COMMONWEALTH of VIRGINIA

Commonwealth Transportation Board

Shannon Valentine
Chairperson

1401 East Broad Street
Richmond, Virginia 23219

(804) 786-2701
Fax: (804) 786-2940

COMMONWEALTH TRANSPORTATION BOARD
WORKSHOP AGENDA

Executive Conference Center
Suite 200
2345 Crystal Drive
Arlington, Virginia 22202
November 20, 2019
12:30 p.m.

1. I-95 Update
   Nick Donohue, Deputy Secretary of Transportation

2. I-81 Update
   Nick Donohue, Deputy Secretary of Transportation

3. Comprehensive Review Special Structures
   Stephen Brich, Virginia Department of Transportation

4. Director's Items
   Jennifer Mitchell, Virginia Department of Rail and Public Transportation

5. Commissioner's Items
   Stephen Brich, Virginia Department of Transportation

6. Secretary's Items
   Shannon Valentine, Secretary of Transportation

# # #

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1. I-95 Update
   Nick Donohue, Deputy Secretary of Transportation

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# # #


VDOT
Virginia Department of Transportation

COMPREHENSIVE REVIEW
SPECIAL STRUCTURES

Stephen C. Brich, P.E., Commissioner of Highways

November 20th, 2019

Special Structures - Introduction

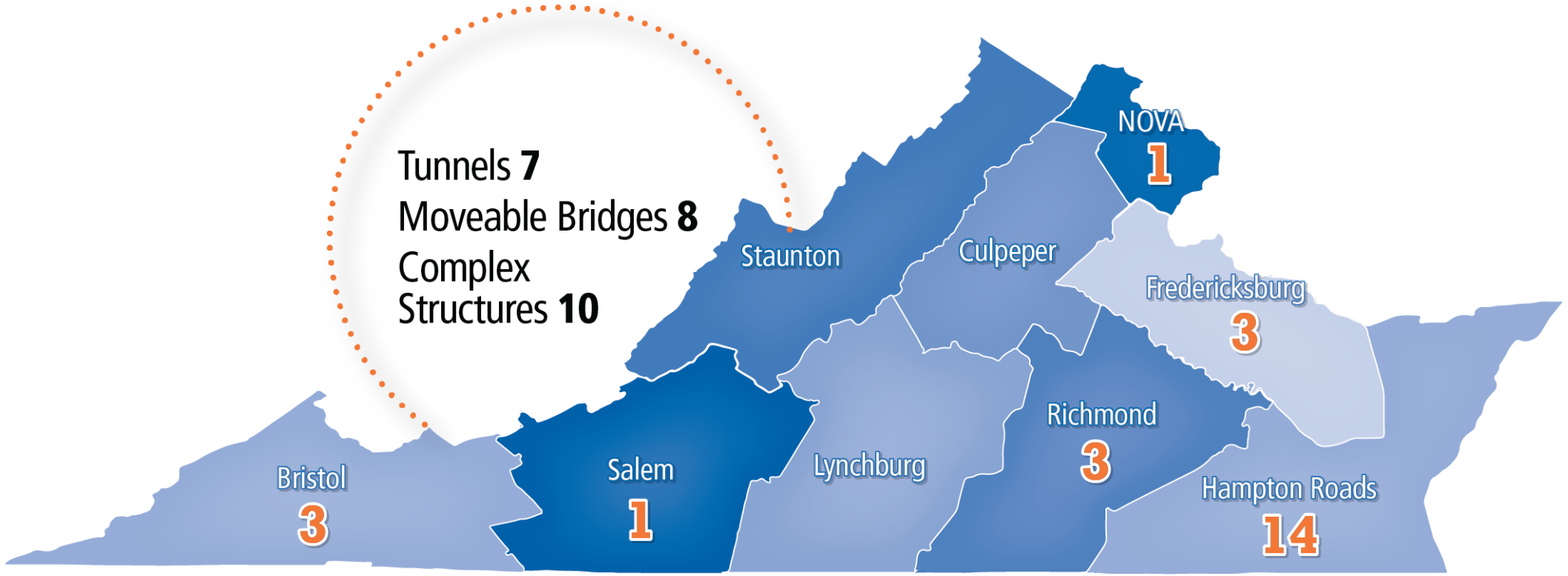
2018 Report to General Assembly


Robert O. Norris Bridge

2019 Developed a statewide, systematic Long-Term Plan

- Draft plan looks ahead 50 years and includes operations – critical to ensuring mobility
- Plan based on consistent classification and life-cycle approach following October workshop (Districts/ Facility managers/ Central Office)
- 2019 Plan is intended to be a live plan that will be maintained and updated annually
- Presented today to inform you of important economic and budget considerations

Special Structures – Inventory



Defined By:

- Risk/Complexity
- Maintenance Cost
- Importance

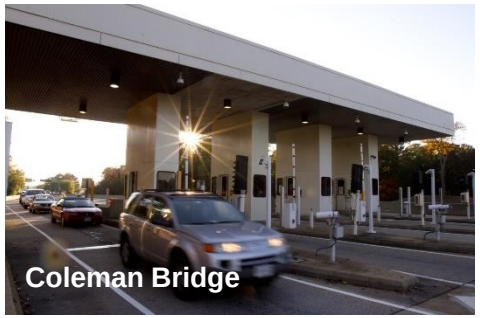
  Long Detours, High Traffic, Economic Significance (Shipping and Vehicular), Access to Vital Facilities (Military and Ports)

Special Structures – Original Build

Many were built and maintained through toll revenues.

