



# Functional Classification

## HB 3202 (2007)

Report to Governor and General Assembly

Virginia Department of Transportation  
1401 East Broad Street  
Richmond, Virginia 23219

**January 2009**





# COMMONWEALTH of VIRGINIA

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

David S. Ekern, P.E.  
COMMISSIONER

January 1, 2009

The Honorable Timothy M. Kaine  
Members of the General Assembly

Dear Governor Kaine and Members of the General Assembly:

Chapter 896 of the Acts of Assembly of 2007 requires the Virginia Department of Transportation (VDOT) with advice and consent of the Commonwealth Transportation Board (resolution attached) to submit a plan to reassign the various highways, bridges, and other facilities comprising the state primary, secondary, and urban highways systems. The plan shall include an analysis of the costs, benefits, and programmatic and other implications of such reassignment.

The attached report details the many problems and complications that arose during the course of this study in the attempt to "merge" the system of functional classification and Virginia's Administrative Classification System in the manner specified by Chapter 896. One of the problems results because the Federal Highway Administration's functional classification designations are made to road segments, not roads as a whole. By contrast, Virginia's primary, secondary, and urban systems are based on roads, not segments. This difference between these systems of classification would lead to discontinuities in the primary system if the reassignment plan were implemented.

Although the plan presented here was designed practically to minimize impacts on system continuity, primary system allocations and other programmatic impacts, and to provide a rational plan for cross-walking functional to administrative classifications, achieving those multiple purposes is not practical. Consequently, there appears to be no practical way to provide a plan as called for in Chapter 896 that remains neutral in terms of programmatic and system continuity impacts.

Attached is a copy of the report for your review. If you have questions or need additional information, please let me know.

Sincerely,

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

David S. Ekern, P.E.  
Commissioner

Attachment

cc: The Honorable Pierce R. Homer

VirginiaDOT.org  
WE KEEP VIRGINIA MOVING



**A PLAN FOR REASSIGNING ROADS TO VIRGINIA'S ADMINISTRATIVE  
CLASSIFICATION SYSTEM USING THE FEDERAL FUNCTIONAL  
CLASSIFICATION SYSTEM: A RESPONSE TO CHAPTER 896  
OF THE ACTS OF ASSEMBLY OF 2007**

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A report prepared by the Virginia Transportation Research Council at the request of the  
Virginia General Assembly.

Virginia Transportation Research Council  
Charlottesville, Virginia

January 2009



## **PREFACE**

The authors, Matthew Grimes, P.E. and Roger Howe, thank the following VDOT Central Office staff for the assistance that they provided: Marsha Fiol, Rick Tambellini, Chad Tucker and Lewis Parsley of Transportation and Mobility Planning Division; Ann Austin of the Maintenance Division; Amanda Kronenberg and John Lawson of the Financial Planning Division; Jennifer DeBruhul and Mike Estes of the Local Assistance Division

The authors also thank the following members of VTRC's Safety, Planning, and Legal Team who reviewed the report and made suggestions for improving it: Associate Director Wayne Ferguson and researchers John Miller and Cheryl Lynn. Ann McDaniel prepared this report for publication. Gary Allen, Chief of Technology, Research and Innovation provided advice on the presentation of the report and its content. Ken Winter assisted the authors by locating certain Federal Documents. Randy Combs provided assistance with graphics. Linda Evans edited the report.



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## **EXECUTIVE SUMMARY**

### **INTRODUCTION**

Chapter 896 of the Acts of the Assembly of 2007 requires

the Virginia Department of Transportation, with the advice and consent of the Commonwealth Transportation Board, [to submit] on or before January 1, 2009 . . . to the Governor and the General Assembly a plan to reassign the various highways, bridges, and other facilities comprising the state primary, secondary, and urban highways systems so that the assignment of components to such systems is based, to the maximum degree practicable, on the components' functional classification. Such plan shall include an analysis of the costs, benefits, and programmatic and other implications of such reassignment.

### **PURPOSE AND SCOPE**

The purpose of this study was to comply with the mandate of Chapter 896, and the scope of the study was limited to the following:

- develop a plan for reassigning road segments to Virginia's three administrative categories based on their functional classification
- show how the implementation of the plan would affect (1) the allocation formula inputs for each of VDOT's districts and (2) urban maintenance payments, and (3) show what other impacts the implementation of the plan would have.

