



COMPREHENSIVE REVIEW SPECIAL STRUCTURES

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

November 20th, 2019

Special Structures - Introduction

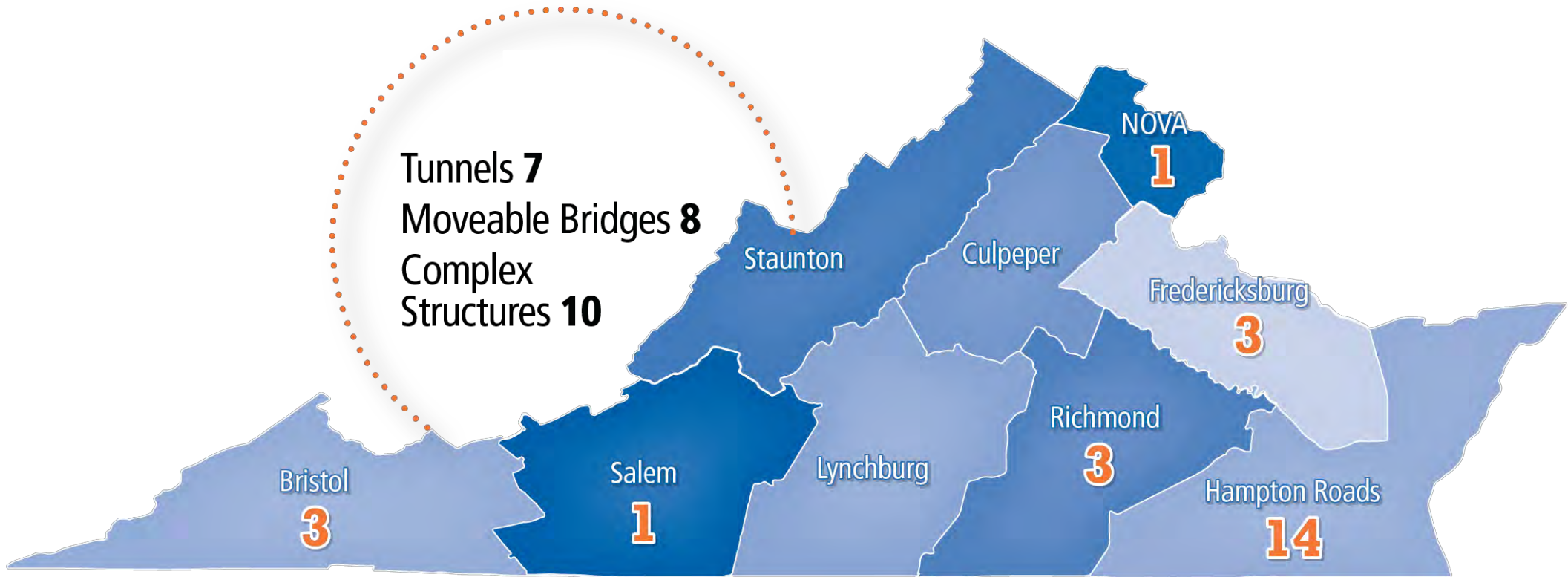
2018 Report to General Assembly



2019 Developed a Statewide, Systematic Long-Term Plan

- **Looks ahead 50 years and includes operations**
 - **Critical to ensuring mobility**
- **Based on consistent classification and life-cycle approach**
- **Based on several workshops (Districts/ Facility Managers/ Central Office)**
- **Will be a living document 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

George P. Coleman Memorial Bridge



Berkley 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
- VDOT responsible for the facility costs (e.g. maintenance, operations and replacement) once the concession agreement ends

Hampton Roads Bridge-Tunnel Project

- HRBT Approaches
- I-64 over Willoughby
- Existing tunnel - not included in HRBT project
 - Required funding included in Long-Term Plan being presented today
- VDOT responsible for new tunnel maintenance and operations once construction is complete
 - Required funding included in Long-Term Plan being presented today

