



BIENNIAL REPORT ON

THE CONDITION AND PERFORMANCE OF

SURFACE INFRASTRUCTURE IN THE

COMMONWEALTH OF VIRGINIA

Chapter 335 and Chapter 355 of the
2007 Acts of the Virginia General Assembly

Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219
September 15, 2007



COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION
1401 EAST BROAD STREET
RICHMOND, VIRGINIA 23219-2000

David S. Ekern, P.E.
COMMISSIONER

September 15, 2007

The Honorable Timothy M. Kaine
Members of the Commonwealth Transportation Board
Joint Legislative Audit and Review Commission

Dear Ladies and Gentlemen:

Chapters 335, 355 and 847 of the 2007 Acts of Assembly established a framework under which the Virginia Department of Transportation (VDOT) is to report on the condition and needs for maintaining and operating the existing transportation infrastructure in the Commonwealth and various aspects of Agency Business Practices.

The enclosed report includes information which shows on a statewide basis:

- The condition of Virginia Interstate and Primary pavements has deteriorated in conditions slightly from 2006 to 2007 caused mainly by increased costs of materials purchasing less pavement repair. The ride quality continues to exceed established performance goals.
- The bridge inventory remains constant with approximately 8.4 % classified as Structurally Deficient which is consistent with trends for the last five years.
- Deaths and injury related crashes continue at levels exceeding 900 deaths per year and 72,000 injuries which are a serious concern for the Commonwealth.
- That VDOT continues to strengthen its use of the private sector in its business and service delivery with overall spending at 81% through the private sector and 69% of all maintenance spending through the private sector. Through F.Y. 2009 the focus will be on completing outsourcing of routine maintenance of the Interstate System through the Commonwealth.
- That VDOT continues to reshape its workforce having reduced from about 10,200 staff in 2002 to approximately 8,675 in 2007. During the 2009/10 biennium no significant reductions are anticipated. In addition, the Department is in the process of completing consolidation of its maintenance facilities from 348 to 244 sites statewide.

The report presents a snapshot of information on the condition and needs for preserving the existing transportation infrastructure and with the passage of HB3202 in 2007 it is anticipated that the needs in new infrastructure will begin to be addressed.

Sincerely,

A handwritten signature in blue ink that reads "David S. Ekern".

David S. Ekern, P.E.

Attachment

cc: The Honorable Pierce R. Homer

Preface

Chapter 335 and Chapter 355 of the 2007 Acts of Assembly require the Virginia Department of Transportation (VDOT) to report by September 15 of each odd-numbered year on the condition of and needs for maintaining and operating the existing transportation infrastructure based on an asset management methodology. The following is the full text of the two identical bills:

No later than September 15 of each odd-numbered year, the Virginia Department of Transportation shall submit to the Governor, the Joint Legislative Audit and Review Commission, and the Commonwealth Transportation Board a report on the condition of and needs for maintaining and operating the existing transportation infrastructure in the Commonwealth for all asset management and maintenance, based on an asset management methodology. Such methodology shall, in accordance with generally accepted engineering principles and business practices, identify and prioritize maintenance and operations needs, including those for pavement, technology, bridges and other structures, pipes and draining, and congestion management and reduction. Reports shall include (i) the performance standards to be used to determine those needs, (ii) an estimate, for the upcoming two fiscal years, of the budget required to meet them, (iii) employment level goals for the next two years, and (iv) the percentage of asset management under private contract.

Chapter 847 (Item 444 B.) of the 2007 Acts of Assembly requires VDOT:

By November 30 of each year, the Department shall submit to the Governor, General Assembly, and the Commonwealth Transportation Board a report on the condition of existing transportation infrastructure and proposed measures to improve the operations of the transportation system and the service areas listed in paragraph A. Such report shall include:

- 1) An assessment of the department's efforts to develop systematic mechanisms to evaluate its efforts as outlined in paragraph A.4. of this Item;*
- 2) A report on all actions, accomplishments, achievements, and initiatives of the Virginia Department of Transportation, in the preceding fiscal year that involved outsourcing, privatization, and downsizing, as required pursuant to Chapter 420, Acts of Assembly of 2006;*
- 3) An enumeration of the status of major bridge maintenance and replacement projects and the availability of federal highway bridge rehabilitation and replacement apportionments; and*
- 4) In conjunction with the Department of Rail and Public Transportation, a report on the number of rail crossings in the metropolitan areas of Hampton Roads, Richmond and Northern Virginia. The report shall take into consideration the impediments to safety, mobility and economic development caused by the rail crossings as measured by the number of trains and frequency of train traffic; the vehicular traffic volumes at the crossings; and the lack of nearby rail and road alternatives. The report shall include an estimate of the costs to remove, relocate or remediate those rail crossings that have the greatest impacts on communities, including environmental."*

To get a full understanding of the long term condition and performance of the physical infrastructure managed, maintained and operated by the Virginia Department of Transportation and the business directions being pursued by the department, these two reports must be reviewed together.

This report addresses each of the four reporting requirements of Chapter 335 and Chapter 355 of the 2007 Acts of Assembly:

- Performance goals used to determine the needs;
- An estimate of the budget for the upcoming biennium to meet performance goals;
- Estimated employment level for the biennium; and
- Percent of asset management under private contract.

Other reports and activities will also influence the performance goals that will be used in deciding the allocation of resources. By October 1, 2007, the Governor's Transportation Accountability Commission will also make its final recommendations regarding performance measures for the transportation system and agencies.

The Council on Virginia's Future has also established and monitors performance of Virginia's transportation programs. Information is available at Virginia Performs (www.vaperforms.virginia.gov) and includes indicators for traffic congestion, infrastructure condition, and land use.

BIENNIAL REPORT ON THE CONDITION AND PERFORMANCE OF SURFACE INFRASTRUCTURE IN THE COMMONWEALTH OF VIRGINIA

Executive Summary

Beginning in the late 1990's, the Virginia Department of Transportation (VDOT) began developing an asset management system that facilitates the decision-making process for determining maintenance and operations needs. Beginning with FY 2006, the system's outputs were used to establish maintenance and operations budget priorities around the Commonwealth. In addition, as the Commonwealth Transportation Board's (CTB) Six-Year Improvement Program is developed, maintenance replacement priorities are considered for funding.

In 2002, the *Code of Virginia* was amended to include a definition of the term "maintenance" and "asset management" as they apply to highways, bridges, and ferries. Since that time, the Governor and General Assembly have: modified the programmatic budget and performance management structure for maintenance and asset management; outlined additional outsourcing requirements; supported staffing and location adjustments to maintenance activities; established requirements for local reporting on maintenance spending and asset condition; and lastly, increased the funding to maintenance activities.

This report is the next step in reporting on the condition of the highway infrastructure and the budgetary need for addressing that condition.

History of Performance Standards, Condition of Existing Infrastructure, and Need

VDOT continues to refine its performance-based system in which condition and performance of the highway infrastructure are collected and reported. As background, first, the various components of the highway infrastructure, commonly referred to as assets, were defined. Then, quantitative measures were developed for key assets. During the 2004-2006 biennium, the key performance measures for the maintenance of the highway network were 1) less than 18 percent of deficient pavement on the Interstate and Primary systems and 2) less than 40 percent of bridges rated as candidate for repair or replacement on the Primary and Interstate systems.

At the same time, VDOT reported for the first time its total maintenance and operations need. Total maintenance and operations need is an empirical figure that does not take into consideration repair work underway, planned work, or funding availability or source. Rather, total need is meant to measure, based on actual information on a specific date, what is the amount of estimated funding required to bring all of the assets up to an acceptable level of condition and provide acceptable level of operational services. Maintenance needs are prioritized through the setting of targets.

In the traditional needs-based approach, past reports indicated the estimated total needs to bring assets up to an acceptable level of condition were \$2.9 billion, \$3.3 billion and \$3.8 billion for FY 2005, FY 2006 and FY 2007, respectively.

As a result, in FY 2006, VDOT requested, and the Governor and General Assembly approved, a 10 percent increase to, or \$97 million in, the maintenance budget to begin addressing the need. This increase has become part of the maintenance base budget. In FY 2007 and FY 2008, the maintenance budget was increased again by approximately \$50 million and \$19 million, respectively. Figure ES-1 presents VDOT’s annual maintenance allocation since FY 2002.