Examples:

- **Coleman Bridge**
- **Hampton Roads Bridge Tunnel**
- **Norris Bridge**
- **Berkley Bridge**


Coleman Bridge


Hampton Roads Bridge Tunnel

Special Structures – Current State

Managed by Public Private Partnership:

- Pocahontas Parkway (Rt 895): through 2105
- Elizabeth River Tunnel (Midtown): through 2069
- Elizabeth River Tunnel (Downtown): through 2069

- Required funding not included in plan
- Must remember facility costs once the concession agreement ends

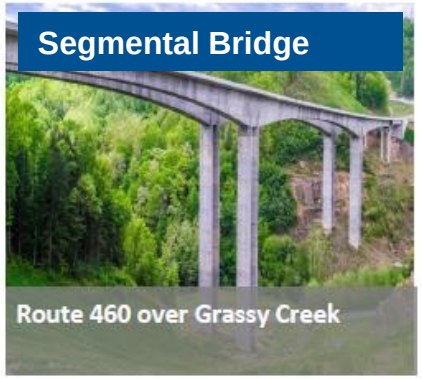
Hampton Roads Bridge Tunnel Project

- HRBT Approaches
- I-64 over Willoughby

- Existing tunnel - not included in project
  - Required funding included in Long Term Plan being presented today
- New tunnel maintenance and operations on completion included also in Plan

Complex Structures

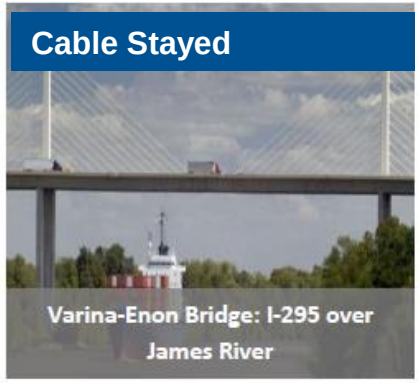
Segmental Bridge



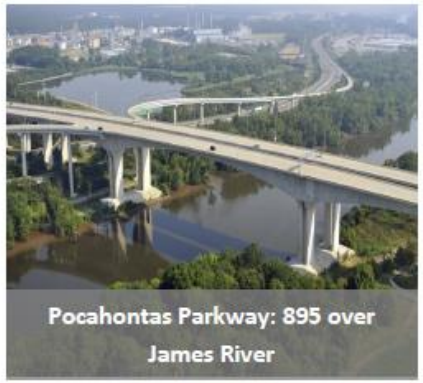
Route 460 over Grassy Creek

SMART Road Bridge

Cable Stayed



Varina-Enon Bridge: I-295 over James River

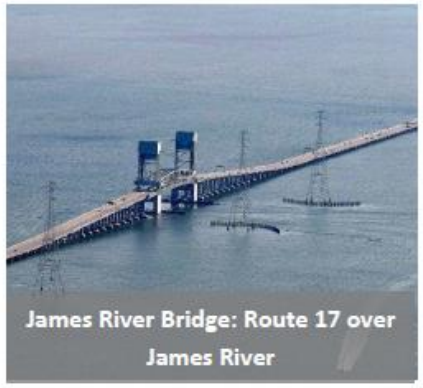


Pocahontas Parkway: 895 over James River

Hampton Roads Bridge Tunnel Approach Bridges I-64 over/under James River

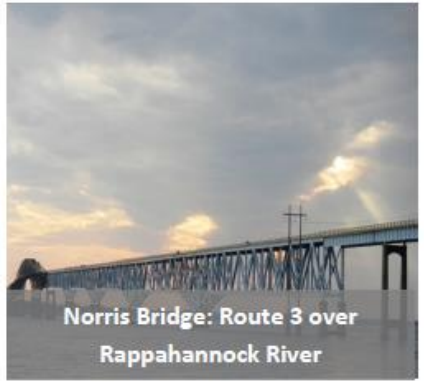
I-64 overWilloughby Bay

Monitor Merrimac Memorial Bridge Tunnel Approach Bridges I-664 over James River



James River Bridge: Route 17 over James River

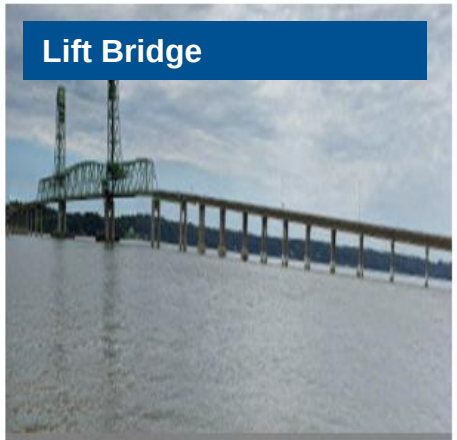
High Rise Bridge: I-64 over Elizabeth River - Large and Fixed Span



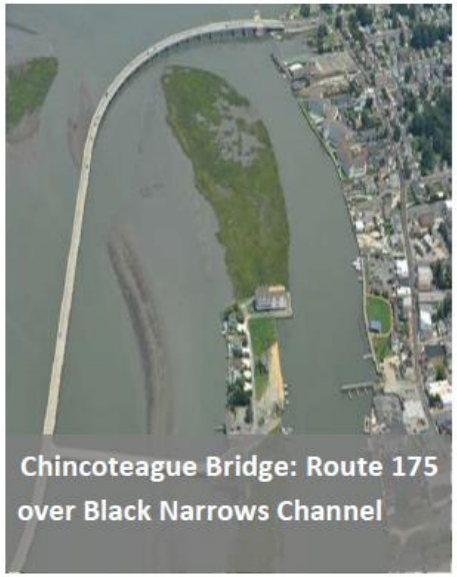
Norris Bridge: Route 3 over Rappahannock River