### **METHODOLOGY**

The purpose of the study was achieved by performing the following tasks:

1. Develop a plan for reassigning road segments to Virginia's Administrative Classification System based on the functional classification of the road segments.
2. Acquire, organize, and validate the necessary data.
3. Reassign road segments to the administrative categories based on the plan developed in Task 1.
4. Analyze the results of the plan with respect to the changes in the allocation inputs, urban maintenance payments, and other impacts.

## RESULTS

### **Task 1: Develop a Plan for Reassigning Road Segments to the Administrative Classification System Based on the Functional Classification of the Road Segments**

#### **Problem Statement**

Fulfilling the mandate of Chapter 896 poses special difficulties. There are primarily two issues of importance:

1. FHWA's functional classification designations are made to road segments, not roads as a whole. By contrast, Virginia's primary, secondary, and urban systems are based on roads, not segments. This difference between these systems of classification tends to lead to discontinuities in the primary system for any reassignment plan that uses functional classification as its basis.
2. The determination of how a road segment should be functionally classified is how well it meets a set of complex FHWA criteria. The FHWA criteria for functional classification have little or no relationship to the existing administrative classification for the Commonwealth. Consequently, it is very difficult to develop reassignments in a consistent, easily documented and understood methodology to comply with the mandate of Chapter 896.

#### **Establishment of Basis for Reassignments**

Among the issues the authors of this study faced is the fact that the structure of Virginia's Administrative Classification System—the system *into which* the road segments were to be reassigned—distinguishes between the state highway system (primary system), the roads within counties (secondary system), and the roads within corporate limits (urban system), which means that geographic criteria play a significant role in sorting roads into the administrative categories. The approach taken in this study had to take cognizance of this fact; consequently, the approach taken here adhered as closely as possible to the requirement that the reassignment be based on the functional classification of the roads *while at the same time retaining the basic structure and character of the Administrative System*. However, in order to accomplish this, the reassignment plan had to deviate to some extent from a strict dependence on functional classification as the basis of the reassignment. Thus, in the attempt to retain the basic character of the Administrative System, the authors based the reassignment on (1) the *similarity* of the functional classification criteria to the *apparent functional character* of the primary, secondary, and urban systems, and (2) the geographic boundaries within which the road segments are actually located.

#### **The Reassignment Plan**

The authors maintained as a guiding assumption of the development of the reassignment plan that the cities and towns in Virginia's Urban Program would continue to maintain control of their roads and that the reassignment should not be inconsistent with the "First Cities Initiative," which allows cities and towns to administer their own road improvement projects.

Consequently, the urban principal arterials and the urban minor arterials within the corporate boundaries of cities and towns in the Urban Program are assigned to the urban system rather than the primary system. To have assigned them to the primary system would have meant that the cities and towns would have lost operational control over these roadways. Further, this would have led to reductions in urban maintenance payments and responsibilities.

The reassignment plan has the following elements:

1. Assign all road segments that are currently classified as a rural or urban principal arterial and that are *not inside* the corporate boundaries of a city or town in Virginia's Urban Program to the primary system.
2. Assign all road segments that are currently classified as a rural minor arterial and that are *not inside* the corporate boundaries of a city or town in Virginia's Urban Program to the primary system.
3. Assign all road segments of *any* functional classification that are *inside* the corporate boundaries of a city or town in the Urban Program to the urban system.
4. Assign all road segments that are *not inside* the corporate boundaries of a city or town in the Urban Program and that are functionally classified as a rural major collector, rural minor collector, rural local, urban minor arterial, urban collector, or urban local to the secondary system.

### **Task 2: Acquire, Organize, and Validate Necessary Data**

The authors acquired data on the functional classification, vehicle miles traveled (VMT), and lane miles of all roads in the primary, secondary, and urban systems. The internal VDOT database which is called the Statewide Planning System (SPS), is the official repository of functional classification data. Even though the official repository of VMT and mileage data is the Highway Traffic Records Inventory System (HTRIS) database, the use of the VMT and lane mileage data from SPS was validated by comparing SPS and HTRIS data. This comparison showed that for the purposes of this study, SPS was an acceptable data source, even though it is not the official road inventory data source.

### **Task 3: Reassign Road Segments to the Administrative Categories Based on Plan Developed in Task 1**

Table ES-1 shows the way functionally classified road segments would be distributed within Virginia's Administrative System as a result of the reassignment plan. Table ES-2 shows the changes in the centerline mileage in each of the administrative categories that would result from the implementation of the plan.

