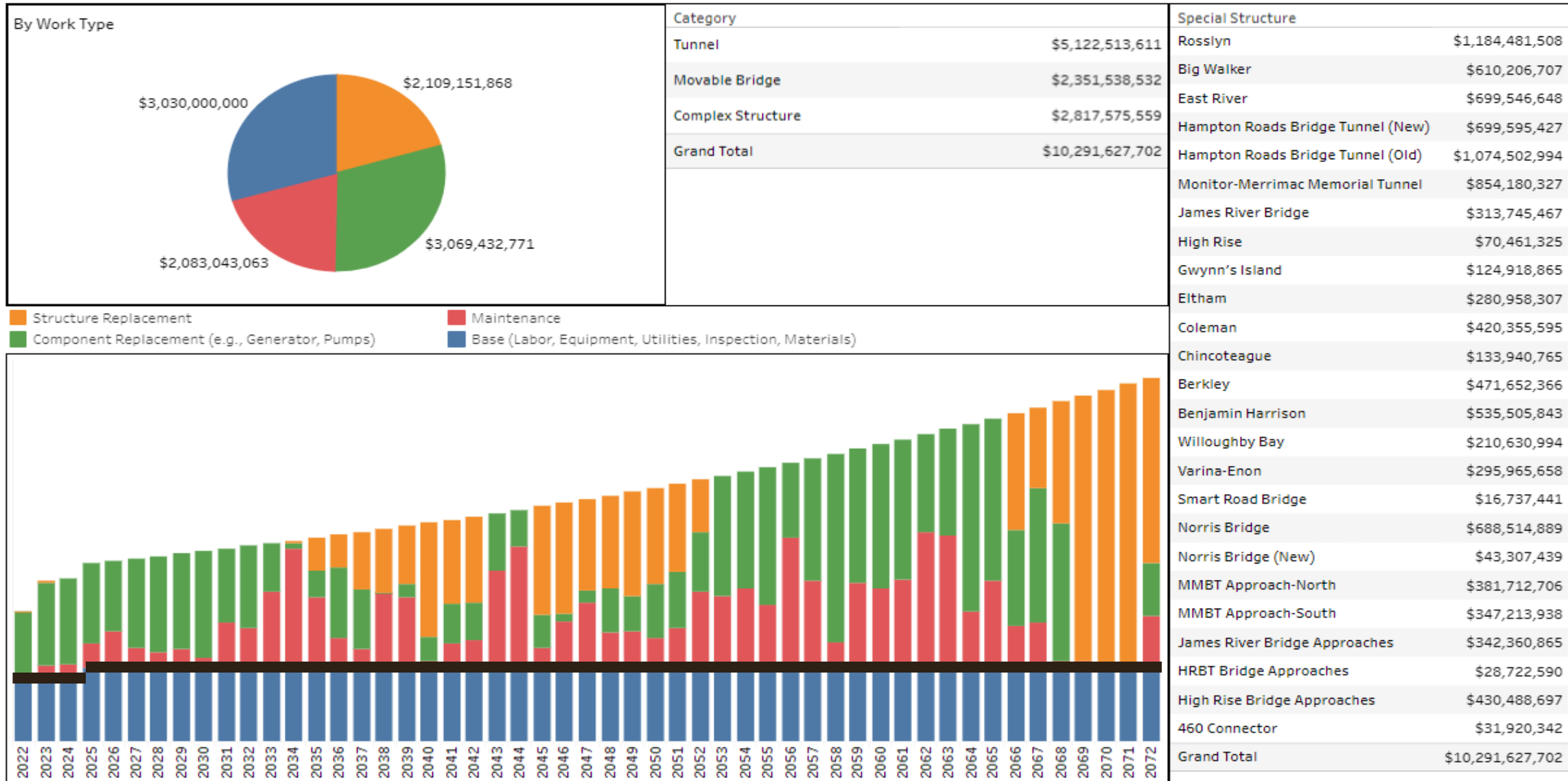
Unconstrained Needs

*All amounts in 2019 dollars



Special Structures – 2021 50-Year Long Term Plan

Fiscally Constrained Needs



Next Steps

Next Steps

- **Special Structure Program - Code of Virginia – 33.2-374**
– October 2021 CTB
 - **50-Year Long Term Plan approval**

- **Complex Structure Health Index – Spring/Fall 2022**

QUESTIONS?