Movable Bridges

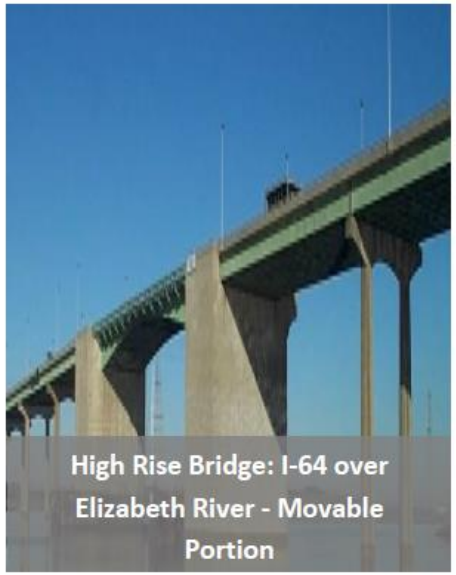
Lift Bridge



Benjamin Harrison Bridge: Route 156 over James River



Chincoteague Bridge: Route 175 over Black Narrows Channel

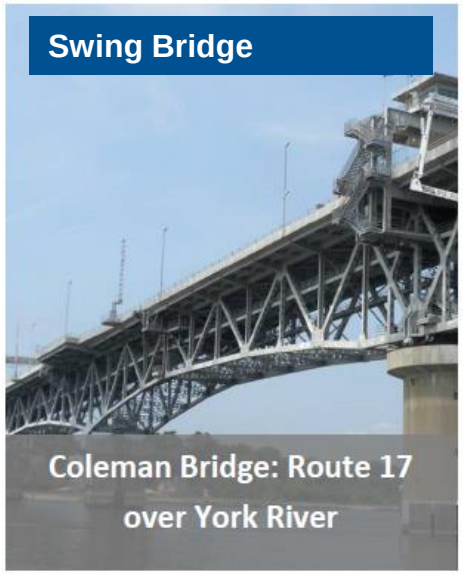


High Rise Bridge: I-64 over Elizabeth River - Movable Portion

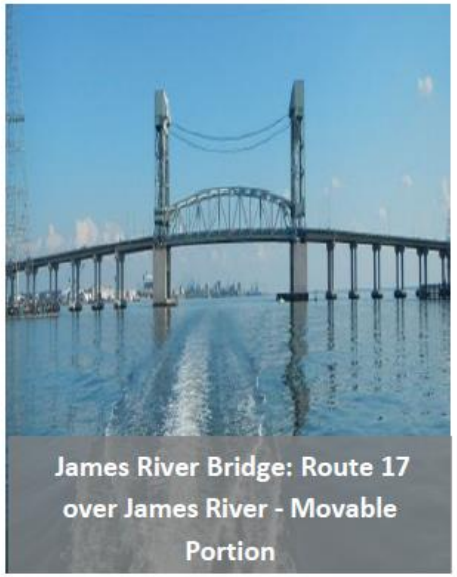
Bascule Bridge

Berkley Bridge: I-264 over Elizabeth River

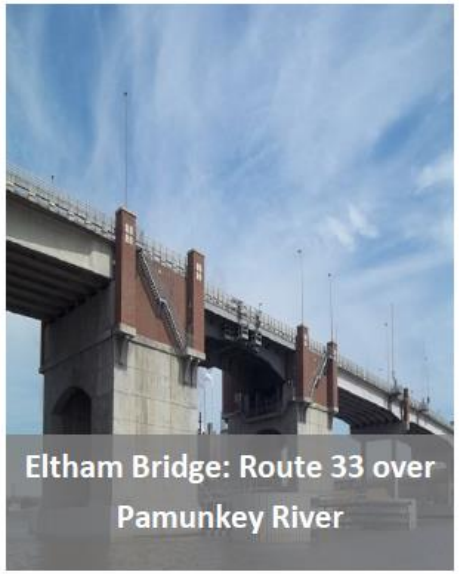
Swing Bridge



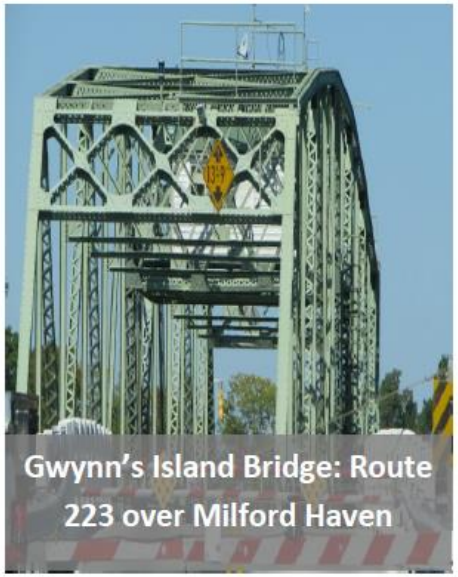
Coleman Bridge: Route 17 over York River



James River Bridge: Route 17 over James River - Movable Portion



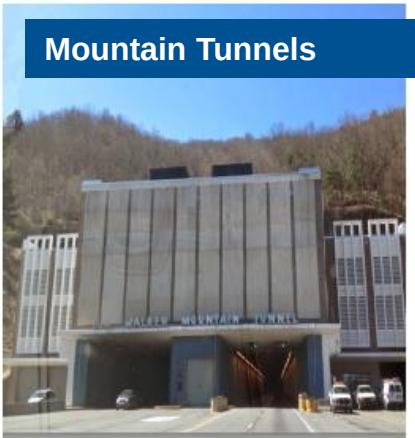
Eltham Bridge: Route 33 over Pamunkey River



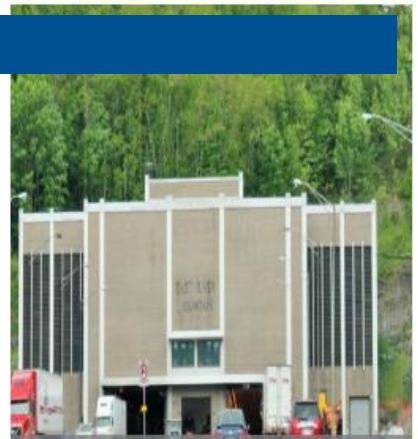
Gwynn's Island Bridge: Route 223 over Milford Haven

