State of the Structures and Bridges Fiscal Year 2017

July 1, 2017

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1 OVERVIEW

Mission of the Structure and Bridge Division

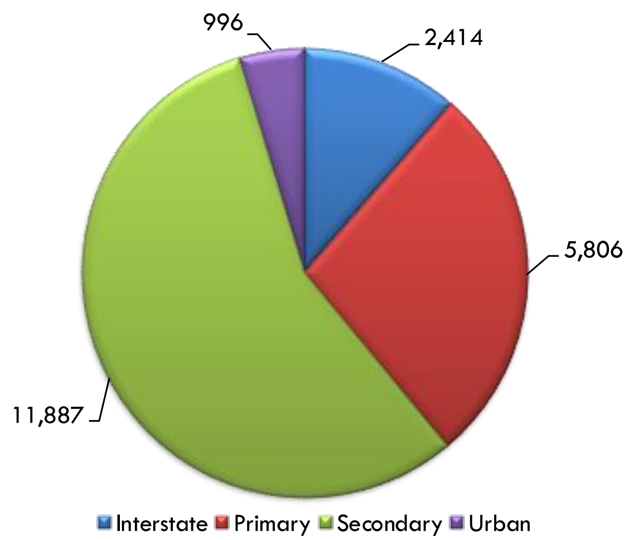
The Structure and Bridge Division will plan, design, inspect and rehabilitate bridges and structures for a surface transportation system that represents the highest standards of safety and quality. Stewardship, accountability, professionalism and customer service will guide every action that we take and every decision that we make.

1.1 INTRODUCTION

This annual report summarizes the conditions of Virginia's bridges, large culverts and ancillary structures (traffic control devices). It also describes the Virginia Department of Transportation's bridge maintenance, construction and inspection programs. The report reflects accomplishments for the 2017 Fiscal Year (referred to as FY2017), which ran from July 1, 2016 through June 30, 2017. Salient historical trends are also provided. All "current" data in this report reflect inventory and condition information as of July 1, 2017. Unless specifically noted otherwise, all graphs, charts and figures in this report provide data on all inventoried Virginia structures that are opened to traffic and maintained by the following entities: the Virginia Department of Transportation (VDOT), localities (cities, towns and counties), other state agencies (e.g. Game and Inland Fisheries, State Parks), state and local toll authorities (Richmond Metropolitan Authority, Dulles Greenway Toll), and private owners (railroads and others).

There are currently 21,103 inventoried highway structures in Virginia. Highway structures include bridges of any length and culverts with total openings greater than 36 square feet (referred to as large culverts). Of these structures, 19,456 are maintained by VDOT, while the remainder are maintained by other legal entities, including localities and toll authorities. As shown in Chart 1, the majority of Virginia's highway structures are on secondary routes the vast majority of which are maintained by VDOT. VDOT's control of secondary routes is due in large part to the Byrd Act of 1932, which transferred ownership of most county-owned secondary roads and bridges to the state, with the exception of the counties of Henrico and Arlington. This is a departure from the practice in most states, where most secondary roads are under local jurisdiction. As a result, VDOT has the third greatest number of highway structures in its state-owned inventory, behind Texas and North Carolina.

Chart 1 - Distribution of Bridges and Large Culverts by System



Since 2007, bridges have been designed and built using new standards and construction materials, resulting in anticipated service lives of 75 years. However, the vast majority (93.8%) of Virginia's bridges were built prior to 2007 and were designed with anticipated design service lives of 50 years. About 47.5% percent of Virginia's structures are 50 years or older (10,033 of 21,103), meaning they have reached or exceeded their anticipated service design life.

The aging of the bridge inventory is a national concern and the greatest challenge facing Virginia's highway structures. To provide some context for the problem, if Virginia were to replace all its 50-year service life bridges as they turned 70, the cost over the next 35 years would be $45 billion. However, if current funding remains constant over the same 35 year interval, approximately $13 billion will be available to address these bridges (combined maintenance and construction funds). Structure deterioration occurs over a period of decades rather than months or years, so the results of short-term funding deficiencies will not necessarily be readily evident in near-term trends of conditions. However, over the long-term, if the funding for bridge maintenance is not increased, we should expect to see significant degradation of the average structure conditions, particularly when evaluated through the metric of deck area as opposed to structure count.

Additional funding is clearly needed, and Virginia annually calculates and reports the monetary needs for the bridge inventory. However, in recognition of real fiscal constraints, Virginia has developed a proactive approach for making the best use of the funding that is available. Virginia's program uses the following techniques to optimize bridge life, safety, and value of funds invested:

- A bridge safety inspection program that exceeds the requirements of the Federal Highway Administration (FHWA), resulting in inspection intervals no greater than 2 years for bridges and 4 years for culverts
- A construction program (State of Good Repair) that emphasizes the most cost-effective and appropriate repairs in conjunction with preservation techniques

- A maintenance program that uses a balanced approach to preserving, repairing, and rehabilitating structures
- A proactive program of practical, collaborative research that allows for early implementation of new and innovative techniques and durable materials
- A decentralized organizational structure allowing decisions to be made at the local/district level wherever possible
- Performance targets and quarterly reporting comparing results with the targets

1.2 PERFORMANCE

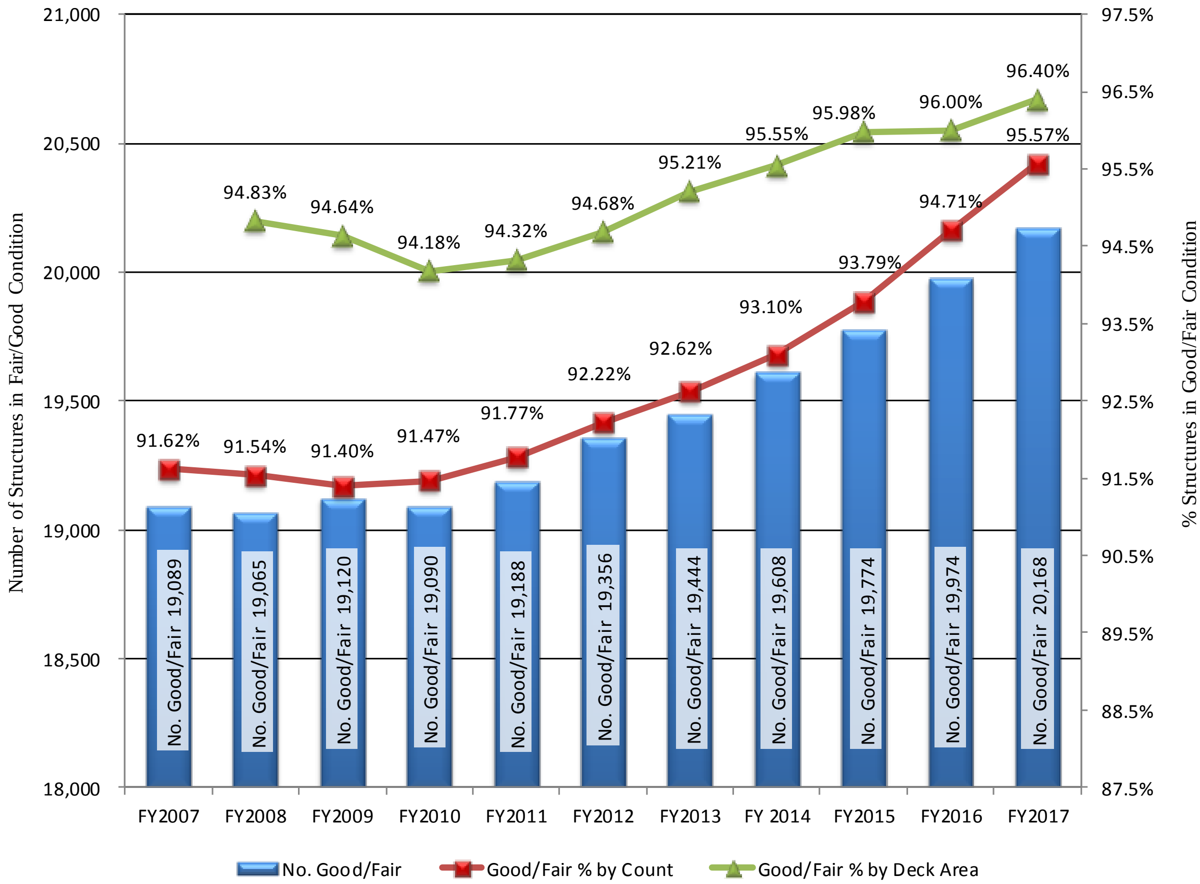
For the past decade, Virginia's primary goal has been to maintain an inventory in which at least 92% of the structures are not structurally deficient (SD). Virginia has surpassed this goal, allowing for the development of new targets. The newly established goals for SD structures are shown in Table 1 below, along with current performance levels.

Table 1 - Percentage of Non-SD Structures

District	Interstate		Primary		Secondary & Urban		NBI Only		All Systems	
	Current	Goal	Current	Goal	Current	Goal	Current	Goal	Current	Goal
1 Bristol	95.8%	99%	96.3%	96%	93.1%	94%	93.1%	94.0%	94.2%	94.0%
2 Salem	98.1%		96.7%		95.6%		95.3%		96.0%	
3 Lynchburg	--		98.5%		94.4%		94.7%		95.7%	
4 Richmond	97.7%		94.2%		93.6%		93.6%		94.6%	
5 H. Roads	99.6%		96.2%		93.2%		95.0%		95.7%	
6 F'burg	96.3%		91.3%		93.2%		92.0%		92.9%	
7 Culpeper	100.0%		98.0%		94.5%		95.0%		95.9%	
8 Staunton	99.8%		97.2%		94.5%		94.7%		95.8%	
9 NOVA	99.5%		98.4%		98.0%		98.0%		98.3%	
Statewide	98.6%	99%	96.6%	96%	94.5%	94%	94.7%	95.5%	95.6%	95.5%

During FY2017 Virginia reduced the number of SD structures in its inventory from 1,116 (5.29%) to 935 (4.43%). For nationwide comparison, 9.1% of the bridges in the National Bridge Inventory (NBI) were SD as of December, 2016 (the last date for which data are available). Chart 2 provides long-term trends showing changes to the number, percentage, and deck area of Virginia's non-SD structures. Additional multiyear bridge condition trends are provided in the body of this report.

Chart 2 - Percentage of Non-SD Structures Statewide by Count and Deck Area (Eleven Year Trend)



Structurally deficient structures are not unsafe, but they have usually deteriorated to a state where they require significant repair, rehabilitation or, in many cases, replacement. Structurally deficient structures usually have one or more major components that are rated as Poor in accordance with National Bridge Inspection Standards (NBIS).

Effective bridge management requires continued maintenance of structures in all conditions, not only the Poor or structurally deficient. As with most physical systems, preventive maintenance on bridges is more cost-effective than waiting to perform the extensive repairs required after advanced deterioration has occurred. Virginia's continued progress in reducing the number of structurally deficient structures has led to the development of additional performance metrics that will lead to an improved balance of expenditures, emphasizing system preservation in addition to work on Poor structures. Specifically, VDOT has added goals for improving the percentage of Fair structures and the conditions of bridge deck expansion joints.

VDOT is also responsible for the inventory, maintenance and inspection of 34,522 ancillary structures. VDOT's inventory includes five types of ancillary structures: Signs, Luminaires, Signals, High Mast Lights, and Camera Poles. Their conditions are summarized in Table 2.

Table 2 - Conditions of Ancillary Structures

	Percentage of Primary Components in Good or Fair Condition		
Structure Type	**Foundation**	**Parapet**	**Superstructure**
Sign	78.1%	89.6%	91.0%
Luminaries	76.8%	67.2%	88.1%
Signal	81.2%	N/A	79.8%
High Mast and Camera Poles	92.0%	N/A	99.4%

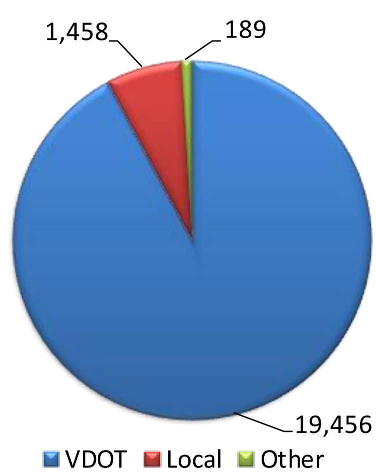
1.3 INVENTORY ADDRESSED IN REPORT

Bridge and large culvert data presented in this report provide the condition and inventory information for all inventoried Virginia structures that are opened to traffic and maintained by the following entities: the Virginia Department of Transportation (VDOT), localities (cities, towns and counties), other state agencies (e.g. Game and Inland Fisheries, State Parks), state and local toll authorities (Richmond Metropolitan Authority, Dulles Greenway Toll), and private owners (railroads and others). VDOT is responsible for the maintenance and inspection of bridges that it owns and for the inspection of any bridge in the National Bridge Inventory (NBI), irrespective of the owner. Chart 3 displays the distribution of bridges and large culverts by the following custodians:

- VDOT (maintained by VDOT)
- Localities (maintained by counties, cities and towns)
- Maintained by others, which includes state toll authorities (Chesapeake Bay Bridge Tunnel Authority), Other state agencies (e.g. Game and Inland Fisheries, State Parks), state and local toll authorities (Richmond Metropolitan Authority, Dulles Greenway Toll), and private owners (railroads and others).

Ancillary structures data provided is only for structures that are owned and maintained by VDOT, as VDOT has very limited information on such structures that it does not own and maintain.

Chart 3 - Distribution of Bridges and Large Culverts by Custodian



2 INVENTORY

2.1 HIGHWAY STRUCTURES

Virginia's inventory of highway structures can be grouped into several categories. The tables in this section provide an overview of the number, type, size, and category of the structures in the inventory. Some terms and abbreviations used in the tables are defined below:

- NBI - Structures in the National Bridge Inventory (Bridges and culverts over 20' in length)
- NHS – Structures on the National Highway System
- I - Structures carrying Interstate Highway System traffic
- P - Structures carrying Primary Highway System traffic
- S - Structures carrying Secondary Highway System traffic
- U - Structures carrying Urban Highway System traffic

Table 3 - Number of Highway Structures

	Number of Highway Structures by District, Highway System and Category											
	NBI				NBI on NHS				All Structures			
District	I	P	S&U	Total	I	P	S&U	Total	I	P	S&U	Total
1 Bristol	164	519	1,320	2,003	164	172	10	346	216	955	2,236	3,407
2 Salem	140	452	1,228	1,820	138	219	13	370	211	819	2,029	3,059
3 Lynchburg	0	412	954	1,366	0	213	18	231	0	659	1,422	2,081
4 Richmond	364	575	1,014	1,953	362	355	35	752	520	778	1,287	2,585
5 H. Roads*	378	384	661	1,423	372	228	75	675	458	468	795	1,721
6 F'burg*	45	177	316	538	45	100	7	152	80	254	488	822
7 Culpeper	85	243	710	1,038	83	91	10	184	121	501	1,090	1,712
8 Staunton	254	457	1,151	1,862	252	141	9	402	430	826	2,237	3,493
9 NOVA*	286	399	836	1,521	281	307	39	627	378	546	1,299	2,223
Total	1,716	3,618	8,190	13,524	1,697	1,826	216	3,739	2,414	5,806	12,883	21,103

**Tables in this report use the abbreviations "H.Roads" for Hampton Roads, "F'burg" for Fredericksburg, and NOVA for Northern Virginia. These abbreviations are necessary to allow clearer presentation of data.*

Table 4 - Area of Highway Structures

District	Area of Highway Structures by District, Highway System and Category (Millions of Square Feet)											
	NBI				NBI on NHS				All Structures			
	I	P	S&U	Total	I	P	S&U	Total	I	P	S&U	Total
1 Bristol	1.6	5.0	2.5	9.2	1.6	2.1	0.0	3.8	1.9	5.4	3.0	10.3
2 Salem	1.5	4.2	3.2	8.9	1.5	2.6	0.0	4.1	1.7	4.7	3.7	10.2
3 Lynchburg	0.0	4.2	2.6	6.8	0.0	2.7	0.0	2.8	0.0	4.6	2.9	7.5
4 Richmond	6.1	9.3	4.8	20.2	6.1	7.3	0.4	13.7	6.5	9.6	5.1	21.1
5 H. Roads	10.7	15.3	4.2	30.1	10.6	12.4	1.5	24.5	10.9	15.5	4.3	30.7
6 F'burg	0.5	2.7	1.2	4.5	0.5	1.7	0.1	2.3	0.6	2.8	1.3	4.8
7 Culpeper	0.9	1.6	1.7	4.2	0.9	0.8	0.0	1.8	1.0	1.8	1.9	4.8
8 Staunton	2.7	3.4	3.2	9.2	2.7	1.4	0.0	4.2	3.2	3.7	3.7	10.6
9 NOVA	6.0	6.1	6.3	18.4	5.9	5.0	0.5	11.4	6.5	6.5	7.0	19.9
Total	30.0	51.8	29.7	111.6	29.9	36.1	2.5	68.5	32.3	54.7	32.9	120.0

The "All Structures" category in the Table 3 and Table 4 includes structures too small to meet the definition of an NBI structure. Note that the definition of an NBI structure is different than the definition of structures on the National Highway System (NHS), so not all structures on the NHS are in the NBI, nor are all NBI structures on the NHS. Virginia also maintains a large inventory of smaller culverts that are not in the inventory of the Structure and Bridge Division because their total opening size is less than 36 square feet. These smaller structures have a separate maintenance and inspection cycle and are not addressed in this report.

2.2 Inventory Changes from Previous Years

Some of the charts in the report provide multi-year trends for various performance measures. Inventory numbers provided in this report for the years 2007-2011 vary slightly from numbers provided in previous editions of this report. These differences are primarily due to a change in the reporting period. Reports from 2007 through 2011 were based on calendar year (January 1 through December 31), whereas subsequent reports are based on the fiscal year (July 1 through June 30). This change was made to align the reporting period of the State of the Structures Report with the fiscal year and with reports developed by other VDOT divisions.

Other factors causing differences between this report and previous editions of this report include:

- **Definition of Interstate Highway Bridges:** From 2007 to 2009 interstate overpasses were categorized as interstate structures. Values shown in this report for 2009 have been adjusted from those included in previous reports to reflect the removal of interstate overpasses from the interstate inventory. Values for 2007 and 2008 have not been adjusted due to a lack of sufficient data. Values for 2010 through 2017 are based on the new criteria.
- **Reporting of Pedestrian Bridges:** Prior to 2009, pedestrian and footbridge structures were included in the State of the Structures Report. They have not been

included since the 2010 report. Pedestrian structures, when included, tend to provide misleading data regarding the number of SD structures.

- **Ownership of Metropolitan Washington Airport Authority Bridges:** Since Fiscal Year 2010 Metropolitan Washington Airport Authority structures have not been reported as part of VDOT's inventory. This authority owns their structures and reports data directly to FHWA.
- **Buchanan County Bridges Added to Inventory:** In Fiscal Year 2012 Virginia added to its inventory 144 existing structures from Buchanan County in the Bristol District. Prior to FY2012 year these structures had not been included in Virginia's inventory. Buchanan County retains responsibility for these bridges.
- **Change in Highway System Designation of Buchanan County Bridges:** In Fiscal Year 2013 the system type of all the recently added bridges from Buchanan County was changed from Secondary to Urban.
- **Norfolk Southern Railway Agreement:** In FY2014, VDOT transferred the ownership and maintenance responsibility for 15 railroad bridges to the Norfolk Southern Railway (NS). The agreement also caused the transfer of ownership and maintenance responsibility of 31 highway bridges crossing the NS railroad from NS to VDOT.
- **Changes to NHS:** In 2016 the NHS was redefined, causing a significant increase in the number of NHS structures (and a commensurate decrease in the number of non-NHS structures). A link to the NHS map is provided below:

  http://www.fhwa.dot.gov/planning/national_highway_system/nhs_maps/updatenhsgm.cfm

Chart 4, Chart 5, and Chart 6 provide data on the ages of Virginia's highway structures.

Chart 4 - Cumulative Age Distribution of Bridges and Large Culverts

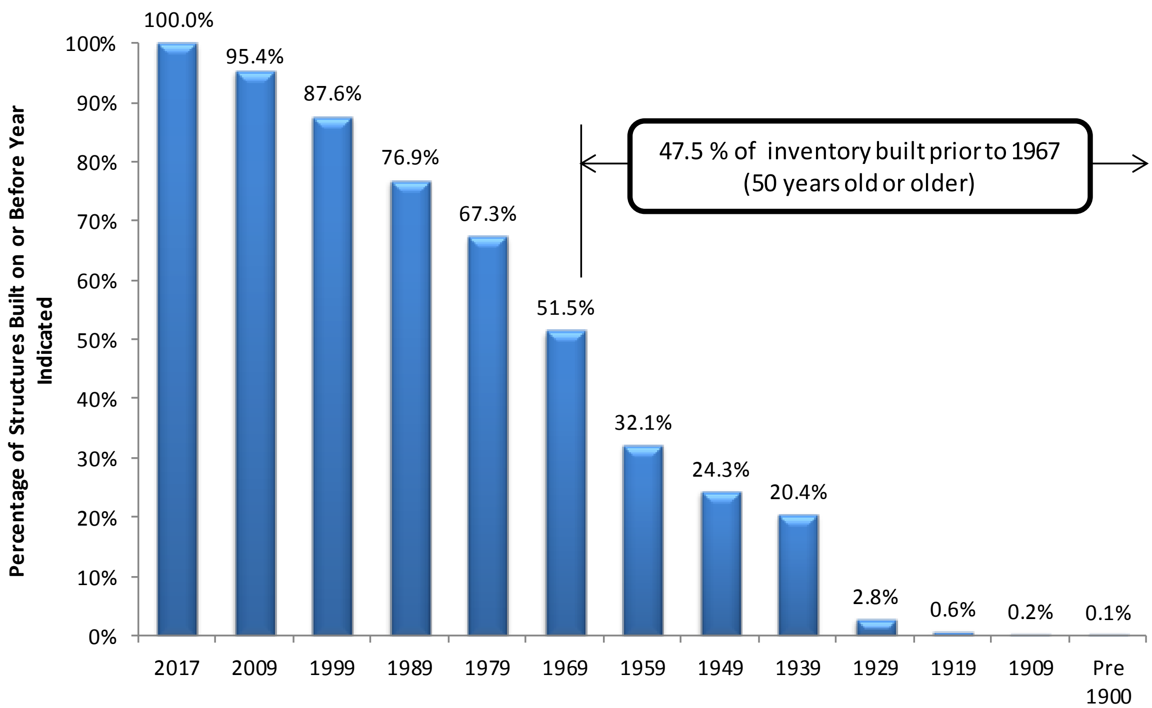


Chart 5 - Average Age of Highway Structures by District

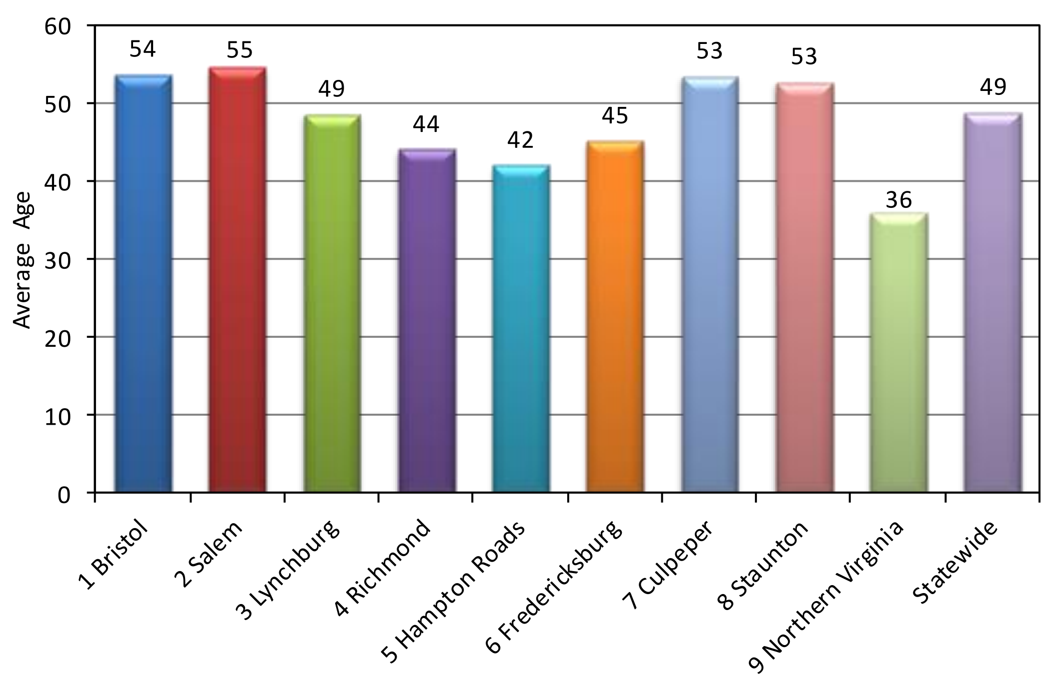
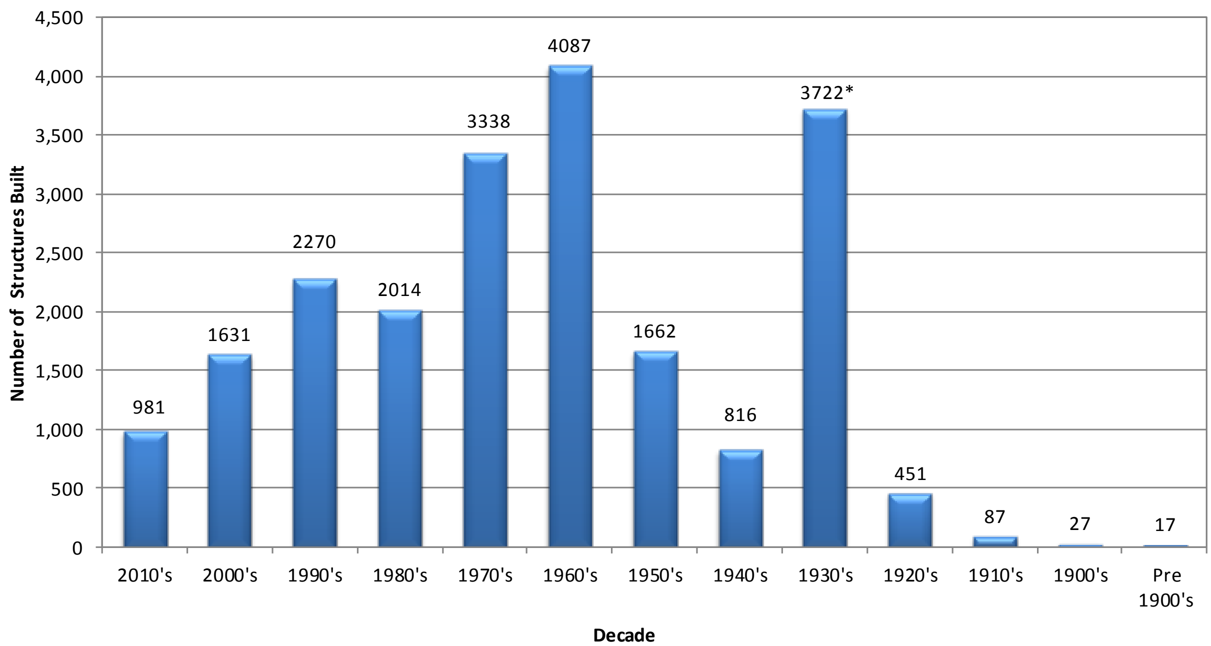


Chart 6 - Number of Highway Structures Built by Decade



* County bridges added to the VDOT Inventory during this period with unknown construction dates. Those structures with unknown construction dates have been assumed to have been built in the 1930s.