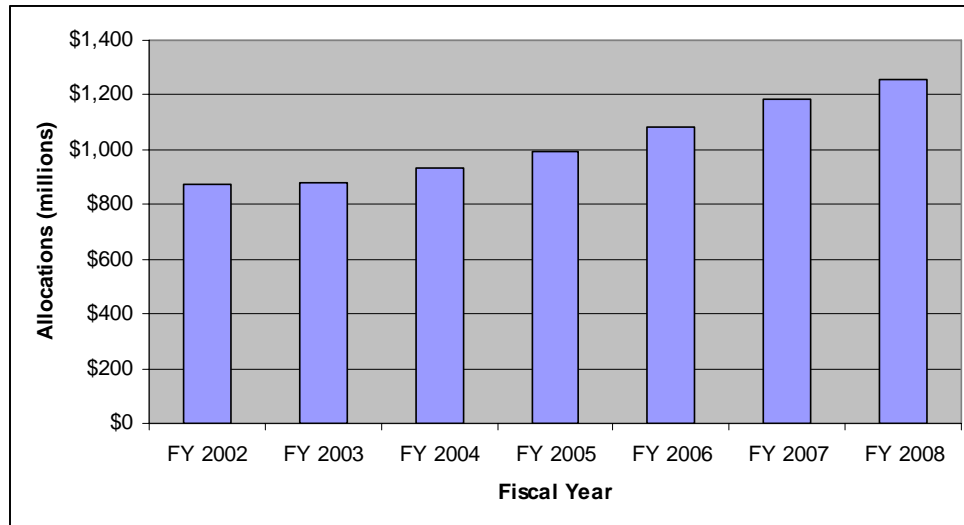


Figure ES-1. VDOT Maintenance Allocation Since FY 2002

In addition, since 2002, both the Joint Legislative Audit and Review Commission and the Auditor of Public Accounts have reviewed the methodology and results of VDOT’s early asset management work. Both found that the approach was appropriate and recommended that VDOT continue to implement the asset management methodology. The Auditor of Public Accounts’ follow-up review in 2004 found that the Asset Management System enabled VDOT to “... identify maintenance needs based on asset inventory, and compare alternative maintenance allocation strategies and the effect of performance targets for the initial set of assets.”

In addition, other reports and activities have been undertaken to examine asset condition and its performance. The Council on Virginia’s Future has also established and monitors performance of Virginia’s transportation programs. Information is available at Virginia Performs (www.vaperforms.virginia.gov) and includes indicators for traffic congestion, infrastructure condition, and land use. As of September 2007, traffic congestion is worsening and the infrastructure condition is about the same according to the measures used.

By October 1, 2007, the Governor’s Transportation Accountability Commission will make its final recommendations regarding performance measures for the transportation system and agencies.

Tables ES-1 and ES-2 summarize the performance measures and targets that are used at a more detailed level for assets and system performance, respectively. For the items in Tables ES-1 and ES-2, the measures and targets were established in 2007. The bridges/culverts performance measure is now structures rated as structurally deficient instead of in need or repair or

rehabilitation. These measures and targets are based on work that has been performed nationally in this area. Data was collected from the Federal Highway Administration (FHWA), Texas Transportation Institute, American Society of Civil Engineers, National Society of Professional Engineers, and the Reason Foundation.

Table ES-1. Summary of Asset Condition

Asset	Measure	Target	Current Performance
Pavement	% of network in deficient condition	≤ 18% - I	19.1% - I
		≤ 18% - P	21.2% - P
		No target set - S	24.2% - S
Pavement	% of network with fair or better ride quality	≥ 85% - I	93.6% - I
		≥ 85% - P	88.0% - P
Bridges/Culverts	% of bridges rated as structurally deficient	≤ 3% - I	2.8% - I
		≤ 6% - P	5.9% - P
		≤ 11% - S	10.8% - S
Cross Pipe	% of inventory in need of repair or replacement	≤ 10% - I	10.2% - I
		≤ 20% - P	21.4% - P
		≤ 20% - S	18.2% - S
Paved Ditches	% of inventory in need of repair or replacement	≤ 25% - I	24.1% - I
		≤ 25% - P	26.1% - P
		≤ 10% - S	8.8% - S
Unpaved Ditches	% of inventory in need of repair or replacement	≤ 17% - I	17.4% - I
		≤ 8% - P	8.0% - P
		≤ 10% - S	10.2% - S
Unpaved Shoulders	% of inventory in need of repair or replacement	NA - I	NA - I
		≤ 18% - P	18.0% - P
		≤ 16% - S	15.0% - S
Guardrail	% of inventory in need of repair or replacement	≤ 2% - I	1.5% - I
		≤ 2% - P	1.6% - P
		≤ 3% - S	2.5% - S
Guardrail Terminals	% of inventory in need of repair or replacement	≤ 4% - I	3.5% - I
		≤ 4% - P	3.4% - P
		≤ 4% - S	3.6% - S
Pavement Markings	% of inventory in need of repair or replacement	≤ 30% - I	30.6% - I
		≤ 65% - P	66.5% - P
		≤ 70% - S	71.7% - S
Signs	% of inventory in need of repair or replacement	≤ 5% - I	7.9% - I
		≤ 5% - P	5.0% - P
		≤ 10% - S	10.2% - S

I = Interstate; P = Primary; S = Secondary

Table ES-2. Summary of System Performance

Dimension	Measure	Target	Current Performance
Safety	Number of traffic deaths annually	846 by 2010	961 (in Calendar Year 2006)
Safety	Number of traffic injuries annually	72,023 by 2010	73,348 (in Calendar Year 2006)
Congestion	% of travel (VMT) that is congestion free	≥ 86% - I 80% of the time	84% - I (as of September 6, 2007)
Delay	% of incidents cleared within 60 and 90 minutes	65% & 90% - I	65% & 79% - I (as of September 11, 2007)

I = Interstate; P = Primary; S = Secondary

Estimated FY 2009-2010 Performance Based Investment

For the first time, VDOT has estimated the spending required to achieve performance targets for most asset groups. The need is determined based on the size and age of inventories, current condition, deterioration rates, and the quantity and cost of each repair. The type of repair assumed (replace, extend, etc.) is determined using a life-cycle methodology.

Based on the performance measures in Table ES-1 and Table ES-2, the maintenance need for the 2009-2010 biennium is \$3.0 billion (Table ES-3). This \$3.0 billion only reflects assets maintained by VDOT and not those of cities, towns, or the counties of Henrico and Arlington. Of that \$3.0 billion in maintenance need, \$1.9 billion is for items that can be considered routine maintenance and are paid solely from the maintenance program budget. For operations, which includes provision of existing operational services, maintenance support programs (equipment and materials management), to be maintained at their existing level will require \$431 in the biennium.

Table ES-3. Performance Based Estimates by Activity for FY 2009-2010 Biennium (millions)

Program Descriptions	Maintenance	Maintenance Replacement	Operations	Total
Interstate System Maintenance	\$247.1	\$174.2	\$4.7	\$426.0
Primary System Maintenance	528.1	267.8	11.5	807.4
Secondary System Maintenance	920.8	238.9	8.7	1,168.4
Transportation Operations Services	0.1	0.0	350.2	350.3
Management and Direction	173.0	0.0	55.8	228.7
Total	\$1,869.0	\$680.8	\$430.9	\$2,980.8

For the asset categories, pavements represent \$1.16 billion or 39 percent of the need. Bridges represent \$284 million or approximately ten percent of the need for the FY 2009-2010 biennium. Cross pipes, paved and unpaved ditches, unpaved shoulders, guardrail, guardrail terminals, pavement marking, and signs represent another \$340 million or approximately 11 percent of the FY 2009-2010 biennium needs. Maintenance and operations of signals, highway lighting, traffic operations centers, tunnels, ferries, incident management, and traffic engineering represent \$323 million, or 11 percent of the biennium needs. Snow and ice removal represent \$133 million or four percent, and equipment and materials inventory management represent \$120 million, or four percent, of the biennium needs. The remaining needs are for other assets and programs.

Many maintenance replacement activities and operational improvements are eligible for, and are paid for, as part of the construction program. For example, nine of the 22 Interstate projects in the Bristol District's construction program are the refurbishment, correction, or replacement of existing highway infrastructure. Another example is the \$77 million allocated by the CTB for operational improvements statewide. This funding will be focused on addressing sign replacement throughout the Interstate system.

These needs could be addressed through the Six-Year Maintenance and Operations Program, the Six-Year Improvement Program or through private or regional/local projects. The source of funding to address the need is based on decisions made by the Governor, General Assembly, and the CTB. The planned maintenance and operations budget for the FY 2009-2010 biennium based on the FY 2008-2013 Six Year Improvement Program is \$2.7 billion. Although the needs shown are greater than the planned maintenance and operations biennial budget, additional allocation is not requested for that program since it is expected that needs not addressed through the Six-Year Maintenance and Operations Program will be addressed by the Six-Year Improvement Program or through a Public-Private Transportation Act (PPTA) project.

Asset Management Outsourcing

In FY 2007, \$664 million of the \$971 million, or 69 percent, spent by VDOT in the maintenance program was paid to the private sector. Of the payments to the private sector, \$464 million (48 percent of the \$971 million) was directly delivered through private contracts. Another \$200 million (21 percent of the \$971 million) was paid to vendors for supplies, materials, fuel, and non-contracted services that support maintenance and operations.