Tunnels

Mountain Tunnels

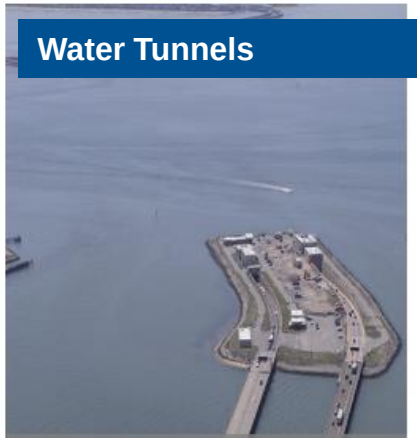


Big Walker Mountain Tunnel: I-77 through Appalachians

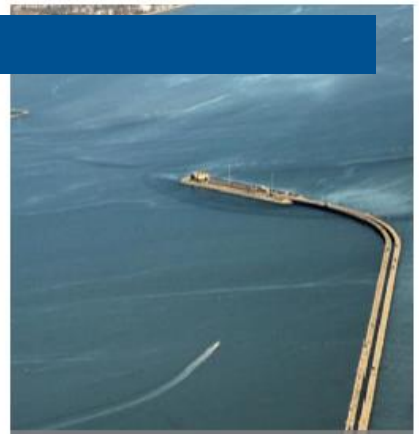


East River Mountain Tunnel: I-77 through Appalachians

Water Tunnels



Hampton Roads Bridge Tunnel I-64 under James River



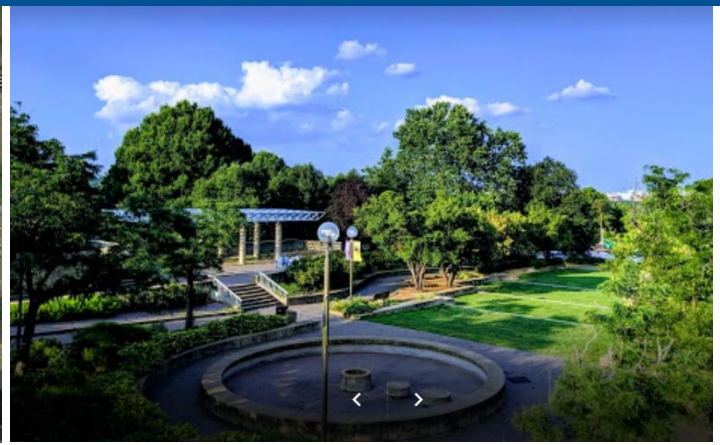
Monitor Merrimac Memorial Bridge Tunnel—I-664 under James River

Midtown Tunnel: Rt. 58 under Elizabeth River

Downtown Tunnel: I-264 under Elizabeth River

Rosslyn Tunnel (I-66 under Gateway Park)

3 Highway bridges,
7 pedestrian bridges,
2 in-fill (deck or park) structure



Rosslyn Tunnel: I-66 under Gateway Park & Fort Meyer Drive

The Cost of Failure – Robert O. Norris Bridge

Emergency maintenance pin replacement – 2007

Restricted to 3 tons for 30 days – (no trucks, buses, trailers)

- Daily 450+ trucks & buses affected
- 85 mile detour

Cost to replace pin = $386,000

Economic impact to truck traffic – $2.4-3.9M

Special Structures – 2019 Long Term Plan

A statewide long term plan (50 years) has been developed and includes each of the special structures

Consistent terminology, work types and work categories were utilized along with a life-cycle approach

- **Work Types**
  - **Structure Replacement – Complete replacement of the structure**
  - **Component Replacement – Replacement of parts of the structure (deck, generator)**
  - **Maintenance – Activities that sustain or improve the condition of structure components**
  - **Operations – Day to day requirements to keep the facility operating (labor, daily utilities (power/water), materials, equipment)**
- **Work Categories**
  - **The component, part or activity (electrical, structural, hydraulic, utilities)**

Monitor-Merrimac Memorial Bridge Tunnel Long-Term Plan

*All amounts in 2019 dollars

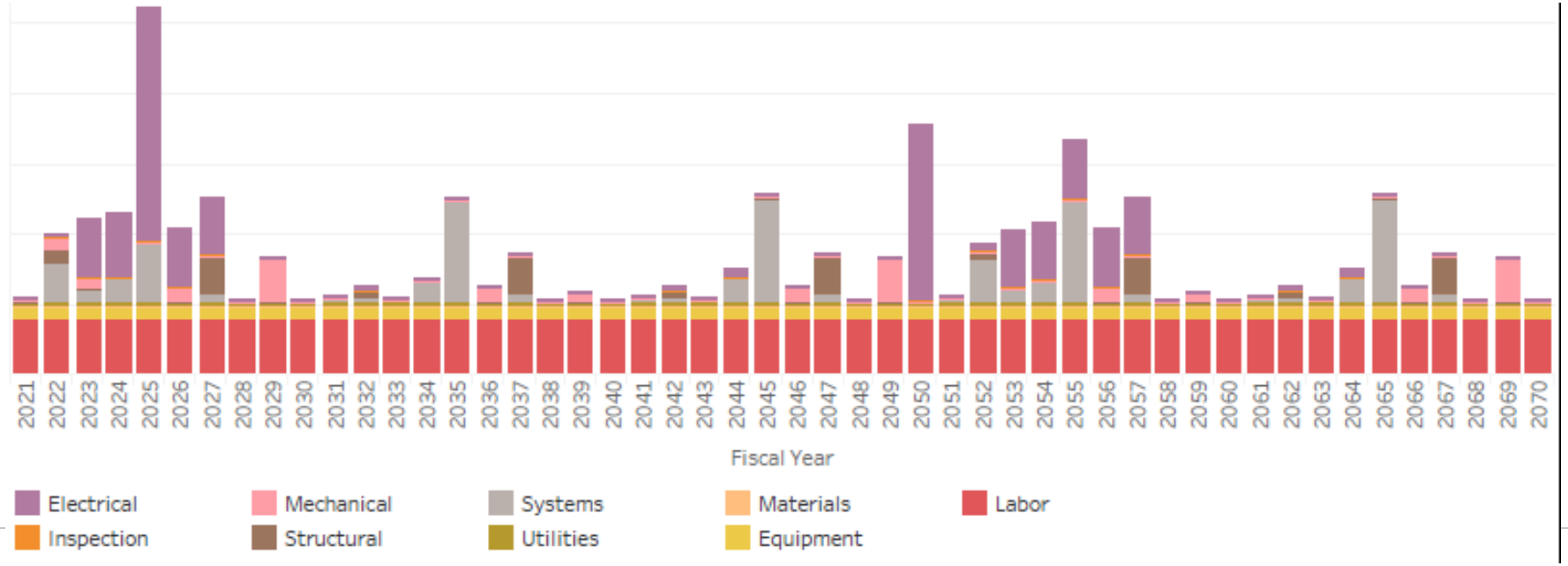
50 Year Plan

Average:
$17M/Year

Category	
Tunnel	$847,260,000
Grand Total	$847,260,000

Work Type	
Component Replacement	$275,010,000
Maintenance	$48,500,000
Operations	$523,750,000
Grand Total	$847,260,000