2.3 TYPES OF HIGHWAY STRUCTURES

Given the large number and broad geographic distribution of Virginia's highway structures, it is often convenient to use structure categories to better understand their needs and rates of deterioration. Chart 7 through Chart 10 provides inventory data for 14 different categories of structures. These categories describe both material type and structural system used. As the charts show, the performance and durability vary considerably between categories, with concrete culverts showing the greatest durability and timber deck bridges and metal culvert displaying the least favorable performance and conditions.

VDOT has also identified a group of "Special Structures" with characteristics that warrant additional consideration for maintenance, repair, and funding. These structures are large and/or complex and play a critical role in the function of the transportation network. They include large fixed-span bridges, movable bridges, and tunnels. A list of the structures is provided in Table 5.

Chart 7 - Inventory and Condition Data for Various Structure Types, Most Common

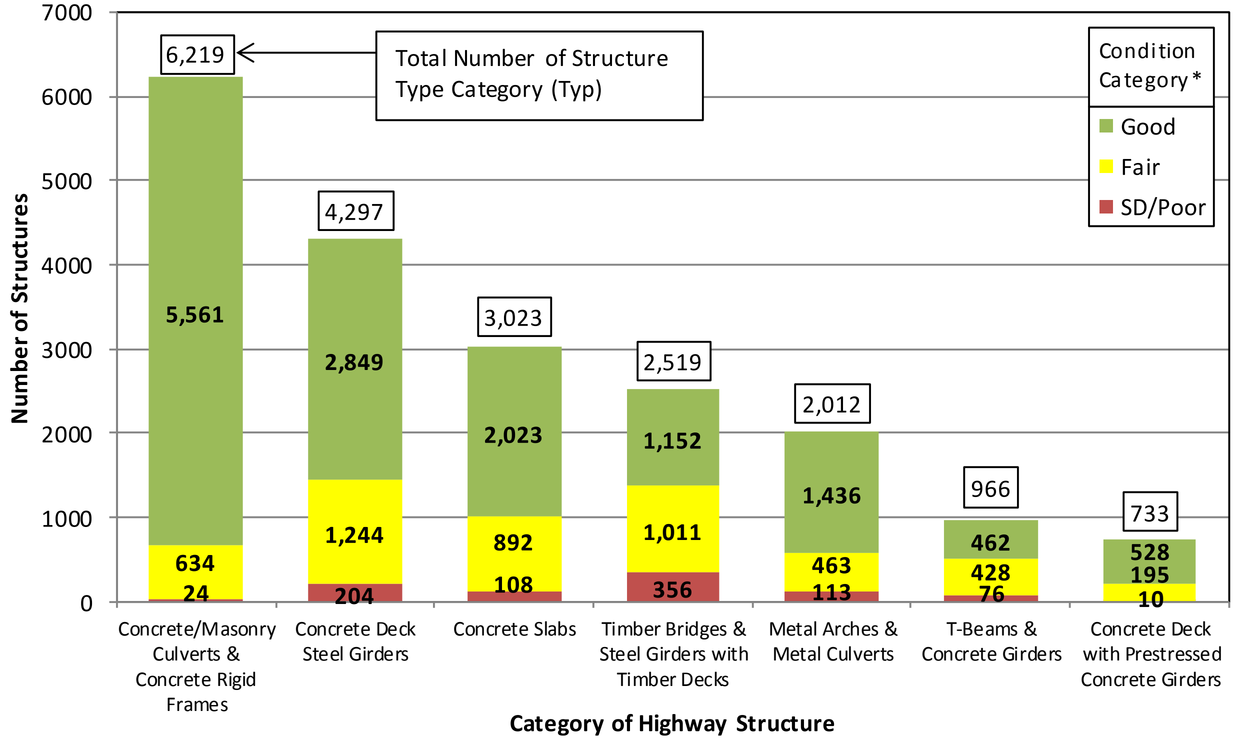
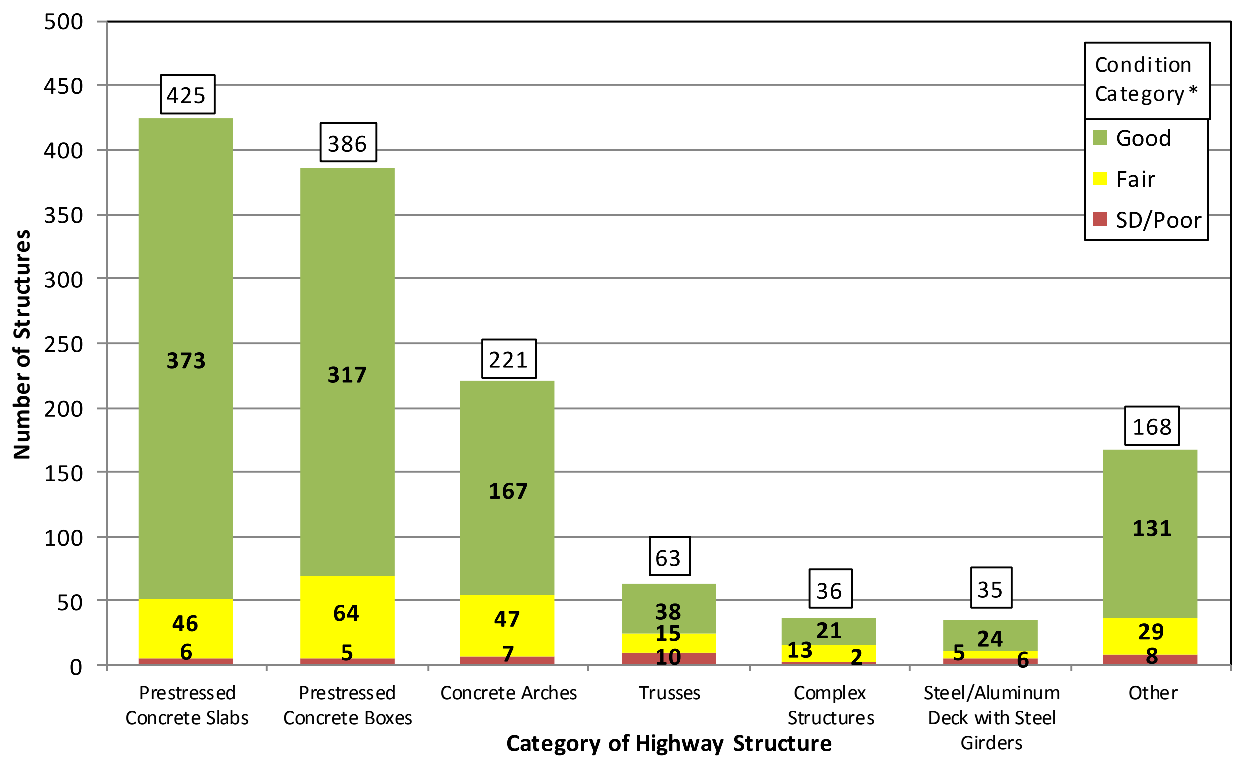


Chart 8 - Inventory and Condition Data for Various Structure Types, Less Common



**See Table 6 for Virginia condition category definitions*

Chart 9 - Inventory and Condition Data for Various NBI Only Structure Types, Most Common

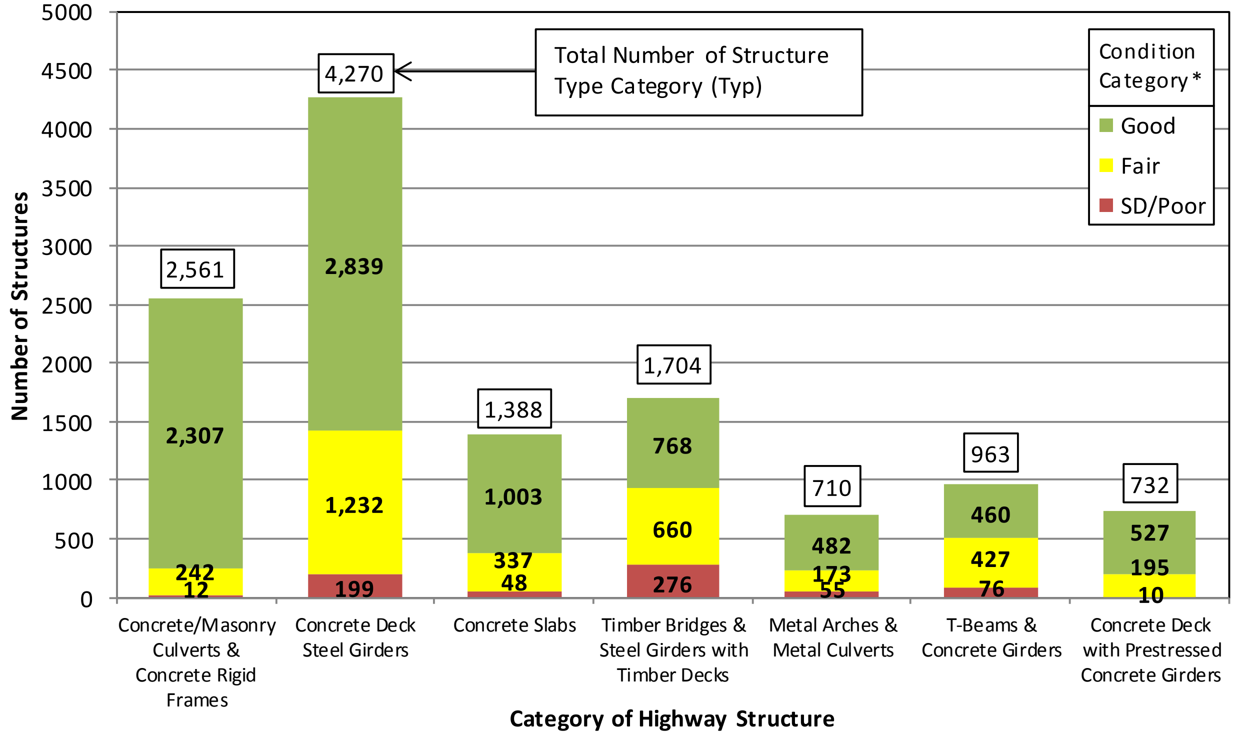
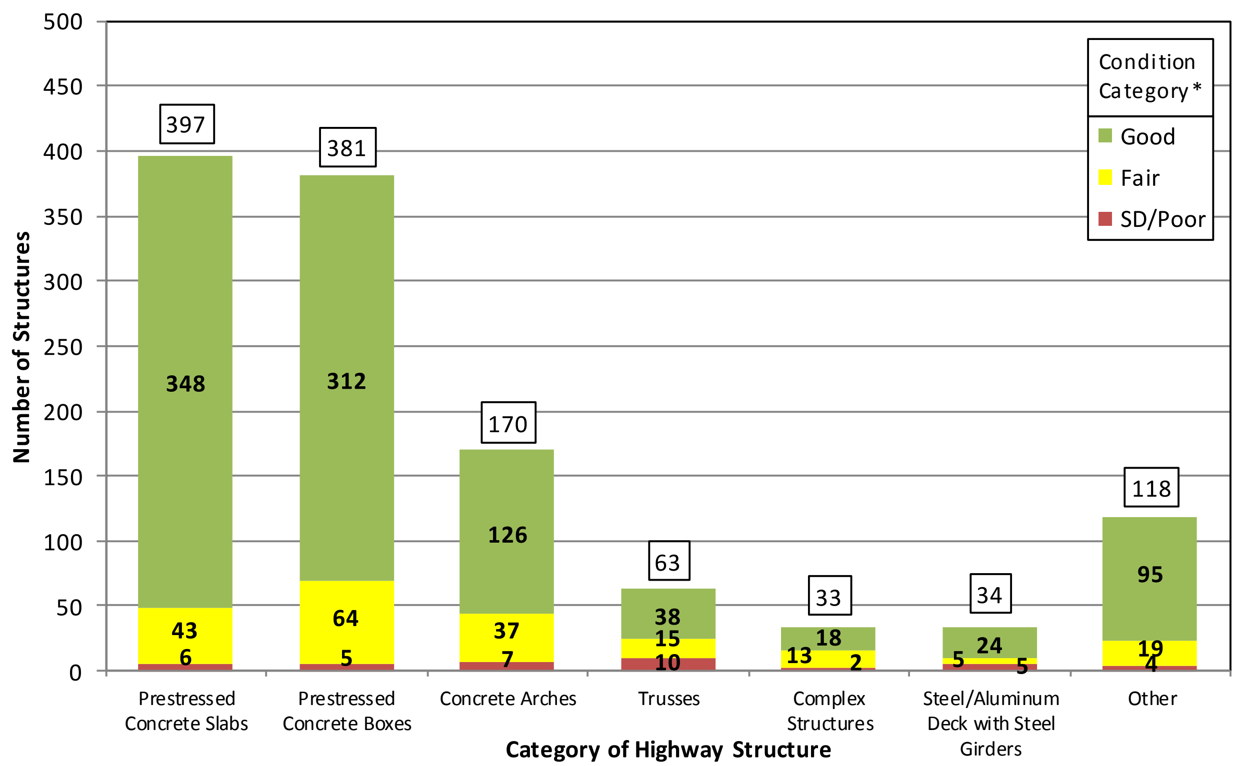


Chart 10 - Inventory and Condition Data for Various NBI Only Structures, Less Common



**See Table 6 for Virginia condition category definitions*

Table 5 - VDOT's Special Structures

	STRUCTURE NAME	ROUTE CARRIED	DISTRICT
TUNNELS	Big Walker Mountain	I-77	Bristol
	East River Mountain	I-77	Bristol
	Hampton Roads Bridge Tunnels (HRBT) – 2 Tunnels	I-64	Hampton Roads
	Monitor Merrimac Memorial Bridge Tunnel (MMBT)	I-664	Hampton Roads
	Elizabeth River Downtown Tunnels – 2 Tunnels	I-264	Hampton Roads
	Elizabeth River Midtown Tunnels – 2 Tunnels	Rt. 58	Hampton Roads
	Rosslyn Tunnel	I-66	Northern Virginia
MOVABLE BRIDGES	Chincoteague Bridge	Rt. 175	Hampton Roads
	High Rise Bridge	I-64	Hampton Roads
	Berkley Bridge	I-264	Hampton Roads
	Coleman Bridge	Rt. 17	Hampton Roads
	James River	Rt. 17	Hampton Roads
	Benjamin Harrison	Rt. 156	Richmond
	Eltham Bridge	Rt. 30/33	Fredericksburg
	Gwynn's Island Bridge	Rt. 223	Fredericksburg
COMPLEX STRUCTURES	Varina-Enon Bridge	I-295	Richmond
	Norris Bridge	Rt. 3	Fredericksburg
	HRBT Approach Bridges	I-64	Hampton Roads
	I-64 over Willoughby Bay	I-64	Hampton Roads
	MMMBT Approach Bridges	I-64	Hampton Roads
	James River Bridge Approach Spans	Rt. 17	Hampton Roads
	High Rise Bridge Approach Spans	I-64	Hampton Roads
	Pocahontas Parkway over James River	I-895	Richmond
	Smart Road Bridges	Smart Rd.	Salem
	460 Connector Bridges	Rt. 460	Bristol

2.4 ANCILLARY STRUCTURES

VDOT is also responsible for the inventory, inspection, and maintenance of 34,522 ancillary structures. VDOT's inventory includes five types of ancillary structures, three of which are further divided into subcategories:

a. High mast lighting structures
b. Camera pole structures
c. Signal structures
    - Span wire
    - Cantilever
    - Bridge-parapet mounted
d. Luminaires
    - Ground mounted
    - Parapet mounted
e. Sign structures
    - Overhead span
    - Cantilever
    - Butterfly
    - Bridge-parapet mounted

Chart 11 and Chart 12 indicate the distribution of the ancillary structures by district and type.

Chart 11 - Distribution of Ancillary Structures by District

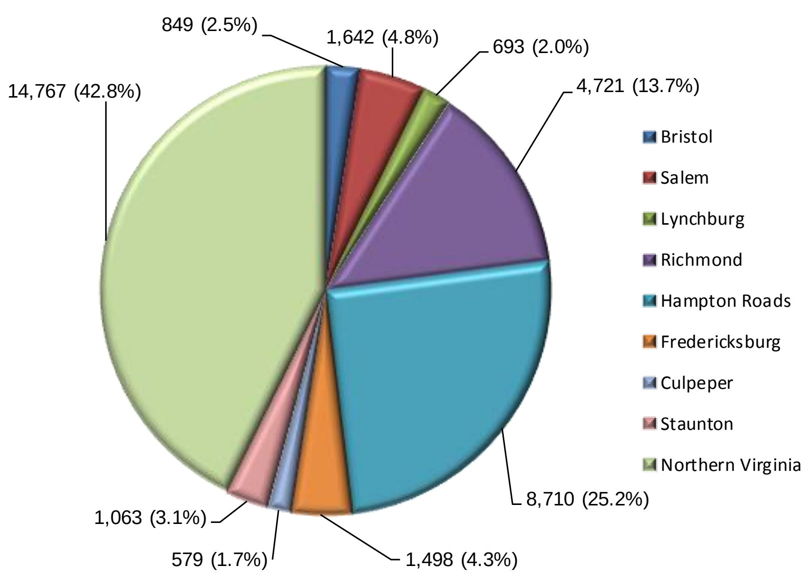
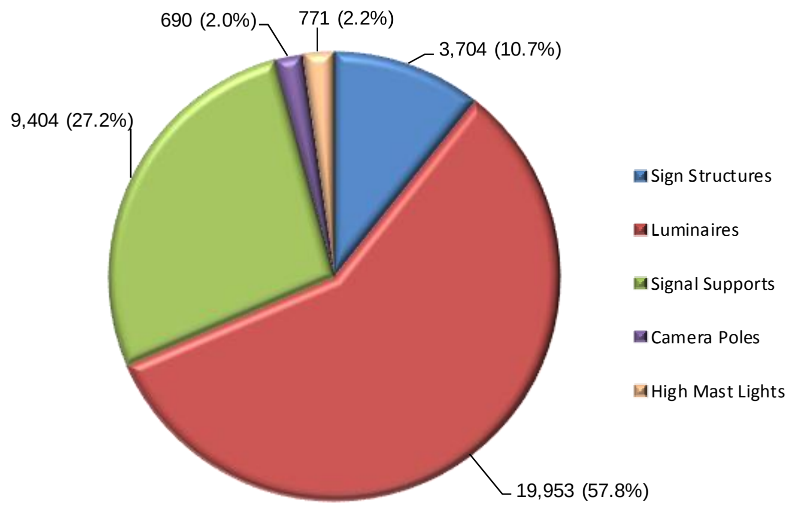


Chart 12 - Distribution of Ancillary Structures by Type



3 CONDITION

3.1 CONDITION CATEGORIES (GOOD, FAIR, AND SD/POOR STRUCTURES)

A true system preservation program extends the service life of structures. This requires a balanced approach, wherein work is performed on structures in all condition categories (Good, Fair and SD/Poor). In order to provide an easily-understood organizational system, structures are placed in one of these three condition categories based on the minimum component General Condition Rating (GCR) of each structure.

The GCR is a numerical rating of the primary components of each structure assigned during regular safety inspections. Definitions of GCRs are provided in the Federal Highway Administration's (FHWA's) "*Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*". See link below:

https://www.fhwa.dot.gov/bridge/mtguide.pdf

Descriptions of GCRs are also provided in Appendix D of this report. Measured on a 0-9 scale, with 0 representing a failed structure and a 9 representing excellent condition, a GCR is assigned to each bridge's deck, superstructure, and substructure at each inspection. Large culverts receive a single GCR. The minimum GCR for each bridge or large culvert is used to define its condition category. Three condition categories have been established: Good, Fair and SD/Poor as shown in Table 6 below.

Table 6 - Condition Categories for Highway Structures

Condition Category	Virginia Definition	FHWA Definition
Good Structures	Minimum GCR ≥ 6	Minimum GCR ≥ 7
Fair Structures	Minimum GCR = 5	Minimum GCR = 5 or 6
SD/Poor Structures[1]	Minimum GCR ≤ 4*	Minimum GCR ≤ 4

**There is a very close, but not exact, correlation between "Poor" structures and "Structurally Deficient" (SD) structures. All Poor structures (min GCR ≤ 4) are SD, but about 5% of Virginia's SD structures are in Fair or Good condition but have received the SD designation due to an appraisal rating of 2 or less for Waterway Clearance or Structural Evaluation. See FHWA's "Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges" for descriptions of appraisal ratings.*

3.2 PERFORMANCE GOALS

3.2.1 General

Performance measurement is an essential tool for guiding asset owners toward making the best use of limited funds in a transparent and accountable manner. A sound performance measurement program requires years of work to identify and adopt a set of metrics that are meaningful, actionable, and practical to measure.

Virginia's maintenance program is large and complex, so in order to more easily direct its efforts, performance goals have been developed for each of the three condition categories described in the previous section (Good, Fair, and SD/Poor). While Virginia has been using performance measure for many years, FHWA has recently required states to track bridge conditions, establish performance targets, and report results. Therefore, Virginia now has two sets of performance targets: state and federal.

3.2.2 Performance Measures for SD/Poor Structures

A Poor structure has a minimum GCR of 4 or less. All Poor structures are SD.

An SD structure has either of the following:

- A general condition rating (GCR) of Poor (GCR of 4 or less) for one or more of the following structural components: deck, superstructure, substructure or large culvert
- An appraisal rating of two (2) or less for the Structural Evaluation or Waterway Adequacy

SD/Poor structures have deficient structural components that require the structure to be monitored and/or repaired. In some instances these structures have been posted to restrict the weight of vehicles driving on the structure.

Virginia: Virginia's new overall goal for SD structures is to limit their number to 4.5% of the overall inventory (95.5% not SD). Goals have also been established regarding the percentage of non-SD structures on each of the three highway systems. These goals apply statewide and to the nine construction districts individually: 99% percent max of interstate system structures, 96% percent max of primary system structures and 94% percent max of secondary system structures. Current and previous targets for the percentage of structures not SD are provided in Table 7 below.

Table 7 - Virginia's non-SD Targets

Highway System	Current Target	Previous Target	Current Statewide Performance
Interstates	99%	97%	98.6%
Primaries	96%	94%	96.6%
Secondaries	94%	89%	94.8%
All Systems Combined	95.5%	92%	95.6%

FHWA: As mentioned previously, there is a slight difference between the definition of Poor and SD structures, as all Poor structures are SD but not all SD structures are Poor. The 2012 federal "Moving Ahead for Progress in the 21st Century Act" (MAP-21) established two requirements relating to Poor and SD structures. Note that one of these new federal requirements is based on Poor structures and the other is based on SD structures. Beginning on January 1, 2018 there will be no distinction between the two populations of structures, as the definition of structural deficiency will include Poor bridges only (the bridges that are currently SD due to inadequate appraisal ratings will no longer be SD in 2018). The MAP-21 Poor and SD requirements are listed below:

1. No more than 10% of the deck area of SD NBI bridges on the NHS
2. Each state must establish a goal for the deck area of their Poor bridges and report their progress against the goal every two years. This goal applies only to NBI bridges

on the NHS. States are required to establish these goals by April, 2018. Virginia has not yet established its goal for this requirement. FHWA defines a “Poor” structure as one whose minimum GCR ≤ 4.

Table 8 below indicates Virginia’s status regarding these two requirements.

Chart 13 below shows the multi-year trend for Virginia’s NBI SD bridges on the current NHS. Chart 14 and Table 9 below provide information on Virginia’s NBI SD bridges on the current NHS broken down by district.