Special Structures - Tunnels

Mountain Tunnels

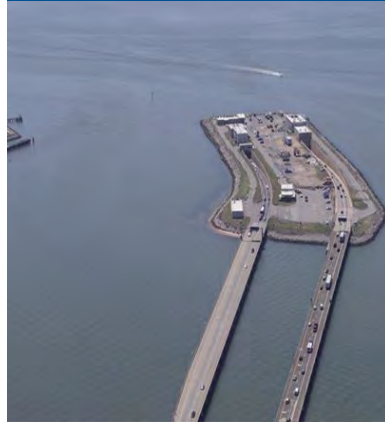
Big Walker Mountain Tunnel



East River Mountain Tunnel

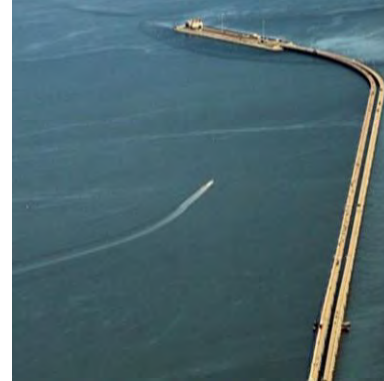


Hampton Roads Bridge-Tunnel



Water Tunnels

Monitor-Merrimac Memorial Bridge-Tunnel



Elizabeth River Tunnel (Midtown)



Elizabeth River Tunnel (Downtown)



Gateway Park / Rosslyn Tunnel

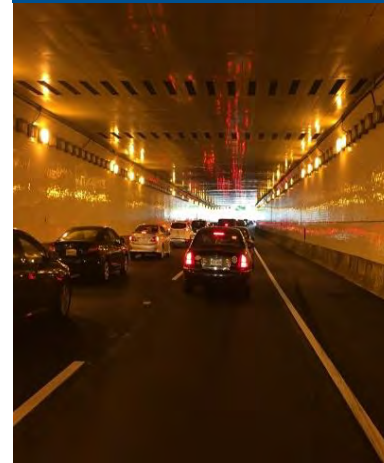
3 Highway bridges, 7 Pedestrian bridges, 2 In-fill (deck or park) structure



Gateway Park



Rosslyn Tunnel



Special Structures - Movable Bridges

Benjamin Harrison Memorial Bridge



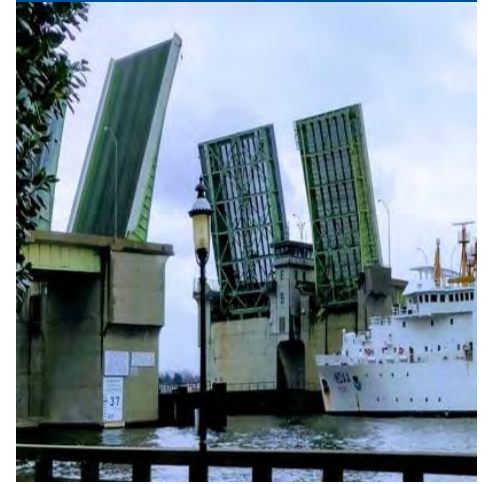
John B. Whealton Memorial Causeway Bridge (Chincoteague)



High Rise Bridge



Berkeley Bridge



George P. Coleman Memorial Bridge



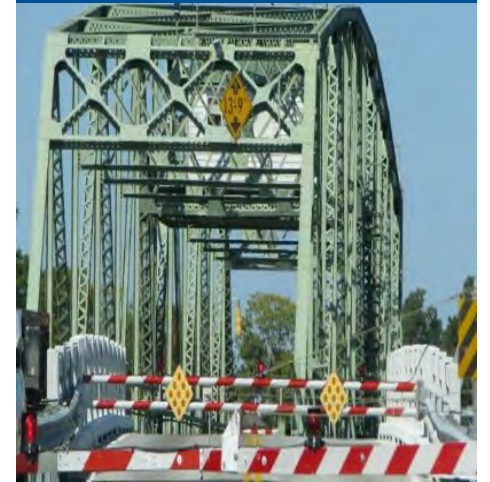
James River Bridge



Eltham Bridge



Gwynn's Island Bridge

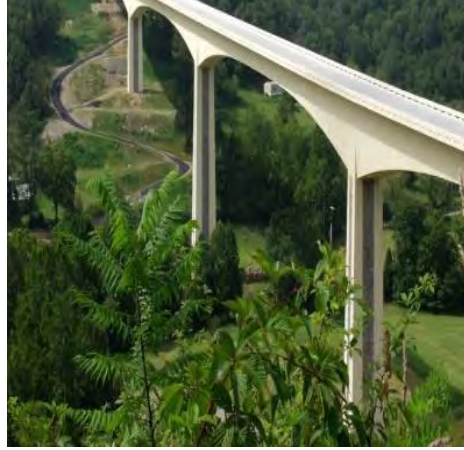


Special Structures - Complex Structures

Grassy Creek Bridge
(460 Connector)