Work Category	
Electrical	$135,580,000
Inspection	$12,000,000
Mechanical	$33,500,000
Structural	$34,380,000
Systems	$108,050,000
Utilities	$35,000,000
Materials	$15,000,000
Equipment	$63,750,000
Labor	$410,000,000
Grand Total	$847,260,000



Monitor-Merrimac Memorial Bridge-Tunnel Tunnel Long Term Plan

Work Examples

Work Category - Electrical

- **Utility Power, Switchgear and generator upgrade**
  Life-cycle 30 years, Immediate Need, $40.5M per replacement
  ($81M over 50 years)

Work Category - Electrical

- **Replace Tunnel Lighting**
  Life-cycle 25 years, Immediate Need, $25M per replacement
  ($50M over 50 years)

Work Category - Labor

- **Operations and Maintenance Staffing**
  VDOT and Contractor, $7.5M per year,
  ($375M over 50 years)

Work Category - Inspection

- **NTIS Inspections**
  Annual Activity, $0.24M per year
  ($12M over 50 years)

Special Structures – Cost Estimate Changes since 2018

***All amounts in 2019 dollars**

Special Structure Report 2018	
30 Year Estimates	**$3,628M ($121M/Year)**

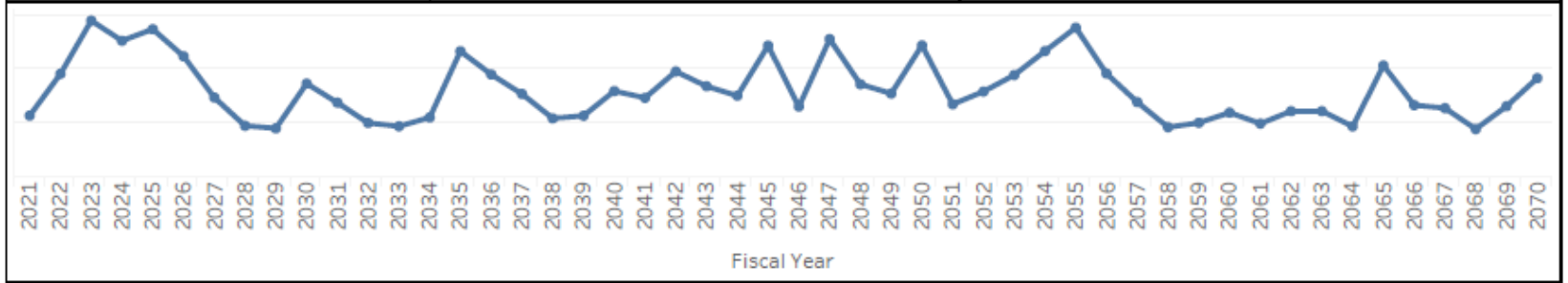
Special Structures Plan 2019	
50 Year Long Term Plan	**$8,121M ($162M/Year)**
Update of Major Repairs from 30 to 50 Years 2018 30 Year Plan updated to 50 Years after replacements ($1,265M) removed	$3,938M
2019 Estimate Update Replacements *Replacements (compared to $1,265M in 2018 Report)	+$917M
Subtotal ($97M/Year) comparing same work items from 2018 and 2019	**$4,855M**
Addition of Operations, Routine Maintenance, New HRBT and Fixed Span Approaches for Movables	
Operations (Labor, equipment, materials, utilities) includes $437M for new HRBT	+$2,470M
Routine Maintenance (Inspection, annual repairs, washing, lubrication on movables) Includes $240M for new HRBT	+706M
Maintenance on movable approaches (fixed portions, where approaches not included in complex list)	+$90M
Subtotal ($65M/Year)	**$3,266M**
Total 2019 50 Year Plan = $4,855 + $3,266M	**$8,121M ($162M/Year)**

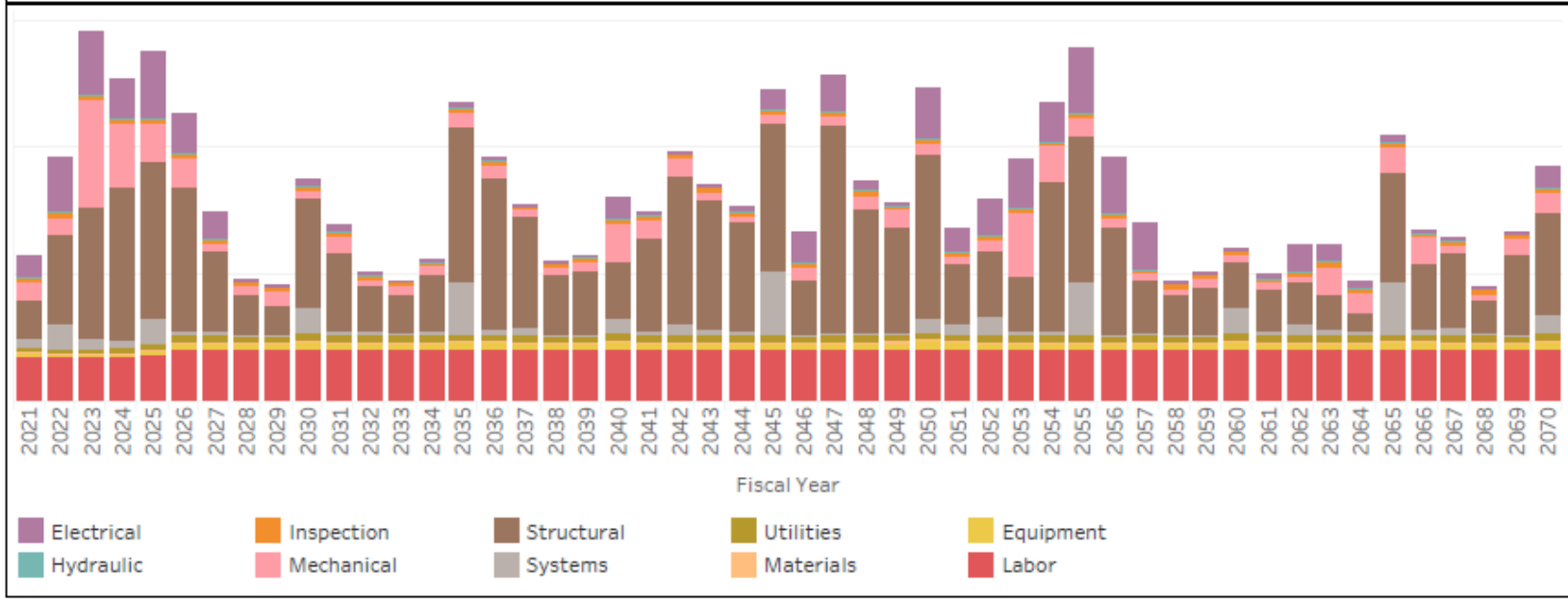
Special Structures - Long Term Plan (50 Years)