Table 8 - Virginia’s Status with FHWA’s Poor and SD Bridge Requirements

Target Description[1]	Status/Performance
SD Deck Area < 10%	96.6%
Two Year Goal for Deck Area of Poor Bridges	Not Yet Established

[1]Apply only to NBI bridges on the NHS

Chart 13 - Percentage of Deck Area of SD NBI Structures on the NHS by Year

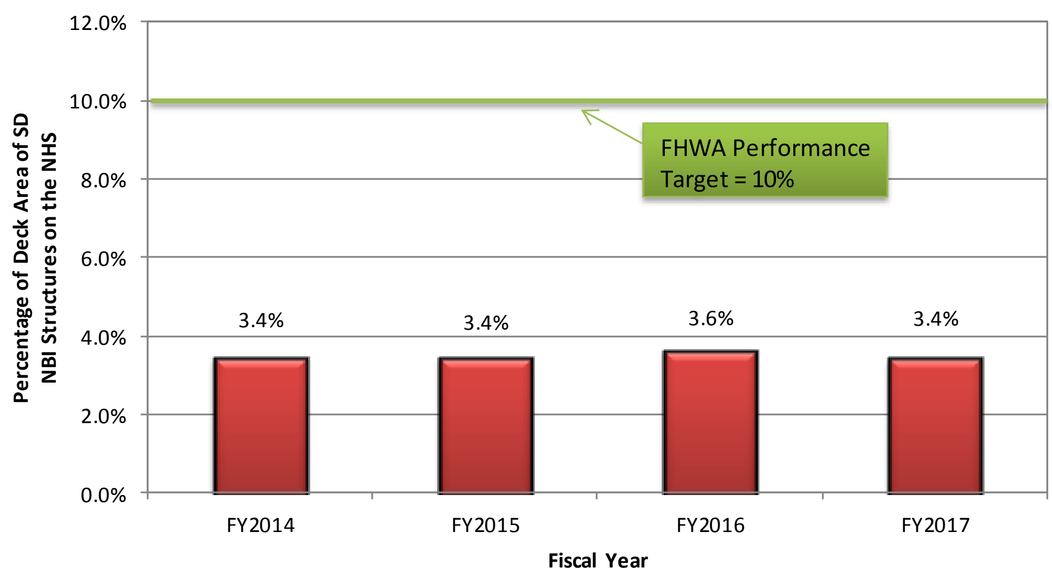


Chart 14 - Percentage of Deck Area of SD NBI Structures on the NHS by District

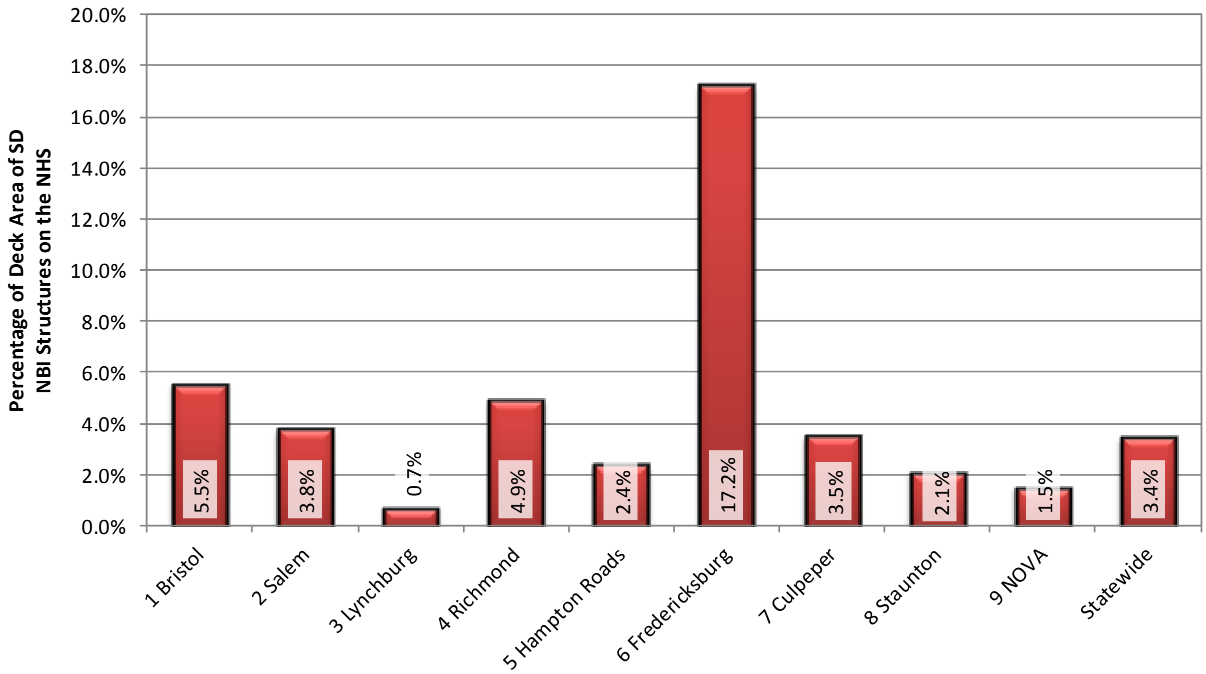


Table 9 - Percentage of Deck Area of SD NBI Structures on the NHS by District

District	Percentage of Structurally Deficient Deck Area				
	Interstate	Primary	Secondary	Urban	Total
1 Bristol	5.4%	5.5%	2.9%	100.0%	5.5%
2 Salem	7.2%	1.8%	6.4%	0.0%	3.8%
3 Lynchburg	0.0%	0.7%	0.0%	0.0%	0.7%
4 Richmond	6.2%	3.8%	0.7%	24.9%	4.9%
5 Hampton Roads	2.9%	2.2%	0.0%	0.0%	2.4%
6 Fredericksburg	5.1%	21.6%	0.0%	0.0%	17.2%
7 Culpeper	0.0%	7.4%	5.5%	0.0%	3.5%
8 Staunton	0.3%	5.4%	4.6%	0.0%	2.1%
9 NOVA	0.4%	2.8%	0.7%	0.0%	1.5%
Statewide	**3.1%**	**3.8%**	**0.9%**	**1.4%**	**3.4%**

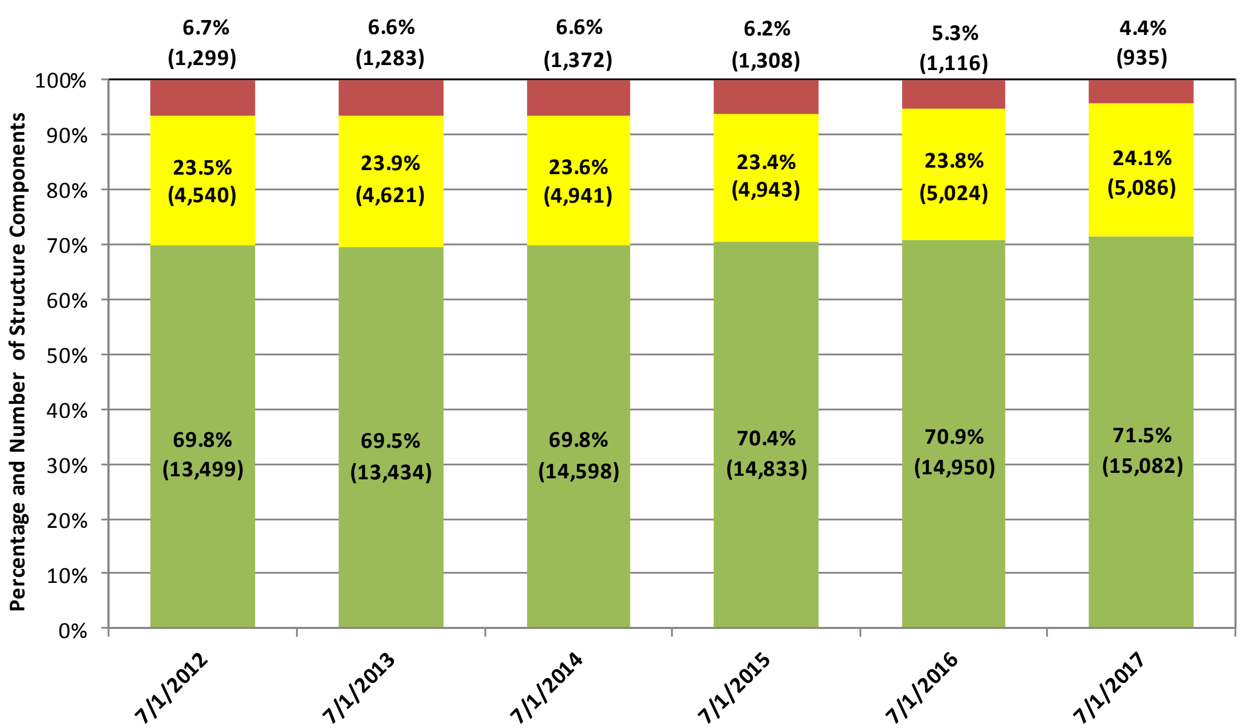
3.2.3 Performance Measures for Fair and Good Structures

Virginia: Virginia's new overall goal for Fair structures is to reduce the number of Fair structures by 0.5% by July 1st, 2019. Virginia defines a "Fair" structure as one with a minimum General Condition Rating = 5 (GCRs are for deck, superstructure, substructure, and culvert). This is a significant challenge due to the age of the inventory. Table 10 provides the number of Fair structures by highway system for the past three years. Chart 15 provides a six year trend.

Table 10 - Virginia's Goal of Maintaining the Number of Fair Structures

Highway System	Number of Fair Structures (GCR = 5)		
	End of FY15	End of FY16	End of FY17
Interstates	740	757	745
Primaries	1,399	1,414	1,439
Secondaries	2,804	2,853	2,902
All Systems Combined	4,943	5,024	5,086

Chart 15 - Percentage of Structures in Good, Fair, and Poor Condition (Six Year Trend)



Note: Uses Virginia definition of "Good", "Fair", and "Poor".

Virginia also has recently established a performance goal for improving the conditions of bridge deck expansion joints. The new goal is for the percentage of expansion joints in Condition State 1 (Good) or Condition State 2 (Fair) to improve by 0.5% by December 31st, 2018. Currently, 85% of VDOT's expansion joints are in Condition State 1 or Condition State 2.

FHWA: MAP-21 established one requirement relating to Good structures:

- Each state must establish a goal for the deck area of their bridges in Good condition and report their progress against the goal every two years. This goal applies only to NBI bridges on the NHS. States are required to establish the goal by April, 2018. Virginia has not yet established its goal for this requirement. FHWA defines a “Good” structure as one whose minimum GCR ≥ 7.

3.2.4 Best Practices/Recommended Targets for System Sustainability

Chapter 32, Part 2, of the *VDOT Manual of the Structure and Bridge Division* establishes recommended targets for system sustainability as follows:

- Maintain 90% of expansion joints in a Condition State of 1*
- Eliminate 2% of the deck expansion joints in each district in each fiscal year
- Perform maintenance activities on at least 6% of structures with a minimum GCR of 5 in each district in each fiscal year
- Perform maintenance activities on at least 2% of structures with a minimum GCR of 6 in each district in each fiscal year
- Meet established targets for SD bridges on each highway system (see previous discussions

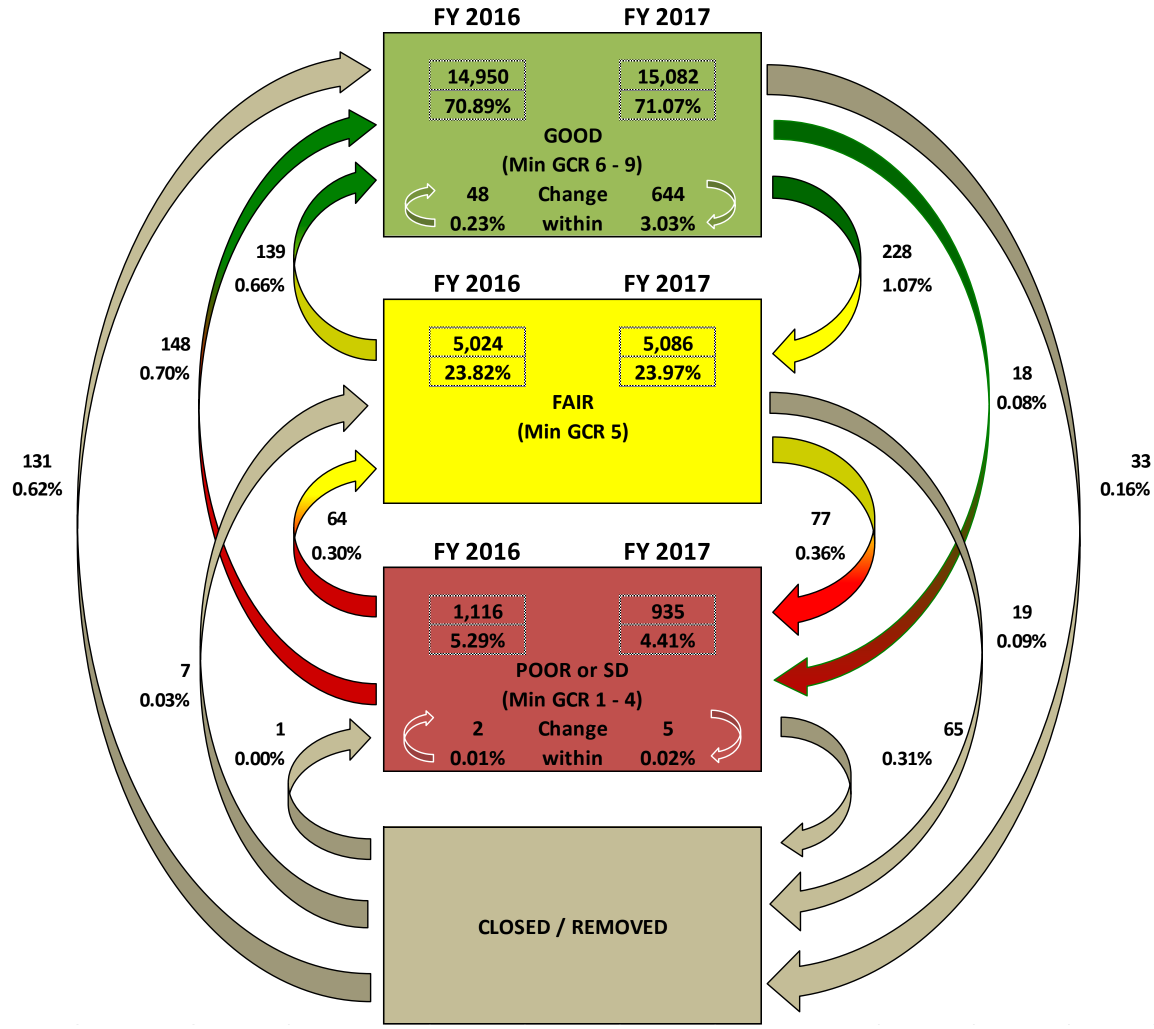
**In addition to GCR, Condition States are assigned to various bridge elements during bridge inspections. A condition state of 1 is “Good”, 2 is “Fair”, 3 is “Poor”, and 4 is “Severe”. Condition states provide more detailed information than GCRs about individual bridge elements. Information on the collection of condition state data may be found in the “Virginia Supplement to the AASHTO Manual for Bridge Element Inspection” at:*

http://www.virginiadot.org/business/resources/bridge/VDOT_Suppl_to_the_AASHTO_Manual_for_Bridge_Element_Insp_2016.pdf

These recommended targets were determined using an analysis of the annual transition of VDOT’s structures from one condition category to another. Recognizing that the bridge maintenance program requires a balanced approach, where the maintenance needs of structures in each of the three condition categories are regularly addressed, the analysis sought to establish thresholds that would achieve the goal of maintaining the average GCR of the existing inventory over time. There is no unique solution for these goals (various combinations of thresholds for Good, Fair and Poor could achieve the desired result of maintaining the average GCR).

Prior to establishing the actual thresholds, a transition study was performed to determine the number of structures whose minimum GCR either improves or deteriorates in any particular year. The initial study focused on the transition between 2009 and 2010, and results of the study were used to establish a baseline and develop achievable goals for each condition category.

Chart 16 - Annual Transitions of Good/Fair/Poor or SD from end of FY2016 to end of FY2017



Note: Percentages based on total structures in the inventory from FY16 to FY17 inclusive of those closed and/or removed over that time period.

Based on the study, it was determined that system sustainability could be achieved with the goals in Chapter 32. Furthermore, these goals were deemed to be reasonably attainable with existing staff. However, the funding required to meet these goals remains significantly higher than that provided.

The numbers of the most recent year-to-year transitions are displayed in Chart 16, which depicts the number of structures that transitioned from one condition category to another or moved up or down within a condition category. The chart shows that during FY2017, 228 structures fell from “Good” to “Fair” condition, and 139 structures were improved from “Fair” to “Good” condition.

Virginia performs an annual analysis in order to determine and report on the monetary needs for each of its assets. The monetary needs for any particular asset are defined as the amount of funding required to reach stated performance goals, which have been established to maintain and improve the condition of Virginia’s bridges.

3.2.5 Targets for Chief Engineer's Quarterly Report

VDOT emphasizes the establishment of objectively measured goals and the regular reporting of progress toward those goals. VDOT's Chief Engineer holds a quarterly meeting with its division administrators in which a status update is provided. Prior to the meeting, a report is produced that includes graphs showing each division's progress toward the Chief Engineer's specific goals. Chart 17 shows the statewide status report provided by the Structure and Bridge Division for the July, 2017 Chief Engineer's Quarterly Meeting. Similar one-page reports were provided for each of the nine districts.

The report provides updates on several internal VDOT goals. As discussed earlier, the SD goals have recently changed, and these new SD goals will be shown in the future reports. In addition to the SD targets, the Chief Engineer's Quarterly Report tracks these goals:

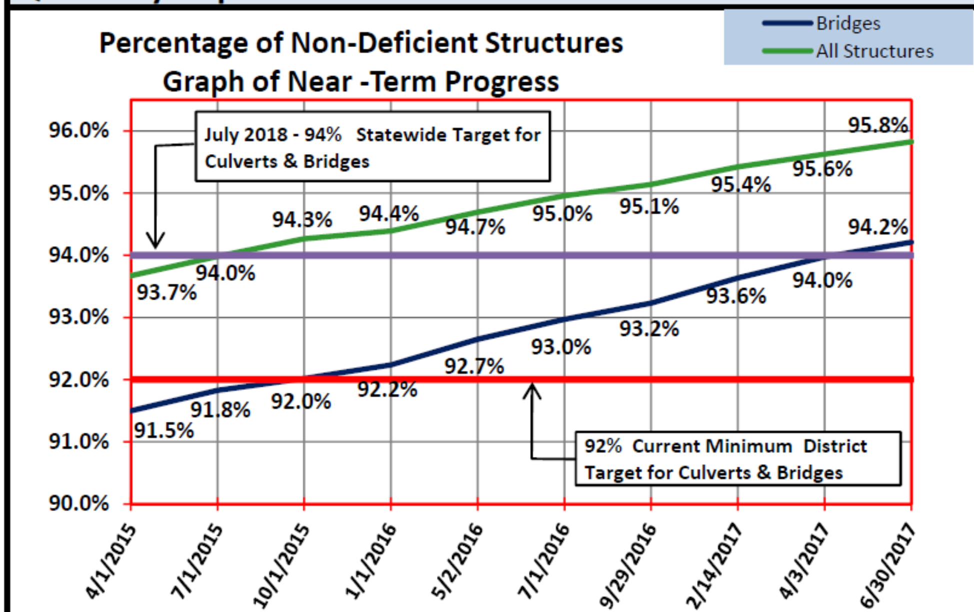
- Reduce number of fracture critical structures as reported in 2013 by 15% (applies to bridges on roads with average daily traffic greater than 1,000 vehicles)
- Perform 95% of bridge safety inspections on time
- Percentage of ancillary structures in Fair or Good condition:
  - Signs: 90%
  - Signals: 90%
  - High Mast Light/Camera Poles: 95%
  - Luminaires: 80%

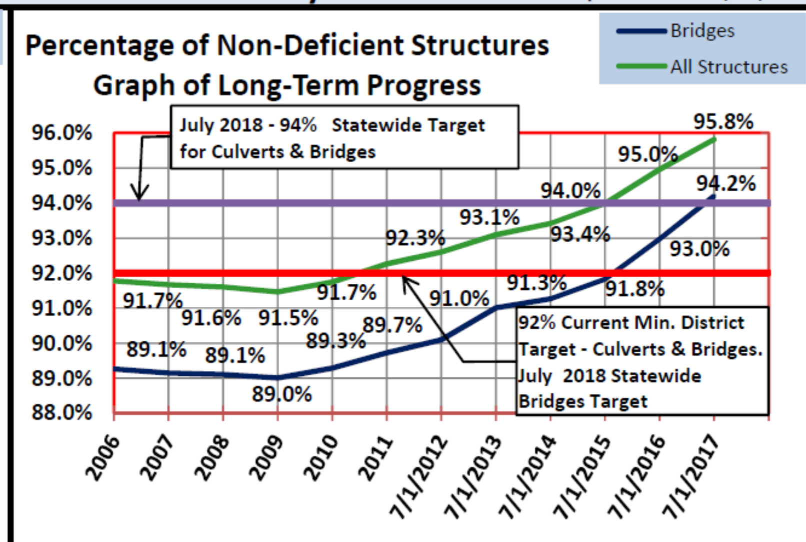
Note that there are differences between the graphs, figures and tables provided elsewhere in this report and those presented in the Chief Engineer's Quarterly Report. This is because the two reports address different populations of bridges. As stated previously, this report provides information on all bridges in Virginia, whereas the Chief Engineer's Quarterly Report only addresses only bridges that VDOT maintains.

Chart 17 - Chief Engineer's Quarterly Report for July 2017

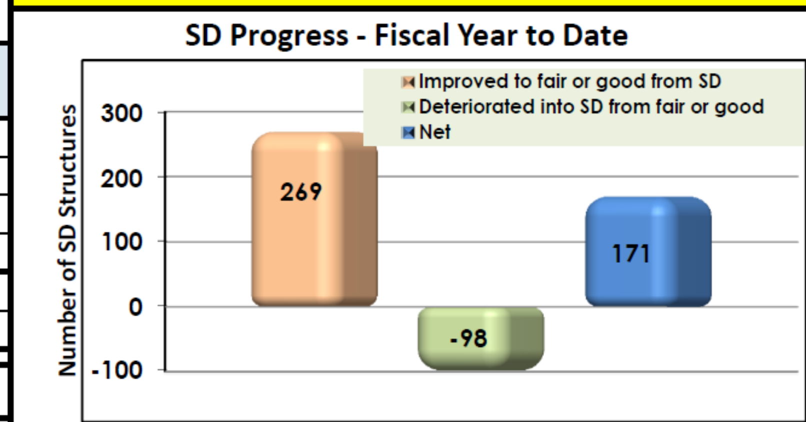
Quarterly Report for S&B Division - Statewide VDOT-Maintained Structures Only

Report Date: 6/30/2017





Current # of SD Structures = 812



	Description	Target Date	Target	Actual	D from Previous
Percentage of Bridge and Culvert Structures in Fair or Good Condition	Interstate	Current	97%	98.6%	0.17%
	Primary	Current	94%	96.9%	0.19%
	Secondary	Current	89%	94.8%	0.21%
	Systems, NBI & Non-NBI Structures	July 2018	94%	95.8%	0.20%
	All Systems, NBI & Non-NBI Bridges	July 2018	92%	94.2%	0.24%
	All Systems, NBI Structures	July 2018	94%	95.0%	0.16%
On Time Inspections	Bridges & Culverts (VDOT & Local)	Current	95%	99.8%	0.04%
Percentage of Ancillary Structures in Fair or Good Condition	Signs	July 2018	90%	77.8%	-3.95%
	Signals	July 2018	90%	66.4%	-6.16%
	High Mast Light/Camera Poles	July 2018	95%	93.0%	0.70%
	Luminaires	July 2018	80%	69.9%	-0.21%

Reduction in Fracture Critical Roadway Bridges All Systems ADT>1000	Total No. Bridges	5/1/2013	92
	FC Reduction Goal (15%)		-14
	No. Removed since	5/1/2013	-13
	No. Added since	5/1/2013	10
	Total No. Bridges	Current	89

3.3 CURRENT CONDITIONS - HIGHWAY STRUCTURES

The following pages contain charts and tables providing information about the current conditions of Virginia's highway structures. The charts and tables detail the current state of Virginia's SD and load-posted structures, as well as information about the percentage of Good, Fair, and Poor structures. They are generally self-explanatory and are thus provided without narrative.

Additional inventory information on bridges and large culverts:

- Chart 18 addresses SD Structures
- Chart 19 addresses SD NBI Structures on the NHS
- Chart 20 through Chart 23 address SD Structures by System

See Chart 14 and Table 9 for percentage of deck area of SD NBI Structures on the NHS by District

- Chart 24, Chart 25, Table 11, and Table 12 address SD Deck area of NBI structures on the NHS.

