



COMMONWEALTH of VIRGINIA

Commonwealth Transportation Board

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Agenda item # 14

RESOLUTION OF THE COMMONWEALTH TRANSPORTATION BOARD

December 5, 2018

MOTION

Made By: Mr. Connors Seconded By: Mr. Miller

Action: Motion Carried, Unanimously

Title: Approval of the Report on the Commonwealth's Large and Unique Bridge and Tunnel Structures (VITAL Infrastructure)

WHEREAS, Item 450, H. of Chapter 2, (2018 Appropriations Act) enacted during the 2018 Special Session 1 of the Virginia General Assembly, requires the Commonwealth Transportation Board (Board) to report no later than December 1, 2018 to the Chairmen of the House and Senate Committees on Transportation, the Joint Transportation Accountability Commission, the House Committee on Appropriations and the Senate Committee on Finance, on the overall condition and funding needs of large and unique bridge and tunnel structures in the Commonwealth; and

WHEREAS, as part of its review pursuant to Item 450. H., the Board is required to make recommendations addressing funding of such projects within the State of Good Repair Program and in developing these recommendations the Board is required to assess the impact of establishing a set aside from the State of Good Repair Program funding, limited use of the provisions § [33.2-369](#) B of the *Code of Virginia*, which allows for waivers of district minimum caps in a single year, or such other options as the Board identifies; and

WHEREAS, the Virginia Department of Transportation (VDOT) has performed a review in response to the requirements set forth in Item 450.H. relating to the overall condition and funding needs of large and unique bridge and tunnel structures, referred to as Very Large, Indispensable Transportation Asset List (or VITAL) Infrastructure, and has prepared a draft

Resolution of the Board Approval of the Report on the Commonwealth's Large and Unique Bridge and Tunnel Structures (VITAL Infrastructure)

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report (VITAL Infrastructure Report) (attached hereto as Appendix A) in response for the Board's consideration; and

WHEREAS, VDOT has advised that the draft VITAL Infrastructure Report was developed over a short time period to address specific, legislatively-mandated issues and that the reviews conducted in preparing the draft report have demonstrated that a more broad-based approach is required to evaluate the impacts of integrating an asset management strategy for VITAL Infrastructure into VDOT's existing programs; and

WHEREAS, VDOT has further advised that additional time is needed to perform the necessary assessments and to produce a more comprehensive report using a broad-based approach relating to VITAL Infrastructure and accordingly, the draft VITAL Infrastructure Report includes a proposal that, over the course of the next year, the Board review investment strategies for VITAL Infrastructure and provide a supplemental report to the General Assembly in December 2019; and

WHEREAS, the Board may offer additional edits and comments to the draft VITAL Infrastructure Report, and in order to facilitate timely submission of the Report, the Commissioner of Highways will need authority to update the report with the edits requested by the Board prior to submission.

NOW, THEREFORE, BE IT RESOLVED, by the Commonwealth Transportation Board, that the VITAL Infrastructure Report (Attached hereto as Appendix A), which may be amended by the Commissioner to incorporate edits and changes requested by the Board and other non-substantive modifications as deemed appropriate by the Secretary of Transportation, is approved.

BE IT FURTHER RESOLVED, that the Secretary of Transportation or her designee is authorized to take all actions necessary to submit the VITAL Infrastructure Report to the General Assembly.

BE IT FURTHER RESOLVED, that VDOT shall engage in the analyses and provide information necessary to enable the Board to review, over the course of the next year, investment strategies for VITAL Infrastructure and to provide to the General Assembly a more comprehensive supplement to the VITAL Infrastructure Report in December 2019.

####

CTB Decision Brief

Approval of the Report on the Commonwealth's: Large and Unique Bridge and Tunnel Structures (VITAL Infrastructure)

Issue: Item 450. H. of Chapter 2 of the 2018 Session of the General Assembly (2018 Appropriation Act) requires the Commonwealth Transportation Board (Board) to review and report no later than December 1, 2018 to the Chairmen of the House and Senate Committees on Transportation, the Joint Transportation Accountability Commission, the House Committee on Appropriations and the Senate Committee on Finance, on the overall condition and funding needs of large and unique bridge and tunnel structures in the Commonwealth. In response to the legislation, the Virginia Department of Transportation (VDOT) has prepared a draft report for the Board's consideration. Board approval of the report is necessary before the report may be submitted to the General Assembly.

Facts: During Special Session 1 of the 2018 Virginia General Assembly, Item 450.H. was enacted as part of the Appropriation Act and provides:

H. The Commonwealth Transportation Board shall, no later than December 1, 2018, review and report to the Chairmen of the House and Senate Committees on Transportation, the Joint Transportation Accountability Commission, the House Committee on Appropriations and the Senate Committee on Finance, on the overall condition and funding needs of large and unique bridge and tunnel structures in the Commonwealth. As part of the review, the Board shall make recommendations addressing funding of such projects within the State of Good Repair program. In developing these recommendations the Board shall assess the impact of establishing a set aside from the State of Good Repair funding pot, limited use of the provisions of § [33.2-369 B.](#), Code of Virginia, which allows for the waiving of district minimum caps in a single year, or such other options as they might identify.

The Virginia Department of Transportation (VDOT) reviewed the structure inventory maintained throughout the Commonwealth of Virginia and identified 25 structures as unique. For purposes of this review and the report prepared in response to Item 450 H., these structures have been designated as "VITAL" Infrastructure (Very Large, Indispensable, Transportation Asset List). VITAL Infrastructure consists of tunnels, movable bridges and large complex fixed span structures.

All tunnels and movable bridges were included in the list because they are highly complex and have specialty parts that, in the event of failure, may require months to procure. Some parts have procurement times of over two years. The remaining structures were selected because of their economic impact, length, traffic volumes, length of detour, construction type and maintenance needs.

A preliminary VITAL Infrastructure 30-Year Plan was created, using an asset management approach, which focuses on timely rehabilitation and preservation actions to maintain the VITAL Infrastructure in fair or good condition. VDOT, in reviewing information and preparing a draft report (VITAL Infrastructure Report) for the Board's consideration in response to Item 450. H., has determined that in order to fully satisfy the requirements set out in Item 450. H., additional time is required to perform necessary assessments and to produce a more informed and comprehensive report.

Specifically, as noted in the draft VITAL Infrastructure Report, (attached hereto as Appendix A), the report was developed over a short time period to address specific, legislatively mandated questions. The analysis conducted in preparing the draft VITAL Infrastructure Report has demonstrated that a more broad-based approach is required to evaluate the impacts of integrating an asset management strategy for VITAL Infrastructure into VDOT's existing programs. This involves examining asset investment strategies to include the prioritization of funding based on current and projected performance of all highway assets, including VITAL Infrastructure.

Accordingly, based on the draft VITAL Infrastructure Report, it is proposed that, over the course of the next year, the Board review investment strategies for VITAL Infrastructure and provide a supplemental report to the General Assembly in December 2019. This supplemental report will summarize a thorough investigation, wherein VDOT will evaluate its investment strategies and analyze asset needs and performance targets while operating within existing funding constraints. The review will take a programmatic, long-term approach to optimizing asset conditions and roadway network performance.

Finally, it is anticipated that the Board may offer edits in the December 2018 Board meeting to the draft VITAL Infrastructure Report. To the extent edits or comments are added by the Board, the Commissioner will need authority to incorporate the edits into the draft VITAL Infrastructure Report prior to its submission.

Recommendations: Based on VDOT's findings and analysis, it is recommended that the Board approve and authorize submission of the VITAL Infrastructure Report (Appendix A) with a request for an additional year (by December 2019) to submit a supplemental, comprehensive report on potential investment strategies for VITAL Infrastructure.

Action Required by CTB: A resolution that provides the Board's approval of the VITAL Infrastructure Report, attached hereto as Appendix A, and authorizes the Commissioner to modify the report based on any edits requested by the Board and any non-substantive edits deemed appropriate by the Secretary of Transportation, prior to submission to the General Assembly, will be presented to the Board for a formal vote. The resolution will also authorize the Secretary or her designee to take all actions necessary to submit the VITAL Infrastructure Report to the General Assembly. Finally, the resolution will direct VDOT over the course of the next year to engage in analyses and provide information that will enable the Board to review, investment strategies for VITAL Infrastructure and to provide to the General Assembly in December 2019 a more comprehensive supplement to the VITAL Infrastructure Report.

Result, if Approved: The legislative requirement that the Board submit the VITAL Infrastructure report will be satisfied and VDOT will engage in the requisite reviews and analyses for a draft supplemental report for the Board's consideration in late 2019.

Options: N/A.

Public Comments/Reactions: N/A

APPENDIX A

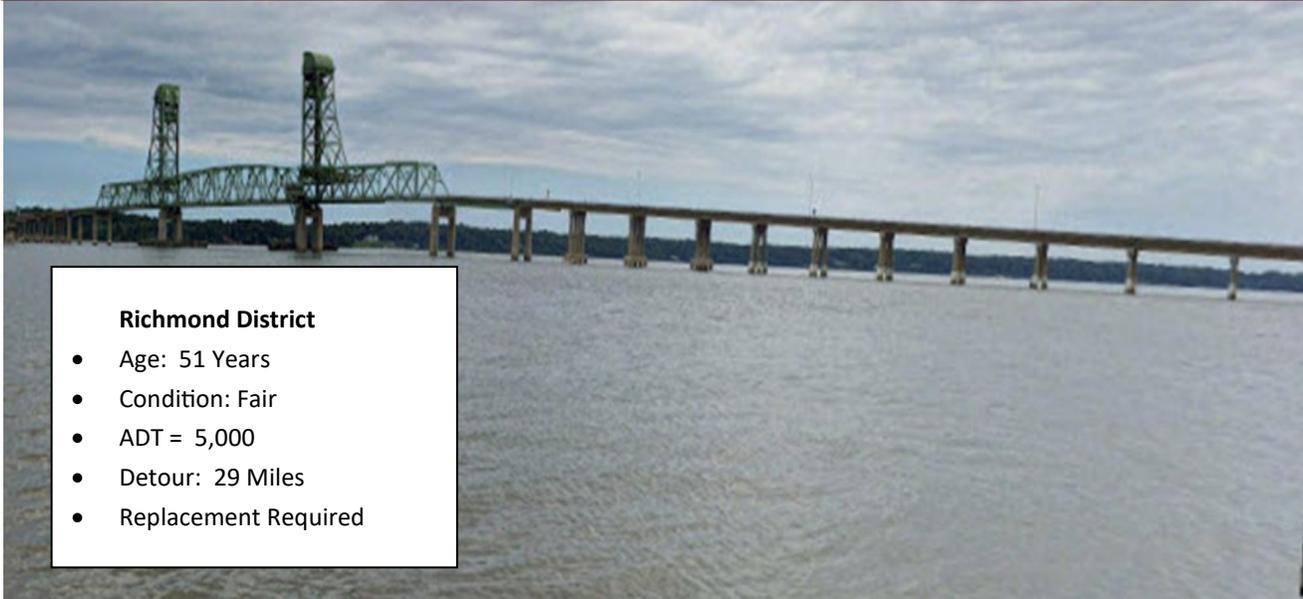
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VDOT's VITAL Infrastructure: Condition, Age and Type of Structure

Type	No.	Structure	Age	Route Carried	Feature Intersected	Condition*
Movables	1	Benjamin Harrison	51	Rt. 156	James River	Fair
	2	Chincoteague	8	Rt. 175	Black Narrows Channel	Fair
	3	High Rise	49	I-64	Elizabeth River	Fair
	4	Berkley	64 & 28	I-264	Elizabeth River	Fair
	5	Coleman	66	Rt. 17	York River	Fair
	6	James River Bridge	38	Rt. 17	James River	Fair
	7	Eltham	11	Rt. 33	Pamunkey River	Fair
	8	Gwynn's Island	80	Rt. 223	Milford Haven	Fair
Tunnels	9	Big Walker Tunnel	46	I-77	Appalachian Mountains	Fair
	10	East River Tunnel	44	I-77	Appalachian Mountains	Fair
	11	Tunnels of Hampton Roads Bridge Tunnel	60 & 44	I-64	Hampton Roads	Fair
	12	Tunnel of Monitor Merrimac Memorial Bridge Tunnel	26	I-664	James River	Fair
	13	Elizabeth River Midtown Tunnel	2 & 56	Rt. 58	South Branch Elizabeth River	Good
	14	Elizabeth River Downtown Tunnel	32 & 66	I-264	South Branch Elizabeth River	Good
	15	Rosslyn Tunnel	35	I-66	Gateway Park & Ft. Meyer Dr.	Fair
Large and Complex	16	460 Connector	1	Rt. 460	Grassy Creek	Good
	17	Smart Road Bridge	17	SMART Hwy	Wilson Creek	Good
	18	Varina-Enon	28	I-295	James River	Fair
	19	895/Pocahontas Parkway	16	895	James River	Good
	20	HRBT Approaches	60 & 44	I-64	Hampton Roads	3-Fair, 1-Poor
	21	Willoughby Bay	46	I-64	Willoughby Bay	Fair
	22	MMMBT Approaches	26	I-64	James River	Fair
	23	James River Bridge Approaches	38	Rt. 17	James River	Fair
	24	High Rise Bridge Approaches	49	I-64	Elizabeth River	Fair
	25	Norris Bridge	61	Rt. 33	Rappahanock River	Fair

Moveable Bridges

Benjamin Harrison Bridge: Route 156 over James River (#1)