Employment Levels

Since 1986 (see Figure ES-2), the agency’s commitment to outsourcing, devolution, and internal efficiency initiatives has resulted in an overall staff level reduction of 1,671 employees (-16.3%) during a time when the transportation infrastructure has expanded by approximately 7.6 percent (increase of 8,700+ lane miles).

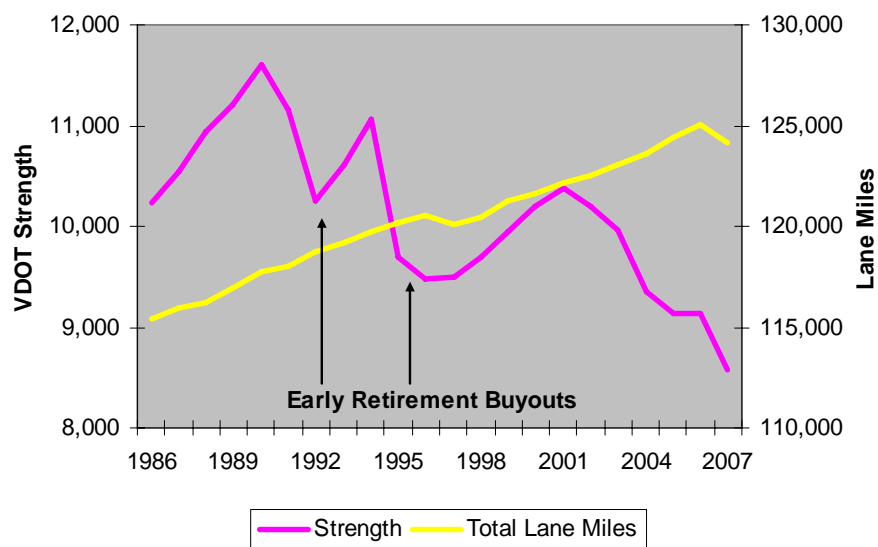


Figure ES-2. VDOT Strength and Lane Miles Maintained Since 1986

In the past five years, direct service-delivery responsibilities have continued to shift from the state workforce to private contractors across all areas of the agency. From 2002 to 2007, VDOT reduced the number of classified employees significantly. VDOT employment levels are expected to remain relatively constant for the FY 2009-2010 biennium with no major reductions.

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Virginia's Transportation Infrastructure

Virginia has the third largest state-maintained highway system in the country (behind North Carolina and Texas), with approximately 57,000 centerline miles of roads and 19,293 structures (bridges and large culverts). Table 1 provides summary information on the inventory of various categories of assets in the State Highway System.

Table 1. Current Inventory in the State Highway System

Inventory Item	Interstate	Primary	Secondary	Frontage¹	Total VDOT Maintained
Lane Miles	5,383	21,642	97,128	658	124,811
Bridges/Culverts	3,010	5,012	11,271		19,293
Tunnels	5	1			6
Toll Facilities		3			3
Tolled Lane Miles		166			166
Safety Rest Areas	41				41
Welcome Centers	11				11
Ferries (vessels)		4	3		7
Pipes ²	8,000	58,000	269,000		335,000
Ditches ² (ft.)	16,067,000	65,126,000	343,278,000		424,471,000
Unpaved Shoulders ² (ft.)	NA	64,085,000	286,800,000		350,885,000
Pavement Marking ² (ft.)	57,029,000	168,620,000	120,142,000		345,791,000
Guardrail ² (ft.)	9,353,000	11,739,000	6,655,000		27,747,000
Signs ²	40,000	161,000	234,000		435,000
Signals	0	1,802	1,228		3,030
Cameras	363	9			372
Dynamic Message Sign	532	85			617
Traffic Sensors	1,416				1,416
Count Stations	73	126	17		216
Roadway Weather Information System	62				62
Fog Detectors	2	0	0		2
HOV gates	30	0	0		30
Highway Advisory Radio	32	1	0		33

¹ The Random Condition Assessment did not include frontage roads

² Estimated inventory based on statistical sampling (see Appendix)

Performance Standards and Condition of the Existing Infrastructure

The Virginia Department of Transportation (VDOT) continues to refine its performance based system on which maintenance and operations spending for the existing infrastructure is based. Table 2 presents performance measures and targets for major assets.

Chapter 847 of the 2007 Acts of Assembly requires VDOT to report on the condition of the existing infrastructure each November 30th. That report (also called the *State of the Assets Report*) should be reviewed together with this report because it explains, in detail, the condition and assessment methodology for various asset categories.

Collectively, the ten assets included in Table 2 have accounted for the majority of historical asset maintenance expenditures on the Interstate, Primary and Secondary systems. More comprehensive inventories are now being developed for signs, guardrail, pavement marking, shoulders, curb and gutter, signals, signal mast arms, overhead sign structures, cameras, dynamic message signs, traffic sensors, and a number of other assets that will provide the basis for improved needs assessments, planning and management of those assets.

Table 2. Summary of Asset Condition

Asset	Measure	Target	Current Performance
Pavement	% of network in deficient condition	≤ 18% - I ≤ 18% - P No target set – S	19.1% - I 21.2% - P 24.2% - S
Pavement	% of network with fair or better ride quality	≥ 85% - I ≥ 85% - P	93.6% - I 88.0% - P
Bridges/Culverts	% of bridges rated as structurally deficient	≤ 3% - I ≤ 6% - P ≤ 11% - S	2.8% - I 5.9% - P 10.8% - S
Cross Pipe	% of inventory in need of repair or replacement	≤ 10% - I ≤ 20% - P ≤ 20% - S	10.2% - I 21.4% - P 18.2% - S
Paved Ditches	% of inventory in need of repair or replacement	≤ 25% - I ≤ 25% - P ≤ 10% - S	24.1% - I 26.1% - P 8.8% - S
Unpaved Ditches	% of inventory in need of repair or replacement	≤ 17% - I ≤ 8% - P ≤ 10% - S	17.4% - I 8.0% - P 10.2% - S
Unpaved Shoulders	% of inventory in need of repair or replacement	NA - I ≤ 18% - P ≤ 16% - S	NA - I 18.0% - P 15.0% - S
Guardrail	% of inventory in need of repair or replacement	≤ 2% - I ≤ 2% - P ≤ 3% - S	1.5% - I 1.6% - P 2.5% - S
Guardrail Terminals	% of inventory in need of repair or replacement	≤ 4% - I ≤ 4% - P ≤ 4% - S	3.5% - I 3.4% - P 3.6% - S
Pavement Markings	% of inventory in need of repair or replacement	≤ 30% - I ≤ 65% - P ≤ 70% - S	30.6% - I 66.5% - P 71.7% - S
Signs	% of inventory in need of repair or replacement	≤ 5% - I ≤ 5% - P ≤ 10% - S	7.9% - I 5.0% - P 10.2% - S

I = Interstate; P = Primary; S = Secondary

Table 3 summarizes the measures, targets, and performance of the system. The measures and targets in Tables 2 and 3 are based on work that has been performed nationally in this area. Data was collected from the Federal Highway Administration (FHWA), Texas Transportation Institute, American Society of Civil Engineers, National Society of Professional Engineers, and the Reason Foundation.

Table 3. Summary of System Performance

Dimension	Measure	Target	Current Performance
Safety	Number of traffic deaths annually	846 by 2010	961 (in Calendar Year 2006)
Safety	Number of traffic injuries annually	72,023 by 2010	73,348 (in Calendar Year 2006)
Congestion	% of travel (VMT) that is congestion free	≥ 86% - I 80% of the time	84% - I (as of September 6, 2007)
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Pavements

Pavement condition data are collected annually for 100% of Interstate and Primary pavements. Secondary pavements are surveyed on a statistical sample basis with approximately 20 percent of the network inspected each year. Pavement condition data are collected using vehicles outfitted with state of the art equipment to measure roughness, rutting, cracking, and other physical distresses. The data are summarized into a condition index that ranges from 0 to 100, where 100 represents the best condition. Pavements with a condition index below 60 are considered to be in deficient condition, which means that they require resurfacing, restorative maintenance, or rehabilitation. Figure 1 shows Interstate and Primary system pavement condition for 2006 and 2007. While no data were collected on Secondary pavements in 2006, 24.2 percent of the 20 percent sampled in 2007 were found to be deficient.