Gordon C. Willis
SMART Road Bridge



Varina-Enon Bridge



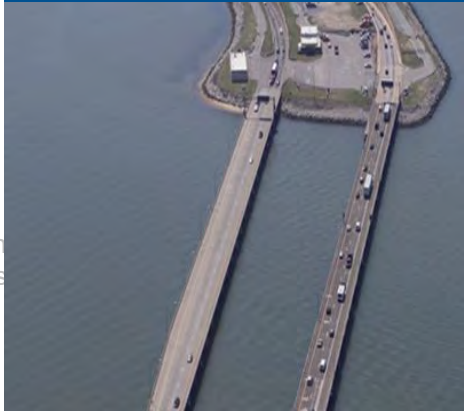
Pocahontas Parkway



Hampton Road
Bridge-Tunnel
(Willoughby Bay)



Hampton Roads
Bridge-Tunnel
Approach Bridges



Monitor-Merrimac Memorial
Bridge-Tunnel
Approach Bridges



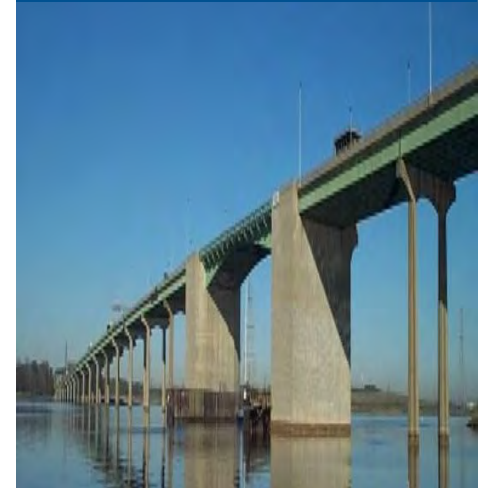
James River Bridge



Robert O. Norris Bridge



High Rise Bridge



Special Structures – 2019 Long-Term Plan

Statewide Special Structures Long-Term Plan (50 years)

- **Developed including each VDOT maintained and operated Special Structure**
- **Consistent terminology established along with a life-cycle approach**
 - **Work Types**
 - Structure replacement – Complete replacement of the structure
 - Component replacement – Replacement of parts (e.g., deck, generator)
 - Maintenance – Activities that sustain or improve the condition of structural components
 - Operations – Day to day requirements to keep the facility operating (labor, daily utilities (power/water), materials, equipment)
 - **Work Categories**
 - Component, part or activity (electrical, structural, hydraulic, utilities)