Richmond District

- Age: 51 Years
- Condition: Fair
- ADT = 5,000
- Detour: 29 Miles
- Replacement Required

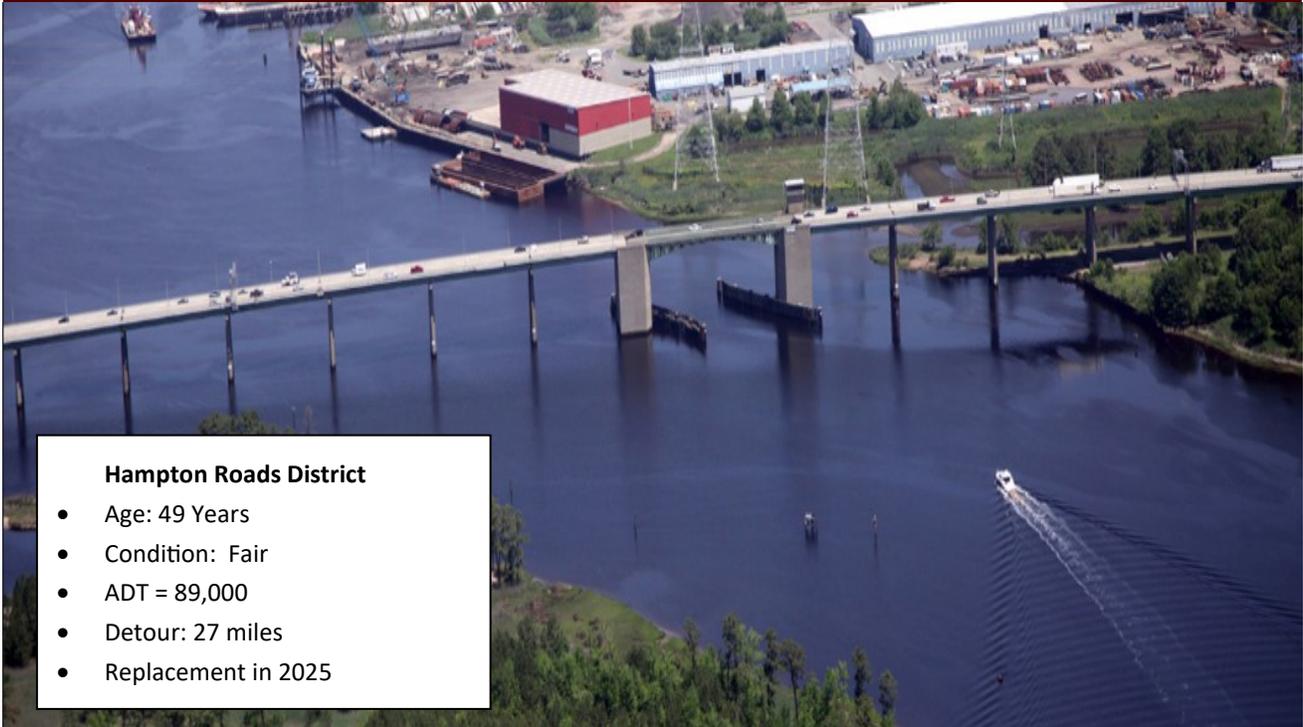
Chincoteague Bridge: Route 175 over Blackwater Channel (#2)



Hampton Roads District

- Age: 8 Years
- Condition: Fair
- Detour: None Available
- Bascule Bridge

High Rise Bridge: I-64 over Elizabeth River
Movable Portion (#3), Large and Fixed Span (#24)



Hampton Roads District

- Age: 49 Years
- Condition: Fair
- ADT = 89,000
- Detour: 27 miles
- Replacement in 2025

Berkley Bridge: I-264 over Elizabeth River (#4)



Hampton Roads District

- Age: 64 (WB) and 28 (EB)
- Condition: Fair
- ADT = 97,000
- Detour: 5 Miles
- Double Leaf Bascule Bridge

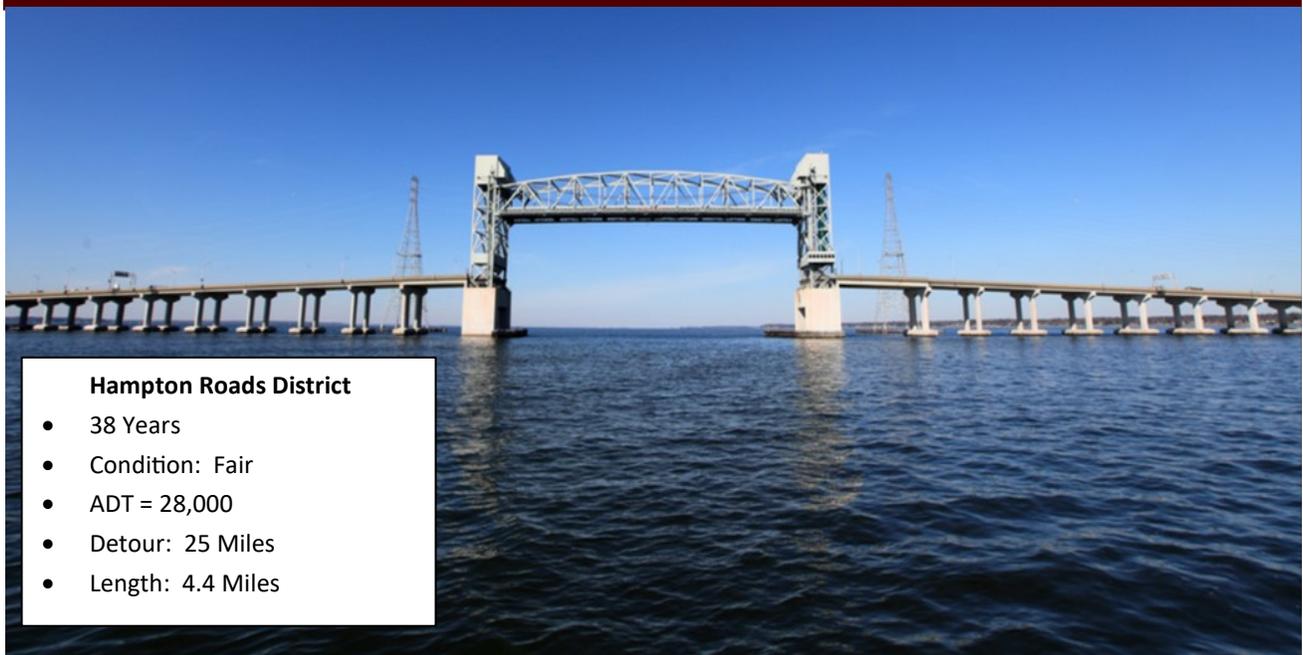
Coleman Bridge: Route 17 over York River (#5)



Hampton Roads District

- Age: 22 Years
- Condition: Fair
- Detour: 76 Miles
- Longest Swing Bridge in America

James River Bridge: Route-17 over James River Movable (#6), Large and Complex (#23)



Hampton Roads District

- 38 Years
- Condition: Fair
- ADT = 28,000
- Detour: 25 Miles
- Length: 4.4 Miles

Eltham Bridge: Route 33 over Pamunkey River (#7)



Fredericksburg District

- Age: 11 Years
- Condition: Fair
- ADT = 18,000
- Detour: 83 Miles
- Double Leaf Bascule Bridge

Gwynn's Island Bridge: Route 223 over Milford Haven (#8)

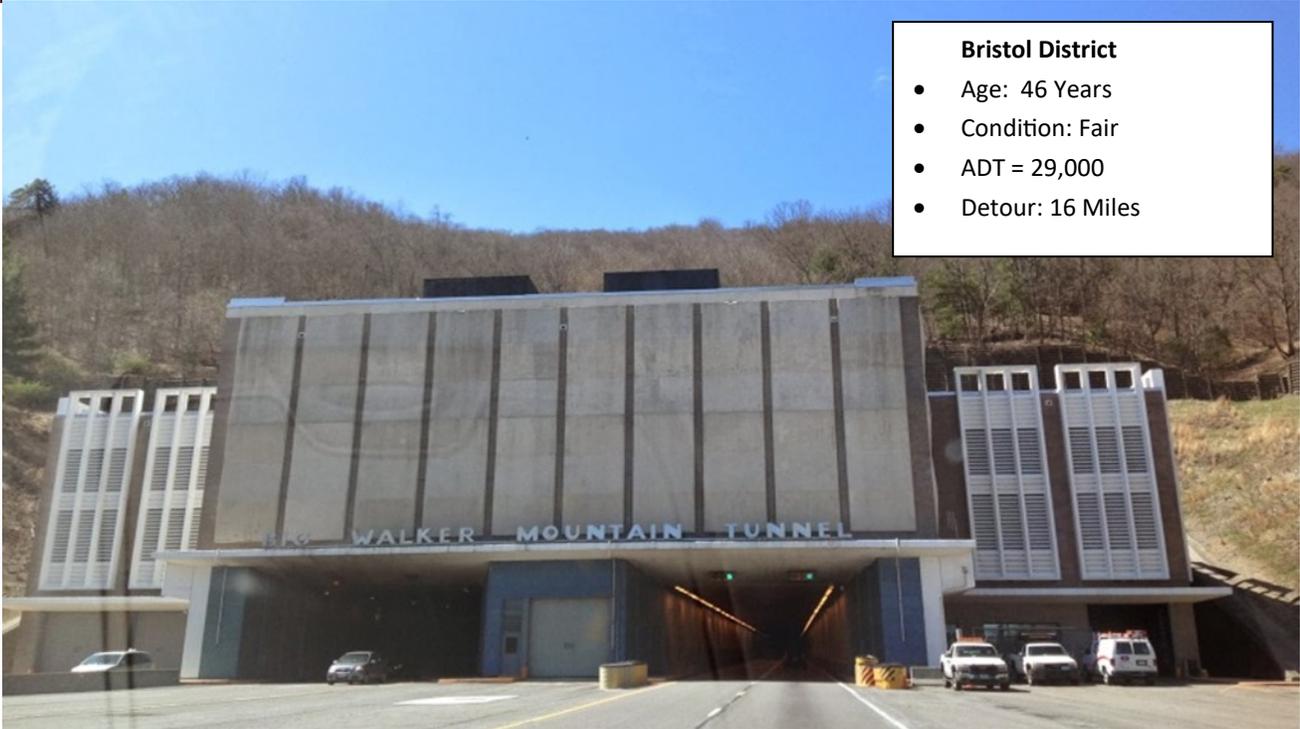


Fredericksburg District

- Age: 80 Years
- Condition: Fair
- Bypass: no other access
- Replacement Required

Mountain Tunnels

Big Walker Mountain Tunnel: I-77 through Appalachians (#9)



Bristol District

- Age: 46 Years
- Condition: Fair
- ADT = 29,000
- Detour: 16 Miles

East River Mountain Tunnel: I-77 through Appalachians (#10)



Bristol District

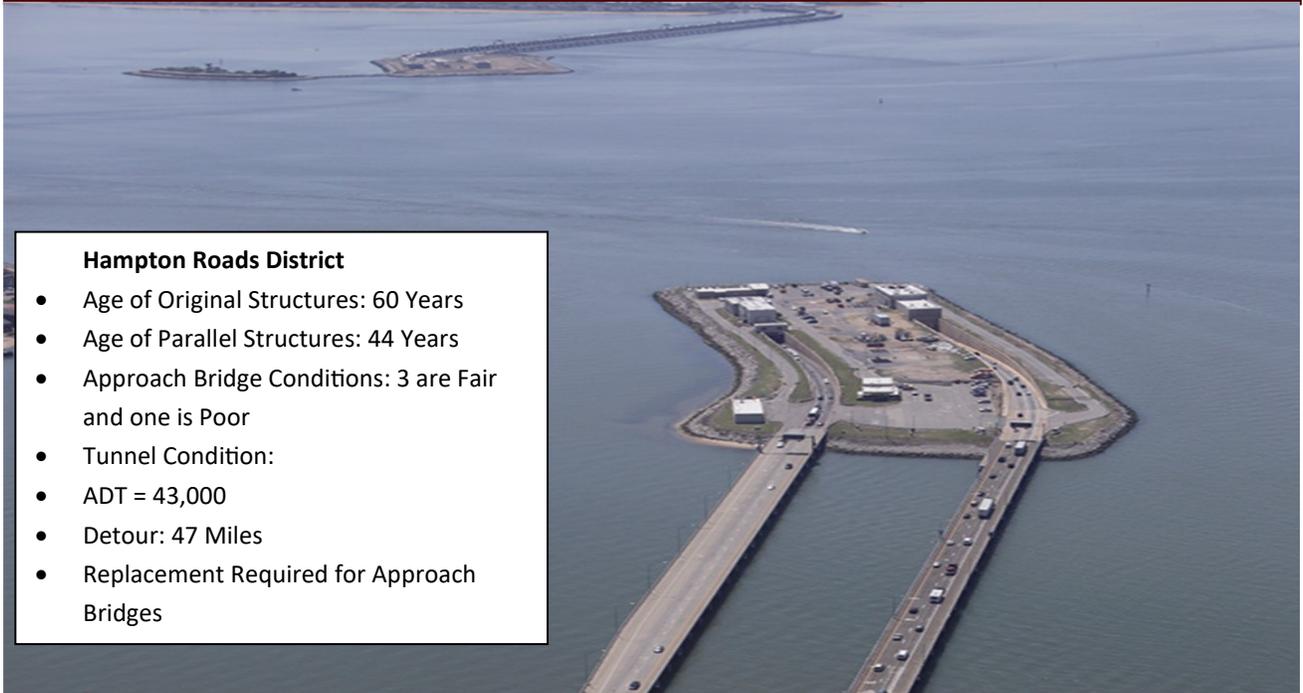
- Age: 44 Years
- Condition: Fair
- ADT = 29,000
- Detour: 13 Miles