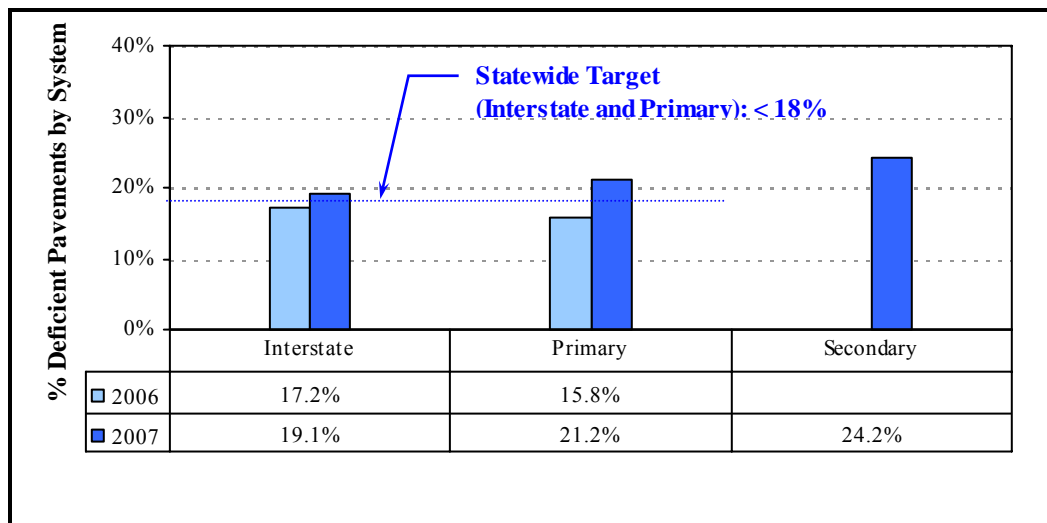


Figure 1. Statewide Percent Deficient Pavements by System

The 2007 pavement condition survey found that 19.1 percent of Interstate and 21.2 percent of Primary pavements are deficient statewide (in poor or very poor condition defined as having a Critical Condition Index of < 60). This is above the established performance target of no more than 18 percent of Interstate and Primary system pavements in deficient condition statewide. The 2007 pavement condition survey was conducted in the spring of 2007 so that the pavement rehabilitation work completed during the summer of 2007 has not been captured in this survey. Table 4 shows percent deficient pavements in each district by system.

Table 4. Pavement Condition by District and System

District	Interstate		Primary		Secondary (Sample)	
	Deficient Lane Miles	Percent Deficient	Deficient Lane Miles	Percent Deficient	Deficient Lane Miles	Percent Deficient
Bristol	147.5	27.4%	372.7	12.8%	596.0	30.9%
Salem	111.4	22.7%	461.2	17.6%	605.4	21.9%
Lynchburg	NA	NA	294.1	10.9%	489.2	18.5%
Richmond	235.4	18.3%	747.2	23.3%	440.8	15.5%
Hampton Roads	160.1	20.3%	364.4	21.3%	377.3	26.7%
Fredericksburg	80.6	28.8%	497.2	23.0%	578.8	29.6%
Culpeper	37.7	13.5%	450.1	24.9%	374.2	24.3%
Staunton	46.7	4.9%	629.5	25.4%	245.8	12.8%
Northern Virginia	177.1	29.2%	668.0	42.2%	885.2	44.4%
Statewide	996.5	19.1%	4,484.4	21.2%	4,592.7	24.2%

Another measure of pavement performance is ride quality. Pavement ride quality is measured by International Roughness Index. A pavement section with an International Roughness Index value less than 140 is termed to have a fair or better ride quality. The performance target set for pavement ride quality is no less than 85 percent of the Interstate and Primary pavements will have fair or better ride quality. The target is based on benchmarking with other states. Statewide, 93.6 percent of the Interstate and 88.0 percent of the Primary pavements were rated to have a fair or better ride quality based on the last condition evaluation performed in 2007. Table 5 shows the percent of each district's network with fair or better ride quality by system.

Table 5. Percent of District Network with Fair or Better Ride Quality

District	Interstate	Primary
Bristol	99.3%	81.9%
Salem	98.6%	90.7%
Lynchburg	NA	95.5%
Richmond	88.9%	85.8%
Hampton Roads	81.5%	87.2%
Fredericksburg	97.4%	90.4%
Culpeper	98.6%	96.9%
Staunton	99.5%	87.9%
Northern Virginia	92.3%	69.8%
Statewide	93.6%	88.0%

Bridges and Large Culverts

There are 20,823 bridges and large culverts in Virginia, 13,118 of which are included in the National Bridge Inventory, 19,293 are maintained by VDOT. Currently, 56 percent of all structures (bridges and large culverts) in Virginia are 40 years old or older as shown in Figure 2.

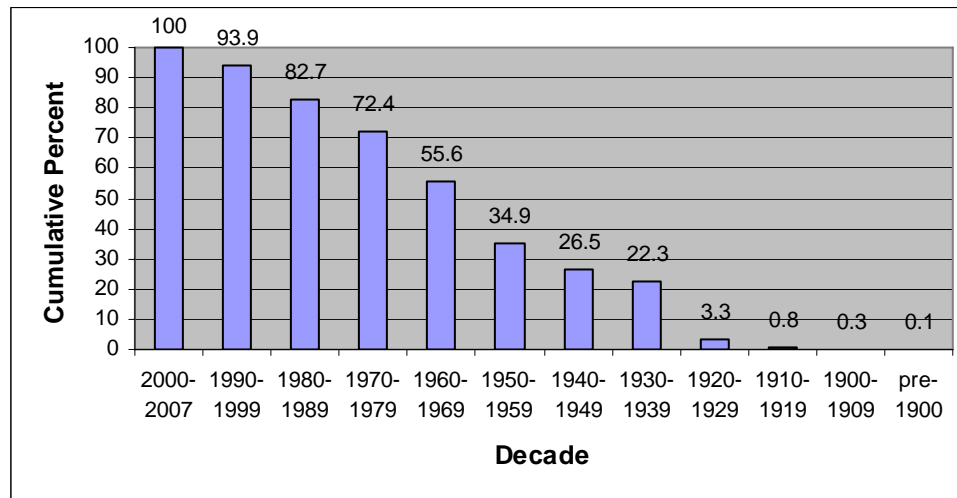


Figure 2. Cumulative Percentage of Structures in Virginia by Age

In accordance with the Code of Federal Regulations, VDOT inspects bridges and culverts that are part of the National Bridge Inventory, defined as structures on public roadways and exceeding 20 feet in length measured along the centerline of the roadway. National Bridge Inventory structures receive a detailed inspection at regular intervals not exceeding 24 months. In addition to the federal inventory and inspection requirements, VDOT also inventories and inspects bridges measuring 20 feet or less in length and large culverts having an opening of 36 square feet or greater. Inspectors use condition ratings to describe the existing, in-place structure as compared to the as-built condition. These condition ratings are based on FHWA's criteria.

VDOT uses FHWA's criteria for identifying deficient or functionally obsolete structures.

- Structurally Deficient—a Structurally Deficient Bridge is one that 1) has been restricted to light vehicles only, or 2) is closed to traffic, or 3) requires rehabilitation.
- Functionally Obsolete—a Functionally Obsolete bridge is one which the deck geometry, load carrying capacity, clearances, or approach roadway alignment no longer meets today's standards.
- Sufficiency Rating—this is a formula that was developed by FHWA to rank bridges and allocate funds. A sufficiency rating of a bridge varies from 0 (poor) to 100 (very good). The formula considers the structural adequacy; functional obsolescence and level of service; and essentiality for public use.

Table 6 presents the inventory of bridges and large culverts in Virginia and the number that are structurally deficient, functionally obsolete, or load posted.

Table 6. Virginia’s Structure Inventory and Rating by System¹

	Interstate²	Primary	Secondary	Urban	Other	Total
No. of Structures	3,006	5,099	11,448	1,194	76	20,823
Structurally Deficient	84	300	1,256	98	1	1,739
Functionally Obsolete	363	679	1,813	243	5	3,103
Load Posted	5	72	1,422	82	3	1,584

¹ Includes 1,530 structures (primarily in Urban and Other) that are not maintained by VDOT

² This includes bridges crossing over the Interstate

Drainage, Guardrail and Markings

The performance measure for pipes, paved and unpaved ditches, unpaved shoulders, guardrail, guardrail terminals and pavement markings is defined as the percent of inventory needing repair or replacement. Targets for each asset are shown in Table 2. Inventories and condition of these assets are assessed through a Random Condition Assessment process (see Appendix for methodology).

Guardrail and Guardrail Terminals

There are an estimated 28 million linear feet of guardrail on VDOT maintained roads. While most guardrail is in good physical condition, as shown in Table 2, a large proportion (58 percent) of guardrail is no longer compliant with current National Cooperative Highway Research Program 350 standards. Guardrail may remain in satisfactory condition for many years until it is hit or damaged by storms, erosion or other factors. During FY 2007, approximately 360,000 feet of guardrail were replaced or upgraded.

Pavement Markings

An estimated 346 million linear feet of pavement marking exists on VDOT maintained roads. VDOT uses several types of pavement marking material including tape, thermo-plastic, epoxy, and latex paint. Each of the products has its own life cycle.

Tunnels

VDOT operates six tunnel facilities—four river tunnels and two mountain tunnels. Table 7 presents location and traffic volume data for each tunnel facility.