Category	
Tunnel	$3,744,166,000
Movable Bridge	$1,858,414,500
Complex Structure	$2,518,850,000
Grand Total	$8,121,430,500

Work Type	
Structure Replacement	$917,500,000
Component Replacement	$2,114,303,000
Maintenance	$2,619,700,500
Operations	$2,469,927,000
Grand Total	$8,121,430,500

Work Category	
Electrical	$704,115,500
Hydraulic	$625,000
Inspection	$200,878,000
Mechanical	$706,804,000
Structural	$3,505,749,000
Systems	$439,074,000
Utilities	$228,935,000
Materials	$71,100,000
Equipment	$250,225,000
Labor	$2,013,925,000
Grand Total	$8,121,430,500

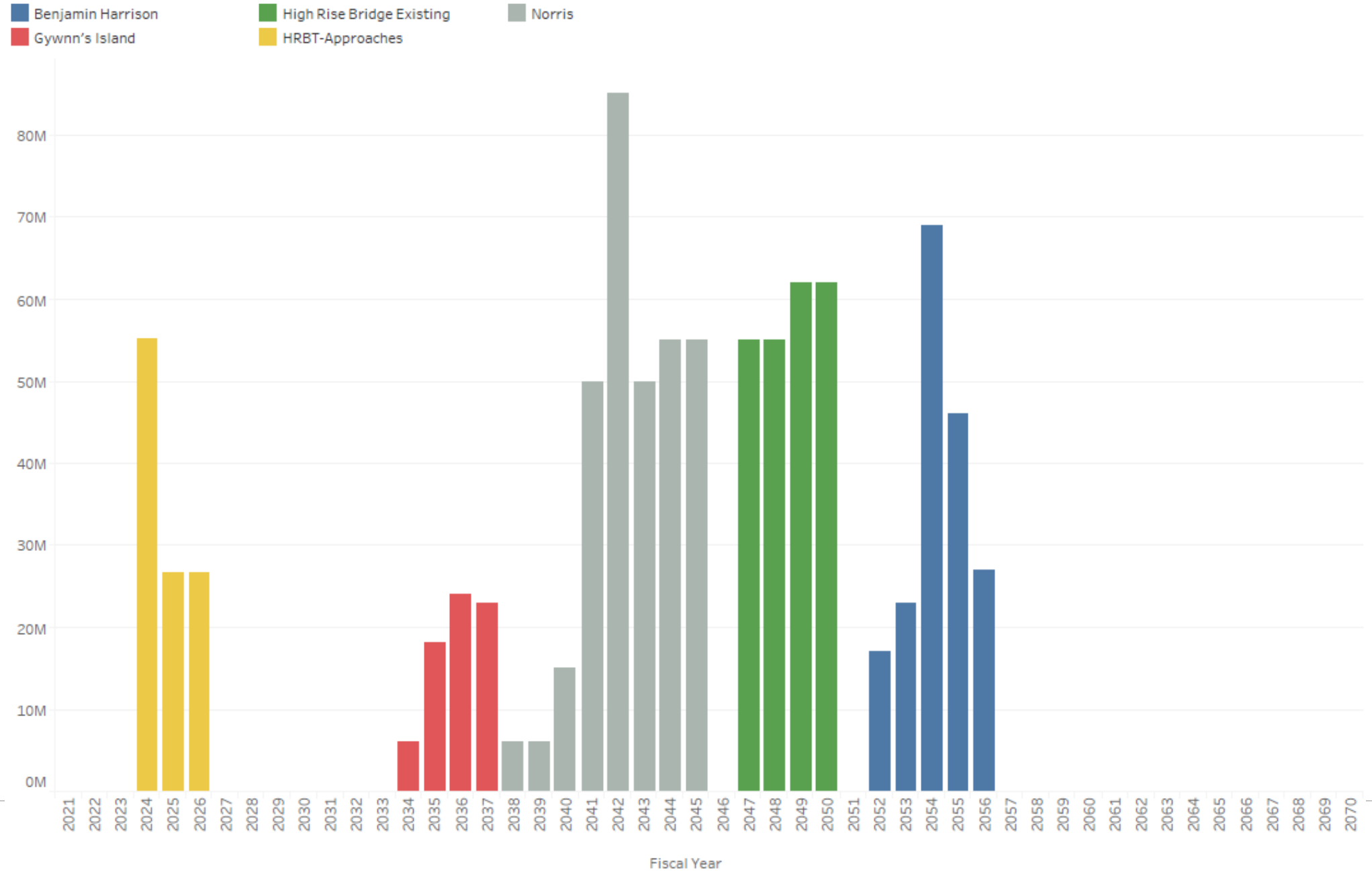




Special Structure	
Rosslyn	$84,721,000
Big Walker	$498,040,000
East River	$531,625,000
HRBT - old	$1,068,830,000
HRBT - new	$713,690,000
MMMBT	$847,260,000
James River Bridge	$257,700,000
High Rise	$72,712,000
Gywnn's Island	$125,295,000
Eltham	$181,375,000
Coleman	$354,338,000
Chincoteague	$120,212,500
Berkley	$369,455,000
Benjamin Harrison	$377,327,000
Willoughby Bay	$180,920,000
Varina-Enon	$193,850,000
Smart Road Bridge	$13,670,000
Norris	$476,370,000
MMMBT - Approac..	$692,380,000
James River Bridg..	$490,835,000
HRBT-Approaches	$149,260,000
High Rise Bridge - ..	$302,850,000
460 Connector	$18,715,000
Grand Total	$8,121,430,500