Tunnels with Associated Approach Bridges

Hampton Roads Bridge-Tunnel (#11) and Approach Bridges (#20): I-64 over/under James River

Hampton Roads District

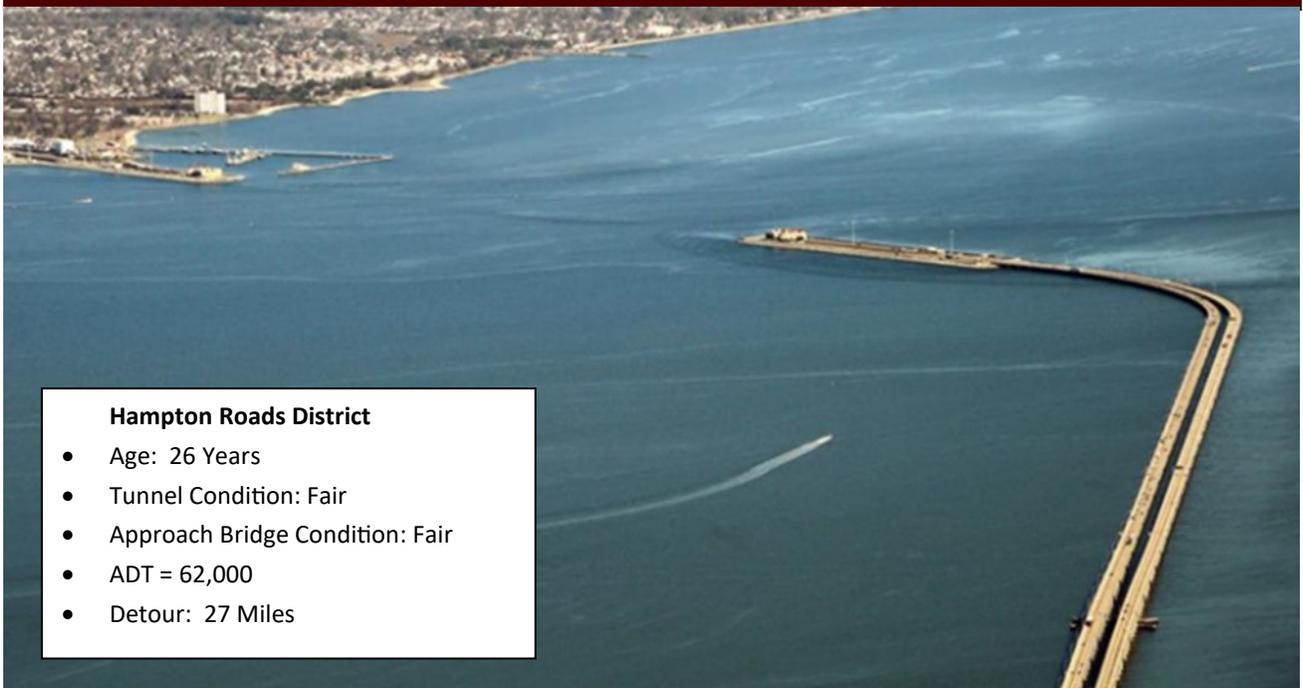
- Age of Original Structures: 60 Years
- Age of Parallel Structures: 44 Years
- Approach Bridge Conditions: 3 are Fair and one is Poor
- Tunnel Condition:
- ADT = 43,000
- Detour: 47 Miles
- Replacement Required for Approach Bridges



Monitor Merrimac Memorial Bridge-Tunnel (#12) & Approach Bridge (#22) I-664 over/under James River

Hampton Roads District

- Age: 26 Years
- Tunnel Condition: Fair
- Approach Bridge Condition: Fair
- ADT = 62,000
- Detour: 27 Miles

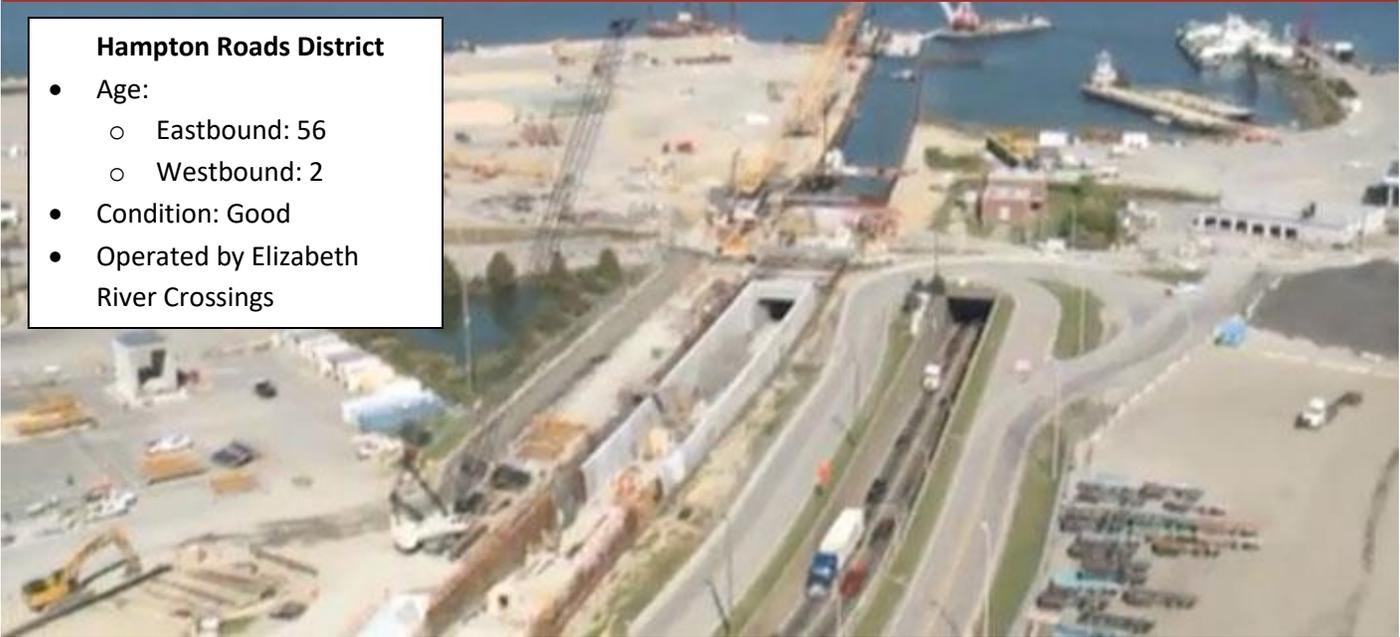


Urban Tunnels

Midtown Tunnel: Rt. 58 under Elizabeth River (#13)

Hampton Roads District

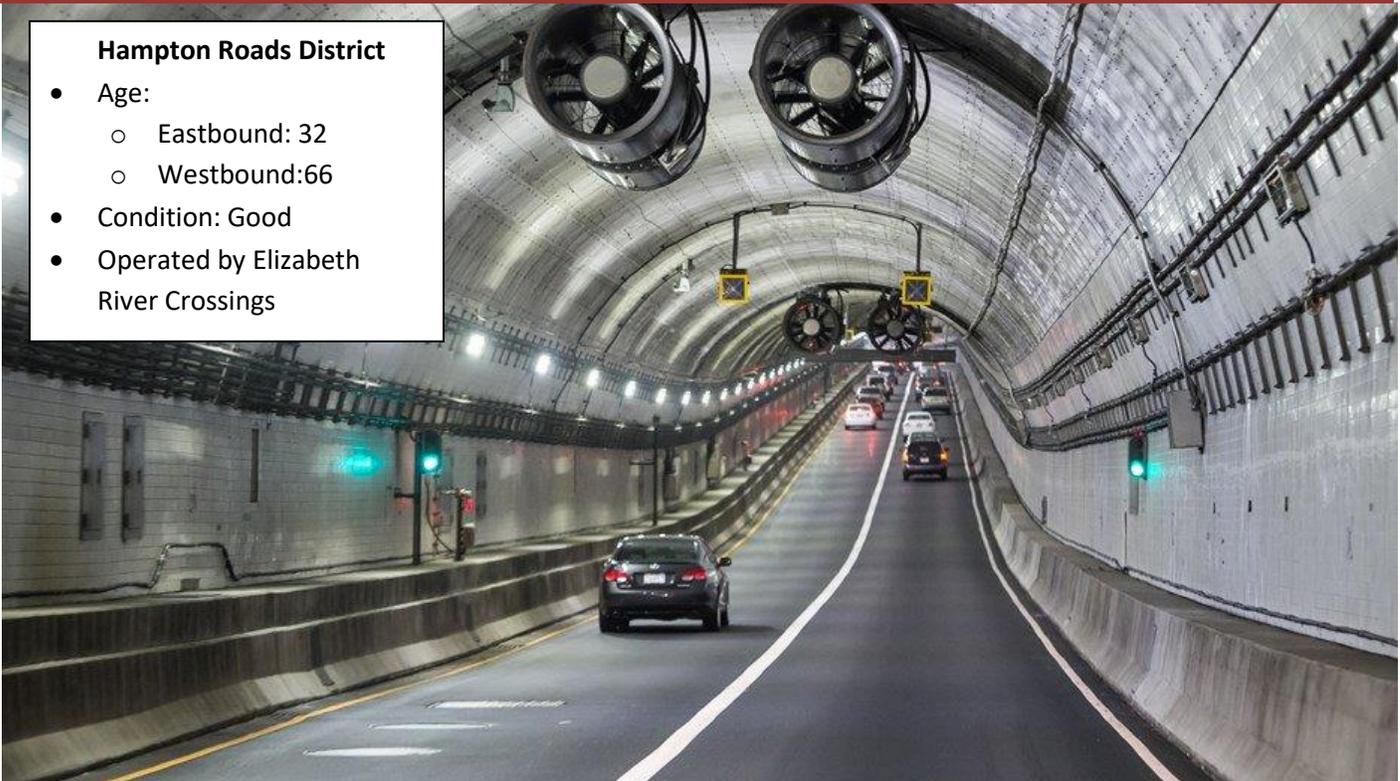
- Age:
 - Eastbound: 56
 - Westbound: 2
- Condition: Good
- Operated by Elizabeth River Crossings



Downtown Tunnel: I-264 under Elizabeth River (#14)

Hampton Roads District

- Age:
 - Eastbound: 32
 - Westbound: 66
- Condition: Good
- Operated by Elizabeth River Crossings



Rosslyn Tunnel: I-66 under Gateway Park & Fort Meyer Drive (#15)



Northern Virginia District

- Age: 35
- Condition: Fair
- ADT = 96,000
- Detour: 13 Miles

Large and Complex Structures

Route 460 over Grassy Creek (#16)



Bristol District

- Age: 1 Year
- Condition: Good
- Segmental Construction

SMART Road Bridge (#17)



Salem District

- Age: 17 Years
- Condition: Good
- Segmental Construction

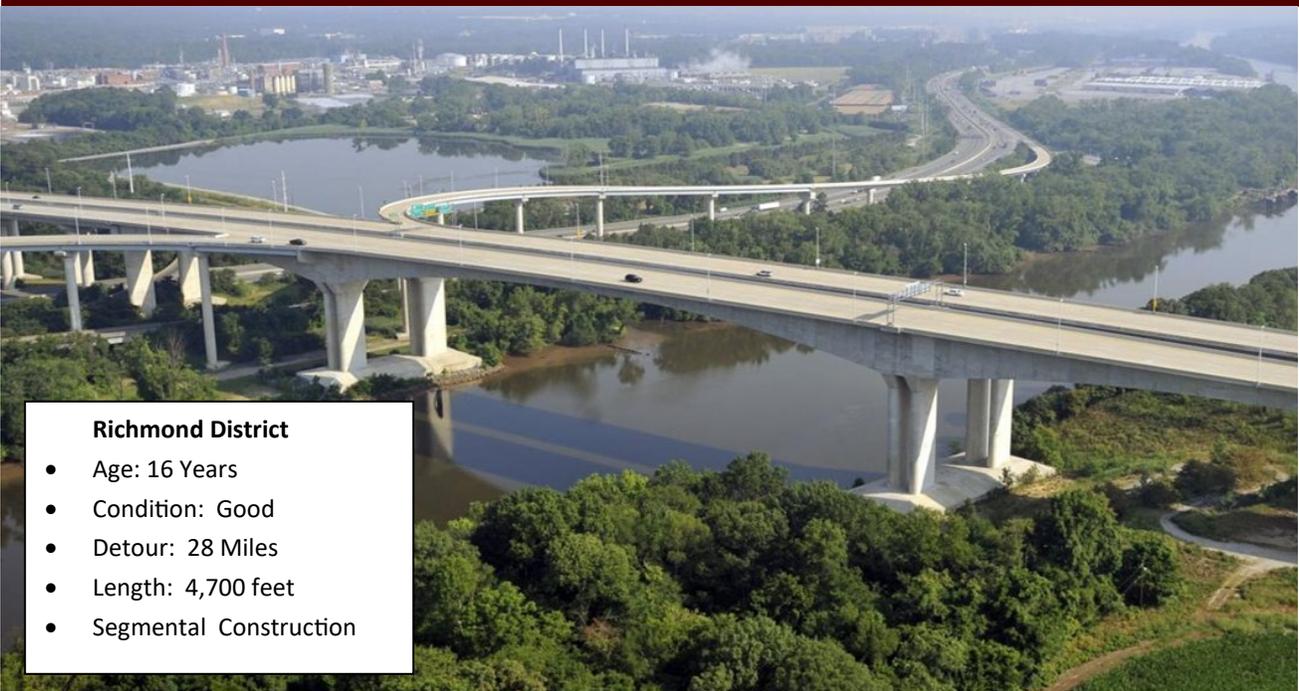
Varina-Enon Bridge: I-295 over James River (#18)