Table 7. Average Daily Traffic Volume at Each Tunnel

Tunnel	Location	Average Daily Traffic Volume (# of vehicles)¹
Hampton Roads Bridge Tunnel	I-64	91,000
Midtown Elizabeth River Tunnel	Rt. 58	35,000
Downtown Elizabeth River Tunnel	I-264	96,000
Monitor-Merrimac Memorial Bridge Tunnel	I-664	57,000
Big Walker Mountain Tunnel	I-77	27,000
East River Mountain Tunnel	I-77	28,000

¹ Traffic volumes rounded to the nearest 1,000 vehicles per day

Ferries

VDOT operates four ferry services, utilizing seven ferry boats. Table 8 provides information on the carrying capacity and the age of each ferry boat.

Table 8. Summary of VDOT Ferry Boats

Vessel	Year Built	Capacity	Ferry Service
Virginia	1936	28 cars	Jamestown-Scotland Ferry
Surry	1979	50 cars	Jamestown-Scotland Ferry
Williamsburg	1983	50 cars	Jamestown-Scotland Ferry
Pocahontas	1995	70 cars	Jamestown-Scotland Ferry
Northumberland	1985	2 cars	Sunnybank Ferry
Lancaster	1985	2 cars	Merry Point Ferry
The Hatton	1986	2 cars	The Hatton Ferry is one of the last two poled ferries in the U.S.

Safety Rest Areas

VDOT operates and maintains 41 safety rest areas and 11 welcome centers. Safety rest areas are facilities that provide traveler services and rest. These facilities include buildings, shelters, tables, plumbing/sanitation systems, HVAC systems, parking lots, ramps, curb and gutter, lighting, fencing, and vegetation.

System Performance

Safety, system operating performance, and incident management are core elements of a maintenance and operations program. The definition of maintenance in §33.1-23.02 of the *Code of Virginia* was amended to include "... operations that include but are not limited to traffic signal synchronization, incident management, other intelligent transportation system functions."

Safety

As shown in Figure 3, annual crashes on Virginia's peaked in 2003 and declined slightly since then, particularly when considering the rate per population. However, traffic safety remains a major health issue in the Commonwealth. Figure 4 shows that the number of deaths from crashes has remained relatively stable for the last decade. Yet, traffic crashes are the leading cause of death for those under 30 in Virginia and our rate per population is over 70 percent higher than the best state's rate (7.2) and above the worldwide average of 34 developed countries (11.7). While injuries resulting from traffic crashes have been declining (as shown in Figure 5), Virginia's injury rate per population remains above the national average.

The 2006-2010 Strategic Highway Safety Plan addresses highway safety as a health issue and sets a goal of 100 fewer deaths and 4,000 less people injured in crashes.

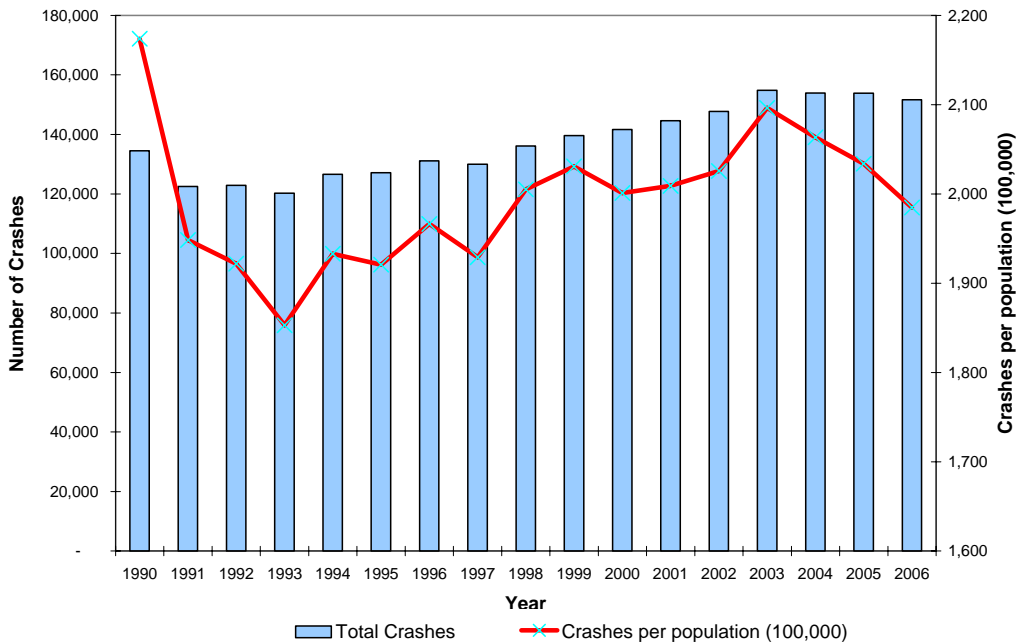


Figure 3. Annual Crashes in Virginia Since 1990

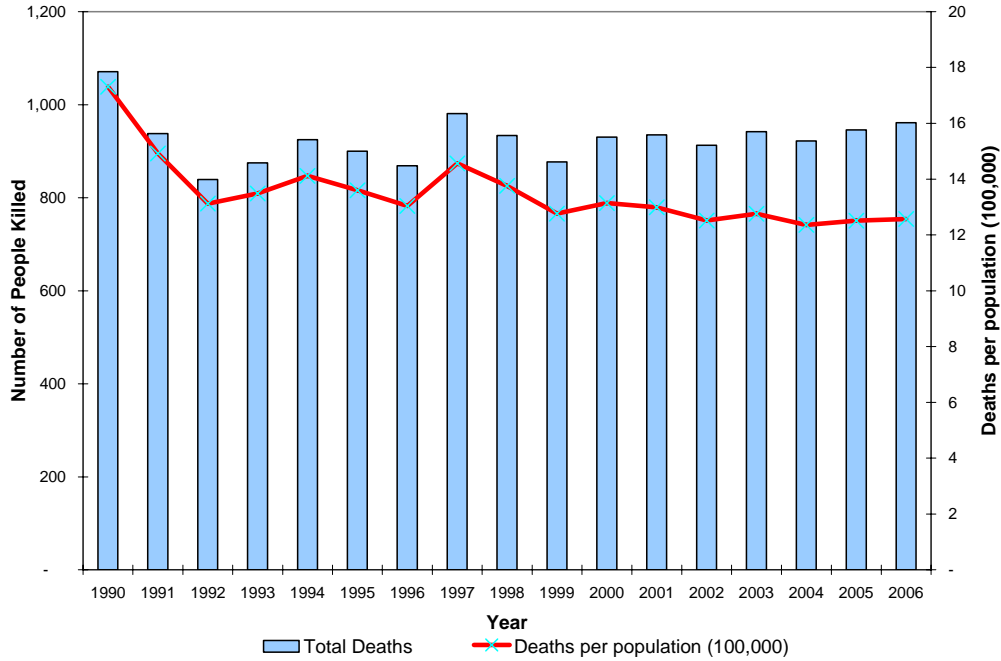


Figure 4. Annual Deaths from Crashes in Virginia Since 1990

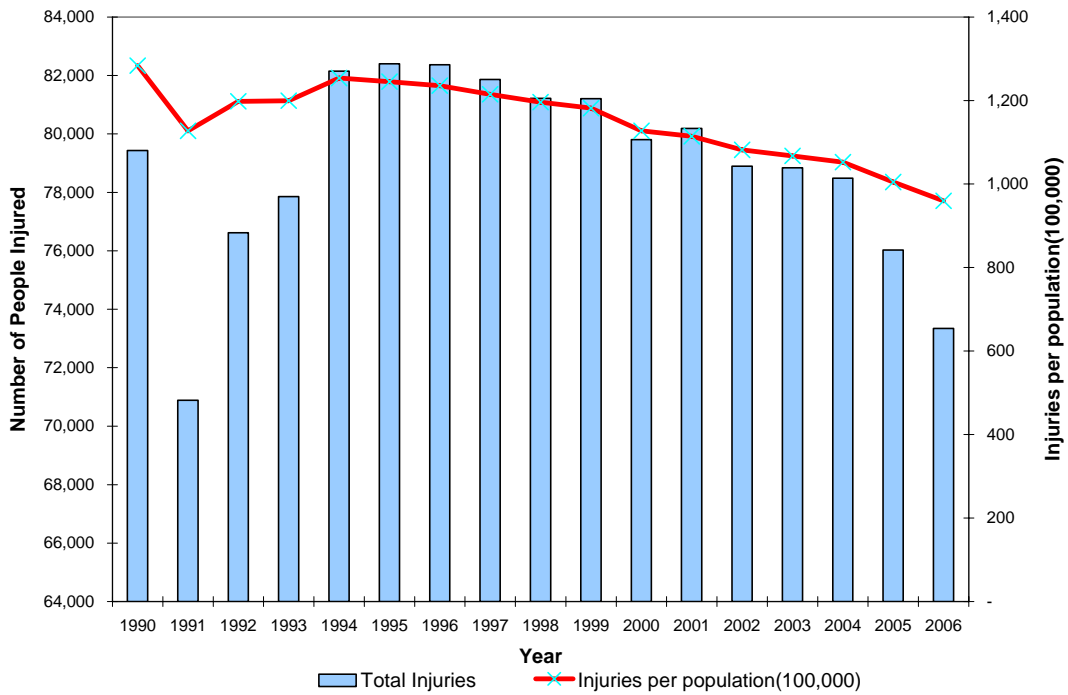


Figure 5. Annual Injuries from Crashes in Virginia Since 1990

System Operating Performance

In addition to evaluating the condition of the assets that comprise the roadway network, evaluating how well it performs in providing the most efficient use of the capacity of the network is also an important measure of maintenance since the *Code of Virginia* defines maintenance to include traffic operations.