**Table ES-1. Distribution of Functionally Classified Road Segments Resulting from the Reassignment Plan**

<b>Functional Classification</b>	<b>Primary System</b>	<b>Secondary System</b>	<b>Urban System</b>
Principal Arterials	Outside corporate boundaries of cities and towns in urban program		Inside corporate boundaries of cities and towns in urban program
Minor Arterials	Within counties but <i>outside</i> MPO urbanized area boundaries	Within counties <i>inside</i> MPO urbanized area boundaries	Within corporate boundaries of cities and towns in urban program
Collectors and Locals		Within counties	Within corporate boundaries of cities and towns in urban program

**Table ES-2. Impact of the Plan on the Centerline Mileage of Each of the Administrative Categories**

	<b>Primary</b>	<b>Secondary</b>	<b>Urban</b>
2008 SPS	8,080	48,980	11,530
Chapter 896 Plan	5,480	51,470	11,640
Difference	-2,600	+2,490	+110

**Task 4: Analyze the Results of the Plan with Respect to the Changes in the Allocation Inputs, Urban Maintenance Payments, and Other Impacts.**

**Allocation Formula Inputs: Primary VMT and Primary Lane Miles**

The allocation formula for primary system construction funds that is used to determine a district’s share of primary construction allocations is set forth in § 33.1-23.2 of the *Code of Virginia*. According to the *Code*, the inputs to this formula are the district proportion of the primary system VMT, multiplied by 0.7, the district proportion of primary system lane miles, multiplied by 0.25, and a CTB needs adjustment through which 5% of the monies are distributed to certain districts. As previously stated, the primary VMT and primary lane miles were determined for each district from official VDOT inventory data; however this project used a different data set to produce approximations of the current and proposed primary system VMT and lane miles for each district. This means that representations of current primary system VMT or lane miles are approximations for planning purposes only. Hereafter, for the sake of brevity, the word “inputs” is used to mean primary system VMT and primary system lane miles, but not the 5% CTB needs adjustment.

Table ES-3 shows the percentage of change in each district’s share of approximate current allocation inputs that would result from implementation of the reassignment plan, so that, for example, for Bristol the difference between the approximate current inputs and the inputs that would result from implementation of the plan is an 18.4% reduction in the current percentage from 8.7% to 7.1%.

**Table ES-3. Changes in Approximate Allocation Inputs Resulting from Implementing the Reassignment Plan**

VDOT District	Current	Reassignment Plan	
	% Input	% Input	% Change
Bristol	8.7	7.1	-18.4
Salem	10.6	9.5	-10.4
Lynchburg	9.2	9.7	+5.4
Richmond	16.0	16.0	0.0
Hampton Roads	7.6	7.3	-3.9
Fredericksburg	9.2	10.0	+8.7
Culpeper	8.9	9.6	+7.9
Staunton	8.8	7.2	-18.2
Northern Virginia	16.0	18.6	+16.3
Total	95	95	N/A

*Source:* Computed from internal VDOT 2008 data stored in the SPS database and rounded to the nearest tenth of a percent. Current percentage inputs do not include the CTB needs adjustment and do not reflect actual allocation shares.

### Urban Maintenance Payments and Continuity of the Primary System

If the reassignment plan described in this study were to be implemented, (1) urban maintenance payments in 39 cities and towns would increase somewhat and (2) there would be discontinuities in the resulting primary system.

### CONCLUSION

Since Chapter 896 does not indicate what goal or goals the proposed reassignment is intended to achieve, it is difficult to evaluate the success of one approach over another; however, many issues and complications arose during the course of this study in the attempt to “merge” the system of functional classification and Virginia’s Administrative Classification System in the manner specified by Chapter 896.

Although the goals of the reassignment approach described here were designed practically to minimize impacts on system continuity, primary system allocations and other programmatic impacts, and to provide a rational plan for cross-walking functional to administrative class, achieving those multiple purposes is not practical. Consequently, there appears to be no practical way to provide a plan as called for in Chapter 896 that remains neutral in terms of programmatic and system continuity impacts.

### EPILOGUE

This plan was presented to the Commonwealth Transportation Board at their workshop on November 19, 2008. At their meeting on December 18, 2008, the Board unanimously passed resolution that accepted the report for submission to the Governor and General Assembly but did not recommend that the plan be implemented (Commonwealth Transportation Board, 2008).