Richmond District

- Age: 28 Years
- Condition: Fair
- ADT = 36,000
- Detour: 25 miles
- Cable-Stayed Bridge

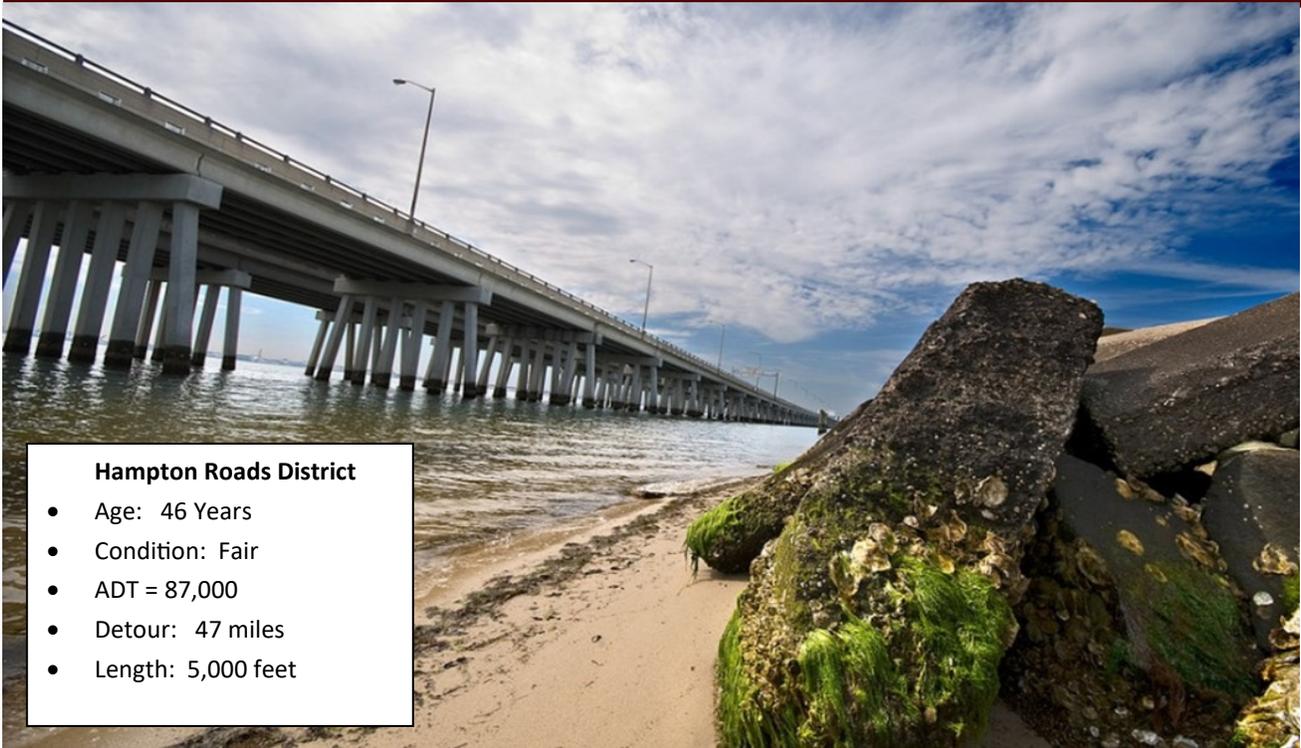
Pocahontas Parkway: 895 over James River (#19)



Richmond District

- Age: 16 Years
- Condition: Good
- Detour: 28 Miles
- Length: 4,700 feet
- Segmental Construction

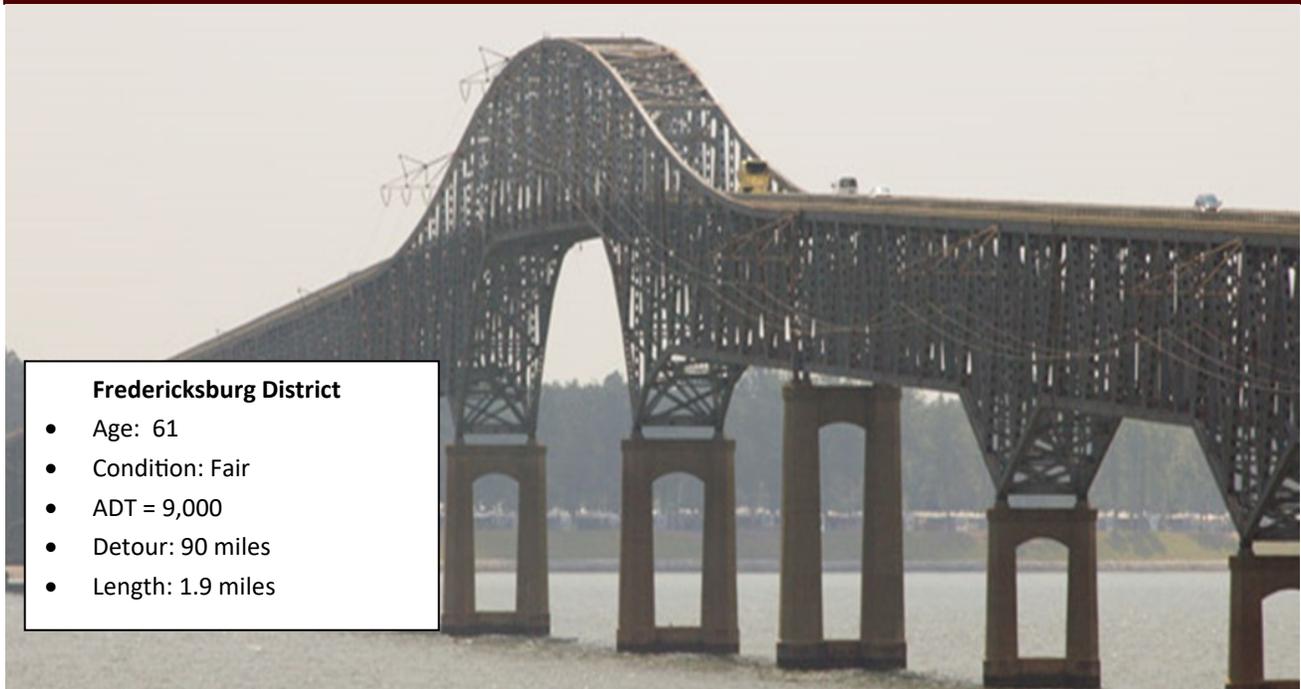
I-64 over Willoughby Bay (#21)



Hampton Roads District

- Age: 46 Years
- Condition: Fair
- ADT = 87,000
- Detour: 47 miles
- Length: 5,000 feet

Norris Bridge: Route 3 over Rappahannock River (#25)



Fredericksburg District

- Age: 61
- Condition: Fair
- ADT = 9,000
- Detour: 90 miles
- Length: 1.9 miles

APPENDIX B

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APPENDIX C

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Practices in Other States

Pennsylvania Department of Transportation (PennDOT)

BACKGROUND

Pennsylvania's population of state-owned bridges is among the largest and oldest in the nation. In 2014, PennDOT prioritized transportation investments to repair and replace structurally deficient bridges. PennDOT developed a program in 2015 called the Rapid Bridge Replacement Project (RBRP) under a public-private partnership to help address the state's nearly 4,200 structurally deficient bridges. The \$889 million Rapid Bridge Replacement (RBR) Project is a key component to obtaining the goal of replacing structurally deficient bridges.

PROGRAM / PROJECT SUMMARY

To identify bridges for inclusion in the RBRP, of the state's 4,200 structurally deficient bridges PennDOT scanned 2,000 bridges within its inventory and identified 900 bridges, which it ranked and prioritized for replacement. PennDOT reviewed the bridge inventory for projects that would have minimal right-of-way, environmental and utility concerns. In addition, PennDOT reviewed for "shovel ready" bridge work to begin construction in 2015 and 2016. The selected group of bridges (558) included within the project are relatively small; many single span, two-lane structures, of similar characteristics.

How does RBRP work? With the RBRP, PennDOT makes availability payments, not tolls, to the concessionaire with a concession term of 28.5 years (42 months construction/25 years for maintenance responsibility for each bridge). The P3 includes 558 bridges with an average cost of \$2.1 million and an average age of 50 years.

Through the RBRP, PennDOT will replace 558 structurally deficient bridges around the state while minimizing impacts to the traveling public. The RBRP is unique because it is the first of its kind in the nation to bundle the replacement of hundreds of bridges in a public-private partnership (P3) agreement. No other P3 project in the country has embarked on a multi-asset, multi-location undertaking of this magnitude.

OUTCOMES

PennDOT implemented the RBRP to affect their performance. The results of implementing the RBRP is an improvement in the number of structurally deficient bridges, decreasing from 24.4% structurally deficient in 2014 to 18.3% structurally deficient in 2018.

[https://www.penndot.gov/ProjectAndPrograms/p3forpa/Documents/Rapid%20Bridge%20Replace%20Project/General%20FAQ%27s%20\(Updated%20Nov.%2016,%202015\).pdf](https://www.penndot.gov/ProjectAndPrograms/p3forpa/Documents/Rapid%20Bridge%20Replace%20Project/General%20FAQ%27s%20(Updated%20Nov.%2016,%202015).pdf)

South Carolina Department of Transportation (SCDOT) – 10 Year Plan

BACKGROUND

In 2017, South Carolina's General Assembly passed into law a fuel tax increase directing funds to the Infrastructure Maintenance Trust Fund (IMTF). The fund is reserved for repairs, maintenance and improvements to the existing highway system.

PROGRAM / PROJECT SUMMARY

South Carolina's DOT (SCDOT) developed a strategy for use of the IMTF funds - 10 Year Plan - with four main areas: safety, paving, bridge replacements and interstate widening.

The gas tax increase will increase steadily for six years, beginning with a bump of 2 cents per gallon each year to reach 12 cents per gallon. The increase is the first state gas tax increase in South Carolina since 1987.

OUTCOMES

SCDOT estimates funding will add \$600 million per year over time, to reach \$800 million per year by about 2023. At that point, resurfacing projects would receive the bulk of the funds at \$407 million yearly, followed by interstate widenings, bridge (465 structures) and safety.

<https://www.dot.state.sc.us/projects/ten-year-plan.aspx>

<https://www.equipmentworld.com/s-carolina-sets-out-10-year-transportation-plan-through-increased-funding/>

Georgia Department of Transportation (GDOT) - 2015 Transportation Funding Act

BACKGROUND

The 2015 Georgia (GA) state legislature passed Georgia's Transportation Funding Act (TFA), which is a dedicated transportation fund to improve transportation throughout Georgia and to aid in business investment and development. The shipment of goods from locations within GA equates to approximately \$790 billion annually, demonstrating how important the state's network of roads and bridges are to Georgia's economy. Georgia's expansion of economic development opportunities relies on the quality of the state's transportation systems. Companies looking to locate or expand seek regional options where congestion is mitigated, roads are maintained and multi-modal options are viable.

By passing the TFA, state legislatures estimate an infusion of \$830 million to \$1 billion in revenues annually for investing in the maintenance and enhancement of GA transportation infrastructure.

PROGRAM / PROJECT SUMMARY

The additional revenue source for the TFA funding are as follows:

- Motor fuel tax on distributors
 - \$0.067 increase in gasoline tax
 - \$0.077 increase in diesel fuel
 - Tax on gasoline and diesel fuel are indexed annually for increased vehicle fuel efficiency
 - Taxes on gasoline and diesel fuel were adjusted for increases in the Consumer Price Index (CPI) from 2016 through 2018
- \$200/\$300 Alternative Fuel Motor Vehicle Annual Registration Fee for non-commercial and commercial vehicles
- Hotel/Motel Nightly Fee: \$5 per night lodging fee. (excludes extended stay occupants)
- Heavy Vehicle Annual Impact Fee:
 - \$50 for vehicles 15,500 lbs. to 26,000 lbs.
 - \$100 for vehicles greater than 26,001 lbs.

The TFA includes 11 megaprojects that will create additional capacity, relieving traffic congestion and expand travel options. In addition to new construction, TFA will allow GDOT to address critical infrastructure needs such as pothole repair, striping, guardrail repair, resurfacing of state routes and interstates, bridge replacements and maintenance, safety improvement projects and local maintenance and improvement funding.

OUTCOMES

The GDOT estimates that between 2016 and 2020 an average of 232 bridges will be repaired, replaced or reconstructed as a result of TFA funding. In addition, it will allow GDOT to reduce the share of state-maintained roads in poor or bad condition and to reduce the state-maintained roads in bad or poor condition from 13% in 2016 to 0% in 2019. Unfortunately, TFA funding is not sufficient to prevent state-maintained roads currently in excellent or good condition from declining, falling from 49 percent in 2016 to 15 percent in 2024.