- Chart 27, Chart 28, Table 14, and Table 15 address SD Deck area

- Chart 29, Chart 30, Table 16, and Table 17 address Weight-Posted Deck Area

3.3.1 Progress Towards Virginia's SD Goals

Chart 18 - Percentage of SD Structures by District – All Systems

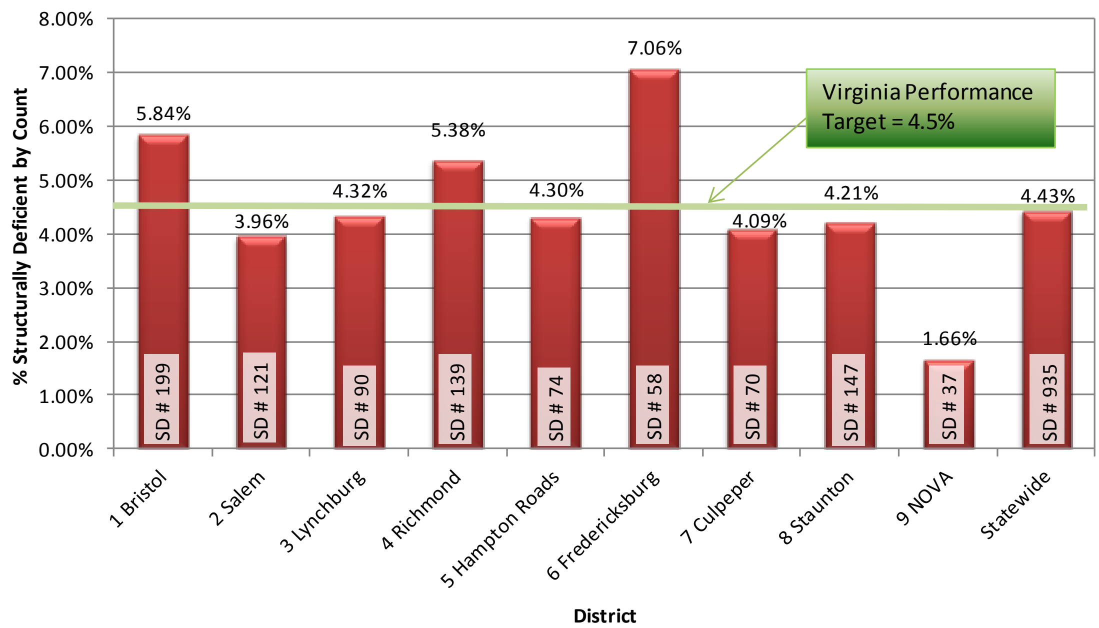


Chart 19 - Percentage of SD NBI Structures on the NHS by District

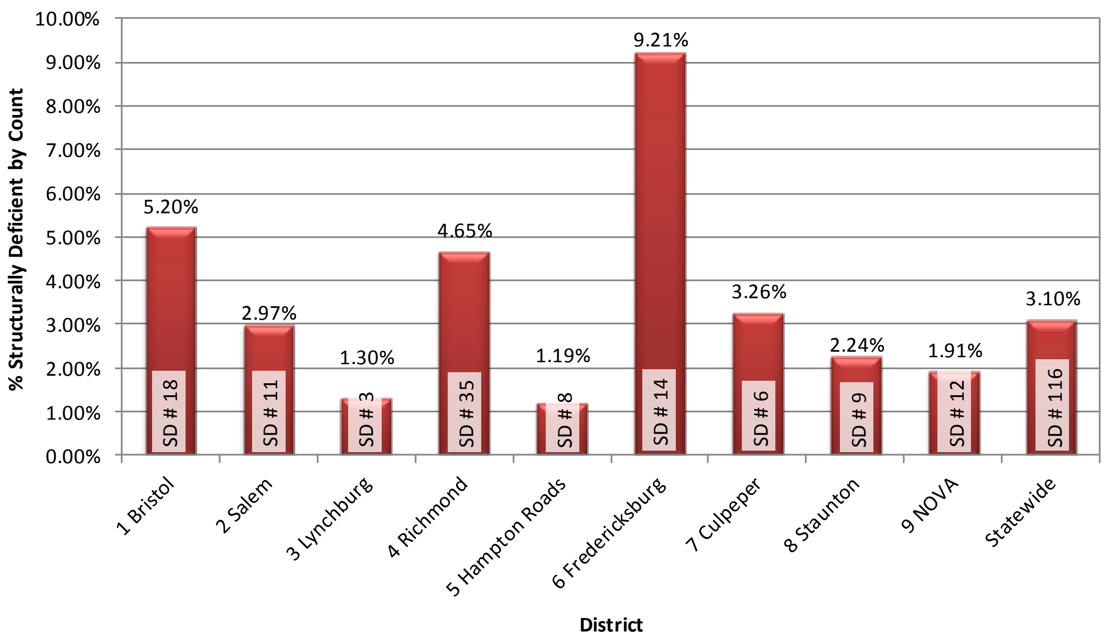


Chart 20 - Percentage of SD Structures on Interstate System by District

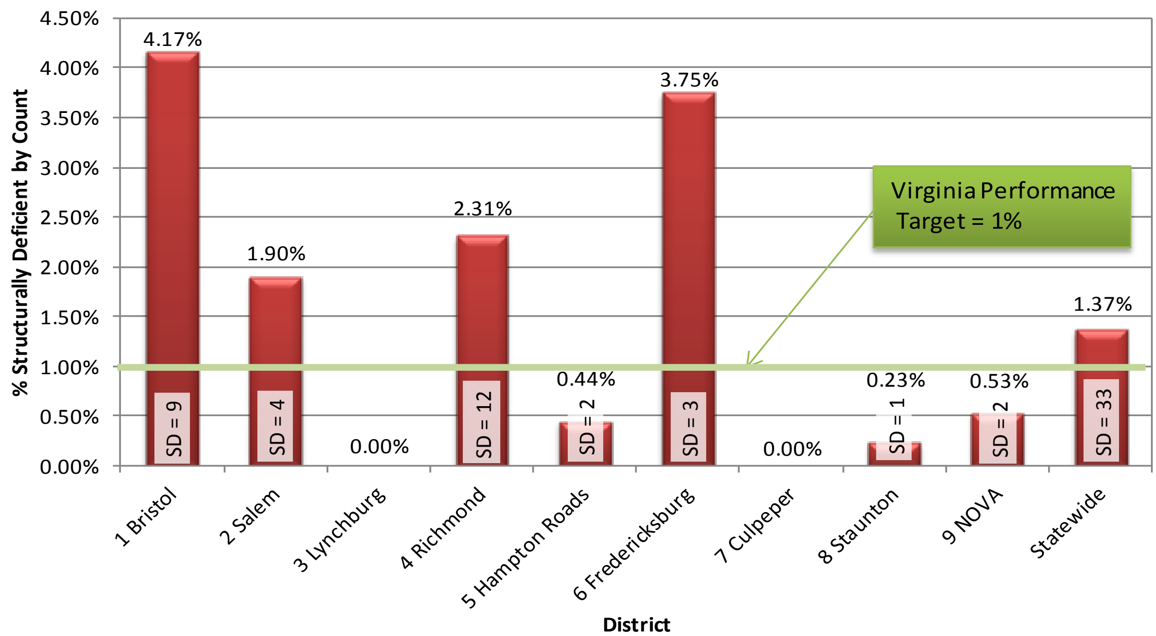


Chart 21 - Percentage of SD Structures on Primary System by District

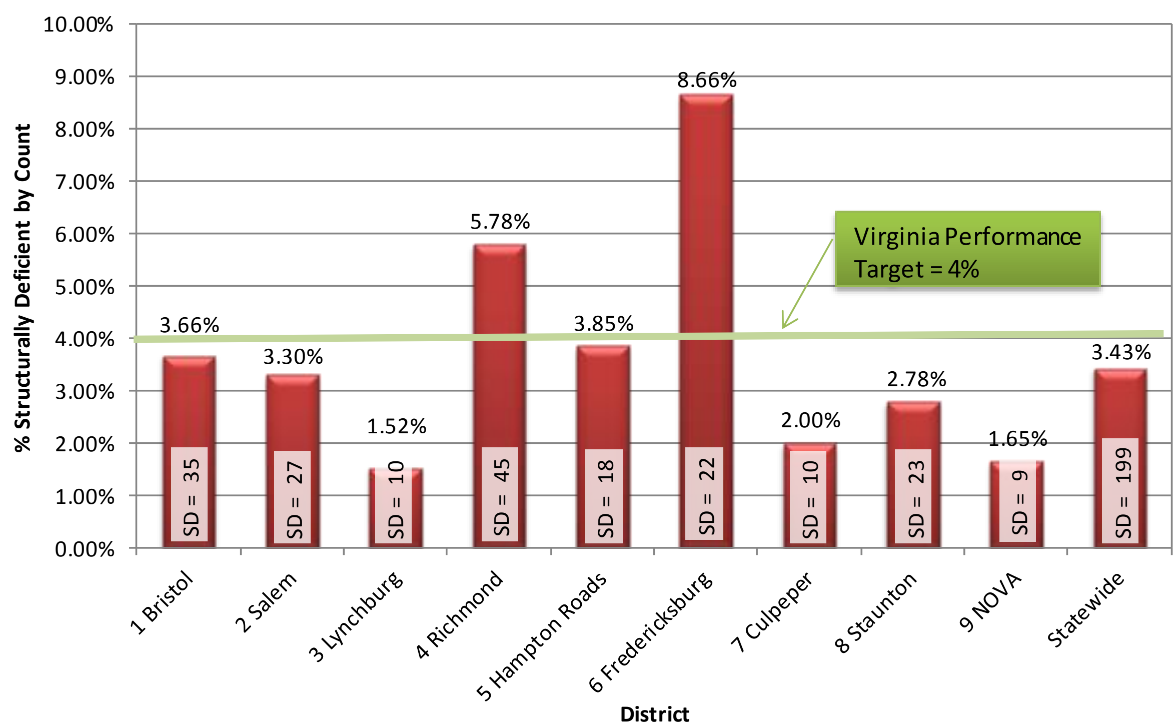


Chart 22 - Percentage of SD Structures on Secondary System by District

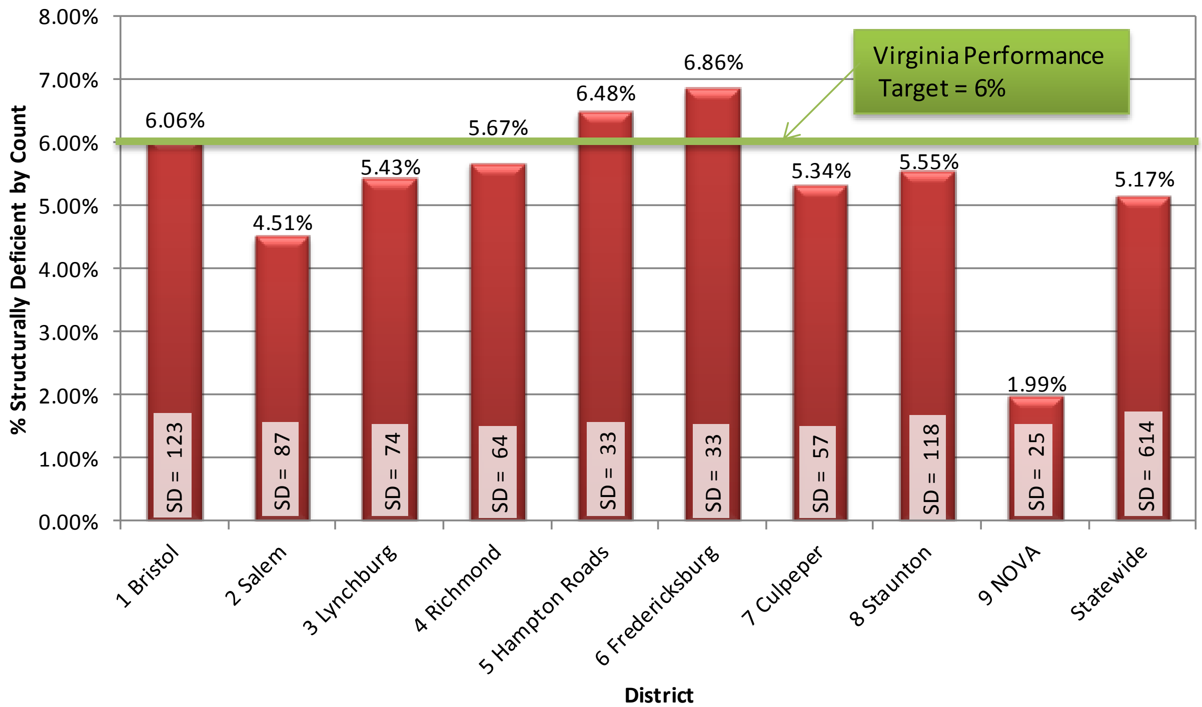
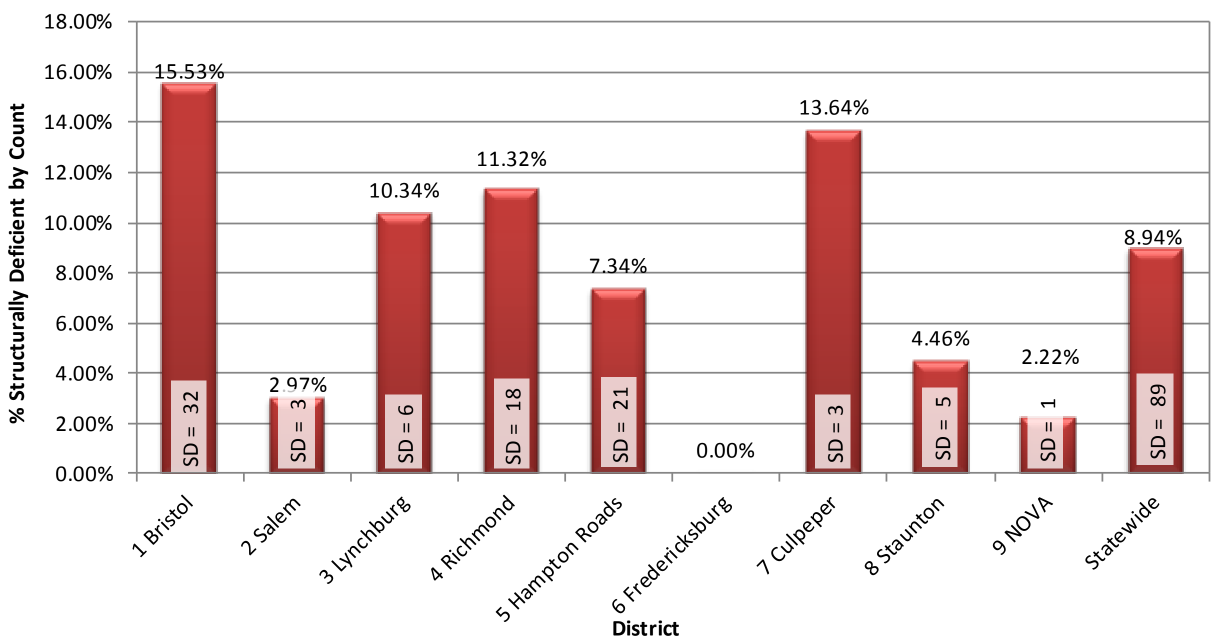


Chart 23 - Percentage of SD Structures on Urban System by District



3.3.2 Progress towards FHWA Goals

See Chart 14 and Table 9 for percentage of deck area of SD NBI Structures on the NHS by District

Chart 24 - Deck Area of NBI Structures on NHS by District

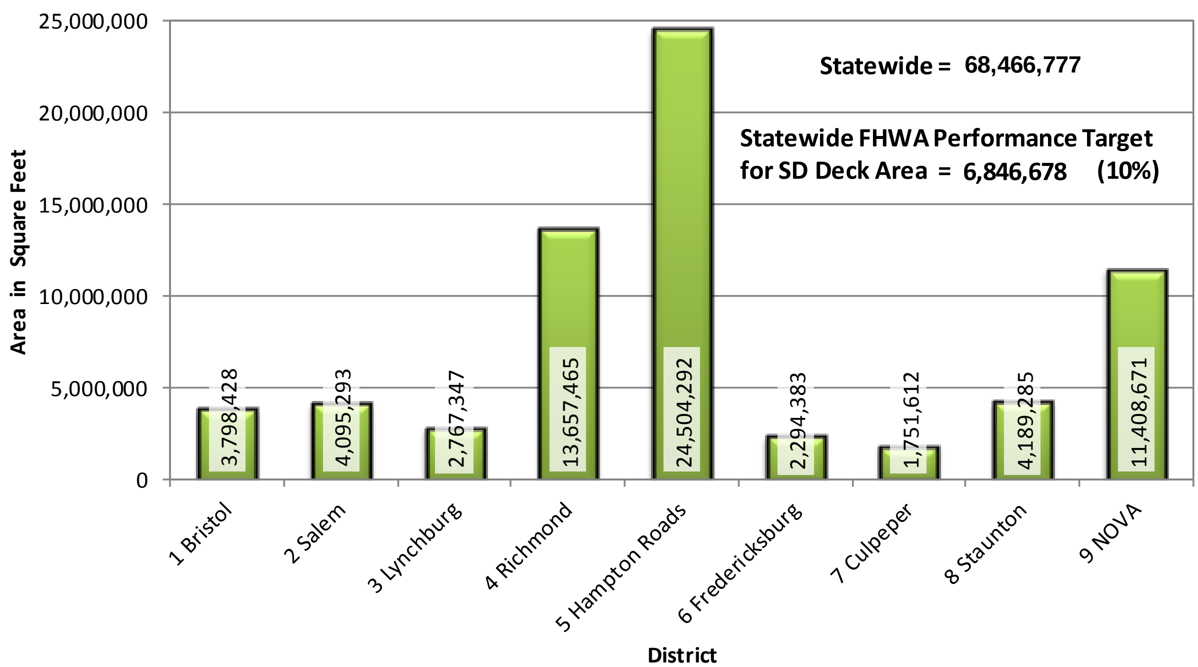


Table 11 - Deck Area of NBI Structures on NHS by District

District	Deck Area of NBI Structures on NHS (Square Feet)				
	Interstate	Primary	Secondary	Urban	Total
1 Bristol	1,645,839	2,113,008	35,244	4,337	3,798,428
2 Salem	1,471,204	2,593,244	15,481	15,364	4,095,293
3 Lynchburg	0	2,737,091	30,256	0	2,767,347
4 Richmond	6,050,534	7,256,451	280,762	69,718	13,657,465
5 Hampton Roads	10,631,033	12,405,096	61,126	1,407,037	24,504,292
6 Fredericksburg	518,382	1,703,167	36,151	36,683	2,294,383
7 Culpeper	905,459	811,728	21,508	12,916	1,751,612
8 Staunton	2,712,069	1,440,034	14,639	22,543	4,189,285
9 NOVA	5,935,332	5,000,595	472,744	0	11,408,671
Statewide	**29,869,853**	**36,060,412**	**967,913**	**1,568,599**	**68,466,777**

Chart 25 –Deck Area of SD NBI Structures on NHS by District

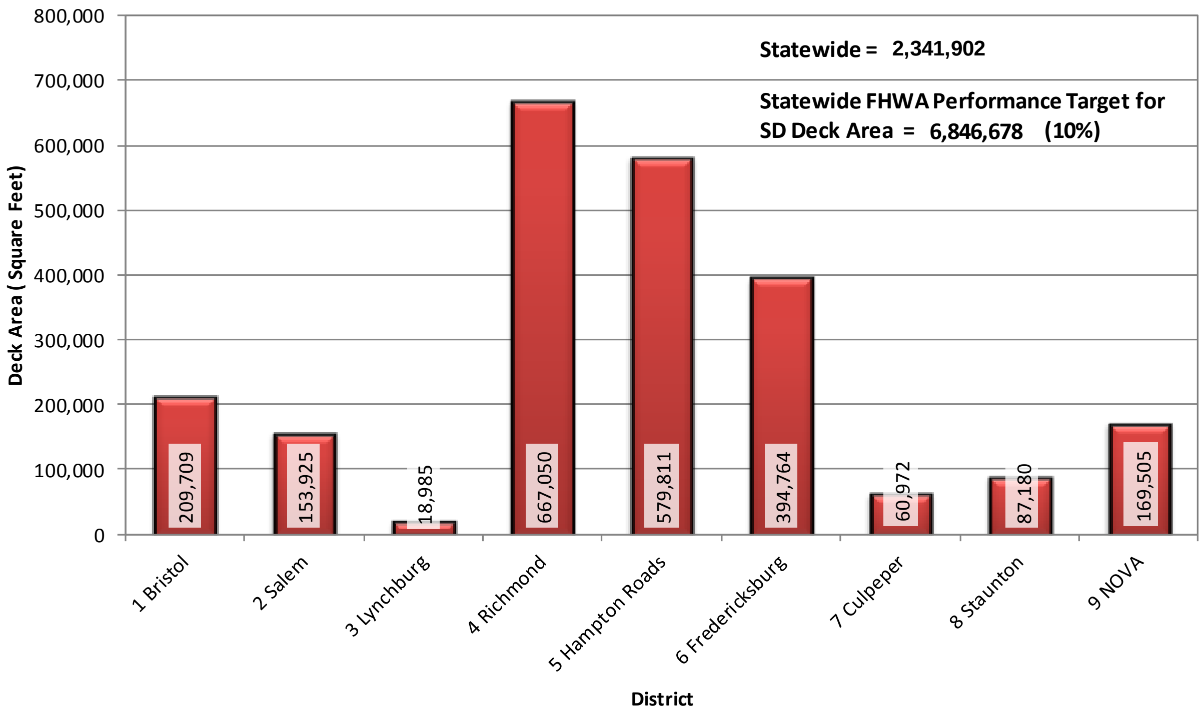


Table 12 –Deck Area of SD NBI Structures on NHS by District

District	Area of Structurally Deficient NBI Structures on NHS (Square Feet)				
	Interstate	Primary	Secondary	Urban	Total
1 Bristol	88,740	115,621	1,011	4,337	209,709
2 Salem	105,631	47,310	984	0	153,925
3 Lynchburg	0	18,985	0	0	18,985
4 Richmond	372,875	274,851	1,955	17,369	667,050
5 Hampton Roads	311,014	268,798	0	0	579,811
6 Fredericksburg	26,280	368,484	0	0	394,764
7 Culpeper	0	59,787	1,185	0	60,972
8 Staunton	8,614	77,898	668	0	87,180
9 NOVA	24,370	142,005	3,130	0	169,505
Statewide	937,523	1,373,739	8,933	21,707	2,341,902

3.3.3 Condition Data – SD Deck Area and Weight-Posted Structures

Chart 26 - Deck Area of NBI and Non-NBI Structures by District

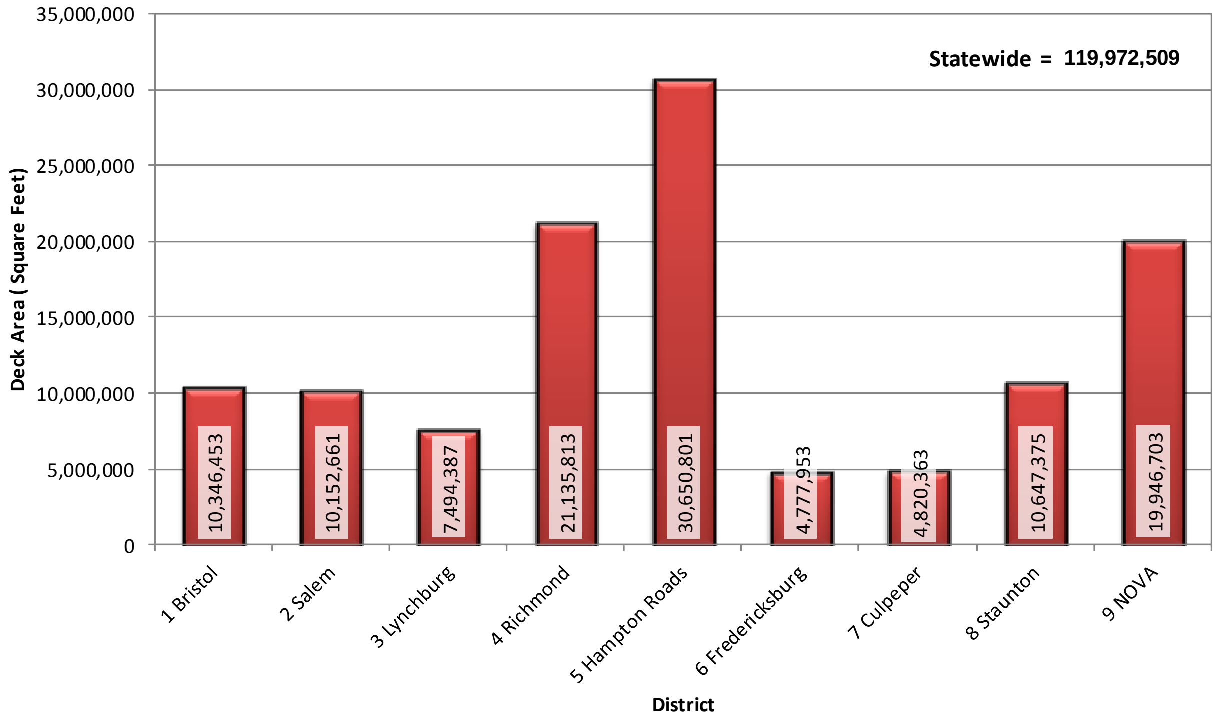


Table 13 - Deck Area of NBI and Non-NBI Structures by District

District	Area of Structurally Deficient Structures (Square Feet)				
	Interstate	Primary	Secondary	Urban	Total
1 Bristol	1,889,187	5,448,335	2,686,739	322,190	10,346,453
2 Salem	1,697,773	4,740,323	3,069,617	644,949	10,152,661
3 Lynchburg	0	4,567,675	2,553,603	373,109	7,494,387
4 Richmond	6,470,089	9,598,404	3,922,401	1,144,919	21,135,813
5 Hampton Roads	10,893,801	15,485,120	1,311,220	2,960,660	30,650,801
6 Fredericksburg	612,156	2,824,603	1,279,206	61,988	4,777,953
7 Culpeper	1,048,893	1,845,535	1,836,410	89,525	4,820,363
8 Staunton	3,217,193	3,697,708	3,231,025	501,449	10,647,375
9 NOVA	6,464,967	6,527,586	6,454,038	500,112	19,946,703
Statewide	**32,294,059**	**54,735,290**	**26,344,258**	**6,598,902**	**119,972,509**

Chart 27 - Deck Area of SD Structures by District

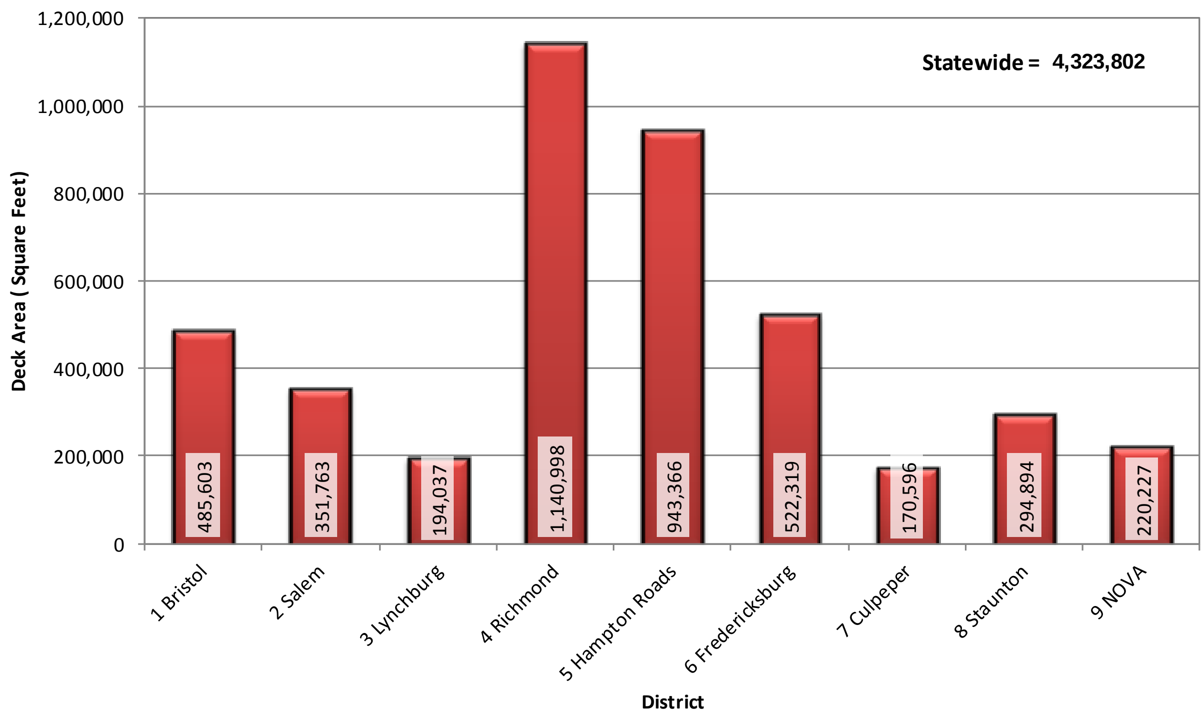


Table 14 - Deck Area of SD Structures by District

District	Area of Structurally Deficient Structures (Square Feet)				
	Interstate	Primary	Secondary	Urban	Total
1 Bristol	88,740	191,538	118,277	87,047	485,603
2 Salem	105,631	110,620	131,109	4,403	351,763
3 Lynchburg	0	81,517	95,471	17,049	194,037
4 Richmond	372,875	509,360	128,846	129,916	1,140,998
5 Hampton Roads	311,014	545,459	44,152	42,742	943,366
6 Fredericksburg	28,857	445,066	48,396	0	522,319
7 Culpeper	0	99,214	55,485	15,898	170,596
8 Staunton	8,614	128,380	139,988	17,912	294,894
9 NOVA	24,370	142,005	53,120	731	220,227
Statewide	**940,100**	**2,253,160**	**814,845**	**315,698**	**4,323,802**