Monitor-Merrimac Memorial Bridge-Tunnel Tunnel Long-Term Plan

50 Year Plan

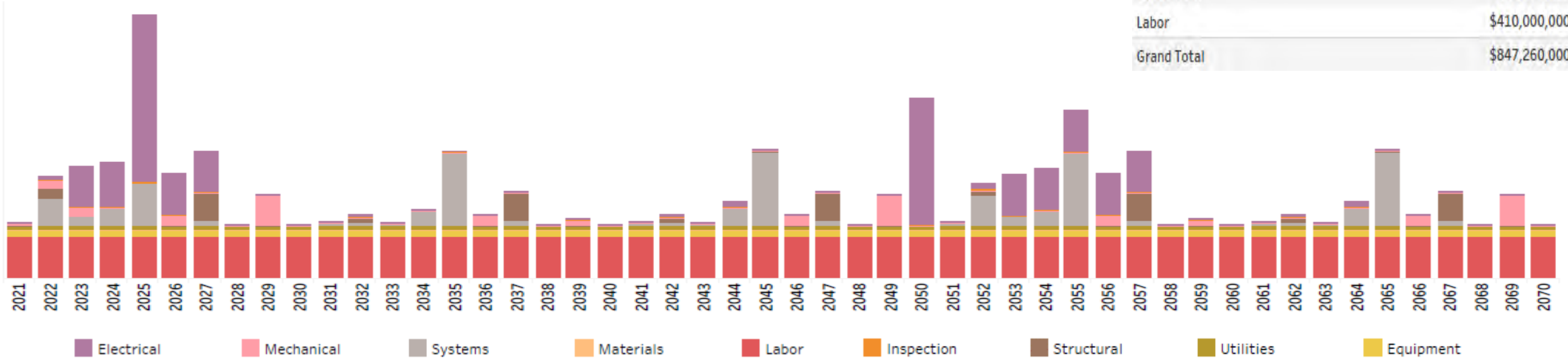
Average:
\$17M/Year

*All amounts in 2019 dollars

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**
Life-cycle 30 years, \$40.5M per replacement
(\$81M over 50 years)
- **Tunnel lighting**
Life-cycle 25 years, \$25M per replacement
(\$50M over 50 years)

Work Category - Labor

- **Maintenance and operations staffing**
VDOT and contractor, \$8.2M per year,
(\$410M over 50 years)

Work Category - Inspection

- **National Tunnel Inspection Standards(NTIS) and other Inspections**
Annual activity, \$0.24M per year
(\$12M over 50 years)



Tunnel Lighting



Control Room

Special Structures – Cost Estimate Changes since 2018

*All amounts in 2019 dollars

Special Structure Report 2018

30 Year Estimates (Structure Replacements \$1,265M, Major Repairs \$2,363M)	\$3,628M (\$121M/Year)
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Special Structures Plan 2019 – Comprehensive Review

50 Year Long-Term Plan	\$8,121M (\$162M/Year)
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Update of Major Repairs life-cycle approach over 50 Years	\$3,899M
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2019 Estimate Update Replacements *Replacements (compared to \$1,265M in 2018 Report)	+\$917M
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Subtotal (\$97M/Year) comparing same work items from 2018 and 2019	\$4,816M
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Additional Items:

Operations (Labor, equipment, materials, utilities) includes \$437M for new HRBT	\$2,470M
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Routine Maintenance (Inspection, annual repairs, washing, lubrication on movables) Includes \$240M for new HRBT	+751M
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Maintenance on movable approaches (fixed portions, where approaches not included in complex list)	+\$84M
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Subtotal (\$65M/Year)	\$3,305M
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Total 2019 50 Year Plan = \$4,816M + \$3,305M	\$8,121M (\$162M/Year)
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Special Structures – Long-Term Plan (50 Years)