Overall, the TFA has fueled improvement in Georgia’s transportation infrastructure; more work is required to keep up with the expected growth projected for the state and its economy.

(reference: LEGISLATIVE COMMITTEE April 15, 2015 LEGISLATIVE SESSION WRAP-UP- slide presentation at <http://www.dot.ga.gov/AboutGeorgia/Board/Presentations/2015LegislativeSessionWrapUp.pdf#search=HB%20170>) and <http://www.dot.ga.gov/InvestSmart/TransportationFundingAct/Documents/General/WhatIsTFA.pdf>

Rhode Island - RI Bridge Replacement, Reconstruction, and Maintenance Fund Act / “RhodeWorks”

BACKGROUND

In 2016, the Rhode Island General Assembly approved legislation (The Rhode Island Bridge Replacement, Reconstruction, and Maintenance Fund Act or “RhodeWorks”) to invest significant funding into transportation infrastructure such as bridges and improve the economic attractiveness of the state. At that time, when reviewing the condition of bridges within Rhode Island and comparing to the other 49 states, Rhode Island’s bridges ranked 50th out of 50 states when comparing bridge inventory conditions. Legislators passed RhodeWorks to improve the quality of life for its residents, promote economic growth by attracting new businesses to their state and increase jobs.

PROGRAM / PROJECT SUMMARY

RhodeWorks, a 10-year, \$4.7 billion investment program, allows the Rhode Island Department of Transportation (RIDOT) to establish and collect tolls on large commercial trucks traveling on Rhode Island bridges. The revenue source is generated through “truck only” toll lanes (electronic tolling) along specified routes in Rhode Island and prohibits assessing a user fee on cars or smaller trucks. In addition to collecting tolls from commercial vehicles through “truck only” toll lanes, RhodeWorks allows for:

- refinancing and restructuring of existing GARVEE bonds,
- issuance of new GARVEE bonds, not to exceed \$300.0 million

OUTCOMES

The purpose of RhodeWorks is to improve RI’s transportation infrastructure and make RI an attractive place for businesses, and ultimately increase jobs and improve RI’s economy. RhodeWorks establishes a source of revenue generated from “truck only” toll lanes (electronic tolls) that provides funding for transportation infrastructure. With this funding stream, RIDOT targets needed repairs to approximately 150 structurally deficient bridges and to approximately 500 additional bridges to prevent them from falling into a structurally deficient status. The ultimate goal is to have 90% or more of RIDOT’s bridge inventory rated as structurally sufficient by 2025.

<http://www.rilegislature.gov/mwg-internal/de5fs23hu73ds/progress?id=jv27NTevNTTtUR6wAHtkJUXPqCprJWWXOIZpSbzyZa8,orhttps://www.ri.gov/press/view/29697>
<http://www.dot.ri.gov/rhodeworks/>

New Jersey Turnpike Authority

BACKGROUND

New Jersey legislators created the New Jersey Turnpike Authority (NJTA) in 1948 to manage the construction of the New Jersey Turnpike and then, subsequently, its operations, maintenance, repair

and/or replacement. Upon completion of construction, the New Jersey Turnpike opened to traffic on November 30, 1951. Construction of the Garden State Parkway (GSP) began in 1946 after passage of New Jersey's Parkway and Freeway Act. The GSP was started as part of the state highway system and was initially funded with annual highway appropriations. In May 2003, the New Jersey Turnpike Authority Act was amended to consolidate the management and operation of both the New Jersey Turnpike and the Garden State Parkway under the control of the NJTA.

PROGRAM / PROJECT SUMMARY

The New Jersey Turnpike Authority, a State of New Jersey agency, owns, operates and maintains the New Jersey Turnpike and the Garden State Parkway. The New Jersey Turnpike is a limited access toll road that serves as part of the Interstate 95 corridor and consists of 122-mile mainline and two extensions. The Garden State Parkway is a 173-mile limited access toll facility. The New Jersey Turnpike Authority has payment requirements to the State of New Jersey. The payments include state's Transportation Trust Fund (\$22M annual payment), Feeder Road Maintenance Agreement (\$4.5M) and State Transportation Projects (\$166.5M). The payments to the State of New Jersey are subordinate to debt service payments to bondholders.

Using their ability to increase tolls to fund debt service, in 2008, the Board of Commissioners for the NJTA approved a 10 year, \$7 billion Capital Improvement Program to undertake major maintenance to stretches of the NJ Turnpike and GSP and add capacity.

OUTCOMES

When the federal interstate program was established, these two roadways were grandfathered allowing toll collection to continue. The New Jersey Turnpike and the Garden State Parkway using its ability to increase tolls, NJTA included in its Capital Improvement Program a 10 year plan that widens stretches of the NJ Turnpike and Garden State Parkway, improve interchanges, bridges and launch new transportation technologies to improve operations. An increase in tolling fee structures are funding the Program.

https://www.njta.com/media/1661/fin_ann_bdg_2017.pdf

<https://www.njta.com/media/3511/2018-capital-project-investment-plan.pdf>

<https://www.state.nj.us/transportation/publicat/pdf/History/historydriscoll.pdf>

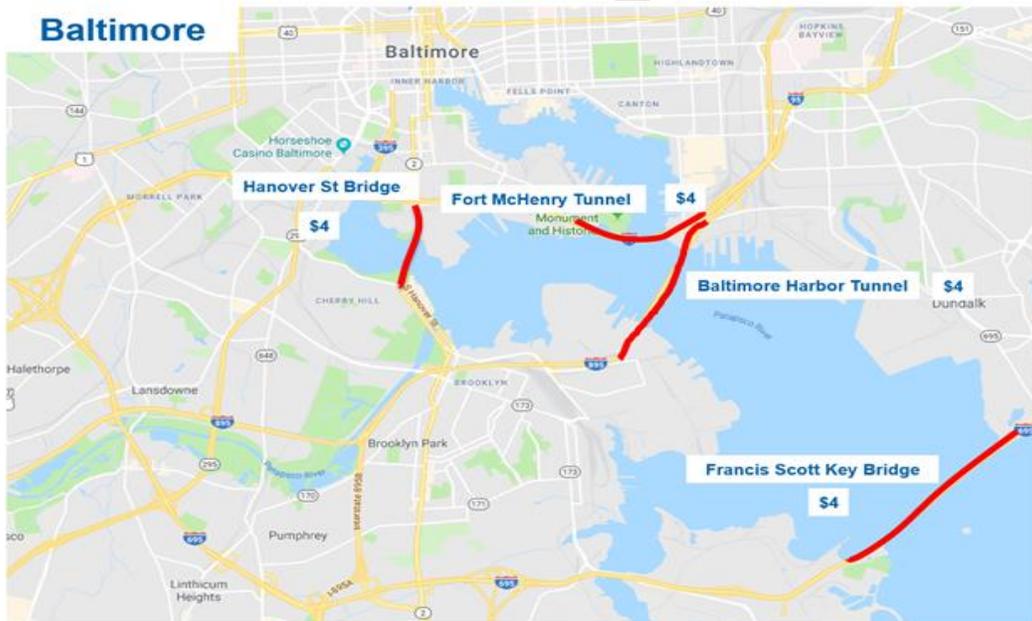
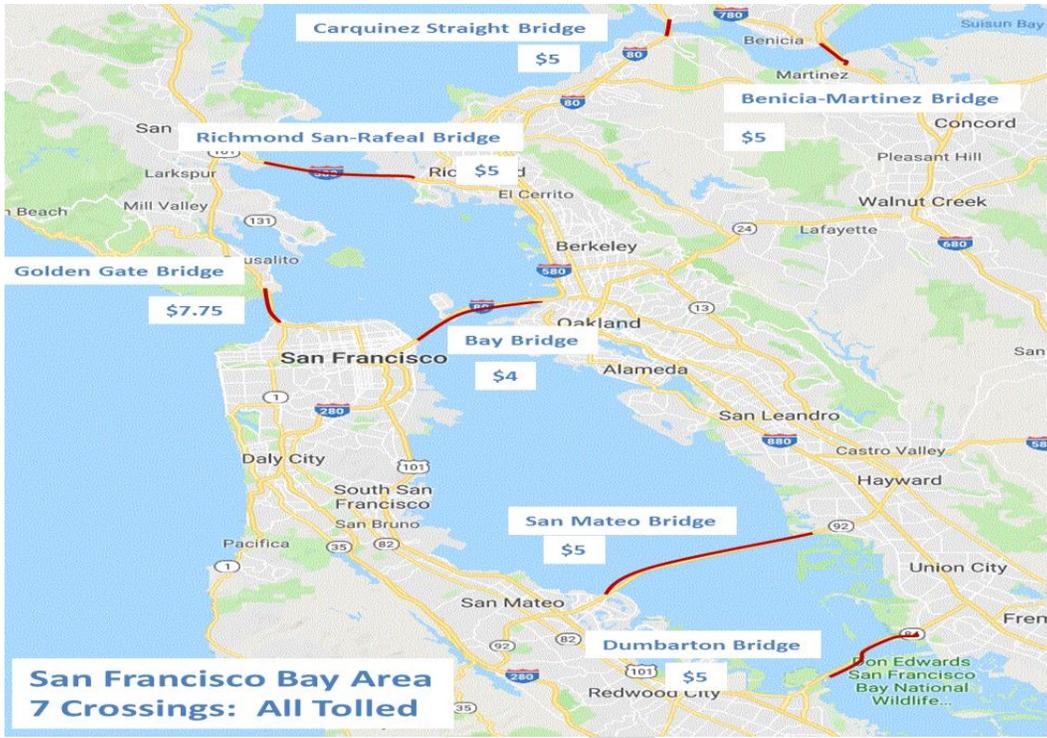
<https://www.njtvonline.org/news/video/where-does-your-toll-money-go/>

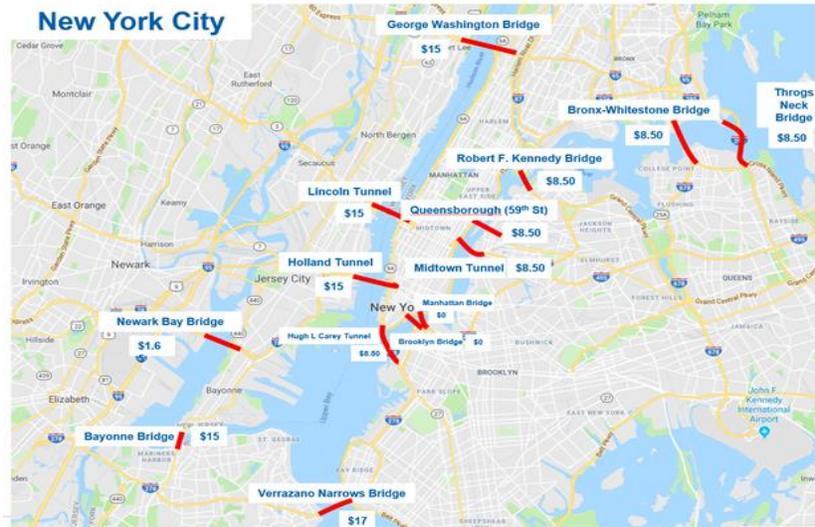
https://en.wikipedia.org/wiki/New_Jersey_Turnpike_Authority

https://www.njta.com/media/1661/fin_ann_bdg_2017.pdf

Other Region Practices within States - California, Maryland, New York

As displayed in the maps below, facility tolls are the predominant method for funding large and complex structures.





In most of these states, separate toll authorities have been created for the collection of tolls and maintenance and operation of the facilities. Virginia has had success with this model, as there are currently two toll authorities that operate in the state:

- Chesapeake Bay Bridge Tunnel Authority (CBBTA)
- Richmond Metropolitan Toll Authority (RMTA)

For any toll road, operations and maintenance are expected to be funded *first* with debt service next. In addition, major maintenance, replacement and repair are also to be funded from existing toll revenues or toll increase. RMTA for example is currently undertaking a major rehabilitation of its bridges and pavements. After these are funded, new capacity can be funded. CBBTA is undertaking the new tube following this process.

2018 APPROPRIATIONS ACT, ITEM 450,H.

Stephen C Brich, P.E., Commissioner of Highways
VIRGINIA DEPARTMENT OF TRANSPORTATION
VITAL INFRASTRUCTURE

VITAL INFRASTRUCTURE REPORT

BUDGET ITEM 450, H.

EXECUTIVE SUMMARY

This report addresses the requirements of Chapter 2 of the 2018 General Assembly Item 450, H. (as detailed below), which requires the Commonwealth Transportation Board (“the Board”) to develop a report that addresses the following topics regarding Virginia’s large and unique bridge and tunnel structures:

- The overall condition and funding needs;
- Recommendations addressing funding within the State of Good Repair (SGR) Program; and
- Other options as identified

Budget Language - Chapter 2, 2018 Appropriation Act, Item 450

H. The Commonwealth Transportation Board shall, no later than December 1, 2018, review and report to the Chairmen of the House and Senate Committees on Transportation, the Joint Transportation Accountability Commission, the House Committee on Appropriations and the Senate Committees on Finance, on the overall condition and funding needs of large and unique bridge and tunnel structures in the Commonwealth. As part of the review, the Board shall make recommendations addressing funding of such projects within the State of Good Repair program. In developing these recommendations the Board shall assess the impact of establishing a set aside from the State of Good Repair funding pot, limited use of the provisions of § 33.2-369 B., Code of Virginia, which allows for the waiving of district minimum caps in a single year, or such other options as they might identify.