Figure 6 shows that by and large the percentage of congestion free travel on the Interstate statewide has been congestion free, on average, 87 to 90 percent of the time. This measure reflects the large percentage of rural Interstate in Virginia that is operating at its posted speeds most of the time. Likewise, the yellow and red lines in Figure 6 indicate significant congestion continues to occur in some areas, primarily the urban areas of Virginia.

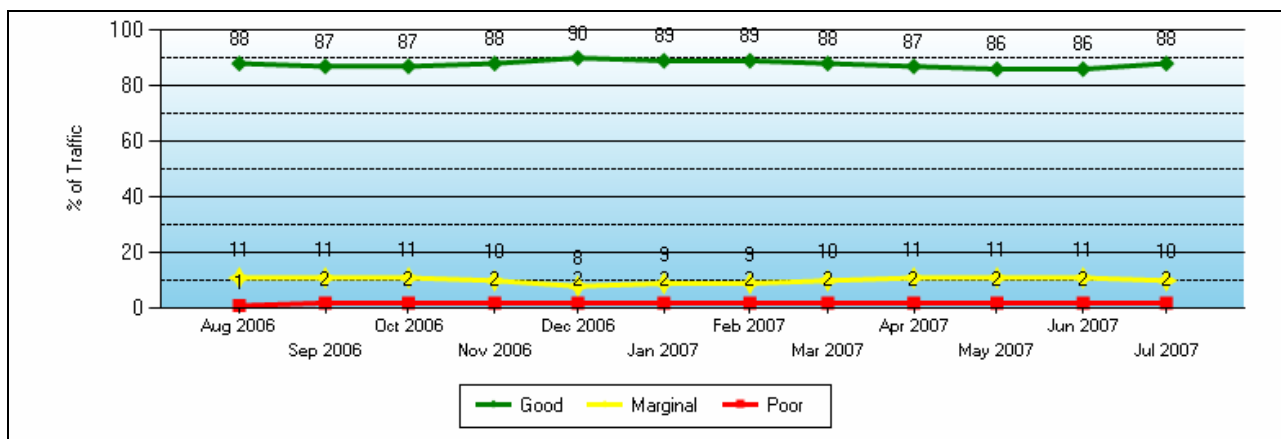


Figure 6. Interstate Congestion Trend Since August 2006

This trend is not unique to Virginia. Congestion reports in other urban areas across the country and national studies document similar trends. The marginal and poor performing sections of Interstate are in the urban corridors. The Texas Transportation Institute studies on congestion in major areas of the United States have documented that congestion continues to grow. Most recently, data suggest a greater growth in travel time over the last several years with substantially fewer additional trips being added over the same period.

Commuting distances are becoming longer, with the proportion of trips from one jurisdiction to another increasing. Also, more people in large urban areas are traveling in a one-way trip to work that is longer than 60 minutes. The length of congested periods is growing as well. For urban areas with a population of more than one million, the Institute data indicate that peak travel hours are now three hours long in each direction.

Incident Management

VDOT operates Safety Service Patrols in four areas: Hampton Roads, Fredericksburg, Salem and Northern Virginia. These patrols cover approximately 350 centerline miles of predominately Interstate and assist stranded motorists and provide traffic control during traffic incidents. This

free service, which began in 1972 in Northern Virginia, was initiated to reduce congestion caused by vehicle breakdowns. Safety Service Patrols responded to over 80,000 incidents or motorist assists between January and August of 2007. Figure 7 presents the statewide average incident duration by month since August 2006.

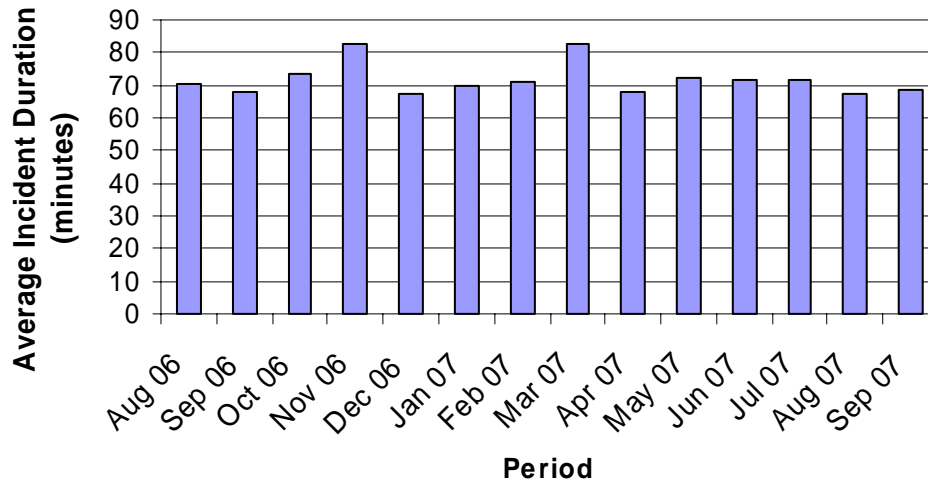


Figure 7. Statewide Average Incident Duration Since August 2006

Estimated FY2009-2010 Performance Based Investment

Over the past five years, the asset management methodology and the Asset Management System have enabled VDOT to move from allocating funds based on historical funding to a process that allocates funds based on actual quantified maintenance needs. The budgeting process using the asset management methodology has focused on preserving the infrastructure by identifying maintenance work needed to achieve stated performance targets for the physical condition of assets (see appendix for methodology). Over the last two years, the focus has shifted to include the operational performance of the system as well as its physical condition. Accordingly, this needs assessment identifies and distinguishes the following categories of need:

- Maintenance—ordinary, routine preventive and corrective maintenance of existing assets;
- Maintenance replacement—major rehabilitation, total replacement or reconstruction of existing assets; and
- Operations—continued provision of existing operational services, maintenance support programs, and management and direction.

Table 9 presents the maintenance potential needs identified for key assets on the existing transportation infrastructure.

**Table 9. Estimated Performance Based Maintenance
Biennium Investment for Major Assets**

Asset Type	Biennium Needs (million)
Pavements	\$1,163.0
Bridges	284.2
Cross Pipe	46.5
Ditches	36.4
Signs	25.1
Pavement Markings	143.1
Guardrail	41.9
Unpaved Shoulders	47.0
Total	\$1,787.2

Other Estimated Performance Based Potential Biennium Spending Needs

Electronic Assets

Approximately \$63 million is needed for preventative and reactive maintenance and \$97 million for replacement of obsolete or non-functioning electronic assets over the biennium. In addition, \$6 million are needed to fund signal retiming projects at locations across the state.

Approximately \$57 million is needed for operations (i.e. utilities and operators) over the biennium to operate electronic assets and the five Traffic Emergency and Operations Centers located across the state. An additional \$10 million is needed to provide engineering services and statewide management and direction to support the program.

Tunnels

VDOT spends approximately \$20 million per year to operate the six state tunnel facilities. In addition, approximately \$40 million in maintenance is needed over the biennium to address Fire-Life-Safety compliance to the two mountain tunnels on I-77 in southwestern Virginia and four river tunnel facilities in Hampton Roads to bring them up to the *2004 National Fire Protection Association (NFPA) 502 Standard for Road Tunnels, Bridges, and Other Limited Access Highways*. This standard sets the minimum fire protection and fire-life-safety requirements for such facilities. Because NFPA 502 is now issued as a standard, compliance is no longer a recommendation, it is required. NFPA 502 sets nationally recognized requirements that provide a level of safety expected by the traveling public.

Ferries

VDOT spends approximately \$12.5 million per year to operate four ferry services and to maintain seven boats. The two oldest ferries at the Jamestown Scotland ferry operation are both eligible for replacement, at a cost of approximately \$20 million each and the two-car ferries at Merry Point and Sunnybank are also in need of replacement with four-car ferries at an estimated cost of \$750,000 each.

Safety Rest Areas

VDOT currently spends about \$20 million per year to operate and provide basic maintenance to the safety rest areas and welcome centers across the state. Approximately \$93 million worth of renovation, expansion, or rebuilding of deteriorating facilities is needed. In addition, expansion of parking to meet current Interstate demand, public sewer work, and approximately \$7.4 million in safety enhancements to 20 deceleration and 34 acceleration ramps at several safety rest areas has been identified.