Chart 28 - Percentage of SD Deck Area by District

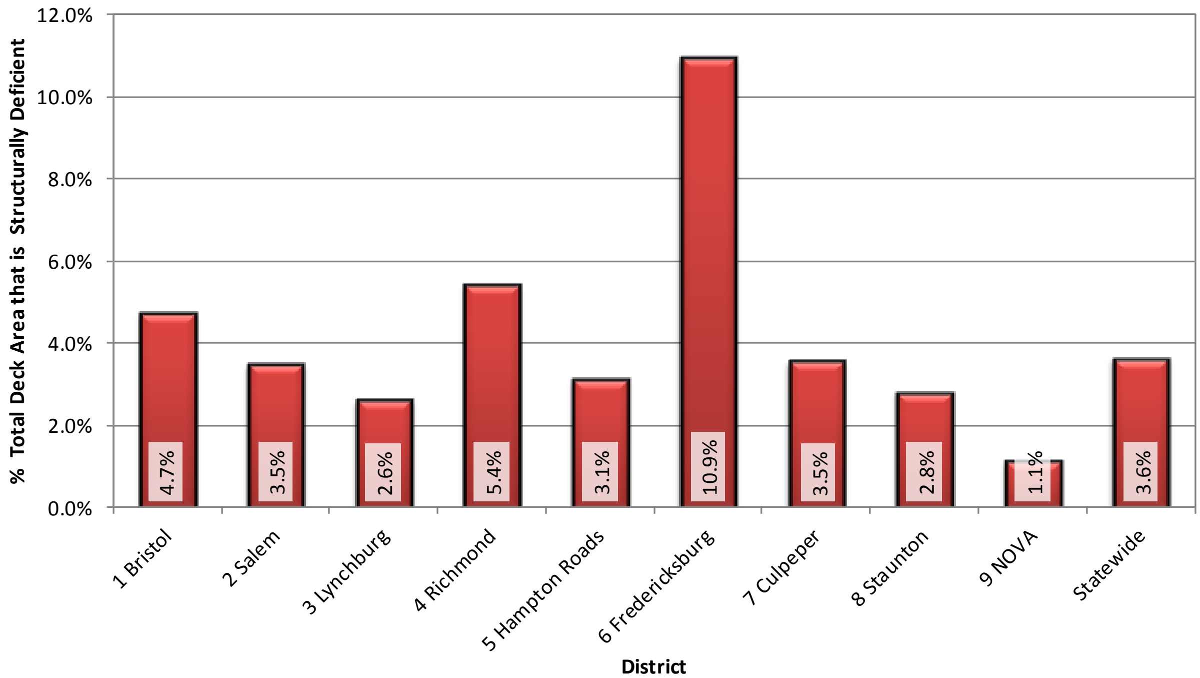


Table 15 – Percentage of SD Deck Area by District

District	Percentage of Structurally Deficient Deck Area				
	Interstate	Primary	Secondary	Urban	Total
1 Bristol	4.7%	3.5%	4.4%	27.0%	4.7%
2 Salem	6.2%	2.3%	4.3%	0.7%	3.5%
3 Lynchburg	0.0%	1.8%	3.7%	4.6%	2.6%
4 Richmond	5.8%	5.3%	3.3%	11.3%	5.4%
5 Hampton Roads	2.9%	3.5%	3.4%	1.4%	3.1%
6 Fredericksburg	4.7%	15.8%	3.8%	0.0%	10.9%
7 Culpeper	0.0%	5.4%	3.0%	17.8%	3.5%
8 Staunton	0.3%	3.5%	4.3%	3.6%	2.8%
9 NOVA	0.4%	2.2%	0.8%	0.1%	1.1%
Statewide	**2.9%**	**4.1%**	**3.1%**	**4.8%**	**3.6%**

Chart 29 - Deck Area of Weight-Posted Structures by District

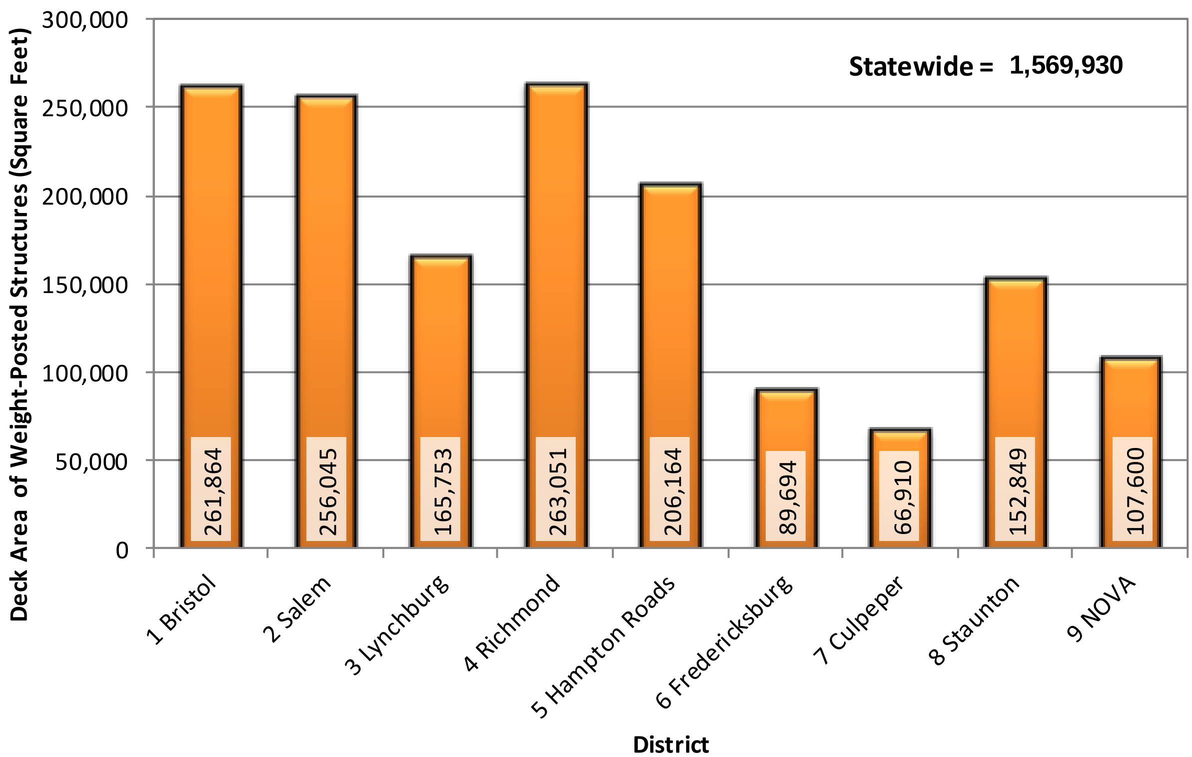


Table 16 - Deck Area of Weight-Posted Structures by District

District	Deck Area of Weight-Posted Structures (Square Feet)				
	Interstate	Primary	Secondary	Urban	Grand Total
1 Bristol	0	48,846	125,611	87,406	261,864
2 Salem	0	28,366	220,493	7,186	256,045
3 Lynchburg	0	34,447	127,596	3,711	165,753
4 Richmond	0	99,815	146,528	16,708	263,051
5 Hampton Roads	0	122,947	58,871	24,347	206,164
6 Fredericksburg	0	61,785	27,909	0	89,694
7 Culpeper	0	6,456	55,462	4,992	66,910
8 Staunton	0	7,425	135,301	10,122	152,849
9 NOVA	0	50,638	56,231	731	107,600
Statewide	**0**	**460,725**	**954,002**	**155,203**	**1,569,930**

Chart 30 - Percentage of Weight-Posted Deck Area by District

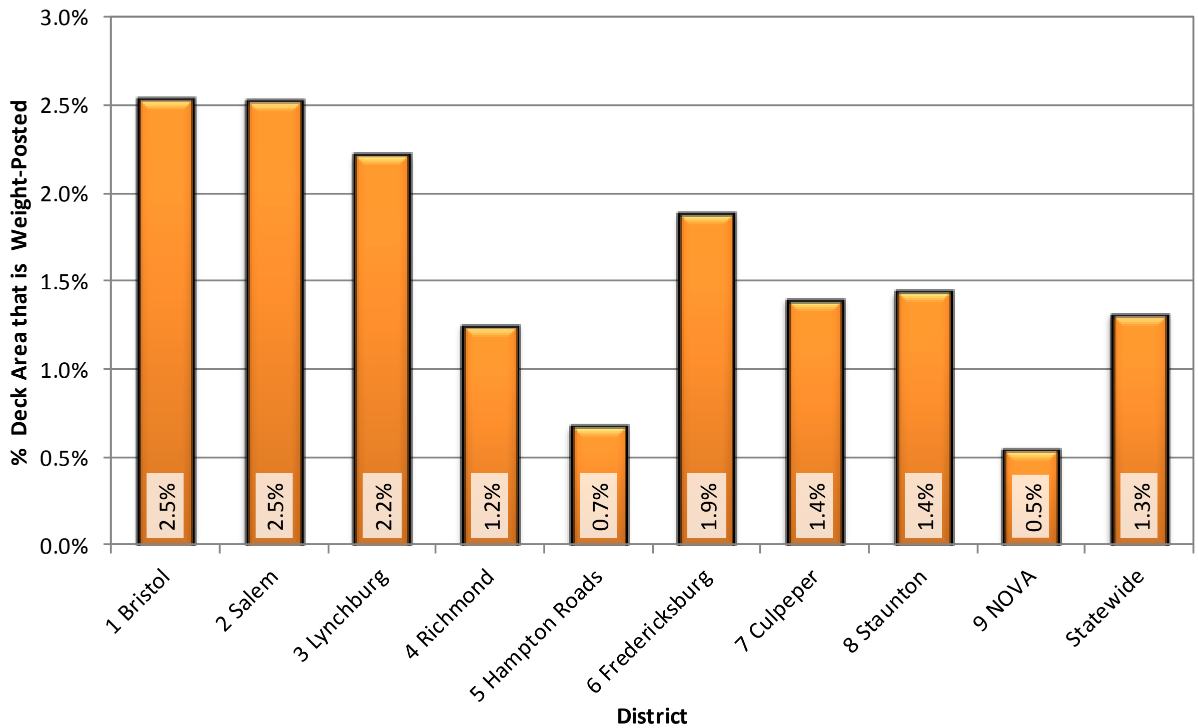


Table 17 - Percentage of Weight-Posted Deck Area by District

District	Percentage of Deck Area of Weight-Posted Structures (Square Feet)				
	Interstate	Primary	Secondary	Urban	Grand Total
1 Bristol	0.0%	0.9%	4.7%	27.1%	2.5%
2 Salem	0.0%	0.6%	7.2%	1.1%	2.5%
3 Lynchburg	0.0%	0.8%	5.0%	1.0%	2.2%
4 Richmond	0.0%	1.0%	3.7%	1.5%	1.2%
5 Hampton Roads	0.0%	0.8%	4.5%	0.8%	0.7%
6 Fredericksburg	0.0%	2.2%	2.2%	0.0%	1.9%
7 Culpeper	0.0%	0.3%	3.0%	5.6%	1.4%
8 Staunton	0.0%	0.2%	4.2%	2.0%	1.4%
9 NOVA	0.0%	0.8%	0.9%	0.1%	0.5%
Statewide	**0.0%**	**0.8%**	**3.6%**	**2.4%**	**1.3%**

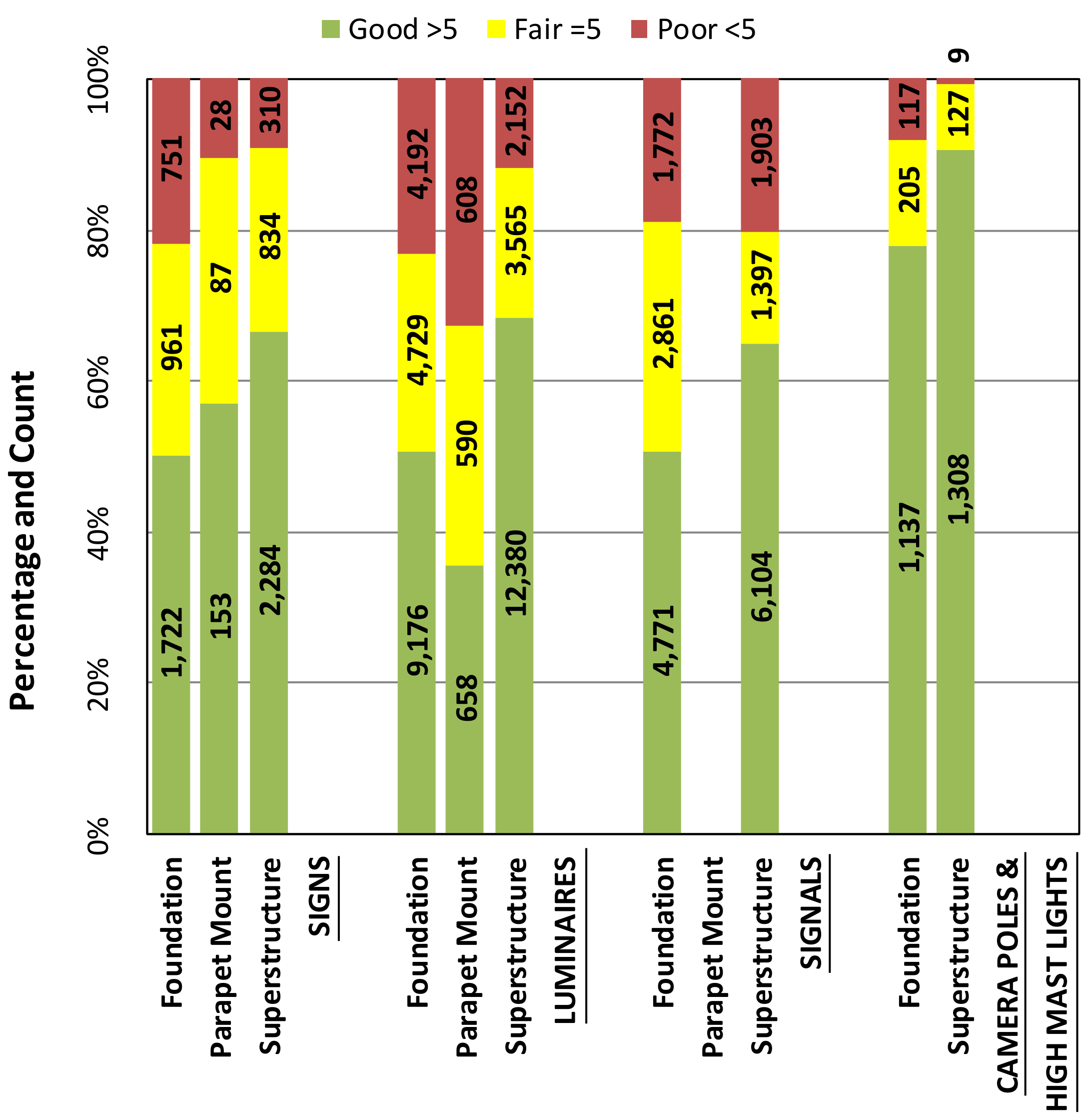
3.4 CURRENT CONDITIONS - ANCILLARY STRUCTURES

Conditions of Ancillary structures are summarized in Table 18 and Chart 31 below.

Table 18 - Ancillary Structures Minimum General Condition Rating by Structure Type

Structure Type	Condition Categories (No. of Structures)			Minimum General Condition Rating (%)		
	Good	Fair	Poor	Good	Fair	Poor
Signs	1,585	1,170	949	42.8%	31.6%	25.6%
Signals	3,701	2,527	3,176	39.4%	26.9%	33.8%
High Mast Lights and Camera Poles	1,076	266	119	73.6%	18.2%	8.1%
Luminaires	7,808	6,087	6,058	39.1%	30.5%	30.4%
Total	**14,170**	**10,050**	**10,302**	**41.0%**	**29.1%**	**29.8%**

Chart 31 - Statewide Ancillary Structure Condition by Asset Type



3.5 CONDITION TRENDS - GENERAL

Table 19 - Change in Number of SD Structures during FY2017

District	Number of Structurally Deficient Structures		
	End of FY2016	End of FY2017	Change
1 Bristol	236	199	-15.7%
2 Salem	150	121	-19.3%
3 Lynchburg	110	90	-18.2%
4 Richmond	172	139	-19.2%
5 Hampton Roads	74	74	0.0%
6 Fredericksburg	69	58	-15.9%
7 Culpeper	80	70	-12.5%
8 Staunton	185	147	-20.5%
9 NOVA	40	37	-7.5%
Statewide	**1,116**	**935**	**-16.2%**

Table 20 - Change in Number of SD Structures during FY2017

District	Reduced No. of SD Structures			New SD Structures	Net Change
	Restored	Closed	Removed		
1 Bristol	-40	-4	-5	+12	-37
2 Salem	-32	-7	-3	+13	-29
3 Lynchburg	-30	-1	-2	+13	-20
4 Richmond	-36	-6	-2	+11	-33
5 Hampton Roads	-13	-8	0	+21	0
6 Fredericksburg	-12	-4	0	+5	-11
7 Culpeper	-11	-3	-2	+6	-10
8 Staunton	-38	-4	-5	+9	-38
9 NOVA	-9	0	0	+6	-3
Statewide	**-221**	**-37**	**-19**	**+96**	**-181**

Chart 32 - Percentage of SD Structures - Recent Trends for Interstate System

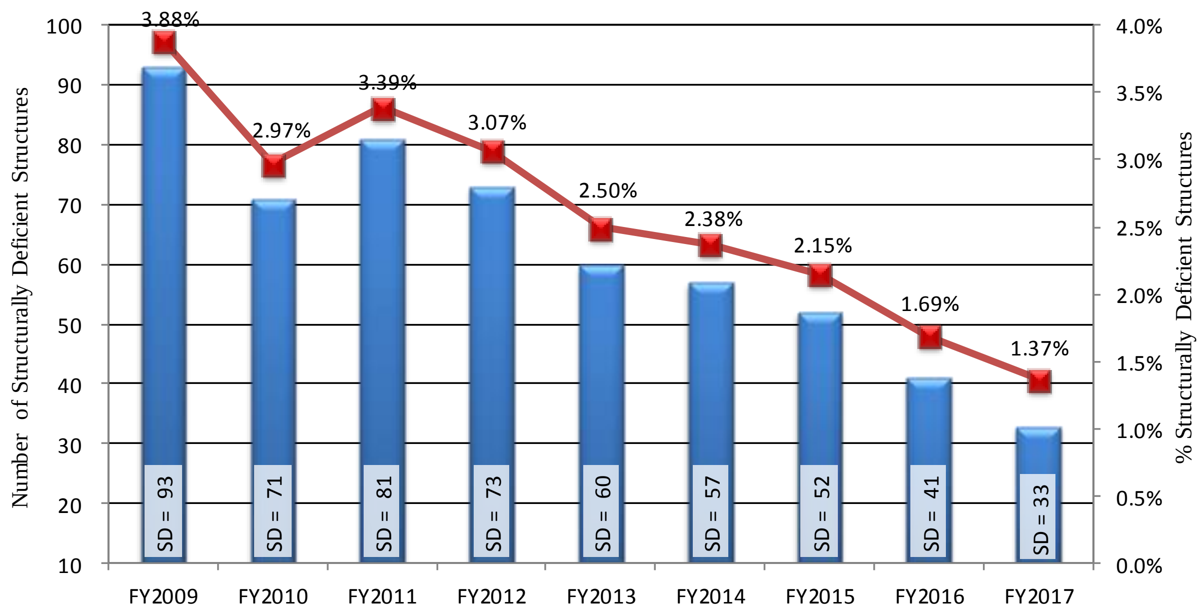


Chart 33 - Percentage of SD Structures - Recent Trends for Primary System

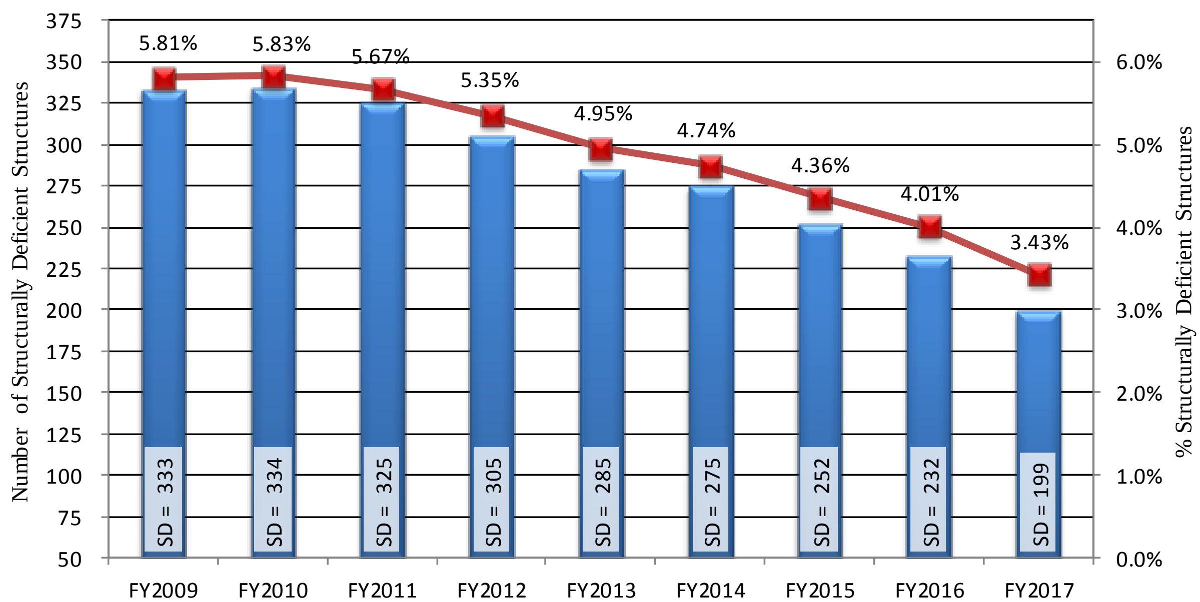


Chart 34 - Percentage of SD Structures - Recent Trends for Secondary System

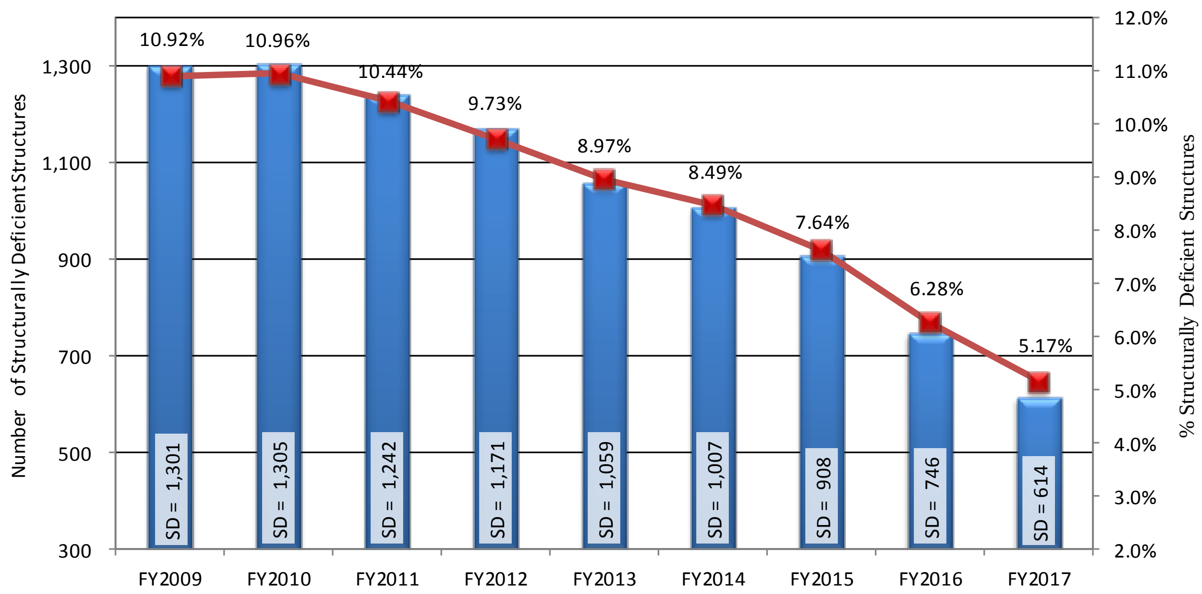
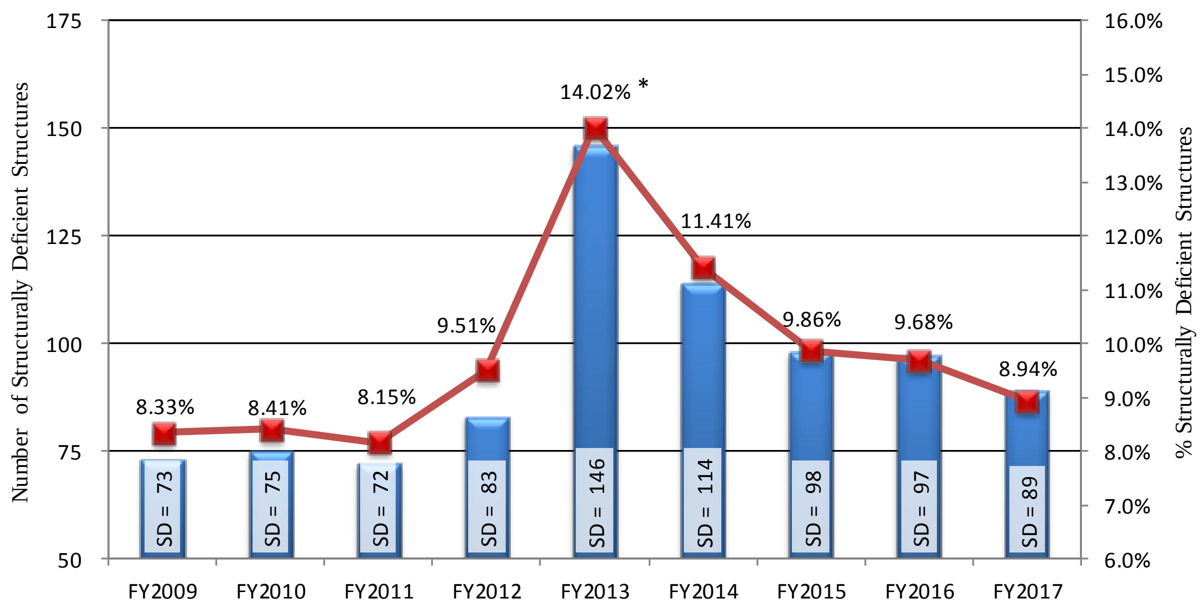
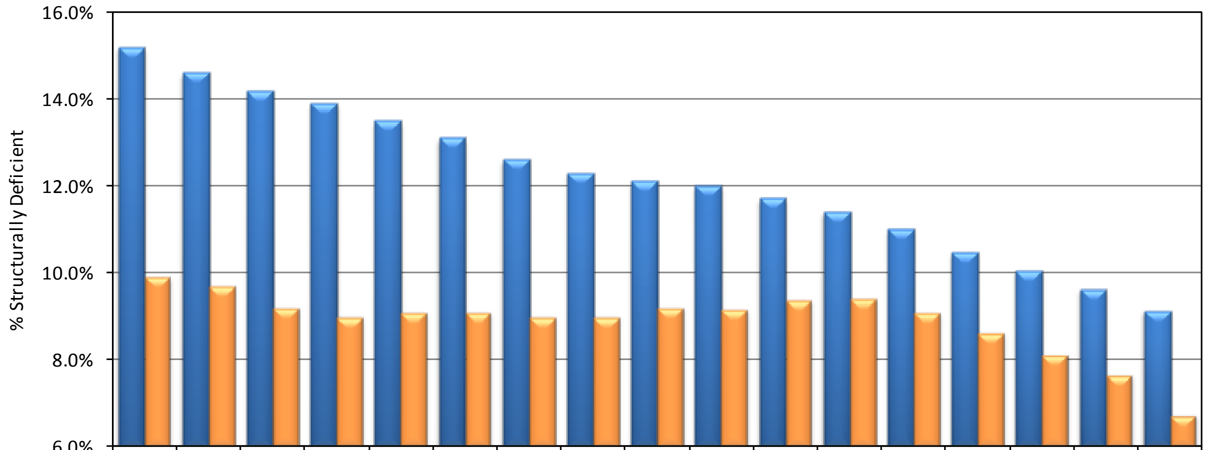


Chart 35 - Percentage of SD Structures - Recent Trends for Urban System



**A large number of SD structures were added in Buchanan County in 2013.*

Chart 36 - Comparing Virginia's NBI SD Structures to the National Average



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
National	15.2%	14.6%	14.2%	13.9%	13.5%	13.1%	12.6%	12.3%	12.1%	12.0%	11.7%	11.4%	11.0%	10.5%	10.0%	9.6%	9.1%
Virginia	9.9%	9.7%	9.2%	9.0%	9.1%	9.1%	9.0%	9.0%	9.2%	9.2%	9.4%	9.4%	9.1%	8.6%	8.1%	7.7%	6.7%

** Data in chart are from FHWA's database and include structures owned by agencies outside of the control of the Commonwealth of Virginia (Federally and Privately-owned, etc.).*

4 Delivery of the Maintenance and Construction Programs

4.1 Maintenance (Bridge Crews & Contracts)

4.1.1 State Force Bridge Crews

Each of VDOT's districts has two or more maintenance crews whose primary function is to maintain state-owned bridges and large culverts. They are supplemented by hired equipment operators to assist in their work. The type of work they perform varies from preventive maintenance to complete replacement of smaller structures. The types of activities performed are indicated in Table 21:

Table 21 - Activities Performed by VDOT's Bridge Crews

Type of Work	Typical Activities performed
Preventive Maintenance	Deck sweeping, deck washing, beam end washing, deck patching, sealing cracks, thin overlays, joint rehabilitation, culvert cleaning, and vegetation removal.
Restorative Maintenance	Overlays, rail repair, superstructure repairs, substructure repairs, bearing repairs, painting, culvert repairs
Rehabilitation	Deck and superstructure replacement, major repairs to substructures and large culverts
Replacement	Complete bridge and large culvert replacement
Other	Special purchases of equipment or materials

Bridge crews are able to rapidly and effectively respond to the needs of the bridge inventory, with particular focus on the secondary system. Table 22 indicates the number of crews and crew members in each district. Accomplishments and expenditures by bridges crews are reported in Table 23.