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CLASSIFICATION SYSTEM: A RESPONSE TO CHAPTER 896  
OF THE ACTS OF ASSEMBLY OF 2007**

**Matthew Grimes  
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**Roger Howe  
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**INTRODUCTION**

Chapter 896 of the Acts of the Assembly of 2007 requires the Virginia Department of Transportation (VDOT) to provide a plan for reassigning the various “highways, bridges, and other facilities comprising the state highway system” to Virginia’s Administrative Classification System and to assess the consequences of this reclassification. Chapter 896 directs

the Virginia Department of Transportation, with the advice and consent of the Commonwealth Transportation Board, [to submit] on or before January 1, 2009 . . . to the Governor and the General Assembly a plan to reassign the various highways, bridges, and other facilities comprising the state primary, secondary, and urban highways systems so that the assignment of components to such systems is based, to the maximum degree practicable, on the components’ functional classification. Such plan shall include an analysis of the costs, benefits, and programmatic and other implications of such reassignment.

**PURPOSE AND SCOPE**

The purpose of this study was to comply with the mandate of Chapter 896.

The scope of the study was limited to the following:

- develop a plan for reassigning road segments to Virginia’s three administrative categories based on their functional classification
- show how the implementation of the plan would affect (1) the allocation formula inputs for each of VDOT’s districts and (2) urban maintenance payments, and (3) show what other impacts would result from the implementation of the plan.

## METHODOLOGY

The purpose of the study was achieved by performing the following tasks:

1. Develop a plan for reassigning road segments to Virginia's Administrative Classification System based on the functional classification of the road segments.
2. Acquire, organize, and validate the necessary data.
3. Reassign road segments to the administrative categories based on the plan developed in Task 1.
4. Analyze the results of the plan with respect to the changes in the allocation inputs, urban maintenance payments, and other impacts.

## RESULTS

### **Task 1: Develop a Plan for Reassigning Road Segments to the Administrative Classification System Based on the Functional Classification of the Road Segments**

#### **Problem Statement**

The Federal Highway Administration's (FHWA's) functional classification system was first documented in a 1968 manual, and the Federal Aid Highway Act of 1973 required federal aid highways to be functionally classified (FHWA, 1989). FHWA defines functional classification as follows:

Functional classification is the process by which streets and highways are grouped into classes, or systems, according to the character of service they are intended to provide. Basic to this process is the recognition that individual roads and streets do not serve travel independently in any major way. Rather, most travel involves movement through a network of roads. It becomes necessary then to determine how this travel can be channelized within the network in a logical and efficient manner. Functional classification defines the nature of this channelization process by defining the part that any particular road or street should play in serving the flow of trips through a highway network (FHWA, 1989).

It is important to note that the FHWA's functional classification system is designed to classify road *segments* and not roads as a whole, so that, for example, segments of a road may have different functional classifications. Table 1 shows the FHWA's functional classification categories. For the purposes of this project, small urban functional classifications are treated as urban functional classifications.

**Table 1. FHWA Functional Categories**

<b>Rural Areas</b>	<b>Urban Areas</b>	<b>Small Urban Areas</b>
Principal arterials	Principal arterials	Principal arterials
Minor arterial roads	Minor arterial streets	Minor arterial streets
Collector roads	Collector streets	Collector streets
Local roads	Local streets	Local streets

*Source: FHWA, 1989.*

Each of the categories in the FHWA system, for example, urban collectors or rural collectors, are defined using a set of criteria, such that whether a road segment is classified as an urban or rural collector is dependent on how well it fulfills the criteria set up to make this determination. Here, for example, are the FHWA’s criteria for urban and rural collectors:

The [urban] collector street system provides both land access service and traffic circulation within residential neighborhoods, commercial and industrial areas. It differs from the arterial system in that facilities on the collector system may penetrate residential neighborhoods, distributing trips from the arterials through the area to the ultimate destination. (FHWA, 1989)

The rural collector routes generally serve travel of primarily intracounty rather than statewide importance and constitute those routes on which (regardless of traffic volume) predominant travel distances are shorter than on arterial routes. (FHWA, 1989)

By contrast, Virginia’s existing primary and secondary systems as we know them today go back to the Byrd Act of 1932 (Acts of Assembly of 1932, Chapter 415). The roads that previously comprised the State Highway System, which had its origins in 1918 (Acts of Assembly of 1918, Chapter 9), were, as a result of the Byrd Act, renamed the primary system. The roads that had previously been county roads—which, as of 1932, were taken into the state system—were renamed the secondary system to distinguish them from the roads in the primary system, which had from its beginnings as the State Highway System been a network of roads of *statewide* significance. The roads in cities and towns had largely been administered independently of the statewide roads and the county roads since before the beginning of the 20th Century. The critical point here is that the categories of Virginia’s Administrative System were not originally defined in terms of sets of functional criteria, and they are not now defined that way.