***All amounts in 2019 dollars**

Special Structures - Long Term Plan, Structure Replacements



***All amounts in 2019 dollars**

Special Structures Summary by Work Type

Category	
Tunnel	$3,744,166,000
Movable Bridge	$1,858,414,500
Complex Structure	$2,518,850,000
Grand Total	$8,121,430,500

Work Type	
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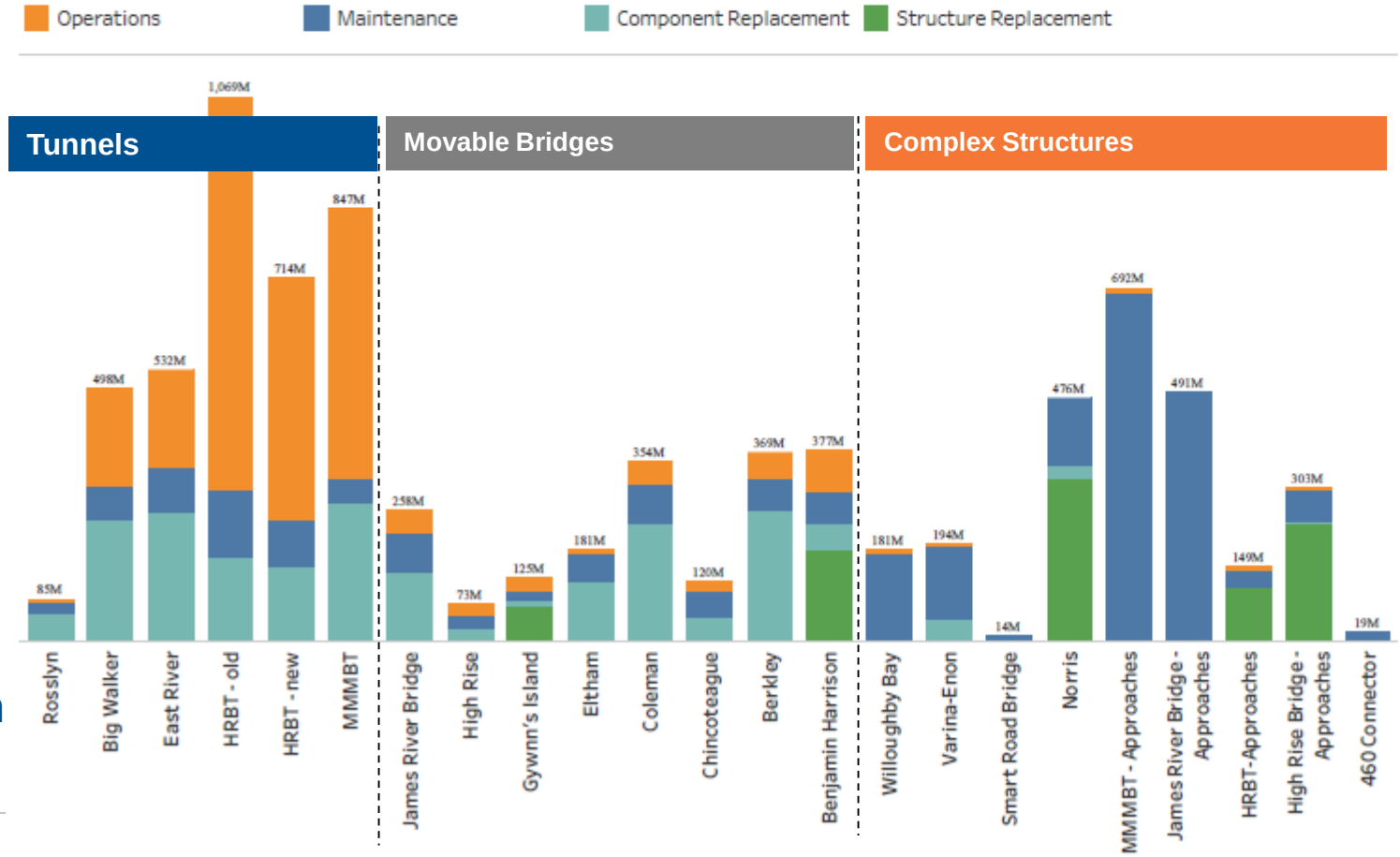

Average per year
$162,428,610

Special Structure	
Rosslyn	$84,721,000
Big Walker	$498,040,000
East River	$531,625,000
HRBT - old	$1,068,830,000
HRBT - new	$713,690,000
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Norris	$476,370,000
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James River Bridge - Approaches	$490,835,000
HRBT-Approaches	$149,260,000
High Rise Bridge - Approaches	$302,850,000
460 Connector	$18,715,000
Grand Total	$8,121,430,500

**All amounts in 2019 dollars*

Summary – Special Structures

Current investment: $50M per year, FY 2020

Special Structures			Avg. Total Cost per Year, $ Millions	
			Years 1-4	Years 5-50
Complex Structures	Movable Bridges	Tunnels	$152	$162
		Cost differential to current investment:	($102)	($112)