Table 22 - VDOT's Bridge Maintenance Crews

District	VDOT State Force Bridge Crews	
	No. Crews	Total Members
Bristol	6	39
Salem	6	39
Lynchburg	4	30
Richmond	4	32
Hampton Roads	5	29
Fredericksburg	2	16
Culpeper	3	23
Staunton	5	37
NOVA	3	21
Statewide	**38**	**266**

Table 23 – FY2017 Accomplishments of VDOT's Bridge Maintenance Crews

District	Preventive		Restorative		Rehabilitation			Replacement			Other	State Force Expenses			Funds Allocated
	No.	Amount	No.	Amount	No.	No. SD	Amount	No.	No. SD	Amount	Amount	No.	No. SD	Amount	
1 Bristol	1,400	$1,561,000	158	$667,000	22	20	$1,615,000	3	3	$109,000		1,583	23	$3,952,000	$4,200,000
2 Salem	639	$1,197,844	202	$1,488,733	28	15	$1,319,688	5	5	$426,688		874	20	$4,432,953	$6,325,449
3 Lynchburg			5	$220,000	8	8	$918,000	20	19	$6,214,100		33	27	$7,352,100	$7,347,392
4 Richmond	344	$2,013,347	71	$1,736,017	7	7	$636,109	3	3	$1,653,246		425	10	$6,038,719	$7,288,508
5 H. Roads		$1,432,088		$1,189,326			$584,161			$205,950		0	0	$3,411,525	$7,476,479
6 F'burg	41	$175,000	16	$900,000	8	7	$830,000	4	4	$1,600,000		69	11	$3,505,000	$3,700,000
7 Culpeper	300	$1,000,000	100	$500,000	18	18	$2,500,000	3	3	$800,000	$313,784	421	21	$4,800,000	$4,581,198
8 Staunton	110	$360,000	5	$160,000	18	13	$2,135,000	14	9	$2,500,000	$402,700	147	22	$5,155,000	$6,120,000
9 NOVA		$880,031		$948,214			$618,832			$613,497	$693,931	0	0	$3,754,505	$3,607,000
Statewide	**2,834**	**$8,619,310**	**557**	**$7,809,290**	**109**	**88**	**$11,156,790**	**52**	**46**	**$14,122,481**	**$1,410,415**	**3,552**	**134**	**$42,401,802**	**$50,646,026**

4.1.2 Contracts

In addition to using state-force bridge crews, VDOT partners with private industry to deliver its bridge maintenance program. There are several types of contracts that VDOT districts employ to accomplish bridge maintenance work:

- **Task-order consultant contracts for design of bridge rehabilitation projects:** VDOT has a group of qualified professional engineering consultants who are called upon to provide design, construction support and engineering expertise as required
- **On-call maintenance contracts:** VDOT uses indefinite quantity contracts with specific unit prices to perform bridge maintenance, repair, and preservation work through task orders. These contracts may be general in nature, encompassing a wide variety of work, or they may be more specific, targeting narrower areas of contractor expertise such as painting or traffic control. On-call contracts are usually district-based or regional.
- **Hired equipment contracts:** Many VDOT bridge offices use hired equipment contracts to provide equipment on an as-needed basis. These contracts are often limited to one or two counties within a particular district.
- **Material purchase contracts:** VDOT has several statewide contracts for materials such as lug bolts and precast concrete slabs. These contracts tend to provide better pricing by increasing volume. They also provide districts with ready access to materials without individual procurements, thus reducing administrative burden.

4.2 INSPECTION, LOAD RATING AND PERMITTING

4.2.1 Bridge and Ancillary Structure Inspection

VDOT uses its comprehensive inspection program to evaluate and monitor the conditions of its structures. The data collected during inspections is used as the primary source of information for determining maintenance, repair and replacement needs. NBI structures and non-NBI bridges receive detailed inspections at regular intervals not exceeding 24 months. Non-NBI large culverts are inspected at intervals not exceeding 48 months.

Inspectors use condition ratings to describe each existing structure. As detailed previously, these condition ratings are based on FHWA criteria. The condition assessments of the structures are performed by qualified inspectors, and all assessments are performed in accordance with the National Bridge Inspection Standards (NBIS) as well as VDOT's policies and procedures. VDOT's inspection procedures and requirements are detailed in VDOT's Current Instructional and Informational Memorandum IIM-S&B-27 and the NBIS requirements in the Code of Federal Regulations.

The structure (bridge and large culvert) safety inspection program provides the basis for most of Virginia's maintenance and bridge management decisions. In FY2017, VDOT inspected 10,781 bridges/large culverts at an expense of $31.2 million, utilizing in-house inspection staff and consultant contracts. Also, VDOT inspected 8,732 ancillary structures at an expense of $7.6 million. In addition to in-house staff, VDOT uses consultants to perform inspections on highway structures and ancillary structures. There are a total of 20 consultant contracts as follows: 17 for bridge and large culvert Inspection; One statewide underwater inspection contract; and two contracts for load rating. Table 24 shows VDOT's inspection practices for inspection frequency compared to the NBIS. Table 25 shows the number of bridge, large culvert and ancillary structure inspections conducted by each district.

NBI bridges owned by other Virginia entities (localities, toll authorities, etc.) must follow the minimum requirements for bridge safety inspection established by the NBIS.

In addition to GCRs, VDOT inspectors collect and record detailed structural element data, which is used in the operation of its Bridge Management System (BMS). The BMS information is used to determine current and future maintenance and preservation needs of the structures.

VDOT's ancillary structure inspection procedures and requirements are detailed in VDOT's current Instructional and Informational Memoranda IIM-S&B-82 and IIM-S&B-90, and VDOT's "Traffic Ancillary Structures Inventory and Inspection Manual."

VDOT utilizes a new, commercial inventory and inspection software system to maintain data on its ancillary structures. Inspections of the ancillary structures are usually performed on a four year cycle, but the required inspection interval varies depending on the purpose, condition, and type of the structure. At the time of each inspection an inspector assigns condition ratings to describe each of the major structural components of each structure. These condition ratings are based on criteria similar to those defined by FHWA for the bridge inspection criteria. The condition assessments of the structures are performed by qualified inspectors and assessments are performed in accordance with VDOT's policies and procedures.

The inspection reports list repair recommendations for each structure. At the time of inspection the inspectors utilize their experience and judgment to determine the immediacy of the need for maintenance and to prioritize the recommended repairs accordingly. Many of VDOT's inspectors have completed FHWA's NHI training course "Inspection and Maintenance of Ancillary Highway Structures" and draw on this training when performing inspections.

Table 24 - Inspection Practices

Structure Type	Frequency of Inspections	
	NBIS	VDOT*
Bridges	2 Years	2 Year or 1 Year (SD or Posted)
Culverts	2 Years	2 Year (NBI) or 4 Year (Non-NBI)
Fracture Critical Structures	2 Years	1 Year
Fatigue Prone Detail	2 Years	1 or 2 Years
Underwater	5 Years	5 Years
Sign Structures	No Requirement	2 - 6 Years
Signal Structures	No Requirement	4 Years
Highmast Light Poles	No Requirement	2 - 4 Years
Camera Poles	No Requirement	4 Years
Luminaires	No Requirement	4 Years

**District Structure and Bridge Engineers may choose to inspect structures more frequently based on the conditions found during the inspections.*

The accuracy, thoroughness, and completeness of the bridge safety inspections are essential. The inspections are used to evaluate each structure's safety and are used for decisions on planning, budgeting, and performance of maintenance, repair, rehabilitation, and replacement of our structures. Since 1991, it has been the policy of VDOT's Structure and Bridge Division to provide rigorous quality control and quality assurance (QC/QA) of the structure safety inspection program. In January 2005, the NBIS portion of the Code of Federal Regulations was amended to require each state to "Assure systematic quality control and quality assurance procedures are used to maintain a high degree of accuracy and consistency in the inspection program. The QA program includes periodic field review of inspection teams, periodic bridge inspection refresher training for program managers and team leaders, and independent review of inspection reports and computations." The Structure and Bridge Division meets these NBIS requirements with its quality control and quality assurance programs.

Table 25 - Number of Inspections in 2017 Fiscal Year

District	Number of Inspections						
	Bridges		Large Culverts		Ancillary		Total No. Structures
	No.	Percent	No.	Percent	No.	Percent	
1 Bristol	1,326	18%	435	12%	112	1%	1,873
2 Salem	1,071	15%	573	16%	896	10%	2,540
3 Lynchburg	683	9%	294	8%	546	6%	1,523
4 Richmond	858	12%	511	15%	1,615	18%	2,984
5 Hampton Roads	679	9%	177	5%	1,334	15%	2,190
6 Fredericksburg	249	3%	199	6%	595	7%	1,043
7 Culpeper	567	8%	277	8%	45	1%	889
8 Staunton	1,259	17%	651	19%	232	3%	2,142
9 NOVA	575	8%	397	11%	3,357	38%	4,329
Total	**7,267**	**100%**	**3,514**	**100%**	**8,732**	**100%**	**19,513**

In 2008, VDOT S&B developed Information and Instruction Memorandum (IIM) IIM-S&B-78, describing the bridge safety inspection QC/QA program which requires the following: In accordance with the NBIS, program managers and team leaders must successfully complete an FHWA approved comprehensive bridge inspection training course; within VDOT, all bridge safety inspection personnel will successfully complete the National Highway Institute (NHI) course 'Safety Inspection of In-Service Bridges' (FHWA-NHI-130055) within the first five years of employment in bridge inspection; VDOT S&B also requires inspection personnel successfully complete the NHI course 'Bridge Inspection Refresher Training' every five years; underwater inspectors are required to fulfill the training requirements as set forth in the NBIS and the VDOT 'Dive Safety Manual'.

Both the Central Office and the districts have a responsibility to review and validate inspection reports and inventory data. Discrepancies found during the field and office reviews performed by the both district and Central Office personnel are documented in a written report and shared with all parties involved. The Central Office conducted an annual QA review on eight of the nine district bridge inspection programs. Review of load ratings for a sample of bridges was a key component of the QA reviews. In addition, underwater inspection QA/QC field reviews are scheduled by the Central Office Underwater Inspection Engineer. Underwater inspection QA/QC was performed on eight structures.

The Federal Highway Administration (FHWA) conducted its annual NBIS compliance review from April 1, 2016 to March 30, 2017 with a draft report provided on December 31, 2016. VDOT had 45 days to address any deficiencies that were identified. The compliance review consisted of a review of the statewide inventory/database/organization/procedures for structure (bridge and large culvert) safety inspections and a QA review of a sample of structure records and structure field reviews of the Hampton Roads District. The review found VDOT to be in compliance with all 23 NBIS metrics. The Department is establishing a QA/QC program for ancillary structures and tunnels similar to the one currently in place for structure (bridge and large culvert) inspections.

In August 2015, FHWA issued the National Tunnel Inspection Standards (NTIS), after which VDOT S&B created a tunnel inspection program to implement the NTIS in Virginia. Policies and procedures for tunnel inspection, including specific inspection manuals for each tunnel, are being developed. Initial inspections were performed for eight tunnels in FY2017. Two existing consultant contracts for tunnel engineering have been used to implement the program.

4.2.2 Load Rating

Structures are designed and constructed to support theoretical design loads. The design procedures are governed by national standards issued by the American Association of State Highway and Transportation Officials (AASHTO) and other state specific guidelines.

Once a bridge is constructed and put in service, load rating analyses are performed when changes in the condition of the structure are noted during inspections. The findings from the inspection are used to update the bridge model to establish its current capacity. This is completed for AASHTO standard design loads, legal loads, and other standard loads that assist in administrating the permitting program. All of VDOT's in-service structures are load rated using nationally adopted AASHTO Standards, in compliance with the National Bridge Inspection Program, and the 23 Metrics used to evaluate the program. Each bridge is assigned a safe capacity for the anticipated configurations of trucks that will use the structure.

4.2.3 Permitting

VDOT provides engineering services to the DMV on the issuance of "superload" hauling permits (for very heavy vehicles). In reviewing the superload permit applications, VDOT staff convert the vehicle's axle configuration, load, and spacing to an *equivalent operating rating* (EOR) for the AASHTO standard design vehicle. This EOR can be compared to the operating load rating of the structure. The operating rating for the design vehicle is defined as the maximum infrequent load that a structure can sustain between scheduled inspections.

Certain haulers are issued "blanket superload permits", and such blanket permits are provided with a list of structures they cannot cross corresponding to the EOR of their vehicle. The provided lists vary from an EOR of 36 tons (approximately 200 restricted structures) to an EOR of 49 tons (approximately 1600 restricted structures). These lists are updated on quarterly basis to account for any change in the bridge inventory and current condition of the bridges. The 49 ton weight limit corresponds to the maximum safe operating load rating of what is known as the "AASHTO standard vehicle".

Any vehicle with an EOR exceeding 49 tons is denied a superload blanket permit and must apply for a superload single trip permit which is route-specific. Each route specific permit requires a more in-depth review of the specific structures the vehicle will cross. The route-specific superload application is a more rigorous process than the blanket superload. When the EOR of the vehicle exceeds the operating rating of a specific structure for a superload single trip permit, the vehicle is given a restriction or denied passage over it.

4.3 CONSTRUCTION

Virginia's highway construction program is divided into major component programs known as "SMART SCALE" and "State of Good Repair". Both programs emphasize transparency and use formulas based on objective data for project selections. At the most general level, SMART SCALE projects are intended to improve congestion, safety, accessibility, land use, economic development, and the environment, while State of Good Repair (SGR) projects are limited to repair, restoration or replacement of deficient bridges and pavements. The SGR program is now the most significant source of construction funds for SD/Poor bridges in Virginia.

The Commonwealth Transportation Board approved the SGR prioritization and fund distribution processes on June 14, 2016 with the resolution shown in the link below:

http://www.ctb.virginia.gov/resources/2016/june/reso/Resolution1.pdf

There are currently 186 bridges in the SGR program. The list of SGR bridges in Virginia's Six Year Improvement Program (SYIP) is provided in Table E. 1 and Table E. 2 in Appendix E.

4.4 TECHNOLOGY AND INNOVATION (TECHNIQUES & MATERIALS)

Virginia has been widely recognized as a leader in the development and successful implementation of new technologies, techniques and materials for use in new and existing bridges. This history of innovation has been used to make our bridges more durable, safer, and less expensive to build. There are many elements contributing to this success, but the most prominent are the two factors indicated below:

- **The Virginia Transportation Research Council (VTRC):** This organization works with VDOT's Structure and Bridge Division, the Materials Division and the nine districts to solve problems in the most practical manner. The results have been extraordinary.
- **Collaboration:** VDOT, Virginia's localities, and many of the state's universities work together to perform targeted, solution-driven research. There are nine "Research Advisory Committees" that hold semi-annual meetings, bringing together the users and developers of technology to help keep the research focused and progressing. This cooperation keeps Virginia on the cutting edge of bridge technology.

Virginia's culture of innovation has resulted in significant improvements to the bridge program, as can be seen from the list below, which highlights some of the most notable advances:

- Corrosion resistant reinforcement in 2009*
- Jointless bridge technology for new bridges in 2011*
- Continuous spans for new bridges starting in the 1970's
- High Performance Concrete in all bridge elements in 2003*
- Three coat zinc-based paint in 1982 *
- Self-consolidating concrete for drilled shafts
- Latex modified concrete deck overlays (milling only) starting in the 1970s
- Epoxy deck overlays starting in the 1970s
- Low-shrinkage, low-cracking, concrete in decks in 2015
- Latex modified concrete overlays (the addition of hydrodemolition to milling) in 2015
- Carbon fiber prestressing strands in prestressed concrete piles in 2017
- Stainless steel prestressing strands in concrete piles in 2017
- * Year of full implementation

In the near future, the Structure and Bridge Division will be placing greater emphasis on the following materials and actions to further improve the durability of its structures:

- Corrosion-resistant structural steel (A1010)
- Virginia abutment member connections for prestressed concrete voided slabs and box beams
- Hydrodemolition for patches and refacing of substructures
- Increased use of joint elimination when repairing and rehabilitating bridges
- Use of materials for large culverts that have shown good past performance
- Lightweight concrete
- Elastomeric Concrete Plug Joints (Implementation project currently under way)
- Self-consolidating concrete for substructure surface repairs

A large portion of the inventory was constructed using older technology and materials and is approaching the last years of anticipated service life. This period can be extended through planned preventative maintenance, restorative maintenance, major rehabilitation, and the strategic use of better materials. Continued innovation and technological advancement helps Virginia meet this challenge.

APPENDIX A – ADDITIONAL INVENTORY INFORMATION

Additional inventory information on bridges and large culverts:

- Table A. 1 - through Table A. 8 and Chart A. 1 through Chart A. 3 provide counts of the number of bridges and large culverts
- Table A. 3 and Table A. 4 address NBI structures
- Table A. 5 and Table A. 6 address Non-NBI structures
- Table A. 7 and Table A. 8 address NBI structures on the NHS
- Chart A. 1 through Chart A. 3 show the average age of structures by system and district

Table A. 1 - Total Number of Bridges by District

District	Number of Bridges				
	Interstate	Primary	Secondary	Urban	Total
1 Bristol	136	547	1,555	189	2,427
2 Salem	113	487	1,341	72	2,013
3 Lynchburg	0	364	799	40	1,203
4 Richmond	281	487	673	99	1,540
5 Hampton Roads	337	350	310	216	1,213
6 Fredericksburg	23	143	217	6	389
7 Culpeper	71	258	677	11	1,017
8 Staunton	205	506	1,366	66	2,143
9 NOVA	257	338	549	17	1,161
Statewide	**1,423**	**3,480**	**7,487**	**716**	**13,106**

Table A. 2 - Total Number of Large Culverts by District

District	Number of Large Culverts				
	Interstate	Primary	Secondary	Urban	Total
1 Bristol	80	408	475	17	980
Salem	98	332	587	29	1,046
3 Lynchburg	0	295	565	18	878
4 Richmond	239	291	455	60	1,045
5 Hampton Roads	121	118	199	70	508
6 Fredericksburg	57	111	264	1	433
7 Culpeper	50	243	391	11	695
8 Staunton	225	320	759	46	1,350
9 NOVA	121	208	705	28	1,062
Statewide	**991**	**2,326**	**4,400**	**280**	**7,997**

Table A. 3 - Total Number of NBI Bridges by District

District	Number of Bridges				
	Interstate	Primary	Secondary	Urban	Total
1 Bristol	136	418	987	186	1,727
Salem	113	369	896	71	1,449
3 Lynchburg	0	329	678	40	1,047
4 Richmond	278	456	613	98	1,445
5 Hampton Roads	337	342	285	215	1,179
6 Fredericksburg	23	135	194	6	358
7 Culpeper	71	171	516	10	768
8 Staunton	205	374	804	65	1,448
9 NOVA	257	301	446	17	1,021
Statewide	**1,420**	**2,895**	**5,419**	**708**	**10,442**

Table A. 4 - Total Number of NBI Large Culverts by District

District	Number of Large Culverts				
	Interstate	Primary	Secondary	Urban	Total
1 Bristol	28	101	130	17	276
Salem	27	83	238	23	371
3 Lynchburg	0	83	218	18	319
4 Richmond	86	119	243	60	508
5 Hampton Roads	41	42	95	66	244
6 Fredericksburg	22	42	115	1	180
7 Culpeper	14	72	177	7	270
8 Staunton	49	83	240	42	414
9 NOVA	29	98	346	27	500
Statewide	**296**	**723**	**1,802**	**261**	**3,082**

Table A. 5 - Total Number of Non-NBI Bridges by District

District	Number of Bridges				
	Interstate	Primary	Secondary	Urban	Total
1 Bristol	0	129	568	3	700
Salem	0	118	445	1	564
3 Lynchburg	0	35	121	0	156
4 Richmond	3	31	60	1	95
5 Hampton Roads	0	8	25	1	34
6 Fredericksburg	0	8	23	0	31
7 Culpeper	0	87	161	1	249
8 Staunton	0	132	562	1	695
9 NOVA	0	37	103	0	140
Statewide	**3**	**585**	**2,068**	**8**	**2,664**

Table A. 6 - Total Number of Non-NBI Large Culverts by District

District	Number of Large Culverts				
	Interstate	Primary	Secondary	Urban	Total
1 Bristol	52	307	345	0	704
Salem	71	249	349	6	675
3 Lynchburg	0	212	347	0	559
4 Richmond	153	172	212	0	537
5 Hampton Roads	80	76	104	4	264
6 Fredericksburg	35	69	149	0	253
7 Culpeper	36	171	214	4	425
8 Staunton	176	237	519	4	936
9 NOVA	92	110	359	1	562
Statewide	**695**	**1,603**	**2,598**	**19**	**4,915**

Table A. 7 - Total Number of NBI Bridges on NHS by District

District	Number of Bridges				
	Interstate	Primary	Secondary	Urban	Total
1 Bristol	136	134	9	1	280
Salem	112	185	10	1	308
3 Lynchburg	0	168	15	0	183
4 Richmond	276	275	23	7	581
5 Hampton Roads	334	200	2	66	602
6 Fredericksburg	23	74	4	2	103
7 Culpeper	70	54	8	2	134
8 Staunton	204	120	6	1	331
9 NOVA	252	237	34	0	523
Statewide	**1,407**	**1,447**	**111**	**80**	**3,045**

Table A. 8 - Total Number of NBI Large Culverts on NHS by District

District	Number of Large Culverts				
	Interstate	Primary	Secondary	Urban	Total
1 Bristol	28	38	0	0	66
Salem	26	34	2	0	62
3 Lynchburg	0	45	3	0	48
4 Richmond	86	80	3	2	171
5 Hampton Roads	38	28	0	7	73
6 Fredericksburg	22	26	1	0	49
7 Culpeper	13	37	0	0	50
8 Staunton	48	21	1	1	71
9 NOVA	29	70	5	0	104
Statewide	**290**	**379**	**15**	**10**	**694**