As part of its ongoing asset management approach, the Virginia Department of Transportation (VDOT) identified a group of structures that, if allowed to deteriorate to poor condition or fail, would pose significant risks to the efficient movement of people and goods. These structures have been assigned the term “**VITAL**” **Infrastructure** (**V**ery Large, **I**ndispensable, **T**ransportation **A**sset **L**ist) which includes tunnels, movable bridges, and large complex fixed-span structures. As of the fall of 2018, 25 structures throughout the Commonwealth met this definition. These 25 structures were built as recently as one year ago to as far back as 80 years ago. Photographs and informational highlights of the individual VITAL Infrastructure identified by VDOT shown in Appendix A.

VDOT developed the VITAL Infrastructure 30-Year Plan (the Plan), using an asset management approach, which focuses on timely rehabilitation and preservation actions to maintain the structures in fair or good condition. However, when VITAL Infrastructure deteriorates to the point where rehabilitation is no longer cost-effective, the Plan includes the replacement cost for the specified structures. The total estimated cost of the unconstrained Plan over 30 years is \$3.6 billion in 2018 dollars.

Included within the Plan are the needs (fiscally unconstrained) for the Hampton Roads Bridge Tunnel (HRBT) trestles and the High Rise Bridge that are part of existing projects. These structures are included in the Plan in case any unforeseen circumstances arise that would preclude these projects coming to fruition. The following table summarizes the unconstrained VITAL Infrastructure Plan needs for the next 30 years in current 2018 dollars in 10 year increments.

VITAL Infrastructure Plan 10 Year Increments (in millions)				
Categories	Year 1 - Year 10	Year 11 - Year 20	Year 21 - Year 30	2018 Amount (in millions)
Movable Bridges	\$227	\$195	\$305	\$727
Tunnels	299	297	455	1,051
Large Complex Fixed-Span Structures	786	672	391	1,849
Total	\$ 1,313	\$ 1,164	\$ 1,152	\$3,628

Note: The HRBT trestles and High Rise Bridge are currently included in the VITAL Infrastructure Plan

In 2015, the General Assembly established new funding allocation processes and programs. One program, the State of Good Repair (SGR) Program was dedicated for pavement and bridge rehabilitation around the Commonwealth on all systems of highways. Current SGR Program allocations for FY 2019 through FY 2024 total \$1.3 billion. Of this \$1.3 billion, \$328 million is available for allocation to pavements rated Poor and below and \$961 million is available for allocation to bridges that are considered structurally deficient or Poor.

Based on VDOT's SGR Program budget presented to the Board in June 2018, the current and projected funding in the SGR Program from FY 2019 - FY 2024 is \$1.3 billion, while the VITAL Infrastructure need in the same time frame is \$1 billion (starting with Year 1 through Year 6 in Appendix B). If the SGR Program were to be used to fully fund the VITAL Infrastructure capital reinvestment needs, the amount of funding remaining for deteriorated pavements and bridges is \$300 million in total over the same six year period.

The purpose of the SGR Program is to fund pavement and bridges rated Poor that are maintained by VDOT and localities through an asset management approach. VITAL Infrastructure is largely excluded from the SGR Program because (i) tunnels are not part of the SGR Program definition in the *Code of Virginia* and (ii) VDOT strives to maintain VITAL Infrastructure to a level where its rating would not trigger the SGR Program or a sufficient condition. By analyzing the impact of funding VITAL Infrastructure needs from the SGR Program, the analysis shows legislative changes would be required to make the VITAL Infrastructure eligible in the SGR Program. In addition, addressing the VITAL Infrastructure needs would consume a majority of the SGR Program funding.

VDOT's Maintenance and Operating Program (the budget appropriations refers to the program as Highway System Maintenance and Operations) supports the ordinary maintenance and operations of these structures and of all other existing highway assets in the Commonwealth under VDOT management. The Maintenance and Operating Program is also used to fund emergency and major rehabilitations/repairs for the VITAL Infrastructure, which diverts funding from planned operations and maintenance activities, requiring VDOT to regularly reprioritize spending. The Maintenance and Operating Program funds services such as paving, safety service patrols, snow and ice removal, and other emergency and incident management activities. The current funding projections reflect the Maintenance and Operating Program will increase annually by the rate of inflation. VDOT's asset management focus and investment since 2012 has emphasized bridges and pavements. This emphasis has impacted the ability to fund other assets, including VITAL Infrastructure.

The Budget Language asked the Board to assess the impact of funding the VITAL Infrastructure through the SGR Program. The magnitude of the need when examined on its own would effectively deplete the SGR Program and nearly eliminate the SGR Program's ability to address deteriorated pavements and deficient bridges. Instead of presenting this impact and outlook with a singular focus on VITAL Infrastructure asset management, VDOT is requesting additional time to examine a holistic approach to integrating pavements, bridges, and VITAL Infrastructure into the existing maintenance and construction programs and determining the resulting impacts. Assessing the impact of funding VITAL Infrastructure independently will not provide a clear view of the true impacts of a VITAL Infrastructure program that is effectively woven into the transportation programs in a programmatic manner.

Conclusion

The report identifies the 25 structures that comprise the VITAL Infrastructure, their conditions, and unconstrained funding needs. These structures were identified to proactively plan for their rehabilitation and replacement, many of which are approaching the latter years of their service life. Given the magnitude of the identified needs, it is clear that funding those unconstrained needs through the SGR Program would severely impact the ability of the SGR Program to accomplish its intended purpose. VITAL Infrastructure needs cannot be viewed and addressed as a standalone issue. Those needs should be intertwined into VDOT's existing programs. Additional due diligence is needed to further examine the whole lifecycle management of the assets before providing additional recommendations.

As part of this additional effort, VDOT is committed to reviewing its current Maintenance and Operating Program funding strategies, performance metrics and priorities and evaluate its investment in existing assets and services. A VITAL Infrastructure program should be integrated into the overall asset management strategy to maximize investments into the highway network. To accomplish this more comprehensive analysis and to explore additional potential funding options, VDOT is recommending that this report serve as an introduction to a more comprehensive, Part 2 report with a target completion of December 2019.

The Part 2 VITAL Infrastructure report will summarize VDOT's review of its program needs and impact of performance measures within current funding constraints. The review will take a holistic, programmatic, long-term approach to optimizing the conditions and performance of the roadway network. More specifically, the comprehensive VITAL Infrastructure report will:

- Refine and prioritize the VITAL Infrastructure needs
- Provide further details on why a dedicated program is needed to support the VITAL Infrastructure
- Examine and present a holistic approach of VDOT's current Highway Maintenance and Operating Program investment strategy to include the VITAL Infrastructure
- Provide a clear, proactive and sustainable approach to addressing the VITAL Infrastructure needs as part of a comprehensive lifecycle management process
- Recommend how the needs could be funded through the SGR Program and/or other programs and the impacts of such options

Virginia Department of Transportation

OVERVIEW

This report addresses one component of Virginia's highway network - large and unique bridge and tunnel structures: tunnels, movable bridges and large complex fixed-span structures or "VITAL" Infrastructure. VDOT maintains the third largest highway network in the United States, behind Texas and North Carolina. Virginia has the financial responsibility for a majority of the Commonwealth's highway network. Cities in Virginia and two counties (Arlington and Henrico) maintain their own local roads, and a portion of VDOT's budget provides financial assistance to these localities for this purpose. Virginia's highway network includes more than 128,000 lane miles, over 19,000 structures, 7 tunnels, and 3 ferry systems. From its existing Maintenance and Operating Program budget, VDOT (i) maintains pavements and bridges, signs, signals, ferries; (ii) operates traffic operations centers along with performing snow and ice removal and (iii) a variety of other services to keep the highway infrastructure safe for the traveling public and in the best possible condition within funding constraints.

VDOT is a national leader in the use and implementation of an asset management approach for the Commonwealth's surface transportation infrastructure. For over 10 years, VDOT has reported annually on the condition of its pavements and bridges and has established performance benchmarks. Internal investment decisions since 2012 have emphasized improving the condition of pavements and bridges statewide while keeping the VITAL Infrastructure somewhat segregated from an asset management approach. Now, VDOT is beginning to holistically evaluate its asset management investment strategy and investigate potential efficiencies.

VDOT identified certain assets that were not just pavement or traditional structures. Rather, these 25 assets include electrical and mechanical components that are integral to their function and require a different asset management strategy. In addition, because of their operational complexity and impact, these assets should be maintained in fair condition and not allowed to become deficient. These 25 assets are known as VITAL Infrastructure and each is described in detail in Appendix A. VDOT has further analyzed the VITAL Infrastructure needs and developed a 30-year unconstrained needs plan. The Plan, in the chart below, totals \$3.6 billion in 2018 dollars.

VITAL Infrastructure Plan 10 Year Increments (in millions)				
Categories	Year 1 - Year 10	Year 11 - Year 20	Year 21 - Year 30	2018 Amount (in millions)
Movable Bridges	\$227	\$195	\$305	\$727
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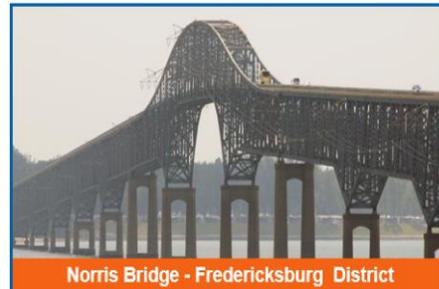
Note: The HRBT trestles and High Rise Bridge are currently included in the VITAL Infrastructure Plan

The needs were developed using an agency-wide, methodical approach that intends to maximize spending efficiencies by optimizing the timing and scope of proposed treatments. If these structures are allowed to deteriorate to poor condition or fail, the risk to the movement of people and goods is high. VITAL Infrastructure has one or more of the following characteristics:

- Failure Risk
- Complexity
- High cost of maintenance and operation and/or replacement
- Importance
 - Long detours
 - High traffic
 - Economic significance (shipping and vehicular)
 - Access to critical facilities (military and ports)

VDOT's VITAL Infrastructure includes three distinct types of structures (see below pictures):

1. **Tunnels:** VDOT maintains five tunnels, and two additional tunnels are maintained by a concessionaire. Tunnels are categorized as underwater, mountain, or urban.
2. **Movable Bridges** (bridges that open to allow maritime traffic): VDOT maintains and operates eight movable bridges. Each has a unique movable section. They include swinging spans, bascules (draw bridges), and/or vertical lifts.
3. **Large Complex Fixed-Span Structures:** These structures possess one or more of the following characteristics: Unusual size, complexity, importance, fracture-critical elements.



All tunnels and movable bridges were included in the list because they are highly complex and have specialty parts (see pictures below) that in the event of failure will require months to procure. Some parts have procurement times of over two years. The remaining structures were selected because of their economic impact, length, traffic volumes, length of detour, construction type and maintenance needs.

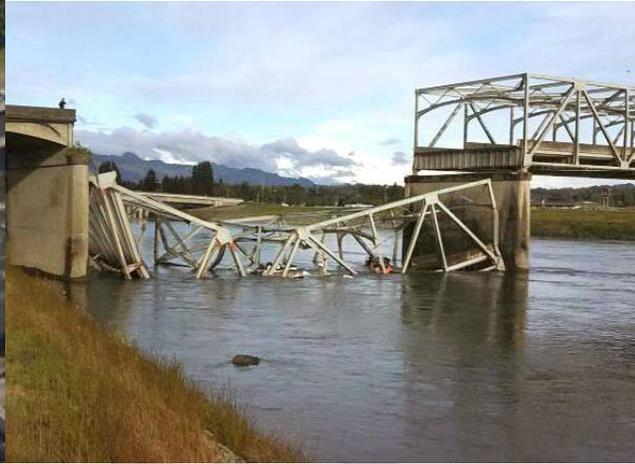


RISK AND THE NEED FOR RESILIENCY

Risk is one of the common elements for all VITAL Infrastructure. It is important to note that many of the structures (all movable bridges and Norris Bridge) on the list are “fracture-critical”. A fracture-critical bridge has a steel member whose failure could cause a portion of or the entire bridge to collapse. Two of the most notable domestic bridge failures in recent years occurred on aging, fracture-critical bridges: I-35W in Minnesota (2007) and the Skagit River Bridge in Washington (2013) (see picture below). Such structures pose risks not only for safety but also for economic impact.



I-35W in Minnesota



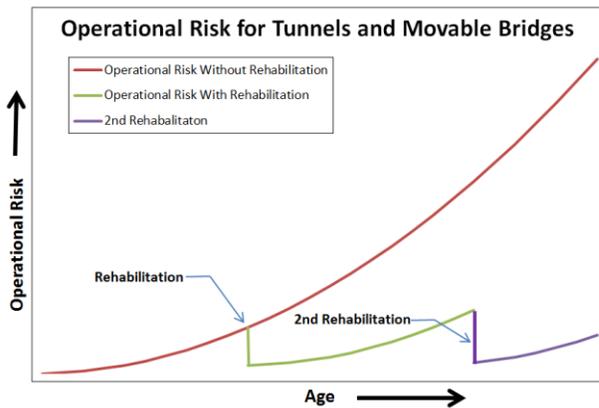
Skagit River Bridge

As shown in the following conceptual graph, risk avoidance becomes exponentially more expensive as it approaches zero.