Snow and Ice Removal

VDOT expects to spend approximately \$132 million on snow and ice removal and preparation over the biennium.

Table 10 presents the estimated maintenance and operations FY 2009-2010 biennium performance based investment on the existing transportation infrastructure.

Table 10. Estimated FY 2009-2010 Biennium Performance Based Investment (millions)

Program Descriptions	Maintenance	Maintenance Replacement	Operations	Total
Interstate System Maintenance	\$247.1	\$174.2	\$4.7	\$426.0
Primary System Maintenance	528.1	267.8	11.5	807.4
Secondary System Maintenance	920.8	238.9	8.7	1,168.4
Transportation Operations Services	0.1	0.0	350.2	350.3
Management and Direction	173.0	0.0	55.8	228.7
Total	\$1,869.0	\$680.8	\$430.9	\$2,980.8

These needs could be addressed through the Six-Year Maintenance and Operations Program, the Six-Year Improvement Program or through private or regional/local projects. The source of funding to address the need is based on decisions made by the Governor, General Assembly, and the Commonwealth Transportation Board (CTB).

It should be noted that while the potential investment shown in Table 10 is greater than the projected Maintenance and Operations Program planned FY 2009-2010 biennial allocation of \$2.7 billion, additional allocation is not requested for that program since it is expected that investment not addressed through the Six-Year Maintenance and Operations Program will be addressed by the Six-Year Improvement Program or through a Public-Private Partnership Act (PPTA) project.

Percent of VDOT Dollars Expended Externally

During fiscal year 2007, VDOT had total expenditures of \$2.9 billion. A breakdown of these expenditures is shown in Figure 8. This breakdown indicates that 81 percent of all VDOT expenditures either go to the private sector or to localities or other agencies.

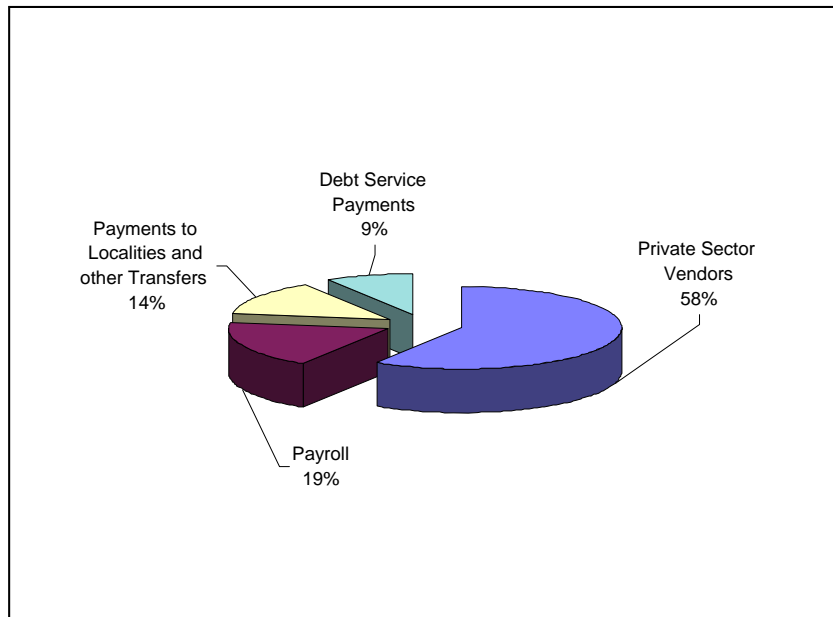


Figure 8. FY 2007 VDOT Total Spending

Asset Management Outsourcing

VDOT has entered into contracts with the private sector to deliver many maintenance and operations related projects and services. In FY 2007, \$664 million of the \$971 million, or 69 percent, spent by VDOT in the maintenance program was paid to the private sector. Of the payments to the private sector, \$464 million (48 percent of the \$971 million) was directly delivered through private contracts. This percentage is expected to increase in FY 2009-2010 as more maintenance and operations services are delivered through private contract. Another \$200 million (21 percent of the \$971 million) was paid to vendors for supplies, materials, fuel, and non-contracted services that support maintenance and operations.

By law, the department is to outsource all Interstate maintenance by July 1, 2009. In response, VDOT has developed Turnkey Asset Maintenance Services (TAMS) contracts where private vendors manage and perform routine, ordinary maintenance, incident management, management of inclement weather events, and replacement of assets that are damaged due to incidents and/or inclement weather. TAMS contracts do not include capital improvements to pavement and bridges. To date, 648 of 1,017 Interstate miles, or 58 percent, have already been outsourced to the private sector. The remaining portions of the Interstate will be under TAMS contracts by July 1, 2009.

Examples of other significant maintenance and operations outsourcing include:

- Pavement resurfacing—pavement resurfacing work is contracted out. Striping of new pavement and upgrade or installation of new guardrail is also completed by private contractors.

- Bridge maintenance—bridge maintenance work is contracted out including bridge painting, deck repair and replacement, superstructure and substructure repair and corrective maintenance, and all bridge rehabilitation or reconstruction.
- Bridge inspection—a portion of bridge inspections are provided by private contractors.
- Operations—Smart Traffic Center operations are delivered through contract in the Hampton Roads. Safety Service Patrols are outsourced in the Hampton Roads, Northern Virginia, and Salem, and will also be provided through private contract in Richmond beginning in FY 2008.
- Nearly all guardrail upgrades and guardrail replacement is conducted by private contractors.
- Installation of signals and electronic signing is nearly all conducted by private contractors.

Area Headquarters Consolidation

As VDOT outsourced more work to the private sector, the agency had to adjust how its workforce was deployed and make the best use of facilities and equipment. By law, the department is in the process of outsourcing all Interstate maintenance by July 1, 2009 (see TAMS discussion). VDOT conducted an analysis of population, superintendent workload, response times and the number of lane miles maintained by each area headquarters. The agency then engaged field staff to review the results and adjust them to reflect actual field operational considerations. The agency identified 87 properties for consolidation.

Sign Shops

VDOT conducted a study to investigate methods of improving highway sign procurement and production. Currently, VDOT employs a mix of outsourcing and in-house sign production in eight districts. The Department has decided to consolidate all statewide internal sign production to one production facility in the Richmond District and to close the remaining six facilities. VDOT is currently soliciting proposals to have the private sector meet all Interstate sign needs to include procurement, upgrade, and maintenance.

Devolution – City of Suffolk and James City County

VDOT presents four options available to all localities regarding Secondary system devolution: a maintenance-only devolution; a construction-only devolution; maintenance & construction devolution; and, full devolution. To assist in this effort, VDOT has developed an analytical model for all counties to utilize when considering any of the above options.

In July 2006, the City of Suffolk chose the maintenance only option. James City County filed a notice of intent to accept construction and maintenance responsibility on the Secondary system on June 27, 2006. On September 11, 2007, James City County passed a resolution to accept construction and maintenance responsibilities.

Dulles Toll Road

VDOT has entered into an operating permit agreement with the Washington Metropolitan Area Transit Authority to assume full control of the maintenance and operations of the Dulles Toll Road. It is expected that this transfer will occur sometime during calendar year 2008.

Employment Levels

Since 1986 (see Figure 9), the agency's commitment to outsourcing, devolution, and internal efficiency initiatives has resulted in an overall staff level reduction of 1,671 employees (-16.3%) during a time when the transportation infrastructure has expanded by approximately 7.6 percent (increase of 8,700+ lane miles).

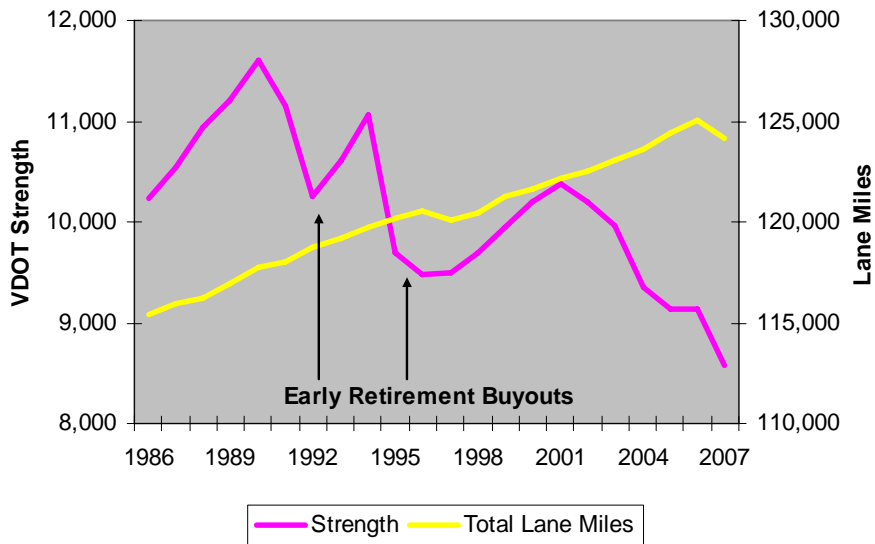


Figure 9. VDOT Strength and Lane Miles Maintained Since 1986

In the past five years, direct service-delivery responsibilities have continued to shift from the state workforce to private contractors across all areas of the agency. From 2002 to 2007, VDOT reduced the number of classified employees significantly (as shown in Figure 10).