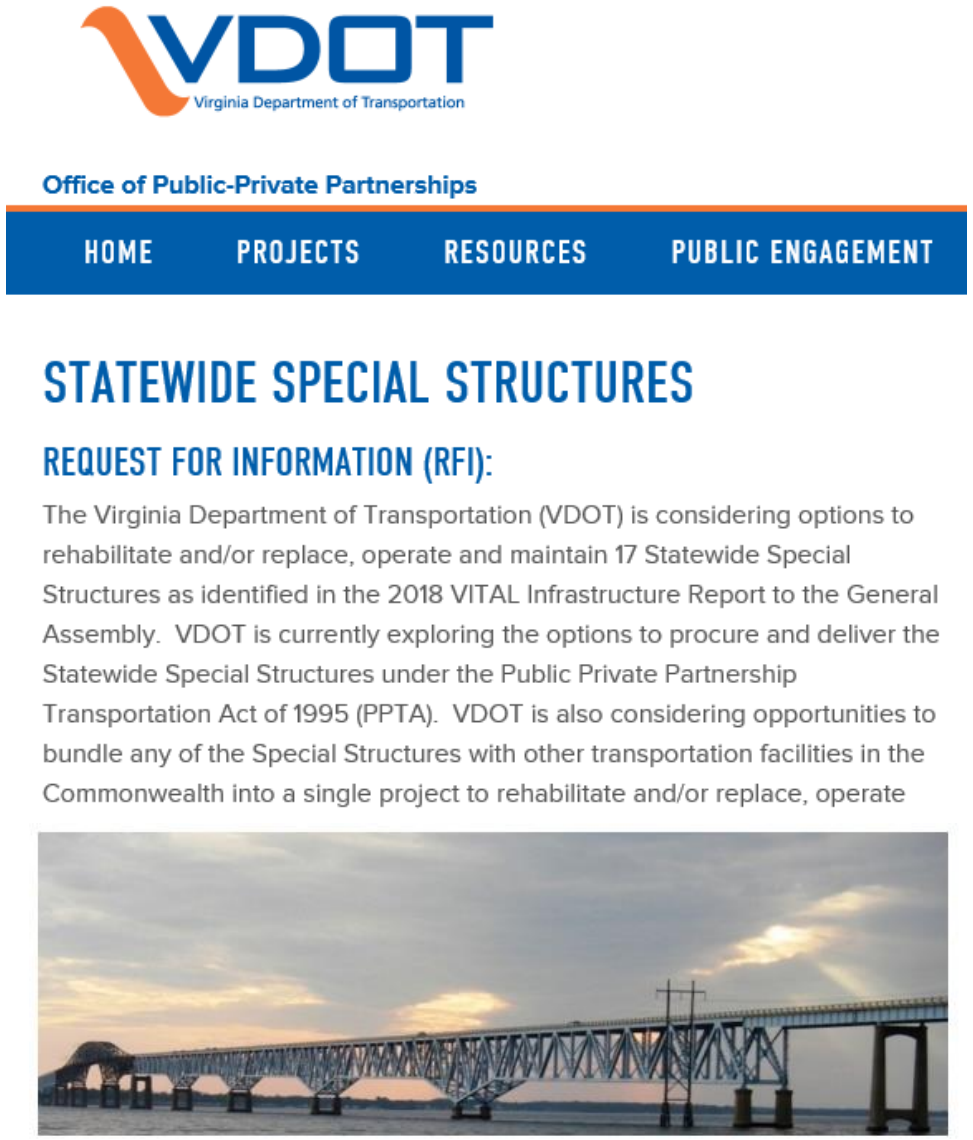
All amounts in 2019 dollars

Cost per year rises to $162M on completion of new HRBT tunnel

Special Structures – Long Term Sustainability

Analysis undertaken to define a sustainable solution

- **Long Term Plan**
  - Defined current and 50-year needs
- **Developed prioritization process to assess risk of individual work category activities**
- **Investigating alternative delivery methods**
  - Request for Information to Industry (Due Nov 18th)
  - Will provide input into P3 screening analysis



Special Structures - Movable Bridges/Tunnels Performance

No federal performance requirements

Performance measures being developed that consider

Movable Bridges

- Structural performance
- Electrical/Mechanical reliability

Tunnels

- Structural Performance
- Mechanical – Mechanical, Electrical, Fire-Life-Safety
- Operational – Roadway, Traffic Control, Lighting, Drainage

VDOT creating standard methodology for level of service

Performance Measures Being Developed:

- Health Index
  - Reliability
  - Remaining service life

Risk Based Example – Movable Bridges

Description	Useful Life (Years)	Age (Years)	Risk
Generator	30	40	Lifting mechanism doesn't operate
Lifting Cables	30	45	

COMPREHENSIVE REVIEW SUMMARY AND NEXT STEPS

Stephen C. Brich, P.E., Commissioner of Highways

November 20th, 2019

Summary - Pavement Investment Options

Current investment: $425M per year, FY 2020 – September CTB Meeting

Targets, % Sufficiency			Avg. Total Cost per Year, $ Millions					
			Years 1-6			Years 7-20		
IS	PR	SC	IS	PR	SC	IS	PR	SC
Current Policy			88	171	227	111	193	203
82%	82%	65%	$486			$507		
Cost differential to current investment:			($61)			($82)		
Proposed Target			88	150	225	111	185	203
82%	82% for ≥ 3,500 75% for < 3,500	82% for ≥ 3,500 60% for < 3,500	$463			$499		
Cost differential to current investment:			($38)			($74)		

Current Policy

Proposed Targets

*All amounts in 2019 dollars

Summary - Structures Investment Options

Current investment: $384M per year, FY 2020 – September CTB Meeting

Targets, % Not-SD				Avg. Total Cost per Year, $ Millions		
				Years 1-50		
IS	PR	SC	All Systems Average GCR	IS	PR	SC
Current Policy				161	222	123
99%	96%	94%	N/A	$506		
			Cost differential to current investment:	($122)		
Proposed Target				113	158	113
97% No Postings	93%	90%	Average GCR ≥ 5.6	$384		
			Cost differential to current investment:	$0		

Current Policy

Proposed Target

*All amounts in 2019 dollars

Summary – Routine Maintenance and Special Structures

Current investment: $725M per year, FY 2020 – October CTB Meeting

Routine Maintenance	Avg. Total Cost per Year, $ Millions
Performance metrics and targets in place and focus on proactive approach	$725
Cost differential to current investment:	$0

Current investment: $50M per year, FY 2020 – November CTB Meeting

Special Structures			Avg. Total Cost per Year, $ Millions	
			Years 1-4	Years 5-50
Complex Structures	Movable Bridges	Tunnels	$152	$162
		Cost differential to current investment:	($102)	($112)

*All amounts in 2019 dollars

Comprehensive Review – Investment Summary (FY2021)

Assuming acceptance of revised performance targets for pavements and structures

	Pavements	Structures	Special Structures	Routine Maintenance
Current Investment $M per year	$425	$384	$50	$725
Required Investment $M per year, 2019 Dollars	$463	$384	$152	$725
Difference	($38)	$0	($102)	$0

*All amounts in 2019 dollars

Comprehensive Review – December Actions

The following actions will be requested in December:

- Approval of new performance targets for Pavements
- Approval of new performance measures and targets for Structures
- Supporting development of Special Structures health index and risk based prioritization of projects
- Approve the Comprehensive Review Report for the General Assembly
  - Draft report available December 1st
- Require an Annual Report that summarizes planned and actual achievement
  - First report, October 2020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