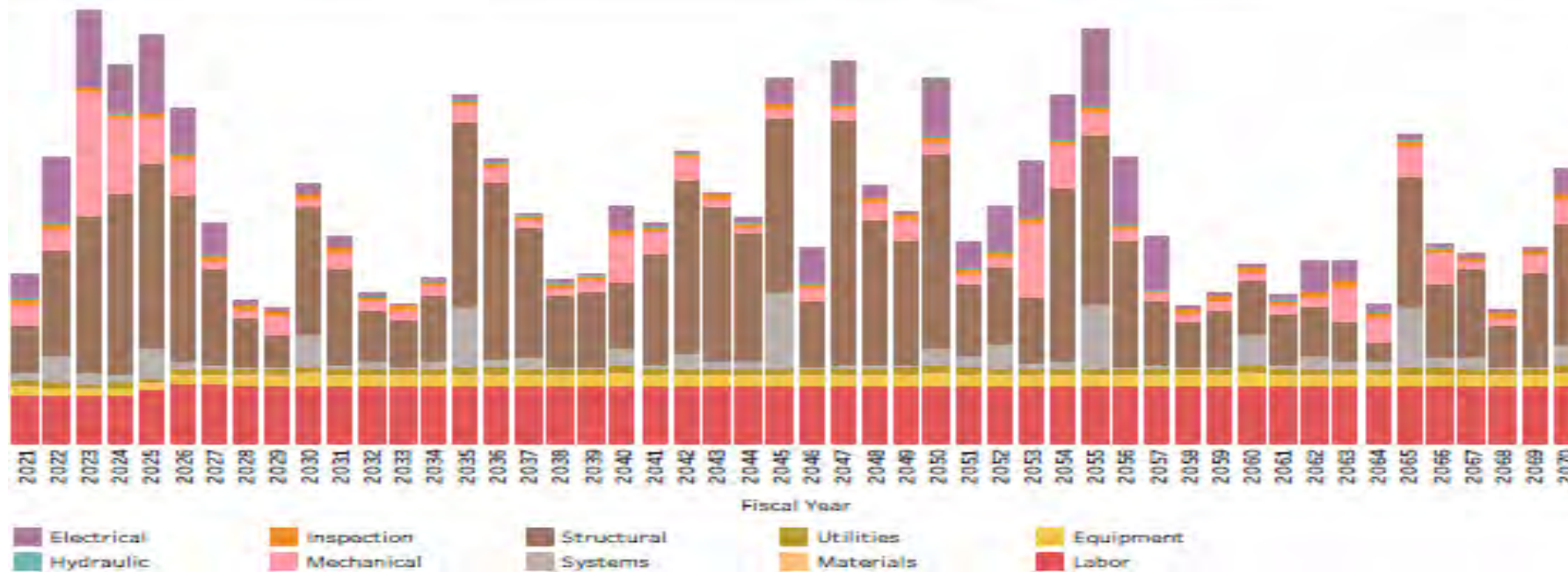
*All amounts in 2019 dollars

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

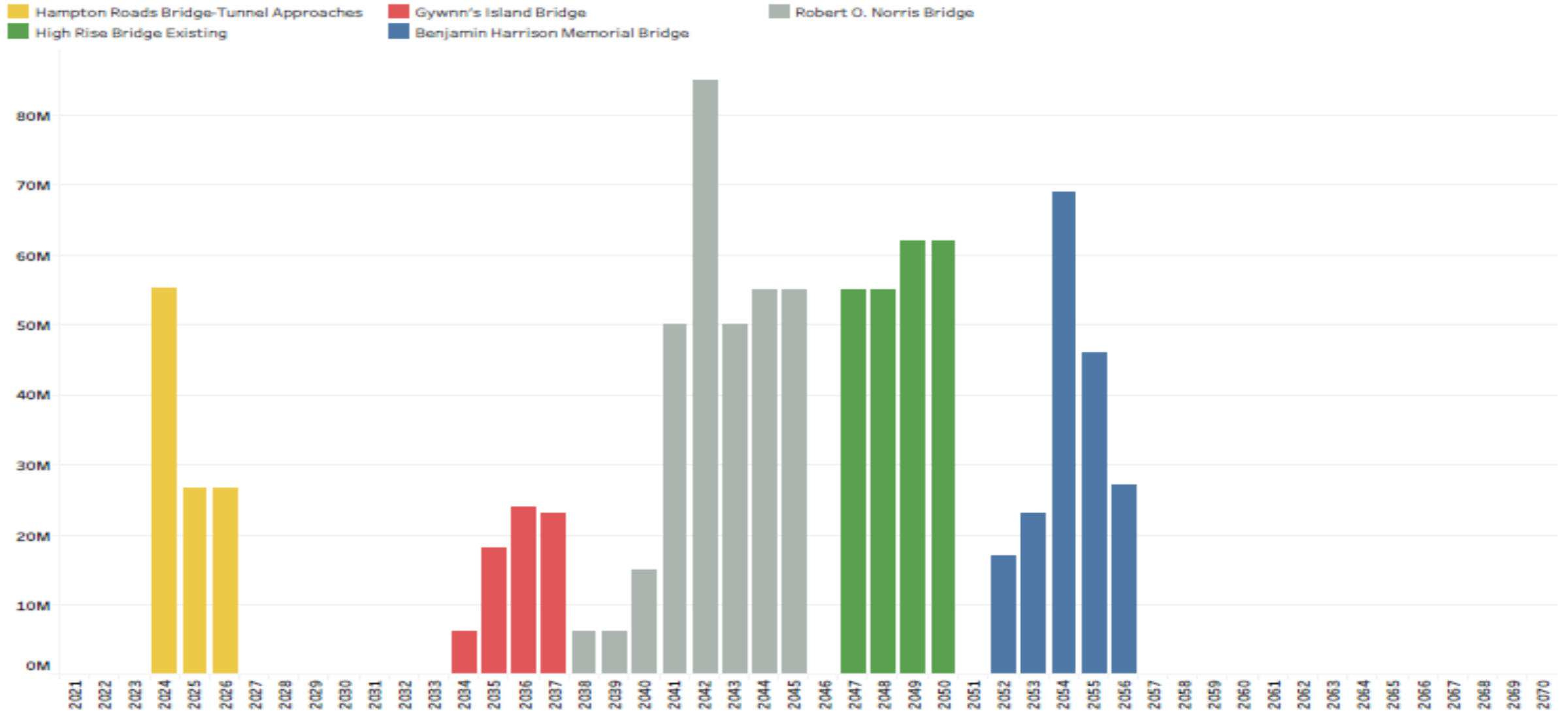
Work Category	
Electrical	\$704,115,500
Hydraulic	\$625,000
Inspection	\$200,878,000
Mechanical	\$706,804,000
Structural	\$3,505,749,000
Systems	\$439,074,000
Utilities	\$228,935,000
Materials	\$71,100,000
Equipment	\$250,225,000
Labor	\$2,013,925,000
Grand Total	\$8,121,430,500