Fulfilling the mandate of Chapter 896 poses special difficulties. In the discussion which follows, two issues of importance are identified. These can be summarized succinctly as follows:

1. FHWA’s functional classification designations are made to road segments, not roads as a whole. By contrast, Virginia’s primary, secondary, and urban systems are based on roads, not segments. This difference between these systems of classification tends to lead to discontinuities in the primary system for any reassignment plan that uses functional classification as its basis.
2. The determination of how a road segment should be functionally classified is how well it meets a set of complex FHWA criteria. The FHWA criteria for functional classification have little or no relationship to administrative classification because the administrative

classification is based on the 1932 Byrd Road Act and the Federal functional classification criteria did not exist at that time. Consequently, it is very difficult to develop reassignments in a consistent, easily documented and understood methodology to comply with the mandate of Chapter 896.

### **Establishment of Basis for Reassignments**

Since Virginia's administrative categories—primary, secondary, and urban—are not defined in terms of the functional criteria used in FHWA's system of functional classification, there is no straightforward 'crosswalk' between roads classified by the FHWA's system of functional classification and Virginia's administrative categories. Consequently, to develop a plan for reassigning road segments to Virginia's Administrative Classification System based on their functional classification, it was necessary to establish a *basis* for making the reassignment.

The fact that the primary system had its origins in the State Highway System of 1918, as previously discussed, suggests a reasonable approach to the reassignment of road segments to the primary system. Although the State Highway System of 1918 served local needs to some extent, it was clearly intended principally to serve as a network of roads of *statewide significance* that provided access to all parts of the state.

The following are FHWA's criteria for classifying road segments as rural principal arterials:

The rural principal arterial system consists of a connected rural network of continuous routes having the following characteristics:

- Serve corridor movements having trip length and travel density characteristics indicative of substantial statewide or interstate travel.
- Serve all, or virtually all, urban areas of 50,000 and over population and a large majority of those with population of 25,000 and over.
- Provide an integrated network without stub connections except where unusual geographic or traffic flow conditions dictate otherwise (e.g., international boundary connections and connections to coastal cities) (FHWA, 1989).

These criteria describe functional characteristics that are similar to the *apparent* character of most of the roads currently in the primary system. It is clear that the road segments described by FHWA's criteria form roads of statewide significance and that most of the routes in the current primary system make up an *actual* network of roads of statewide significance. It is on this basis that the authors of this report think that all road segments that are outside the corporate boundaries of a city or town in the Urban Program and are functionally classified as rural principal arterials or urban principal arterials should be assigned to the primary system. In addition, since the rural minor arterials that are outside the corporate boundaries of a city or town in the Urban Program play a supporting role to the rural principal arterials, they have also been assigned to the primary system. However, because there are also strong similarities between the descriptions of FHWA's functional criteria for the urban minor arterials, collectors (both rural and urban), and locals (both rural and urban) and the apparent functional character of the secondary and urban systems, it is the authors' contention that it would be reasonable to use the

same approach for assigning road segments of these functional classifications to the secondary and urban systems. With respect to the secondary and urban systems, it was also necessary to use the actual geographical location of a road segment to determine whether that road segment should be assigned to the secondary versus the urban system.

### **The Reassignment Plan**

The authors maintained as a guiding assumption of the development of the reassignment plan that the cities and towns in Virginia's Urban Program would continue to maintain control of their roads. It was also assumed that the reassignment should not be inconsistent with the "First Cities Initiative," established through Code of Virginia amendments in 2003, which allows cities and towns to administer their own road improvement projects (VDOT, 2007). Thus, despite the fact that assigning the urban principal and minor arterials *within* the corporate boundaries of cities and towns to the primary system would have provided for a more continuous statewide network of primary roads and, strictly speaking, would have conformed more closely to the mandate of Chapter 896, in this plan, the urban principal arterials and the urban minor arterials within the corporate boundaries of cities and towns in the Urban Program are assigned to the urban system. The authors chose not to include these road segments in the primary system because, the cities and towns would have lost operational control over these roadways. Further, this would have led to reductions in urban maintenance payments.