Potential for operational failures present another significant element of risk for VITAL Infrastructure. These risks are particularly pronounced for tunnels and movable structures. When operational failures occur, they can present life safety risks while adversely affecting motorists who must navigate the extensive detours required by even a short-term disruption to the roadway network. Unfortunately, the risks posed by movable bridges affect both maritime and vehicular traffic, since a movable bridge could fail to operate in either the “open” or “closed” position. Virginia’s movable bridges cross waterways that are used by commercial vessels to gain access to the Port of Virginia’s Richmond Terminal (James River Bridge and Benjamin Harrison Bridge), one of the nation’s largest ports, as well as naval vessels that require access to the Naval facilities such as the Naval Weapons Station (Coleman Bridge).

The graph below provides a conceptual illustration of the operational risks to tunnels and movable bridges as they age. The operational risks increase exponentially with time and reach an unsustainable level if major components are not addressed systematically.



Aging Generator at Gwynn's Island Bridge

The operational risks to these structures is real, as it has occurred with greater frequency in recent years. Three examples of incidents illustrate some of the potential problems facing VITAL Infrastructure:

1. **Control System Failure at the James River Bridge (July 2018).** The James River Bridge, a moveable bridge, experienced a failure of the control cards for the thyristor motor drive systems that allow the bridge to open and shut, resulting in the inability to open the bridge to maritime traffic. Additionally, the tachometer that allows the bridge to remain level during opening and closing failed. The simultaneous failure of both the primary and alternate control systems caused a complete shutdown of shipping traffic to the Port of Richmond Terminal. Parts for the antiquated control system are no longer readily available and must be custom-ordered with an extended lead-time for replacement. While VDOT keeps spare parts on hand, the fragility of these systems makes it difficult to predict the cause(s) of the next system failure.
2. **Fire in the East River Tunnel (July 2014).** A tractor-trailer travelling through the tunnel overheated and caught fire, shutting down all lanes of traffic on I-77 for 16 hours, requiring trucks and autos to take a 13-mile detour through steep, winding mountain secondary roads. Unfortunately, there was no dedicated fire brigade available at the time, so assistance was required from nearby municipalities in West Virginia and Virginia.
3. **Tanker Impact on Benjamin Harrison Bridge (1977).** In February 1977, a tanker collided with the Benjamin Harrison Bridge. About 350 feet of the trestle was destroyed, one section falling into the river and the other landing on the deck of the ship. In March 1977, the north tower section of the bridge collapsed. The tower failure damaged the wiring, which lead to an explosion and fire in an oil drum near the bridge tender's house. While this event was not in the recent past, it does illustrate the vulnerability of the VITAL Infrastructure bridges to vessel impact. The relatively new structure (10 years old at the time) required reconstruction after the impact (see photo below).

Additional electrical and mechanical failures have occurred at the 80-year-old Gwynn's Island Bridge and the now 50-year old Benjamin Harrison Bridge, causing marine and/or vehicular traffic interruptions. If a similar event were to occur on the Berkley Bridge, which opens on average twice per day to serve marine traffic while carrying more than 110,000 vehicles per day, the impacts would be severe. The Berkley

Bridge is in critical need of a rehabilitation project that would greatly reduce operational risk. This project is needed to address deficiencies in the bridge's mechanical, electrical, and power supply systems.



East River Tunnel Fire - July 2104



1977 Tanker Impact to Benjamin Harrison Bridge

By rehabilitating our tunnels and movable bridges in a timely manner, Virginia will build resiliency into high-risk, critical elements of the transportation network.

CURRENT APPROACH

As previously stated, VDOT's Maintenance and Operating Program funds are necessary for the ordinary maintenance and operations of the VITAL Infrastructure. Ordinary maintenance and operations of the structures includes inspection of components (e.g. drive gears), sweeping for debris and contaminants, painting to slow deterioration, etc. However, the investment mechanism and prioritization of the major repairs and replacements have not been identified. The report describes earlier how the VITAL Infrastructure are assets and, as with any asset, preventative maintenance and at some point replacement is required. For example, an individual must periodically perform preventive maintenance on their automobile, such as an oil change; however, once a vehicle's repair costs begin exceeding the value of the automobile the vehicle will likely be replaced. Similarly, VDOT makes every attempt to maximize the life of all assets it maintains while ensuring not to compromise safety. While VDOT performs ordinary maintenance and operations on VITAL Infrastructure, the Department has not been able to tactically, systematically, or proactively address major repairs and replacements.

The three major funding sources (SMART Scale, State of Good Repair and the Maintenance and Operating Program) that are available for addressing projects of this magnitude are not an appropriate fit for this type of work. However, when emergencies (e.g. mechanical components stuck in open/closed position) occur, VDOT re-prioritizes other work and funding in order to ensure the VITAL Infrastructure is functioning and safe for the traveling public. Planned maintenance are then sacrificed and deferred to a later date.

Along with examples of emergency repairs to VITAL Infrastructure, referenced previously documented, recent examples of how VDOT is proactively managing the ordinary maintenance and operations of VITAL Infrastructure assets include:

- **Norris Bridge painting and overlay project** - To preserve the steel beams and slow the process of deterioration, VDOT painted the Norris Bridge with zinc-based paint. In conjunction with the

bridge painting, VDOT undertook a pavement overlay project to increase its service life of the deck by 20 years.

- **Monitor Merrimac Memorial Bridge Tunnel waterproofing project** - The expansion joints connecting the concrete sections in the approach portion of the Monitor Merrimac Memorial Bridge tunnel have been leaking, and a project is currently underway to address the leakage and keep the sections water tight.
- **Hampton Roads District tunnels ventilation refurbishment project** - Tunnels require a ventilation system for air quality within the facility. To extend the service life of the ventilation systems in several Hampton Roads tunnels, VDOT refurbished the tunnels' ventilation systems.

VDOT maximizes the use of its current resources (e.g. funding and labor force) to assist in the continued operations of the VITAL Infrastructure. Nevertheless, any structure nearing the end of its service life will eventually need to be replaced and consideration for the necessary resources must be prioritized and planned.

VITAL STRUCTURES NEEDS

The Plan identified a focused strategy for addressing the major repairs, rehabilitation, and replacement requirements and is segmented into three ten-year increments without considering impacts of other programs. The unconstrained needs total \$3.6 billion with \$1.3 billion identified in the first 10 years. The 30-year horizon was selected to correspond with a window in which deterioration can be reasonably predicted. The Plan is based on realistic expectations for an adequate level of service for the structures. The Plan also represents a long-term asset management investment strategy, in that it proposes appropriate interventions at the time when they can have maximum effect for reducing life-cycle costs. The consequences of inaction or delay for the majority of the work will have the dual effect of increasing long-term (life-cycle) costs and increasing operational and safety risks.

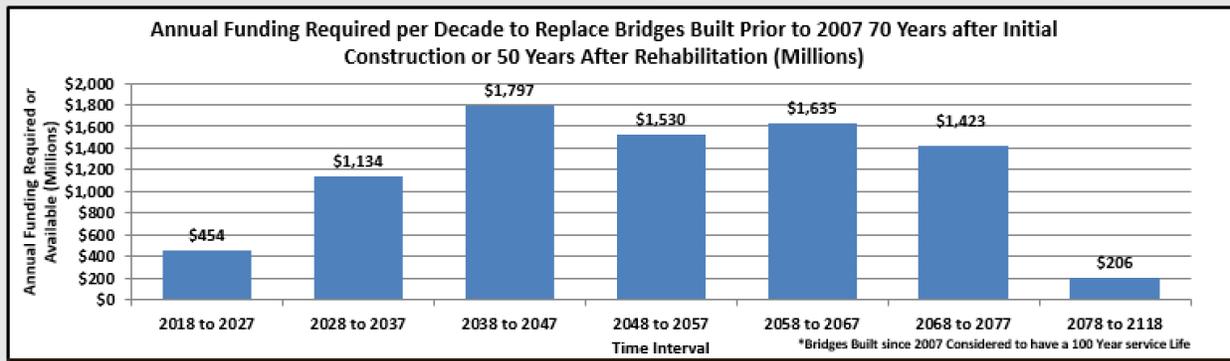
While this report addresses VDOT-maintained structures, it is important to note that there are several other structures owned by localities and other jurisdictions that meet the criteria used to identify VDOT's VITAL Infrastructure. They are maintained by localities or jointly maintained by Virginia and Maryland. They include:

- Woodrow Wilson Bridge: Owned/Operated by Maryland
- American Legion Bridge (I-495 over the Potomac River): Owned by Maryland
- Harry Nice Bridge (Rt. 301 over the Potomac River): Owned by Maryland
- Lesner Bridge (post-tensioned, segmental concrete – complex structure): Owned by Virginia Beach
- Three movable bridges in the City of Chesapeake
 - Gilmerton Bridge
 - Centerville Turnpike Bridge
 - Great Bridge Bridge

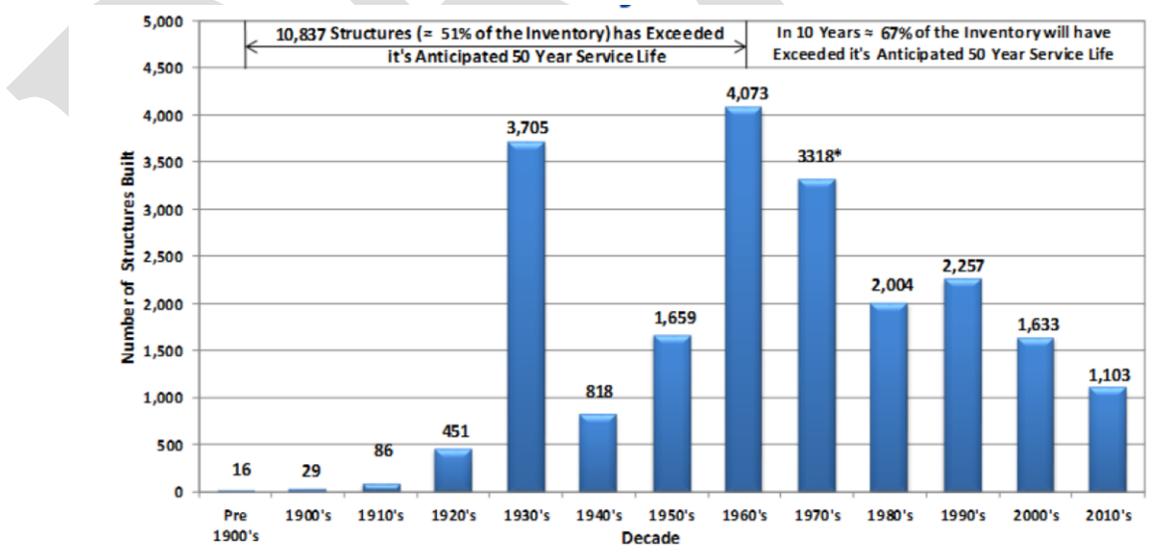
In the past, Virginia has participated in funding for these structures, and in the future, these other entities may request funding for replacements.

VDOT is providing the bridge program as an example. While other examples exist, VDOT used the bridge program as the 25 VITAL Infrastructure includes eight movable bridges and ten large complex fixed-span bridges. Maintaining bridges and pavements at a reasonable condition level is a nationally recognized issue affecting all state departments of transportation and is the greatest challenge facing Virginia’s highway structures. For example, the average age of Virginia’s bridges is 49 years old with many constructed with a service life of 50 years. In practice, VDOT works to extend their service life including the use of new technologies and efficiencies so that replacement is not required until later in the lifecycle while keeping safety in mind.

To provide some context of the aging bridge problem (including the 18 VITAL bridges), if Virginia were to replace all 50-year service life bridges when they reach age 70, the cost over the next 50 years would exceed \$65 billion in 2018 dollars (through 2067). The following graph displays average annual funding requirements by decade for VDOT maintained structures, including the 18 VITAL bridges.

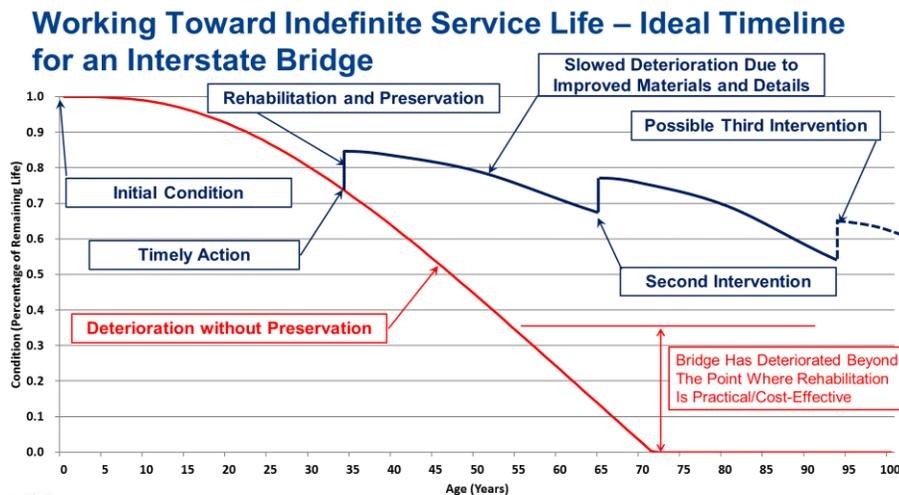


The following graph shows the bridge inventory with the number of structures built by decade:



Timely execution of major repairs and rehabilitation is the best asset management strategy for extending the service lives of an asset including the VITAL assets. While rehabilitation does not fully restore a bridge or tunnel, it can extend service life well beyond that anticipated at the time of construction.