Chart A. 1 - Average Age of Interstate Structures by District

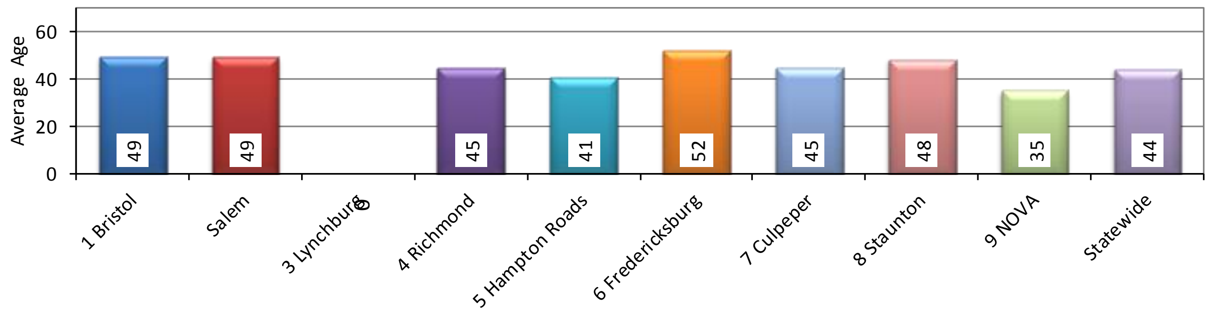


Chart A. 2 - Average Age of Primary Structures by District

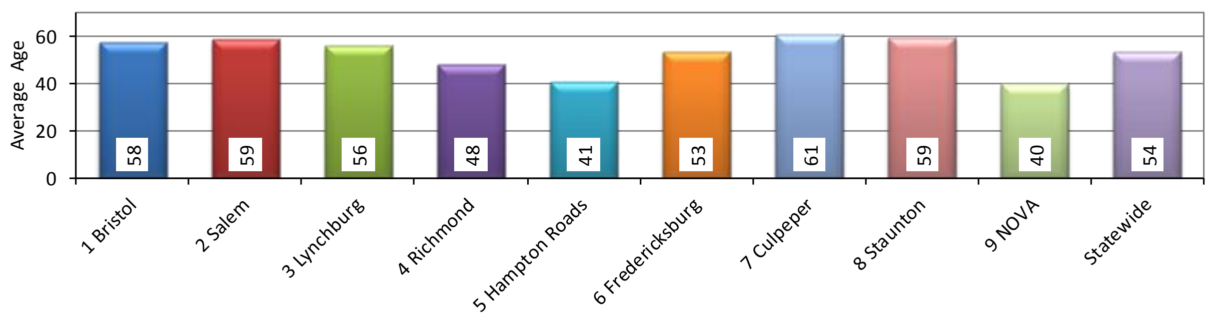


Chart A. 3 - Average Age of Secondary Structures by District

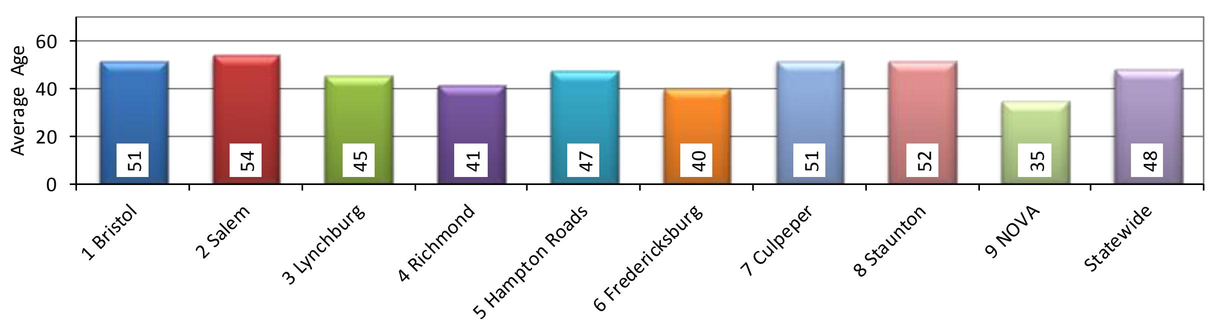
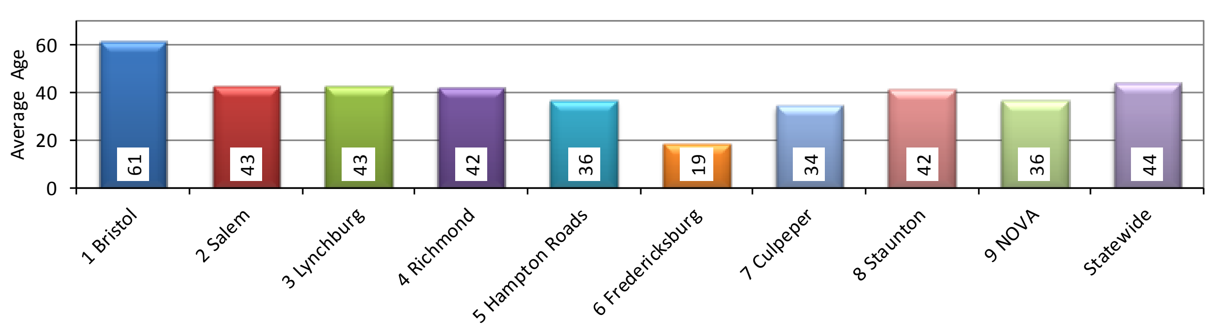


Chart A. 4 - Average Age of Urban Structures by District



APPENDIX B – ADDITIONAL INVENTORY INFORMATION ON ANCILLARY STRUCTURES

Table B. 1 through Table B. 4 provide information for the subcategories of each type of ancillary structure. Figures 1 - 13 provide typical examples of each type of ancillary structure.

Table B. 1 - Number of Sign Structures by District

District	Structure Type					Percentage of Total Inventory
	Cantilever	Overhead	Parapet Mount	Butterfly	Total	
1 Bristol	22	37	1	10	70	1.9%
2 Salem	87	86	0	93	266	7.2%
3 Lynchburg	7	60	0	5	72	1.9%
4 Richmond	381	325	125	1	832	22.5%
5 Hampton Roads	321	440	99	58	918	24.8%
6 Fredericksburg	67	32	0	1	100	2.7%
7 Culpeper	9	21	10	5	45	1.2%
8 Staunton	20	49	15	22	106	2.9%
9 NOVA	629	580	18	68	1,295	35.0%
Statewide	**1,543**	**1,630**	**268**	**263**	**3,704**	**100.0%**

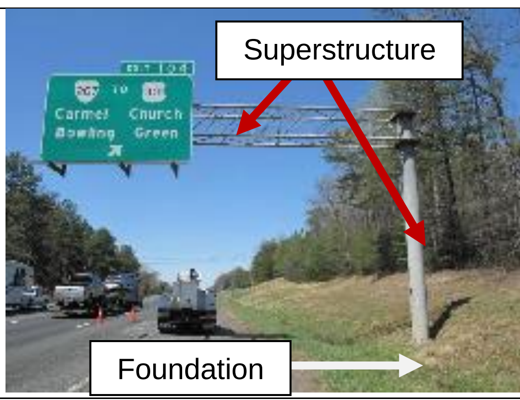


Figure 1 – Cantilever Sign Structure

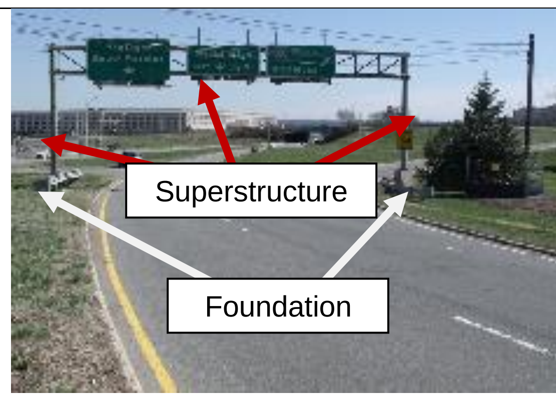


Figure 2 – Overhead Sign Structure

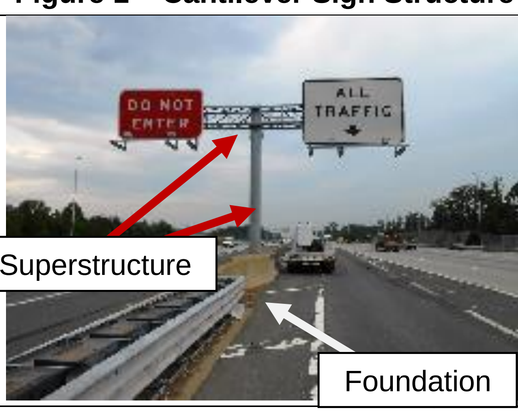


Figure 3 – Butterfly Sign Structure

Figure 4 – Parapet Mount Sign Structure
(Note that "Parapet-Mount' sign structures may also be attached to bridge girders in addition to bridge parapets)

Table B. 2 - Number of Luminaire Structures by District

District	Structure Type			Percentage of Total Inventory
	Parapet Mount Luminaire	Luminaires	Total	
1 Bristol	2	460	462	2.3%
2 Salem	17	802	819	4.1%
3 Lynchburg	0	302	302	1.5%
4 Richmond	397	1,803	2,200	11.0%
5 Hampton Roads	1,361	5,477	6,838	34.3%
6 Fredericksburg	0	606	606	3.0%
7 Culpeper	0	167	167	0.8%
8 Staunton	0	282	282	1.4%
9 NOVA	79	8,198	8,277	41.5%
Statewide	**1,856**	**18,097**	**19,953**	**100.0%**

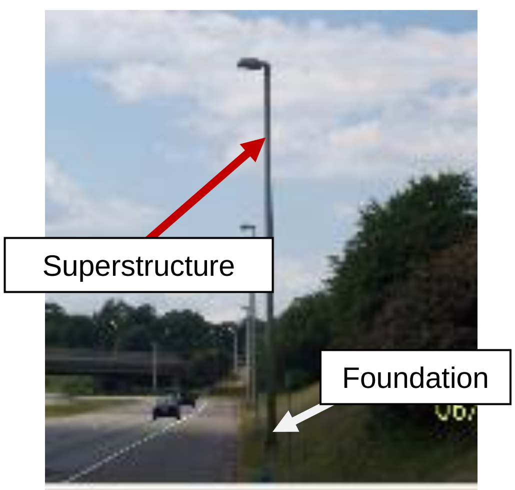


Figure 5 – Luminaire Structure

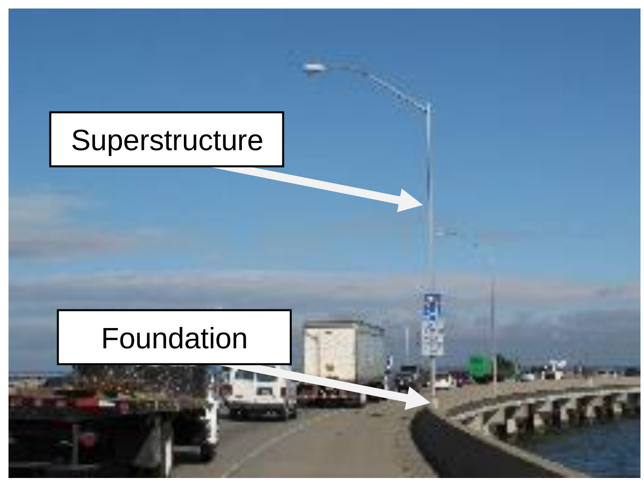


Figure 6 – Parapet Mounted Luminaire Structure

Note: Prior to September 2014 a single label "Parapet Mount" was used for the entire structure.

Table B. 3 - Number of Traffic Signal Structures by District

DISTRICT	Structure Type					Percentage of Total Inventory
	Cantilever	Overhead	Parapet Mount	Span Wire	Total	
1 Bristol	224	0	0	16	240	2.6%
2 Salem	522	0	0	19	541	5.8%
3 Lynchburg	309	0	0	10	319	3.4%
4 Richmond	1,246	0	0	285	1,531	16.3%
5 Hampton Roads	467	0	0	55	522	5.6%
6 Fredericksburg	748	1	0	8	757	8.0%
7 Culpeper	359	0	0	8	367	3.9%
8 Staunton	525	0	0	64	589	6.3%
9 NOVA	3,714	2	0	822	4,538	48.3%
Statewide	**8,114**	**3**	**0**	**1,287**	**9,404**	**100.0%**

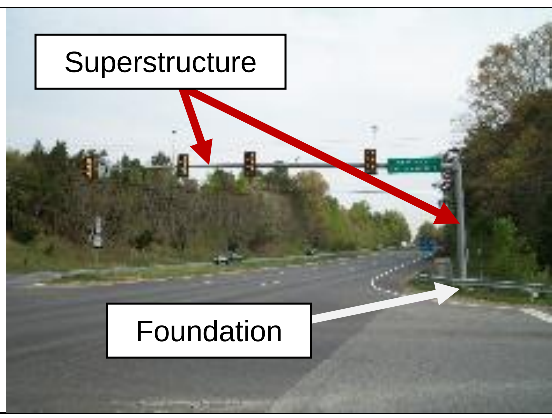


Figure 7 – Cantilevered Arm Traffic Signal Structure

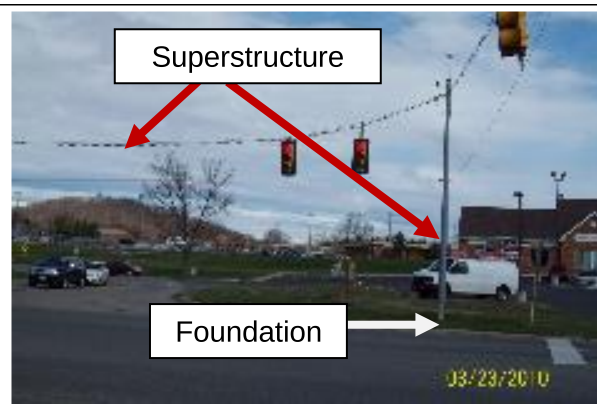


Figure 8– Span Wire Traffic Signal Structure

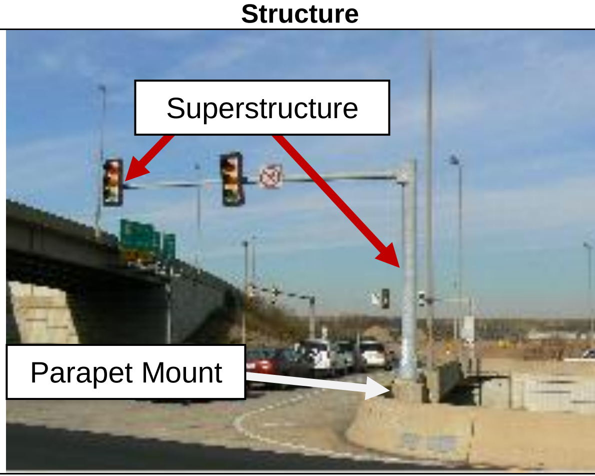


Figure 9 – Parapet Mount - Traffic Signal Structure

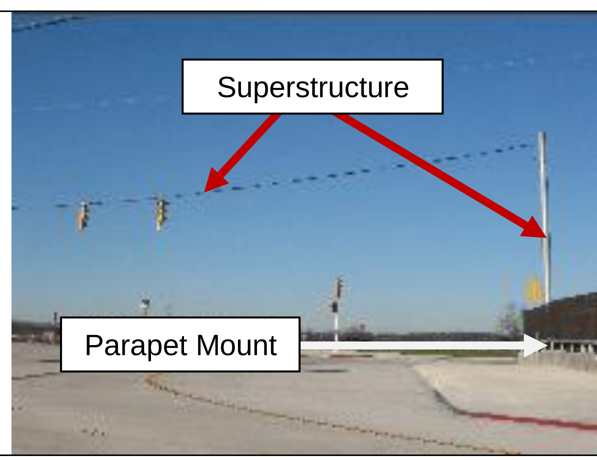


Figure 10 – Parapet Mount - Traffic Signal Structure

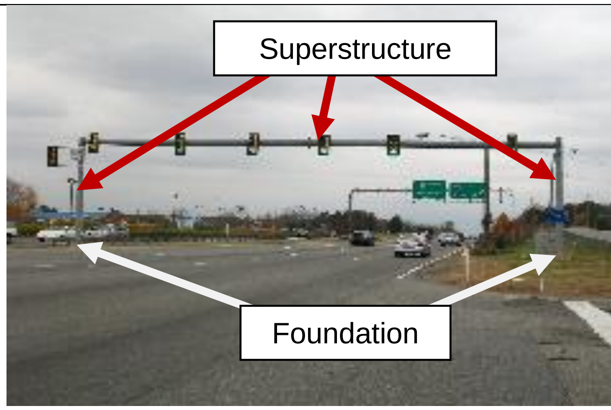


Figure 11 – Overhead Traffic Signal Structure

Table B. 4 - Number of High Mast Light and Camera Pole Structures by District

District	Structure Type			Percentage of Total Inventory
	Camera Poles	High Mast Light	Total	
1 Bristol	76	1	77	5.3%
2 Salem	13	3	16	1.1%
3 Lynchburg	0	0	0	0.0%
4 Richmond	105	53	158	10.8%
5 Hampton Roads	145	287	432	29.6%
6 Fredericksburg	1	34	35	2.4%
7 Culpeper	0	0	0	0.0%
8 Staunton	20	66	86	5.9%
9 NOVA	330	327	657	45.0%
Statewide	**690**	**771**	**1,461**	**100.0%**

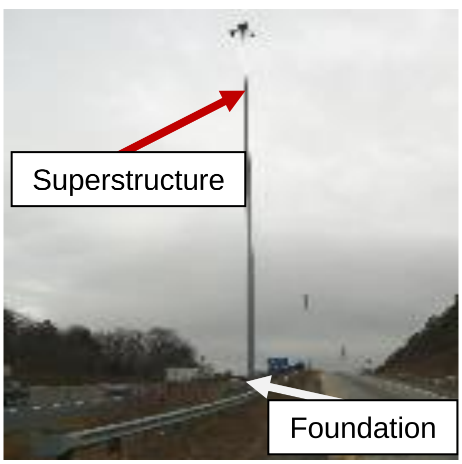


Figure 12 – High Mast Light Structure

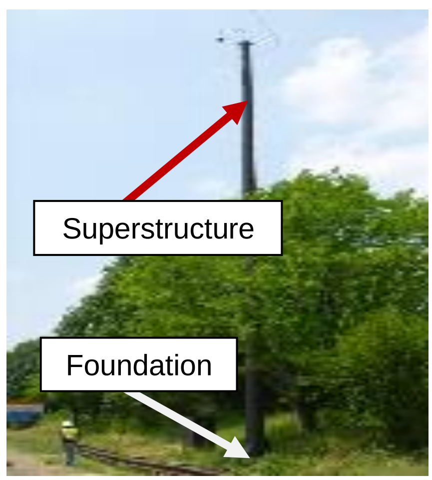


Figure 13 – Camera Pole Structure

APPENDIX C – ADDITIONAL INVENTORY AND CONDITION INFORMATION FOR HIGHWAY STRUCTURES

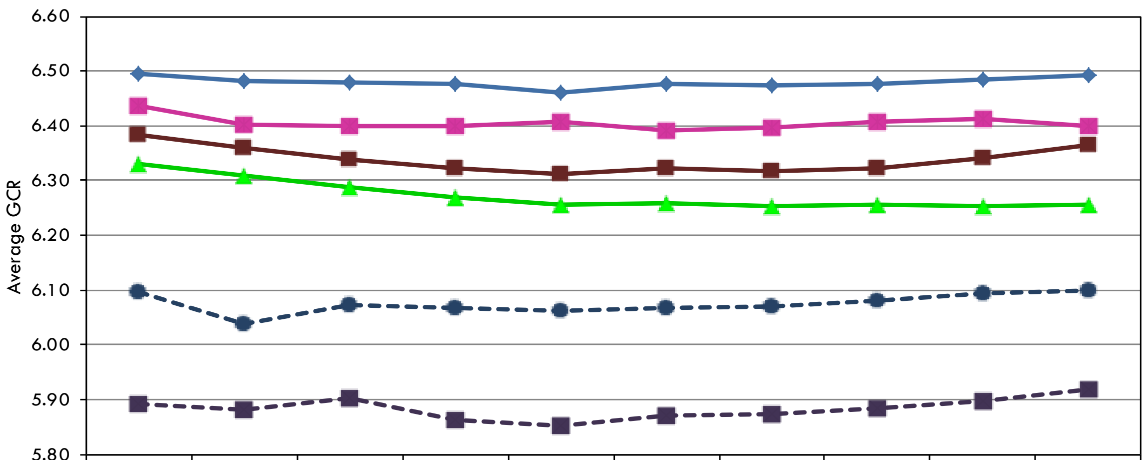
Table C. 1 - Number of Structure Components in Each General Condition Rating by System

Highway System	Component	GCR								Avg. GCR
		9	8	7	6	5	4	3	0 - 2	
Interstate	Deck	1	41	514	632	223	11	1	0	6.25
	Superstructure	6	92	369	529	405	22	0	0	6.09
	Substructure	2	47	311	609	446	8	0	0	5.96
	Bridge Min GCR	1	29	205	543	613	31	1	0	5.71
	Large Culvert	1	11	257	589	132	1	0	0	6.15
	Min GCR	2	40	462	1,132	745	32	1	0	5.89
Primary	Deck	35	151	1,328	1,190	696	70	2	0	6.26
	Superstructure	39	349	1,106	1,070	786	125	6	0	6.25
	Substructure	25	148	1,230	1,311	704	63	0	0	6.22
	Bridge Min GCR	21	74	842	1,258	1,106	172	7	0	5.88
	Large Culvert	3	71	743	1,157	335	18	0	0	6.22
	Min GCR	24	145	1,583	2,416	1,441	190	7	0	6.02
Secondary	Deck	201	1,230	3,057	1,883	970	114	2	0	6.66
	Superstructure	195	1,444	2,309	1,705	1,446	378	6	0	6.48
	Substructure	44	633	2,667	2,626	1,355	159	0	0	6.32
	Bridge Min GCR	42	396	2,001	2,417	2,155	469	7	0	5.97
	Large Culvert	100	578	1,723	1,319	579	99	5	0	6.54
	Min GCR	141	972	3,724	3,736	2,734	568	12	0	6.18
Urban	Deck	9	56	285	243	95	24	2	0	6.39
	Superstructure	15	76	262	184	127	51	3	0	6.31
	Substructure	15	54	272	224	127	24	2	0	6.34
	Bridge Min GCR	8	26	209	226	175	67	5	0	5.95
	Large Culvert	0	21	129	94	29	6	0	0	6.47
	Min GCR	8	47	338	321	204	73	5	0	6.09
All	Deck*	246	1,478	5,184	3,948	1,984	219	7	0	6.49
	Superstructure*	255	1,961	4,046	3,488	2,764	576	15	0	6.36
	Substructure*	86	882	4,480	4,770	2,632	254	2	0	6.26
	Bridge Min GCR	72	525	3,257	4,444	4,049	739	20	0	5.92
	Large Culvert	104	681	2,852	3,159	1,075	124	5	0	6.40
	Min GCR	175	1,204	6,107	7,605	5,124	863	25	0	6.10

** A small number of bridges have particular configurations so that they don't have all the major components. Accordingly, there is a small difference in the total number of deck, superstructure, and substructure components.*

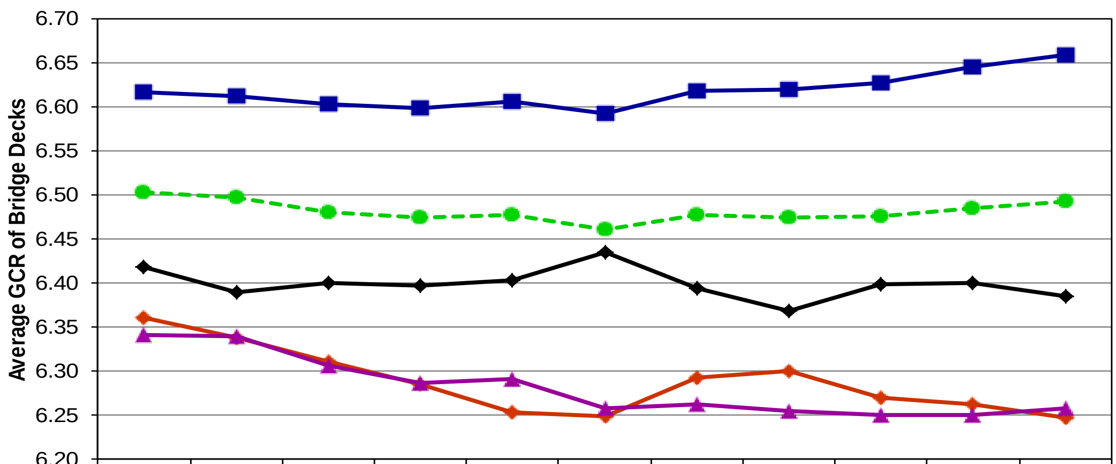
Trend lines showing the average general condition ratings of rated components are provided in Chart C. 1 through Chart C. 4 below.