The reassignment plan has the following elements:

1. Assign all road segments that are currently classified as a rural or urban principal arterial and that are *not inside* the corporate boundaries of a city or town in Virginia's Urban Program to the primary system.
2. Assign all road segments that are currently classified as a rural minor arterial and that are *not inside* the corporate boundaries of a city or town in Virginia's Urban Program to the primary system.
3. Assign all road segments of *any* functional classification that are *inside* the corporate boundaries of a city or town in the Urban Program to the urban system.
4. Assign all road segments that are *not inside* the corporate boundaries of a city or town in the Urban Program and that are functionally classified as a rural major collector, rural minor collector, rural local, urban minor arterial, urban collector, or urban local to the secondary system.

### **Task 2: Acquire, Organize, and Validate Necessary Data**

The authors acquired data on the functional classification, vehicle miles traveled (VMT), and lane miles of all roads in the primary, secondary, and urban systems. The internal VDOT database, which is called the Statewide Planning System (SPS), is the official repository of functional classification data. But the official repository of VMT and mileage data is the

Highway Traffic Records Inventory System (HTRIS) database. The authors extracted data from both systems and imported them into a relational database. This allowed the data from the two systems to be compared and made it possible for a large number of queries to be written so as to examine and manipulate the data. The use of the VMT and lane mileage data from SPS was validated by comparing SPS and HTRIS data. This comparison showed that for the purposes of this study, SPS was an acceptable data source.

**Task 3: Reassign Road Segments to the Administrative Categories Based on Plan Developed in Task 1**

Table 2 shows the way functionally classified road segments would be distributed within Virginia’s Administrative System as a result of the reassignment plan. Table 2 presents the results of the reassignment in a relatively simple way. Table 3 presents additional data that reflect the distinction between urban and rural functional classification categories and the various subcategories of functional classification such as urban principal arterials and rural collectors. Table 3 reflects the impacts of carrying out the plan. The Primary System column shows that if the plan were implemented, the primary system would consist only of road segments functionally classified as principal arterials (rural and urban) and rural minor arterials (and a very small percentage, approximately 2%, of primary system frontage roads, which are classified as locals), whereas there would be no rural principal, urban principal, or rural minor arterial segments in the secondary system. Table 4 shows the changes in the centerline mileage in each of the administrative categories that would result from the implementation of the plan.

**Table 2. Distribution of Functionally Classified Road Segments Resulting from the Reassignment Plan**

Functional Classification	Primary System	Secondary System	Urban System
Principal Arterials	Outside corporate boundaries of cities and towns in urban program		Inside corporate boundaries of cities and towns in urban program
Minor Arterials	Within counties but <i>outside</i> MPO urbanized area boundaries	Within counties <i>inside</i> MPO urbanized area boundaries	Within corporate boundaries of cities and towns in urban program
Collectors and Locals		Within counties	Within corporate boundaries of cities and towns in urban program

**Table 3. Categories of Mileages Resulting from Implementing the Reassignment Plan**

<b>Functional Classification</b>	<b>Interstate<sup>a</sup></b>	<b>Primary</b>	<b>Secondary</b>	<b>Urban</b>
Rural Interstate	47.65%	0.00%	0.00%	0.00%
Rural Principal Arterial	0.00%	25.85%	0.00%	0.14%
Rural Minor Arterial	0.00%	56.30%	0.00%	0.29%
Rural Major Collector	0.00%	0.00%	18.03%	0.82%
Rural Minor Collector	0.00%	0.00%	4.66%	0.30%
Rural Local	13.08% <sup>b</sup>	2.21%	59.98%	5.20%
Total Rural Percentage	60.73%	83.36%	82.67%	6.75%
Urban Interstate	36.36%	0.00%	0.00%	0%
Urban Freeway/Expressway	0%	2.79%	0.00%	0.85%
Urban Principal Arterial	0%	11.70%	0.00%	5.81%
Urban Minor Arterial	0%	0.00%	2.18%	10.33%
Urban Collector	0%	0.00%	2.78%	9.73%
Urban Local	2.91% <sup>b</sup>	2.15% <sup>b</sup>	12.36%	66.53%
Total Urban Percentage	39.27%	16.64%	17.32% <sup>c</sup>	93.25%
Approximate system centerline miles	1,380	5,480	51,470	11,640

<sup>a</sup>The interstate system is a unique and separate category within Virginia’s Administrative System; it is included in this table because *interstate* is a functional classification category and because the interstates are included in the total centerline mileage.