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
Gwynn'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 - Approaches	\$692,380,000
James River Bridge - Appro..	\$490,835,000
HRBT-Approaches	\$149,260,000
High Rise Bridge - Approac..	\$302,850,000
460 Connector	\$18,715,000
Grand Total	\$8,121,430,500



Special Structures – Long-Term Plan, Structure Replacements

*All amounts in 2019 dollars



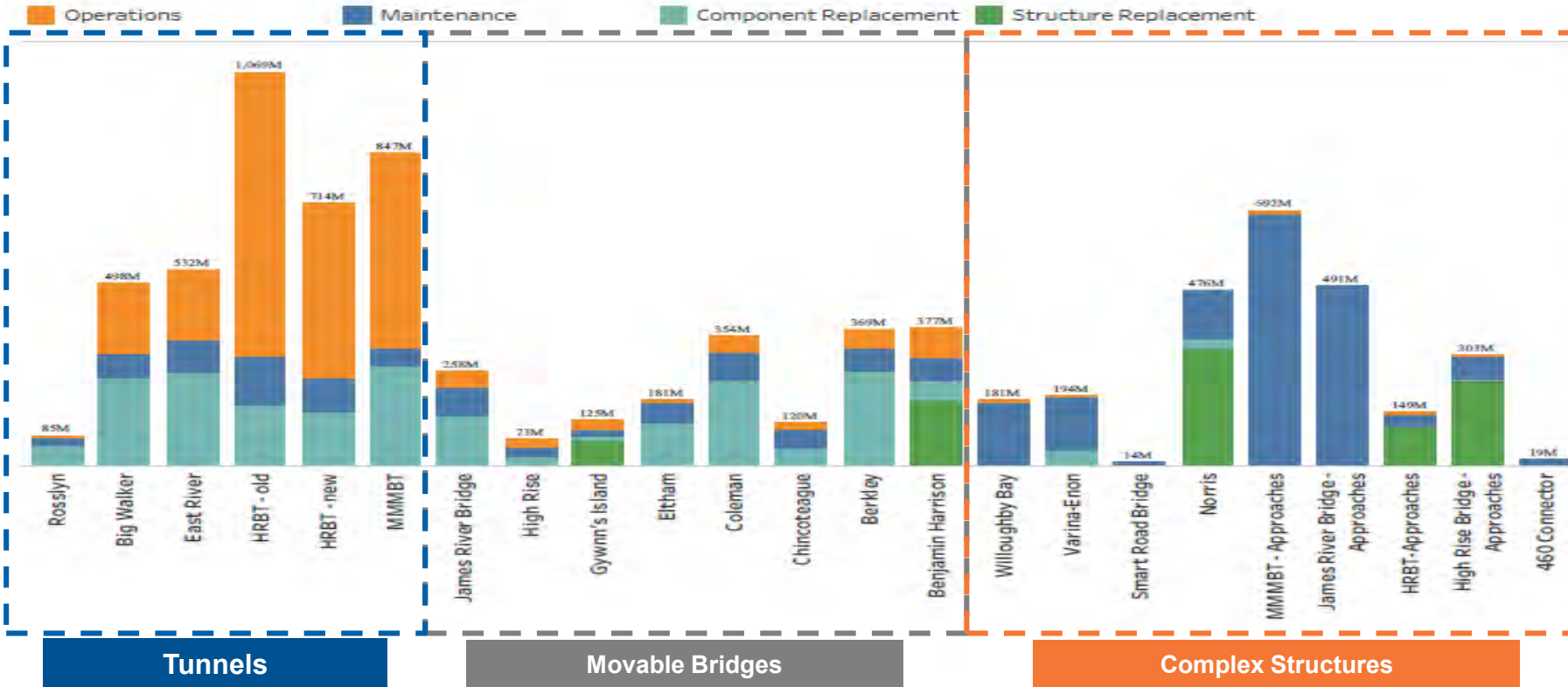
Special Structures Summary by Work Type

*All amounts in 2019 dollars

Special Structures Summary by Work Type

Category	Amount	Work Type	Amount
Tunnel	\$3,744,166,000	Structure Replacement	\$917,500,000
Movable Bridge	\$1,858,414,500	Component Replacement	\$2,114,303,000
Complex Structure	\$2,518,850,000	Maintenance	\$2,619,700,500
Grand Total	\$8,121,430,500	Operations	\$2,469,927,000
		Grand Total	\$8,121,430,500

Special Structure	Amount
Average per year	\$162,428,610
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
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Eltham	\$181,375,000
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HRBT-Approaches	\$149,260,000
High Rise Bridge - Approaches	\$302,850,000
460 Connector	\$18,715,000
Grand Total	\$8,121,430,500



Summary – Special Structures

Current investment: \$50M per year, FY 2020

Special Structures			Avg. Total Cost per Year, \$ Millions	
Tunnels	Movable Bridges	Complex Structures	Years 1-4	Years 5-50
			\$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

Underway

- **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**
- **Long-Term Plan**
 - **Periodic Updates**



Office of Public-Private Partnerships

HOME

PROJECTS

RESOURCES

PUBLIC ENGAGEMENT

STATEWIDE SPECIAL STRUCTURES

REQUEST FOR INFORMATION (RFI):