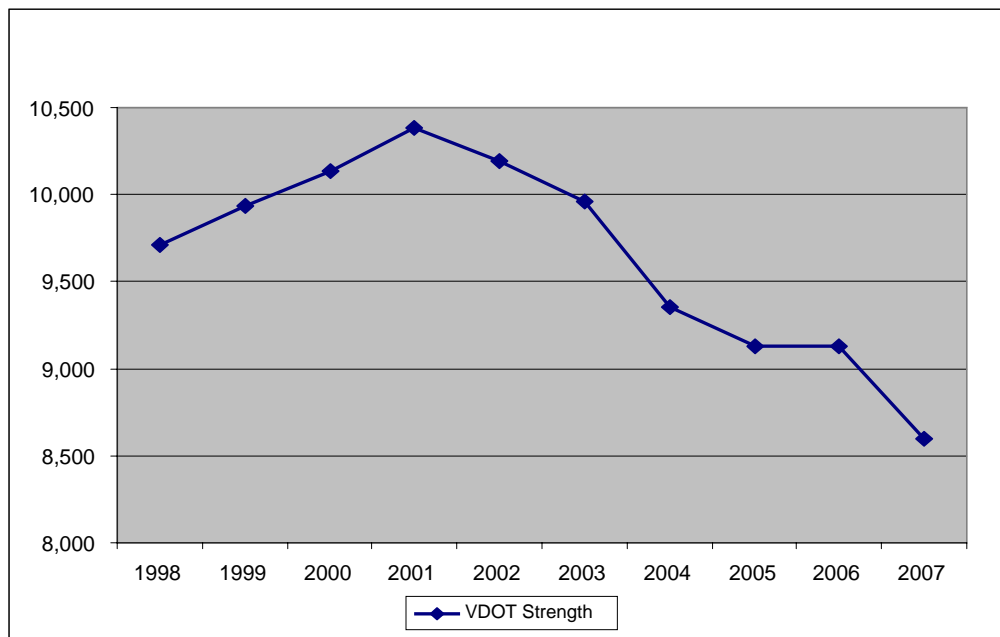


Figure 10. Historical VDOT Strength

Figure 11 compares functional staff levels for Engineering and Construction Management, Maintenance and Operations, Planning and Program Management, and Administration.

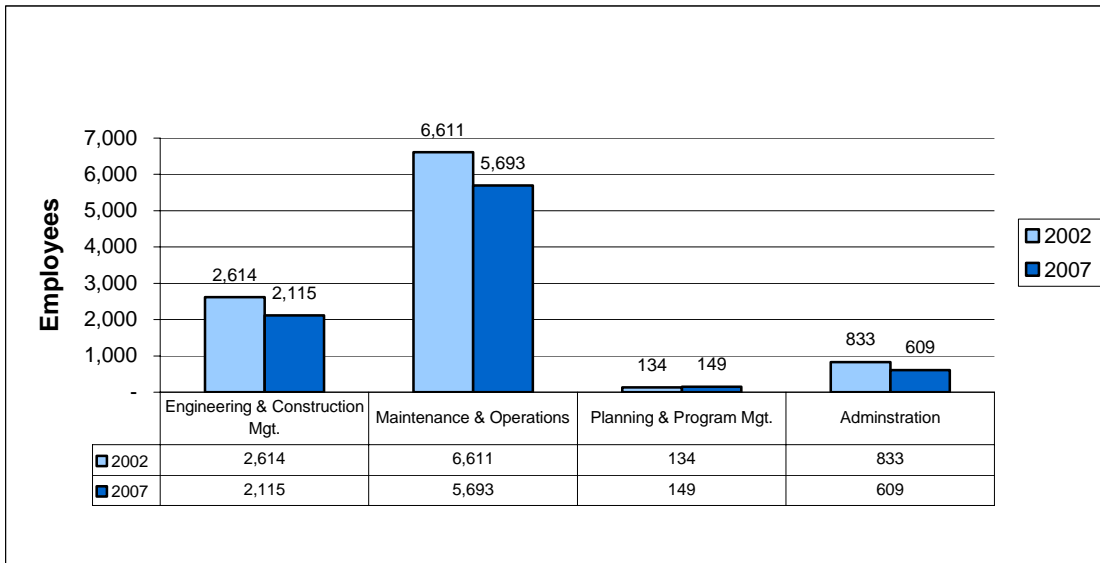


Figure 11. VDOT Staffing Levels 2002 and 2007 by Functional Area

VDOT employment levels are expected to remain relatively constant for the FY 2009-2010 biennium with no major reductions.

APPENDIX

VDOT's Approach to Asset Management

“Asset Management” has been defined in § 33.1-23.02 of the *Code of Virginia* as “a systematic process of operating and maintaining the state system of highways by combining engineering practices and analysis with sound business practices and economic theory to achieve cost-effective outcomes.” The asset management approach to maintenance of the highway network assets reflects a comprehensive view of the highway network assets’ performance. Resource allocation decisions are based on the desired system condition, level of service, and safety provided to customers.

VDOT’s asset management approach is based on the following goals:

- Manage assets based on a life-cycle cost analysis approach
- Develop and implement performance measures as the basis for identifying and prioritizing maintenance and operations needs
- Develop predictive models that link inventory, work activities, utilization, and environmental conditions to asset condition and system performance, to generate performance based needs assessments
- Employ processes to plan, budget, implement, monitor and measure performance

VDOT’s asset management methodology follows the American Association of State Highway Transportation Official’s (AASHTO) model for asset management, which includes:

- Performance objectives
- Asset inventory
- Condition assessment
- Investment analysis
- Planning, programming, and budgeting
- Program implementation
- Performance monitoring

VDOT is in various stages of developing and implementing business processes, technology and applications to address each of these objectives. Ultimately, data collection, analysis and assessment of needs on the existing infrastructure should provide information not only to planning and budgeting for maintenance and operations but to capital planning for capacity expansion and enhancement as well. Currently, asset management information is used only for planning and budgeting maintenance and operations.

VDOT’s Asset Management Methodology is supported by technology, data, and software applications referred to as the Asset Management System (AMS). The AMS includes the following:

- Inventory and condition information gathered on 100 percent of Interstate and Primary, and 20 percent of Secondary system pavements, 100 percent of bridges and large culverts, and a district level statistical sample of pipes, paved and unpaved ditches, unpaved shoulders, guardrail, guardrail terminals, pavement markings, and signs;
- Pavement management system - integrates data on structural composition, current and historic condition, and maintenance work history with predictive modeling and economic decision tools to generate performance based needs assessments;
- Bridge management system - integrates current and historic condition information on each bridge structural element with predictive modeling and economic decision tools to generate performance based needs assessments;
- Random Condition Assessment – involves processing a statistical sample of condition information for eight assets through a maintenance repair assignment and cost model, using observed asset density, number of samples, and directional mileage to generate extrapolated statewide and district level total inventories for each asset and percent of inventory needing work by repair group, applying deterioration rates to enable performance based predictive modeling and needs assessment;
- Financial information from VDOT’s Financial Management System – includes historic expenditures; and
- Work Accomplishments – an activity based work tracking system

Development of the AMS is not complete. Current development initiatives include:

- Development of performance measures and the supporting data, technology, methods, and system tools to facilitate performance based needs assessment of other assets such as traffic signals, overhead signs, tunnels, rest areas, ferries, smart traffic devices, movable bridges, and paved shoulders. Currently, these assets are assessed using various combinations of data on inventory, life cycle maintenance recommendations, replacement costs, activity based unit costs, maintenance history, and historic expenditures. District level needs are developed by central office business contacts with input and collaboration from the districts and regions
- Development of business requirements for a statewide inventory management system;
- Development of business requirements for a project planning and development system;
- Development of process and system tools needed to conduct six-year programming of the Maintenance and Operations Program; and
- Research to develop performance measures, and the supporting data, technology, and system tools to facilitate needs assessments for safety and operations and to integrate those technologies and data into the AMS

Needs for VDOT programs and services such as roadside management, storm water management, snow & ice control, emergency services such as Safety Service Patrol, and management and direction are currently based on historic expenditures adjusted for inflation. Performance standards and measures are being developed for these and other programs.

Equipment replacement needs are identified using the VDOT Rental Equipment Budget System (REBS). This system identifies total replacement needs for each district based on established statewide replacement criteria for each class of equipment. All users of VDOT equipment are

charged a rental rate set to recoup fuel, maintenance, depreciation, and program administration costs. Surplus equipment is auctioned off periodically in an effort to recoup salvage value on each piece of equipment. Revenue from rental and salvage sales is used to offset the cost of purchasing new equipment.