<sup>b</sup>Certain frontage roads for the interstate and primary systems are functionally classified as locals. However, because these roads serve no purpose of their own, but rather support the interstate or primary system in certain ways in specific locations, they were left in these systems despite their functional classification as locals.

<sup>c</sup>Rounding causes the total to be 0.01% less than 100%; however, the actual total is 100%.

Source: Internal VDOT 2008 data from the official functional classification database: “SPS.”

**Table 4. Impact of the Plan on the Centerline Mileage of Each of the Administrative Categories**

	<b>Primary</b>	<b>Secondary</b>	<b>Urban</b>
2008 SPS	8,080	48,980	11,530
Chapter 896 Plan	5,480	51,470	11,640
Difference	-2,600	+2,490	+110

**Task 4: Analyze the Results of the Plan with Respect to the Changes in the Allocation Inputs, Urban Maintenance Payments, and Other Impacts**

**Allocation Formula Inputs: Primary VMT and Primary Lane Miles**

In order to analyze the effect that the reassignment plan would have on the inputs to the state primary construction allocation formula, it was necessary to determine the percentage of primary system VMT and lane-miles that each construction district has within its boundaries. As previously mentioned, the VDOT official functional classification database approximates these data, which are shown in Table 5.

**Table 5. 2008 SPS Data: Approximate Primary Lane-Miles and VMT**

<b>VDOT District</b>	<b>VMT</b>	<b>Lane-Miles</b>	<b>Composite</b>
Bristol	5,120,834	2,927	8.7%
Salem	7,373,598	2,621	10.6%
Lynchburg	5,829,724	2,758	9.2%
Richmond	11,802,500	3,345	16.0%
Hampton Roads	5,507,665	1,681	7.6%
Fredericksburg	6,470,007	2,180	9.2%
Culpeper	6,549,773	1,845	8.9%
Staunton	5,770,011	2,447	8.8%
Northern Virginia	13,899,787	1,498	16.0%
Total	68,323,898	21,303	95%

*Source:* Internal VDOT data stored in the SPS database.

“Composite” values do not include the CTB needs adjustment and do not reflect actual allocation shares.

The allocation formulae for the administrative systems are specified in the *Code of Virginia*:

- § 33.1-23.2 for the primary system
- § 33.1-23.3 for the urban system
- § 33.1-23.4 for the secondary system.

Neither the secondary nor the urban allocations are based on any attributes of the roads within those systems; therefore, the reassignment plan would not affect those allocations. According to § 33.1-23.2, primary system construction allocations are distributed to the nine construction districts based on their weighted statewide share of the primary system lane-miles and primary system VMT. The data in the “Composite” column are computed from the VMT and Lane-Miles columns, using the 0.7 and 0.25 proportional weights, as described in § 33.1-23.2. (The balance of 5% of the primary construction funds are distributed by the Commonwealth Transportation Board to construction districts based on primary system needs)

As previously stated, for allocation purposes, the primary VMT and primary lane miles were determined for each district from official VDOT inventory data, but this project used a different data set to produce approximations of primary VMT and lane miles. This means that representations of current primary system VMT or lane miles are approximations for planning purposes only. Hereafter, for the sake of brevity, the word “inputs” is used to mean primary system VMT and primary system lane miles, but not the 5% CTB needs adjustment.

The authors computed the allocation inputs that would result from the reassignments in the plan and calculated the percentage difference between the proposed allocation inputs and the current allocation inputs. Table 6 compares the approximate allocation formula inputs for the primary system allocations for each VDOT construction district, and it shows the percentage of change in each district’s share of approximate current allocation inputs that would result from implementation of the reassignment plan, so that, for example, for Bristol the difference between

the approximate current inputs and the inputs that would result from implementation of the plan is an 18.4% reduction in the current percentage from 8.7% to 7.1%.

**Table 6. Changes in Approximate Allocation Inputs Resulting from Implementing the Reassignment Plan**

VDOT District	2008	Reassignment Plan	
	% Input	% Input	% Change
Bristol	8.7	7.1	-18.4
Salem	10.6	9.5	-10.4
Lynchburg	9.2	9.7	+5.4
Richmond	16.0	16.0	0.0
Hampton Roads	7.6	7.3	-3.9
Fredericksburg	9.2	10.0	+8.7
Culpeper	8.9	9.6	+7.9
Staunton	8.8	7.2	-18.2
Northern Virginia	16.0	18.6	+16.3
Total	95	95	N/A

*Source:* Computed from internal VDOT 2008 data stored in the SPS database and rounded to the nearest tenth of a percent. Current percentage inputs do not include the CTB needs adjustment and do not reflect actual allocation shares.