The Virginia Department of Transportation (VDOT) is considering options to rehabilitate and/or replace, operate and maintain 17 Statewide Special Structures as identified in the 2018 VITAL Infrastructure Report to the General Assembly. VDOT is currently exploring the options to procure and deliver the Statewide Special Structures under the Public Private Partnership Transportation Act of 1995 (PPTA). VDOT is also considering opportunities to bundle any of the Special Structures with other transportation facilities in the Commonwealth into a single project to rehabilitate and/or replace, operate



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					
IS	PR	SC	Years 1-6			Years 7-20		
			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 $\geq 3,500$ 75% for $< 3,500$	82% for $\geq 3,500$ 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		
IS	PR	SC	All Systems Average GCR	Years 1-50		
				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	
Tunnels	Movable Bridges	Complex Structures	Years 1-4	Years 5-50
			\$152	\$162
Cost differential to current investment:			(\$102)	(\$112)

*All amounts in 2019 dollars

Comprehensive Review – Annual Investment Summary (FY 2021)

Assuming acceptance of revised performance targets for pavements and structures

	Pavements		Structures	Special Structures		Routine Maintenance
	Years 1-6	Years 7-20		Years 1-4	Years 5-50	
Current Investment \$M per year	\$425	\$425	\$384	\$50	\$50	\$725
Required Investment \$M per year, 2019 Dollars	\$463	\$499	\$384	\$152	\$162	\$725
Difference	(\$38)	(\$74)	\$0	(\$102)	(\$112)	\$0

***All amounts in 2019 dollars**

Comprehensive Review – December Actions

The following request in December 2019

- **Pavements - Approval of new performance targets**
- **Structures - Approval of new performance measures and targets**
 - **Change to preservation first**
- **Special Structures – Support prioritization 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**
 - **Annual CTB Report anticipated October of each year**