One of the most significant reasons for considering the funding VITAL Infrastructure separately is to allow for planning and funding of rehabilitation efforts so that they can be performed at the appropriate time. The positive effects of timely intervention are displayed in the graph below, which shows how a structure’s service life (the example is for an Interstate bridge) can be extended significantly at a lower cost. It is important to remember that in addition to the “traditional” service life issues of a bridge and tunnel, VITAL Infrastructure have electrical and mechanical components that must also be managed.



A specific example of a bridge where timely intervention extended service life at a low cost is on the 52 year-old bridge carrying I-64 over Dunlop Creek in the Staunton District. While the example is a bridge, VDOT performs similar efficiencies on other assets (e.g. pavements and tunnels). The bridge was originally built in 1966 and received a significant preservation in 1978.

- VDOT’s 2016 rehabilitation cost (deck, joints, bearings and substructure) \$2.5 million, extending the anticipated service life by 40 years
- Forty years from 2016, this bridge can be rehabilitated again at a similar cost, with an anticipated service life extension of an additional 30 years
- Had the rehabilitation not taken place, the bridge would have required replacement in 20 years (at age 70) at a cost of \$35 million (in 2016 dollars)



While rehabilitation is a key component of asset management, once a structure reaches the end of its service life, replacement, rather than rehabilitation, is usually the most cost-effective action. As in the case of a personal automobile, structures eventually reach a point where it is more cost-effective to replace than to continue funding escalating repair costs. This is the case for several of the VITAL Infrastructure that will need to be replaced during the Plan as shown in Appendix B.

Wherever possible, the same approach can and should be used on the VITAL Infrastructure. Some of the VITAL Infrastructure are relatively new and will have minimal long-term needs if they are proactively addressed with the appropriate preservation treatment at the appropriate time. These newer, lower-need structures were included in as VITAL Infrastructure so that they will receive the planning and attention needed to receive timely, cost-effective actions and thereby reduce future deterioration rates. This is asset management in action.

A significant number of the structures in the VITAL Infrastructure have now reached the point on the life-cycle deterioration curve where their replacement will be required within the 30 year Plan. The replacements are part of the unconstrained needs. The table below outlines the strategies for the VITAL Infrastructure.

The Gwynn Island Bridge provides an example of a bridge for which replacement is the most cost-effective investment. Since its original construction 80 years ago, this bridge has received multiple preservation and rehabilitation treatments, including repairs to pivot gears, electrical systems and motors, structural repairs, and painting. However, despite these efforts, the regular repair costs have grown so great that bridge is now at the point where replacement is more economical than repair.

The creation of the VITAL Infrastructure list allows Virginia to track, monitor, and treat these important, expensive assets in the most appropriate manner, whether the facility is in the early or later portion of its service life.

The chart below illustrates the Plan's balanced approach to the management of these assets, rehabilitating where appropriate, and replacing when necessary.

Percentage of Needs by for VITAL Infrastructure by Structure Type and Required Action				
Required Action	Tunnels	Movable Bridges	Large Complex Fixed-Span Bridges	Total
Rehabilitation	29%	13%	24%	65%
Replacement*	0%	7%	28%	35%
Total	29%	20%	51%	100%

As part of the Plan, VDOT intends to standardize electrical service systems for all movable bridges to the maximum extent possible. Electrical service and controls are the most failure-prone components of movable bridges, and by modernizing these bridge elements, VDOT can maintain interchangeable spare parts for the bridge components that are most susceptible to breakdown.

When replacements are required, VDOT will deploy advanced technologies and material improvements that result in anticipated service lives of 75 years and lower annual maintenance costs. While the following is an example of new technologies and materials deployed in the bridge program, VDOT has other asset examples (e.g. tunnels – jet engines used in the ventilation systems). Virginia’s culture of innovation has resulted in significant improvements to the bridge program, and some of the most notable advances implemented on new bridges are listed below:

1. High performance concrete (2003)
2. Corrosion-resistant reinforcement (2009)
3. Jointless bridges (2011)
4. Low-shrinkage, low-cracking, concrete in decks (2015)
5. Latex modified concrete overlays (the addition of hydrodemolition to milling) (2015)
6. Carbon fiber and stainless steel prestressing strands in prestressed concrete piles (2017)

Funding

Many of the VITAL Infrastructure assets were built as toll facilities or with toll funding. Others were constructed with dedicated federal bridge funding or federal earmarks. Today, federal earmarks do not exist and federal funding formulas have changed. In addition, VDOT has different funding programs and formulas. The largest fund sources include the State of Good Repair Program, the High Priority and District Grant Program funds distributed through SMART Scale, and the Maintenance and Operating Program. The following provides more details on the funding sources available.

State of Good Repair Program - The SGR Program (§ 33.2-369 of the *Code of Virginia*) provides funding for the reconstruction and rehabilitation of deteriorated pavements on the interstate, primary and primary extensions (both VDOT and locally maintained/owned), as well as the replacement and/or rehabilitation of structurally deficient or “Poor” (federal and VDOT definition) bridges on all systems. Secondary system pavements can be funded under certain conditions.

Funding available for the SGR Program is distributed under § 33.2-358 of the *Code of Virginia*, setting aside 45 percent of construction funds beginning in FY 2021. Prior to FY 2021, authorization within the 2016 and 2017 Appropriations Acts provided funding to the SGR Program prior to FY 2021, with all nine VDOT districts receiving annual allocations based on the calculated pavement and bridge needs for VDOT and localities. A minimum allocation of 5.5 percent and a maximum allocation of 17.5 percent is established in the *Code of Virginia* for the SGR Program distribution to each district.

The Commonwealth Transportation Board may approve annually two “exceptions” or waivers to the SGR Program funding distribution. The first exception waives the funding cap/maximum share in order to provide funds for an urgent pavement or bridge project resulting from extraordinary circumstances. The second waiver allows the Board to reserve 20 percent of funds for use by the nine districts on secondary pavements if VDOT does not meet secondary pavement statewide performance targets.

VITAL Infrastructure would not typically qualify for SGR Program. First, VDOT makes every effort to maintain its bridges including movable components categorized as VITAL Infrastructure above a rating of structurally deficient. Second, tunnels are not included as an eligible asset for SGR Program funding.

SMART Scale - The SMART Scale selection formula emphasizes projects that provide significant improvements to relieve congestion, improve safety or help the environment in relation to cost. Capital repairs to VITAL Infrastructure do not generally ease congestion or greatly improve safety or the environment, so they will rarely score well in the SMART SCALE process thereby becoming eligible to receive either High Priority and/or District Grant Program funds.

To be eligible for SMART SCALE scoring, projects must first demonstrate that they meet a capacity need on a corridor of statewide significance, regional network, or urban development area. Projects that are determined to meet a VTrans need are evaluated based on 5 factors: Safety, Congestion, Accessibility, Land Use, Economic Development and Environment. Consideration for funding through SMART SCALE must be submitted by an eligible entity: regional planning body (MPO, PDC), locality, or public transit provider. VDOT cannot submit applications. Each eligible entity has a cap on the number of applications that can be submitted in a given round and VITAL Infrastructure replacements are unlikely to rise above other local or regional priorities for submission.

Funding distributed through the SMART SCALE process is estimated to be approximately \$800M for the next round, split equally between the Construction District Grant Program and the High Priority Projects Program. Each district receives a portion of the Construction District Grant Program based on population, VMT, lane miles, and land area. The average amount available to each district in the next round is less than \$45 million. The typical replacement costs of VITAL Infrastructure makes it cost prohibitive to rely on this funding. SMART SCALE process allocates funds available in the last two years of the Six-Year Improvement Program, which creates a delay in starting projects selected for funding. For example, SMART SCALE Round 3 project selections will be made in June 2019, but projects will be unable to begin before July 2023 unless other financial resources are committed to the project.

Maintenance and Operating Program - Each fiscal year VITAL Infrastructure, VDOT suballocates Maintenance and Operating Program funds for the ordinary maintenance and operating costs of these assets. However, funding more costly needs, such as the rehabilitation, reconstruction and/or replacement, will strain the Maintenance and Operating Program that is used for all other highway infrastructure

maintenance and services such as pavement and bridge maintenance, emergencies such as snow and ice, and other services such as Safety Service Patrols.

Condition

VDOT's VITAL Infrastructure detailed in the Appendix A were built between one year to eighty years ago with conditions that range from good to poor in 2018. The unconstrained needs for the VITAL Infrastructure have been developed in the Plan and total \$3.6 billion in 2018 dollars. The VITAL Infrastructure Plan considers the structures along with any components for the movable bridges and tunnels. The needs were developed by knowledgeable stewards of the structures using long-term projections.

Practices in Other States

Maintenance, repair and/or replacement of highway infrastructure is a reinvestment issue facing many states. To finance the reinvestment in strategic transportation infrastructure assets, states are using options such as:

- Public-Private Partnerships
 - Package a group of transportation assets, such as bridges, for a concessionaire to repair or replace and then maintain for an extended period of time, at an established payment amount (availability payments, not tolls) and time interval (e.g. annually).
 - Availability payments “are contractually contained within a P3 procurement, they are likely to be added to a sponsoring government’s debt statement”¹; therefore, considered debt and part of a state’s debt capacity.
 - State DOT retains ownership of the asset, but places the burden of repair or replacement and on-going maintenance onto a concessionaire for a set period of time.
- Increasing existing transportation infrastructure revenue sources to target needed infrastructure reinvestment (i.e. increase the gas tax every year for a set period of time)
- Establishing new sources of revenue targeted for transportation infrastructure reinvestment (e.g. Alternative Fuel Motor Vehicle Annual Registration Fee, “truck only” toll lanes (electronic tolls) or a Heavy Vehicle Impact Fee)

Specific examples are included within the Appendix C.

State of Good Repair Program and Other Options

State of Good Repair Program - Requires changes to the *Code of Virginia*

The use of SGR Program funding for VITAL Infrastructure requires the following legislative changes to amend §33.2-369 of the *Code of Virginia* in order for SGR Program funds to be used for VITAL Infrastructure. The *Code of Virginia* could be revised to include:

- Tunnel structures and all tunnel components
- Bridge structures, all bridge components including movable bridge components, considered structurally deficient

¹Connecting P3s, Bond Ratings, and Debt Calculation, Government Finance Review, December 2015
<http://www.gfoa.org/sites/default/files/1215GFR08.pdf>

- Bridges (structure and components) that are not rated structurally deficient
- To allow continuous annual funding and not one time funding for urgent pavement and/or bridge project as stated in the *Code of Virginia*

State of Good Repair Program Funding

The current funding in the SGR Program from FY 2019 - FY 2024 is \$1.3 billion while the VITAL Infrastructure needs, if viewed independently, for the same time period (as shown in Appendix B) is \$1 billion. If the SGR Program funds were applied towards the VITAL Infrastructure unconstrained needs, the amount of funding remaining for deteriorated pavements and bridges throughout the Commonwealth is expected to be \$300 million over the six years. However, the fiscally unconstrained needs for deteriorated pavements and bridges in the SGR Program is \$5.8 billion in 2018 dollars.

The VITAL Infrastructure funding needs would deplete funding for the intended purpose of deteriorated pavements and bridges (or the worst rated assets). This action essentially removes funding for necessary work on Virginia's pavements and bridges.

Other Options and Recommendations

Following the request made by the General Assembly during the 2018 session, an analysis of the VITAL Infrastructure and their funding needs was initiated. After assessing the needs and evaluating the VITAL Infrastructure Plan, it has been determined that VDOT should review its current Maintenance and Operating Program funding strategies, performance metrics and priorities and evaluate its investment in existing assets and services prior to making funding recommendations on VITAL Infrastructure. A VITAL Infrastructure program should be integrated into the overall asset management strategy to maximize investments into the highway network. To accomplish this more comprehensive analysis and to explore additional potential funding options, VDOT is recommending that this report serve as an introduction to a more comprehensive report with a target completion of December 2019.

Summary

This effort had a short delivery time frame for completion and was required to address specific, legislatively-mandated questions. The results of the efforts to date have revealed that a broad-based approach is required to evaluate the impacts of integrating an asset management strategy for the VITAL Infrastructure into the Department's existing programs. This will include examining the prioritization of funding based on current and projected performance of highway assets, including VITAL Infrastructure. VDOT proposes to provide a follow-up report to the Legislature in December 2019. This report will summarize a thorough investigation, wherein VDOT will review its program needs and performance measures within current funding constraints. The review will take a holistic, programmatic, long-term approach to optimizing the conditions and performance of the roadway network. More specifically, the comprehensive VITAL Infrastructure report will:

- Refine and prioritize the VITAL Infrastructure needs
- Provide further details on why a dedicated program is needed to support the VITAL Infrastructure
- Examine and present a holistic approach in VDOT's current investment strategy to include the VITAL Infrastructure

- Present a follow-up report in December 2019

After review of the SGR Program and VITAL Infrastructure needs, funding VITAL Infrastructure needs through the SGR Program would severely impact the intent of the SGR Program. The approach to addressing and funding VITAL Infrastructure needs should be intertwined into VDOT's existing programs to maximize investment. A more comprehensive review and investigation will assist VDOT in presenting a sustainable approach.

DRAFT