### Urban Maintenance Payments

Cities and certain towns are eligible to receive state payments to maintain their street networks. These maintenance payments are distributed by a formula based on the number of “moving lane miles” of streets with certain functional classifications. The reassignment plan does not remove any street segments from the urban system networks within the corporate boundaries of a city or town that participates in this program, but it does add certain street segments that are currently maintained by VDOT to the city or town in which the street is located. Under this plan, 39 cities and towns would receive additional moving lane miles to the street networks they already control. A total of 430 moving lane miles would be reassigned from VDOT control to city or town control.

### Continuity of the Primary System

In addition to the changes in allocation formula inputs and urban maintenance payments, the reassignment plan would lead to changes in the composition and character of the primary system such that it would no longer be a continuous network of roads of statewide significance as it is now. If the plan were implemented, the primary system would become discontinuous, for example:

- Current federal primary routes such as US 15, US 29, US 58, US 60, US 360, and US 460 would have segments assigned to the secondary system.
- US 1, US 11, US 250, and US 301, which support the interstates by providing parallel facilities, would have many segments assigned to the secondary system.

- Routes within the current primary system that interconnect county seats within a region, such as VA 24, VA 30, VA 40, VA 42, VA 43, and VA 53, would have segments assigned to the secondary system.

Although the reassigned segments of current US and VA primary routes would still exist on the ground as secondary roads, it is possible that over time the corridor mobility would be degraded due to policy, funding and development choices at local, state and federal levels.

## CONCLUSIONS

One of the issues the authors of this study faced is the fact that the structure of Virginia’s Administrative Classification System—the system *into which* the road segments were to be reassigned—distinguishes between the state highway system (primary system), the roads within counties (secondary system), and the roads within corporate limits (urban system), which means that geographic criteria play a significant role in sorting roads into the administrative categories. The approach taken in this study had to take cognizance of this fact; consequently, the approach taken here adhered as closely as possible to the requirement that the reassignment be based on the functional classification of the roads *while at the same time retaining the basic structure and character of the Administrative System*. However, in order to accomplish this, the reassignment plan had to deviate to some extent from a strict dependence on functional classification as the basis of the reassignment. Thus, in the attempt to retain the basic character of the Administrative System, the authors based the reassignment on (1) the *similarity* of the functional classification criteria to the *apparent functional character* of the primary, secondary, and urban systems, and (2) the geographic boundaries within which the road segments are actually located. Thus, though the road segments reassigned to the secondary and the urban systems—such as collectors, locals, etc.—are assigned to them because their function is to serve traffic having local origins or destinations, they were assigned to the secondary versus the urban system based on their geographic location and not necessarily on their functional classification.

The reassignment presented in this report is also dependent on certain “practicalities”; for example, even though placing the urban principal arterials within the corporate boundaries of a city or town in the primary system would have made for a more continuous network of principal arterials, the reassignment plan does not call for this because the cities and towns would have lost operational control over these major roads. This is not a decision that could be justified by an appeal to functional classification alone.

Since Chapter 896 does not indicate what goal or goals the proposed reassignment is intended to achieve, it is difficult to evaluate the success of one approach over another; however, the many complications that arose during the course of this study in the attempt to “merge” the system of functional classification and Virginia’s Administrative Classification System in the manner specified by Chapter 896 show just how difficult this endeavor is.

Although the goals of the reassignment plan described here were designed practically to minimize impacts on system continuity, primary system allocations and other programmatic

impacts, and to provide a rational plan for cross-walking functional to administrative classifications, achieving those multiple purposes is not practical. Consequently, there appears to be no practical way to provide a plan as called for in Chapter 896 that remains neutral in terms of programmatic and system continuity impacts.

## **EPILOGUE**

This plan was presented to the Commonwealth Transportation Board at their workshop on November 19, 2008. At their meeting on December 18, 2008, the Board unanimously passed a resolution that accepted the report for submission to the Governor and General Assembly but did not recommend that the plan be implemented (Commonwealth Transportation Board, 2008).

## **REFERENCES**

Federal Highway Administration. *FHWA Functional Classification Guidelines*. Washington, DC, 1989. <http://www.fhwa.dot.gov/planning/fctoc.htm>. Accessed August 12, 2008.

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