Chart C. 1 - Trends in Average General Condition Ratings by Component – Statewide



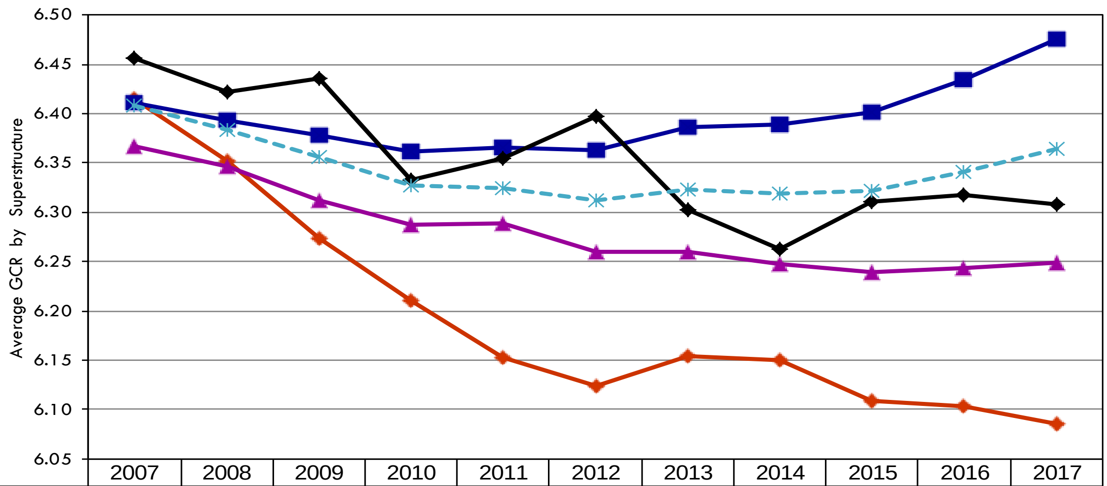
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Deck	6.496	6.482	6.480	6.476	6.461	6.477	6.475	6.476	6.485	6.492
Super	6.383	6.359	6.338	6.323	6.312	6.323	6.318	6.322	6.341	6.364
Sub	6.330	6.310	6.289	6.270	6.256	6.257	6.253	6.256	6.253	6.256
Br Min	5.892	5.882	5.904	5.863	5.853	5.871	5.873	5.884	5.898	5.919
Culvert	6.437	6.402	6.399	6.399	6.409	6.393	6.397	6.407	6.414	6.399
Str Min	6.097	6.039	6.073	6.068	6.063	6.068	6.071	6.082	6.093	6.100

Chart C. 2 - Bridge Decks: Trends in Average General Condition Ratings by Highway System



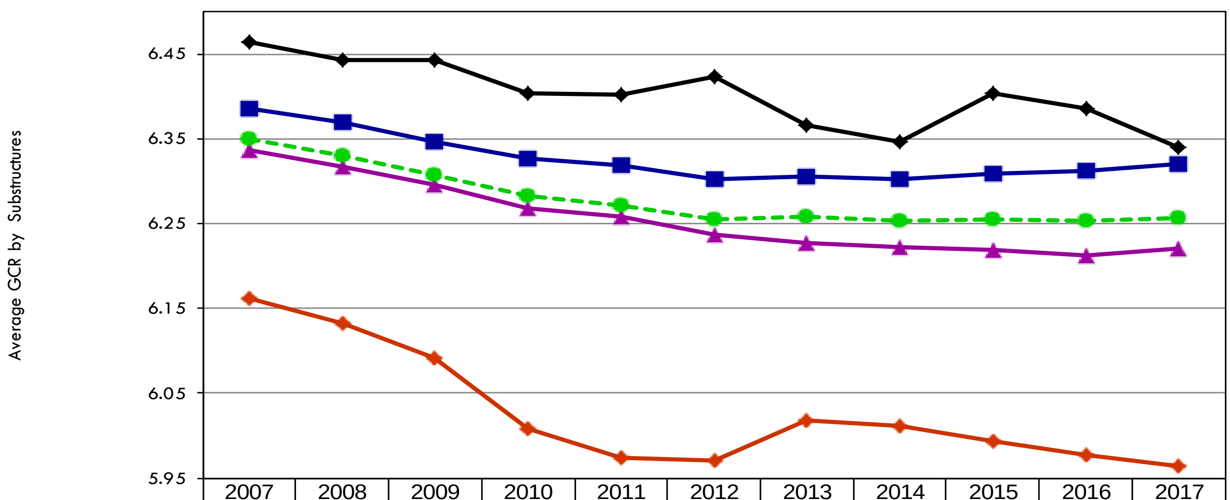
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Interstate	6.361	6.338	6.310	6.285	6.253	6.249	6.293	6.300	6.269	6.263	6.247
Primary	6.342	6.340	6.307	6.286	6.292	6.257	6.262	6.254	6.251	6.251	6.257
Secondary	6.617	6.613	6.603	6.598	6.606	6.593	6.619	6.620	6.627	6.645	6.659
Urban	6.418	6.389	6.400	6.397	6.404	6.436	6.394	6.369	6.398	6.400	6.385
Average	6.504	6.497	6.481	6.474	6.477	6.461	6.477	6.475	6.476	6.485	6.492

Chart C. 3 - Superstructures: Trends in Average General Condition Ratings by Highway System



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Interstate	6.415	6.352	6.273	6.210	6.152	6.124	6.155	6.149	6.109	6.103	6.086
Primary	6.367	6.346	6.313	6.287	6.288	6.259	6.260	6.247	6.239	6.243	6.249
Secondary	6.411	6.394	6.379	6.362	6.366	6.363	6.386	6.388	6.401	6.434	6.476
Urban	6.457	6.422	6.435	6.333	6.354	6.397	6.303	6.262	6.311	6.317	6.308
Average	6.408	6.383	6.357	6.328	6.324	6.312	6.323	6.318	6.322	6.341	6.364

Chart C. 4 - Substructures: Trends in Average General Condition Ratings by Highway System



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Interstate	6.162	6.132	6.091	6.008	5.974	5.971	6.019	6.011	5.993	5.977	5.964
Primary	6.338	6.317	6.296	6.268	6.258	6.236	6.227	6.222	6.219	6.212	6.221
Secondary	6.386	6.369	6.347	6.326	6.319	6.303	6.306	6.303	6.308	6.312	6.320
Urban	6.465	6.443	6.443	6.404	6.402	6.423	6.366	6.346	6.404	6.386	6.340
Average	6.350	6.330	6.307	6.283	6.271	6.256	6.257	6.253	6.256	6.253	6.256

APPENDIX D – GENERAL CONDITION RATINGS (BRIDGES AND LARGE CULVERTS)

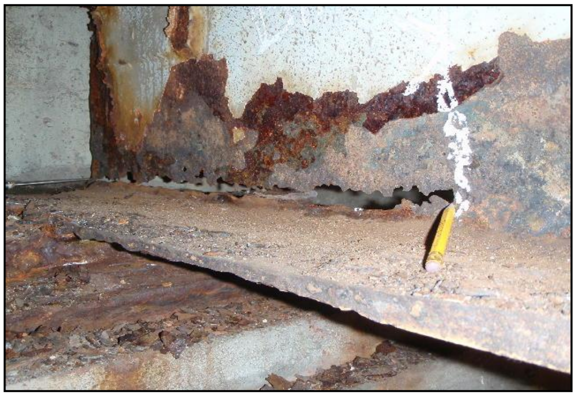
General Condition Ratings (GCRs): According to the National Bridge Inventory (NBI), General Condition Ratings are assigned by the structure inspection team after each bridge inspection. These ratings are included in each inspection report to describe the current physical state of the bridge or large culvert. Evaluation is based on the physical condition of the structure at the time of inspection. Separate GCR values are assigned to the deck, superstructure and substructure components of a bridge. A large culvert receives a single GCR. The GCRs are assigned based on a numerical grading system that ranges from 0 (failed condition) to 9 (excellent condition). The table below provides a description of the general condition ratings. The tables in the following pages provide illustrative examples of these ratings.

0	1	2	3	4	5	6	7	8	9
Failed	Imminent Failure	Critical	Serious	Poor	Fair	Satisfactory	Good	Very Good	Excellent
Structurally Deficient									

A structure is defined as SD if one or more of its major components (deck, superstructure, substructure, or large culvert) has a General Condition Rating (GCR) less than or equal to four (4) or if it has an appraisal rating of 2 or less for Structural Evaluation or Waterway Adequacy.

Code	Description
N	**NOT APPLICABLE**
9	**EXCELLENT CONDITION**
8	**VERY GOOD CONDITION**: No problems noted.
7	**GOOD CONDITION**: Some minor problems.
6	**SATISFACTORY CONDITION**: Structural components show some minor deterioration.
5	**FAIR CONDITION**: All primary structural elements are sound but may have some minor section loss, cracking, spalling or scour
4	**POOR CONDITION**: Advanced section loss, deterioration, spalling or scour.
3	**SERIOUS CONDITION**: Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
2	**CRITICAL CONDITION**: Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
1	**"IMMINENT" FAILURE CONDITION**: Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put back in light service.
0	**FAILED CONDITION**: Out of service - beyond corrective action.

Typical Examples of General Condition Ratings for Decks	
GCR	Example
4 or less – (Poor Condition) Structurally Deficient	 Bridge Deck with advanced deterioration
5 – Fair Condition (At risk of becoming structurally deficient)	 Bridge Deck with extensive cracking and patching
6 – Satisfactory Condition	 Bridge Deck with minor to no deterioration

Typical Examples of General Condition Ratings for Superstructure		
GCR	Example Steel	Concrete
4 or less - (Poor Condition) Structurally Deficient	 Bridge Superstructure with advanced section loss	 Concrete Beam with major spalling (bottom of beam viewed from below)
5 – Fair Condition (At risk of becoming structurally deficient)	 Bridge Superstructure with minor to moderate section loss	 Spall on end of beam with exposed reinforcing with section loss
6 – Satisfactory Condition	 Rust scale and minor section loss	 Concrete Beam with localized spalling

Typical Examples of General Condition Ratings for Substructure	
GCR	Example
4 or less – (Poor Condition) Structurally Deficient	 Bridge Substructure with advanced deterioration
5 – Fair Condition (At risk of becoming structurally deficient)	 Bridge Substructure with moderate cracks and deterioration
6 – Satisfactory Condition	 Bridge Substructure with minor cracks

Typical Examples of General Condition Ratings for Large Culverts		
GCR	Example	
	Steel	Concrete
4 or less - (Poor Condition) Structurally Deficient	 Culvert with advanced section loss	 Portion of center wall of box culvert missing
5 – Fair Condition (At risk of becoming structurally deficient)	 Culvert panels separated	 Culvert moderate deterioration
6 – Satisfactory Condition	 Light rust along flowline	 Culvert with minor cracks

APPENDIX E – STATE OF GOOD REPAIR BRIDGES IN VIRGINIA'S APPROVED SYIP

Table E. 1 and Table E. 2 provide lists of all the bridges currently in the State of Good Repair program.

Table E. 1 - SGR Bridges in Virginia's Approved SYIP: VDOT- Maintained Bridges

Route	Featured Intersection	Virginia System	District	SGR Total Allocation	Total Project Allocations
81	RT11,NS RR,M.F.HOLSTON R	Interstate	Bristol	$ 12,499,999	$ 12,499,999
77	COVE CREEK	Interstate	Bristol	$ 7,900,000	$ 8,400,000
81	RTE 686	Interstate	Bristol	$ 7,100,000	$ 7,450,000
81	RTE 686 (MULBERRY LANE)	Interstate	Bristol	$ 7,100,000	$ 7,450,000
81	REED CREEK	Interstate	Bristol	$ 11,750,000	$ 11,750,000
81	REED CREEK	Interstate	Bristol	$ 11,750,000	$ 11,750,000
58	PEGGY BRANCH	Primary	Bristol	$ 3,405,953	$ 5,161,642
23	NORFORK SOUTHERN RAILWAY	Primary	Bristol	$ 1,700,000	$ 1,900,000
19	NS RWY & WRIGHTS VAL CRK	Primary	Bristol	$ 2,800,000	$ 2,800,000
687	SR-63	Secondary	Bristol	$ 1,300,000	$ 1,300,000
682	COPPER CREEK	Secondary	Bristol	$ 1,255,510	$ 1,255,510
658	S FORK HOLSTON RIVER	Secondary	Bristol	$ 1,016,115	$ 1,180,000
893	LITTLE TOMS CREEK	Secondary	Bristol	$ 608,000	$ 608,000
240	LICKINGHOLE CREEK	Primary	Culpeper	$ 1,900,000	$ 1,900,000
601	ROUTE 29 & 250 BYPASS	Secondary	Culpeper	$ 1,858,026	$ 2,858,026
647	South Anna River	Secondary	Culpeper	$ 1,200,000	$ 2,050,000
759	MECHUNK CREEK	Secondary	Culpeper	$ 1,450,000	$ 1,450,000
647	East Branch Thumb Run	Secondary	Culpeper	$ 1,970,000	$ 2,800,000
600	PREDDY CREEK	Secondary	Culpeper	$ 1,780,000	$ 1,780,000
641	MARSH RUN	Secondary	Culpeper	$ 700,000	$ 700,000
667	PINEY CREEK	Secondary	Culpeper	$ 1,723,500	$ 1,723,500
708	NORTH FORK HARDWARE RVR	Secondary	Culpeper	$ 5,100,000	$ 5,100,000
717	SOUTH FORK HARDWARE RVR	Secondary	Culpeper	$ 1,000,000	$ 1,000,000
726	TOTIER CREEK	Secondary	Culpeper	$ 3,020,000	$ 3,020,000
795	HARDWARE RIVER	Secondary	Culpeper	$ 1,100,000	$ 1,100,000
701	Little River	Secondary	Culpeper	$ 2,215,000	$ 2,215,000
95	RTE. 17	Interstate	Fredericksburg	$ 10,210,411	$ 10,210,411
95	RTE. 17	Interstate	Fredericksburg	$ 10,210,411	$ 10,210,411
14	NORTH END BRANCH	Primary	Fredericksburg	$ 2,558,165	$ 3,058,165
207	MATTAPONI RIVER	Primary	Fredericksburg	$ 9,060,970	$ 9,060,970
14	PORPOTANK CREEK	Primary	Fredericksburg	$ 2,250,000	$ 2,250,000
360	MONCUIN CREEK	Primary	Fredericksburg	$ 500,000	$ 550,000
17	DRAGON RUN	Primary	Fredericksburg	$ 6,200,000	$ 6,200,000
360	RAPPAHANNOCK R RTE-1013	Primary	Fredericksburg	$ 500,000	$ 550,000
1	CHOPAWAMSIC CREEK	Primary	Fredericksburg	$ 5,750,000	$ 5,750,000
3	RAPPAHANNOCK RIVER	Primary	Fredericksburg	$ 19,000,000	$ 20,000,000
617	EXOL SWAMP	Secondary	Fredericksburg	$ 2,500,000	$ 2,500,000
620	PISCATAWAY CREEK	Secondary	Fredericksburg	$ 1,600,000	$ 1,600,000
641	NORTHWEST BR SARAH CREEK	Secondary	Fredericksburg	$ 500,000	$ 550,000

Route	Featured Intersection	Virginia System	District	SGR Total Allocation	Total Project Allocations
662	FOX CREEK	Secondary	Fredericksburg	$ 1,759,785	$ 2,469,785
625	CUSTIS POND	Secondary	Fredericksburg	$ 1,800,000	$ 1,875,000
632	HARRISONS CREEK	Secondary	Fredericksburg	$ 1,950,000	$ 1,950,000
606	ROUTE I-95	Secondary	Fredericksburg	$ 4,424,138	$ 12,120,868
658	NORTH ANNA RIVER	Secondary	Fredericksburg	$ 2,101,556	$ 2,548,518
10	Cypress Creek	Primary	Hampton Roads	$ 1,600,000	$ 2,250,000
40	Otterdam Swamp	Primary	Hampton Roads	$ 1,715,151	$ 2,665,151
35	Tarrara Creek	Primary	Hampton Roads	$ 2,434,031	$ 3,189,882
189	Blackwater River	Primary	Hampton Roads	$ 23,732,391	$ 25,077,498
308	Three Creek	Primary	Hampton Roads	$ 3,428,502	$ 3,872,413
173	IS 64 & CSX Railroad	Primary	Hampton Roads	$ 1,240,020	$ 32,500,000
671	Nottoway River	Secondary	Hampton Roads	$ 7,000,000	$ 7,000,000
692	Champion Swamp	Secondary	Hampton Roads	$ 1,250,000	$ 1,950,000
1304	West Ridge Ck @ Tangier	Secondary	Hampton Roads	$ 1,525,805	$ 2,447,151
1306	West Ridge Ck @ Tangier	Secondary	Hampton Roads	$ 1,867,059	$ 2,465,819
635	N&W Railroad	Secondary	Hampton Roads	$ 3,023,629	$ 3,606,981
603	Blackwater River	Secondary	Hampton Roads	$ 2,576,164	$ 2,722,246
29	NS Railway	Primary	Lynchburg	$ 6,842,565	$ 6,842,565
92	Staunton River	Primary	Lynchburg	$ 11,904,228	$ 12,054,228
29	Staunton River & NS Rwy	Primary	Lynchburg	$ 13,078,673	$ 28,388,031
622	Flat Creek	Secondary	Lynchburg	$ 736,867	$ 736,867
621	Appomattox River	Secondary	Lynchburg	$ 3,194,285	$ 4,044,285
681	Williams Run	Secondary	Lynchburg	$ 1,882,965	$ 2,182,965
778	Buffalo River	Secondary	Lynchburg	$ 1,916,533	$ 2,623,363
711	NS Railway	Secondary	Lynchburg	$ 3,481,327	$ 4,082,181
761	Straighstone Creek	Secondary	Lynchburg	$ 1,474,157	$ 2,082,704
66	RMPS B & F	Interstate	NOVA	$ 6,000,000	$ 6,700,000
123	LEESBURG PIKE, ROUTE 7	Primary	NOVA	$ 1,250,000	$ 1,250,000
123	LEESBURG PIKE (RTE. 7)	Primary	NOVA	$ 1,250,000	$ 1,250,000
28	BULL RUN	Primary	NOVA	$ 5,000,000	$ 5,000,000
7	ROUTE I-395, RAMPS C&G	Primary	NOVA	$ 2,690,332	$ 12,194,800
120	PIMMITT RUN	Primary	NOVA	$ 7,000,000	$ 8,000,000
7	SUGARLAND RUN	Primary	NOVA	$ 9,200,000	$ 10,000,000
236	ROUTE I-395	Primary	NOVA	$ 11,844,889	$ 11,844,889
738	I-495 & SCOTTS RUN	Secondary	NOVA	$ 950,000	$ 1,350,000
640	POWELLS CREEK	Secondary	NOVA	$ 1,500,000	$ 1,500,000
711	TRIB. OF SF CATOCTIN CK.	Secondary	NOVA	$ 700,000	$ 700,000
613	ARLINGTON BOULEVARD	Secondary	NOVA	$ 2,500,000	$ 2,500,000
627	QUANTICO CREEK	Secondary	NOVA	$ 1,300,000	$ 1,800,000
3469	BRANCH OF HOLMES RUN	Secondary	NOVA	$ 800,000	$ 800,000
711	BRANCH OF CATOCTIN CREEK	Secondary	NOVA	$ 1,500,000	$ 1,500,000
674	COLVIN RUN	Secondary	NOVA	$ 2,273,488	$ 3,073,488
673	CATOCTIN CREEK	Secondary	NOVA	$ 4,500,000	$ 5,280,000
64	ROUTE I-95	Interstate	Richmond	$ 6,111,770	$ 6,301,283
95	RTE 608 (REYMET RD)	Interstate	Richmond	$ 11,000,000	$ 12,050,000
64	ROUTE 95	Interstate	Richmond	$ 4,050,000	$ 4,050,000
195	RTE 76 , CSX RR , RAMP S	Interstate	Richmond	$ 17,637,679	$ 18,800,180
30	NORTH ANNA RIVER	Primary	Richmond	$ 3,000,000	$ 3,300,000

Route	Featured Intersection	Virginia System	District	SGR Total Allocation	Total Project Allocations
46	U.S. 58 BYPASS	Primary	Richmond	$ 2,350,000	$ 2,350,000
156	RTE 360	Primary	Richmond	$ 2,000,000	$ 2,200,000
157	I-64 & RAMPS GASKIN RD	Primary	Richmond	$ 4,000,000	$ 4,300,000
460	U.S. 460 (BYPASS)	Primary	Richmond	$ 4,500,000	$ 4,676,484
1	UPHAM BROOK	Primary	Richmond	$ 3,133,665	$ 4,062,665
360	NS RAILWAY & RTE 360BUS	Primary	Richmond	$ 6,165,986	$ 6,165,986
360	NS RAILWAY & RTE 360BUS	Primary	Richmond	$ 4,384,600	$ 4,384,600
92	BUTCHERS CREEK	Primary	Richmond	$ 3,020,000	$ 3,845,000
657	I-95	Secondary	Richmond	$ 5,000,000	$ 5,000,000
7667	ROUTE 0064	Secondary	Richmond	$ 4,000,000	$ 4,300,000
641	CSX TRNS & USDGSC SERVIC	Secondary	Richmond	$ 3,500,000	$ 3,500,000
703	CSX TRANSP RIGHT OF WAY	Secondary	Richmond	$ 2,500,000	$ 2,850,000
630	WAQUA CREEK	Secondary	Richmond	$ 1,544,886	$ 1,894,886
604	Tomohawk Creek	Secondary	Richmond	$ 2,179,257	$ 3,208,576
703	ROWANTY CREEK	Secondary	Richmond	$ 1,892,980	$ 3,081,377
708	NAMOZINE CREEK	Secondary	Richmond	$ 2,241,763	$ 3,035,763
625	Chickahominy River	Secondary	Richmond	$ 2,251,726	$ 3,192,817
621	Meherrin River	Secondary	Richmond	$ 1,491,833	$ 2,171,131
0	ROUTE I-95 (I-64)	Urban	Richmond	$ 8,436,957	$ 8,626,470
81	RTE 8	Interstate	Salem	$ 22,137,195	$ 24,343,147
81	RTE 8	Interstate	Salem	$ 8,631,005	$ 10,564,435
11	N&W RAILWAY	Primary	Salem	$ 2,625,000	$ 2,825,000
8	Mayo River	Primary	Salem	$ 3,756,340	$ 5,156,340
40	Tharp Creek	Primary	Salem	$ 1,240,199	$ 1,240,199
58	Crooked Creek	Primary	Salem	$ 3,943,914	$ 5,486,092
220	Reed Creek	Primary	Salem	$ 5,885,000	$ 7,585,000
43	Big Otter River	Primary	Salem	$ 2,954,054	$ 4,409,877
760	ROANOKE RIVER	Secondary	Salem	$ 2,280,939	$ 3,205,939
715	NSRailway	Secondary	Salem	$ 2,376,197	$ 3,147,519
634	Roanoke River	Secondary	Salem	$ 7,144,759	$ 12,987,953
666	NS Railway	Secondary	Salem	$ 3,864,445	$ 3,873,419
668	NS Railway	Secondary	Salem	$ 811,698	$ 4,880,519
703	Little Reed Island Creek	Secondary	Salem	$ 1,997,470	$ 3,518,246
813	Roanoke River @ Kumis	Secondary	Salem	$ 4,944,758	$ 4,952,596
33	I-81	Primary	Staunton	$ 11,278,670	$ 14,250,164
33	NS RAILROAD & CREEK	Primary	Staunton	$ 8,232,423	$ 8,232,423
250	BELL CREEK	Primary	Staunton	$ 3,295,695	$ 4,117,392
11	I-81	Primary	Staunton	$ 10,682,394	$ 11,878,633
33	NS RAILWAY & CREEK	Primary	Staunton	$ 8,232,423	$ 8,473,463
703	EDISON CREEK	Secondary	Staunton	$ 1,981,095	$ 2,700,000
687	CASCADES CREEK	Secondary	Staunton	$ 1,152,510	$ 2,531,763
723	OPEQUON CREEK	Secondary	Staunton	$ 1,325,731	$ 1,888,605
682	PLEASANT RUN	Secondary	Staunton	$ 3,884,132	$ 4,668,569
698	MILL CREEK	Secondary	Staunton	$ 1,407,507	$ 3,015,303
720	I-81	Urban	Staunton	$ 2,245,388	$ 10,220,470

Table E. 2 - SGR Bridges in Virginia's Approved SYIP: Locality - Maintained Bridges

Route	Featured Intersection	Virginia System	District	SGR Total Allocation	Total Project Allocations
460	CLINCH RIVER	Primary	Bristol	$ 2,158,556	$ 2,158,556
16	CAVITTS CREEK	Primary	Bristol	$ 1,300,000	$ 1,300,000
19	S FORK CLINCH RIVER	Primary	Bristol	$ 1,100,000	$ 1,100,000
61	N FORK CLINCH RIVER	Primary	Bristol	$ 1,500,000	$ 1,500,000
16	CLINCH RIVER	Primary	Bristol	$ 357,810	$ 357,810
0	S.F. POWELL RIVER	Urban	Bristol	$ 676,508	$ 2,130,916
3050	Booth Branch	Urban	Bristol	$ 290,000	$ 290,000
3137	Slate Creek	Urban	Bristol	$ 180,000	$ 180,000
2164	Knox Creek	Urban	Bristol	$ 92,500	$ 92,500
4263	Stream	Urban	Bristol	$ 290,000	$ 290,000
1030	Stream	Urban	Bristol	$ 180,000	$ 180,000
5417	Granny Creek	Urban	Bristol	$ 180,000	$ 180,000
2080	Left Fork	Urban	Bristol	$ 60,000	$ 60,000
0	BEAVER CREEK	Urban	Bristol	$ 286,000	$ 286,000
2435	Dan Branch	Urban	Bristol	$ 180,000	$ 180,000
5105	Levisa Fork	Urban	Bristol	$ 575,000	$ 575,000
2078	Knox Creek	Urban	Bristol	$ 170,000	$ 170,000
4062	War Fork	Urban	Bristol	$ 85,000	$ 85,000
4245	Russell Fork	Urban	Bristol	$ 265,000	$ 265,000
2163	Knox Creek	Urban	Bristol	$ 85,000	$ 85,000
0	BENGES BRANCH	Urban	Bristol	$ 316,000	$ 316,000
250	NORFOLK SOUTHERN RAILWAY	Primary	Culpeper	$ 1,303,496	$ 1,303,496
250	RTE 29 BUSINESS	Primary	Culpeper	$ 3,847,554	$ 3,847,554
250	RUGBY AVE	Primary	Culpeper	$ 2,488,292	$ 2,488,292
0	NORFOLK SOUTHERN RAILWAY	Urban	Culpeper	$ 2,440,627	$ 2,440,627
3	RAPPAHANNOCK RIVER	Primary	Fredericksburg	$ 19,000,000	$ 20,000,000
13	NS RAILWAY	Primary	Hampton Roads	$ 2,912,000	$ 3,187,000
105	N.N. Resevoir	Primary	Hampton Roads	$ 5,100,000	$ 18,100,000
13	RTE. 460 & NS RAILWAY	Primary	Hampton Roads	$ 5,110,040	$ 5,110,040
460	RTE 166 & U # 1808	Primary	Hampton Roads	$ 2,215,700	$ 2,672,200
0	CHESAPEAKE&ALBEMARLE CAN	Urban	Hampton Roads	$ 4,036,475	$ 8,871,745
337	Beamons Mill Pond	Urban	Hampton Roads	$ 880,183	$ 1,121,252
688	Kilby Creek Spillway	Urban	Hampton Roads	$ 778,000	$ 2,128,000
337	Jerico Canal	Urban	Hampton Roads	$ 479,633	$ 620,900
616	Jones Swamp	Urban	Hampton Roads	$ 1,397,829	$ 1,815,362
660	Somerton Creek	Urban	Hampton Roads	$ 1,981,084	$ 2,589,652
639	SBD SYS RR & NS RAILWAY	Urban	Hampton Roads	$ 2,838,000	$ 3,440,000
608	Cohoon Creek	Urban	Hampton Roads	$ 470,400	$ 640,858
661	Chapel Swamp	Urban	Hampton Roads	$ 408,459	$ 567,304
32	CYPRESS SWAMP	Urban	Hampton Roads	$ 1,988,889	$ 2,705,971
674	WASHINGTON DITCH	Urban	Hampton Roads	$ 414,104	$ 575,144
0	Ivy Creek	Urban	Lynchburg	$ 2,000,000	$ 3,555,000
0	Poplar Creek	Urban	Lynchburg	$ 154,681	$ 154,681
420	I-395	Primary	NOVA	$ 750,553	$ 750,553
360	JAMES RIVER NORTH DIV	Primary	Richmond	$ 700,000	$ 3,000,000
360	JAMES RIVER SOUTH DIV	Primary	Richmond	$ 1,050,000	$ 4,750,000

Route	Featured Intersection	Virginia System	District	SGR Total Allocation	Total Project Allocations
36	APPOMATTOX RIVER CANAL	Primary	Richmond	$ 2,025,000	$ 2,025,000
0	CSX RAILWAY	Urban	Richmond	$ 1,774,000	$ 2,174,000
11	COLORADO ST O NS RWY	Primary	Salem	$ 6,450,000	$ 6,450,000
11	APPERSN DR O ROANOKE RV	Primary	Salem	$ 972,694	$ 972,694
211	HAWKSBILL CK	Primary	Staunton	$ 1,953,030	$ 3,978,457
1411	N FORK SHENANDOAH RIVER	Secondary	Staunton	$ 676,491	$ 676,491
0	BLACKS RUN	Urban	Staunton	$ 499,100	$ 2,238,095
0	CSX RAILROAD	Urban	Staunton	$ 300,000	$ 300,000