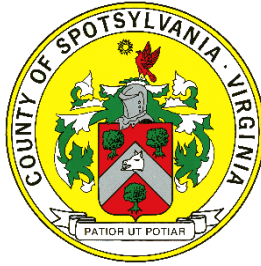


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# ROAD IMPROVEMENTS PLAN AND ROAD IMPACT FEE STUDY

*County of Spotsylvania, Virginia*



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**DRAFT**

**May 8, 2008**

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## Spotsylvania County, Virginia

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## EXECUTIVE SUMMARY

### OVERVIEW

TischlerBise was retained by Spotsylvania County, Virginia, to analyze potential impact fee funding to meet the demands for road improvements generated by new development in the County. Funding substantial road improvements is a relatively new role for the County, and impact fees offer one component to assist with the provision of this infrastructure. The County is authorized to implement Road Impact Fees per § 15.2-2317 through 15.2-2327 of the Code of Virginia. Methodologies and calculations are presented in this report to meet the requirements of the Virginia Road Impact Fee Act and serve as supporting documentation for implementation of road impact fees in Spotsylvania County.

The Virginia Act provides the following definition for impact fees:

*[a] charge or assessment imposed against new development in order to generate revenue to fund or recover the costs of reasonable road improvements benefiting new development. Impact fees may not be assessed and imposed for road repair, operation and maintenance, nor to meet the demand which existed prior to the new development.*

Impact fees are one-time payments used to construct system improvements needed to accommodate new development. An impact fee represents new growth's fair share of capital facility needs. By law, impact fees can only be used for *capital* improvements, not operating or maintenance costs. Impact fees are subject to legal standards, which require fulfillment of three key elements: need, benefit and proportionality. First, to justify a fee for public facilities, it must be demonstrated that new development will create a **need** for capital improvements. Second, new development must derive a **benefit** from the payment of the fees (i.e., in the form of public facilities constructed within a reasonable timeframe). Third, the fee paid by a particular type of development should not exceed its **proportional** share of the capital cost for system improvements.

TischlerBise documented appropriate demand indicators by type of development for the required Road Improvement Plan and resulting fees. Specific capital costs have been identified using local data and costs. This report includes summary tables indicating the specific factors used to derive the impact fees. These factors are referred to as level of service standards. Service areas have been determined and are documented herein. Credits have also been evaluated per the Impact Fee Act.

## UNIQUE REQUIREMENTS OF THE VIRGINIA IMPACT FEE ACT

Virginia's Road Impact Fee Act (Sections 15.2-2317 through 15.2-2327) sets forth specific requirements for localities to enact a Road Impact Fee program. Like all impact fees, Virginia's enabling law requires satisfying rational nexus requirements, including the demonstration of impact/need, proportionality, and benefit. All requirements of the Virginia Road Impact Fee Act have been met in the supporting documentation prepared by TischlerBise.

The following requirements are addressed in this report with further detail in subsequent sections:

- Development of a Road Improvements Plan, which includes an analysis of existing capacity, current usage, and existing commitments for future usage of the existing road system; a plan to fund needed infrastructure for existing and committed development that exceeds the capacity of existing roads; an assessment of road improvement needs benefiting the service areas; documentation of the need for and construction costs of road improvements attributable in whole or part to new development; documentation of the demographic and other assumptions on which the projections are made. The Plan is required to be adopted as an amendment to the locality's comprehensive plan and incorporation into the capital improvement plan.
- Consideration of credits to ensure new development does not pay twice for the same capacity.
- Consideration of service areas to address benefit of road improvements.
- Implementation considerations including establishing an advisory committee; time of calculation of fees (at site plan or subdivision) and collection (at building permit); establishing separate accounts for road impact fees by service area; provision of refunds per the Act if projects are not completed within a maximum 15-year period or if actual costs exceed the estimated cost by 15 percent

## SUMMARY OF ROAD IMPROVEMENTS PLANS AND IMPACT FEES

The impact fees calculated for Spotsylvania County represent the highest amount feasible for each type of applicable land use, or *maximum allowable* amounts, which represents new growth's fair share of the cost for road improvements. The County may adopt fees that are less than the amounts shown. However, a reduction in impact fee revenue will necessitate an increase in other revenues, a decrease in planned capital expenditures, and/or a decrease in levels of service.

The road impact fee is calculated for both residential and nonresidential land uses and is based on the Road Improvements Plan developed as part of the impact fee effort. Road improvements were provided by the County and analyzed by William Allen, traffic model developer for the County and subconsultant on this assignment. The road improvements plan details planned improvements on major and minor arterials and collectors necessary to accommodate growth in the County over the next twenty years. Two service areas have been designated to ensure benefit. The share allocated to growth is detailed in this report and is based on travel model results. The maximum allowable road impact fees by type of land use are summarized below in Figure 1 and 2.

**Figure 1. Summary of Maximum Allowable Road Impact Fees by Land Use: Eastern Service Area**

EASTERN Service Area		
ITE		
Code		
<b>Residential</b>	<b>Residential</b>	<b>Commercial / Shopping Centers</b>
	<i>Per Housing Unit</i>	<i>Per Square Foot</i>
210 Single Family Detached*	\$7,608	
221 Multifamily/Other Residential	\$5,342	
<b>Commercial (per Square Foot)</b>		<i>Per Square Foot</i>
820 Commercial / Shopping Center under 25,000 SF		\$22.80
820 Commercial / Shopping Center 25,001 - 50,000 SF		\$19.80
820 Commercial / Shopping Center 50,001 - 100,000 SF		\$16.54
820 Commercial / Shopping Center 100,001 - 200,000 SF		\$14.16
820 Commercial / Shopping Center 200,001 - 400,000 SF		\$12.03
820 Commercial / Shopping Center 400,001+ SF		\$9.92
<b>Commercial (per Demand Unit)</b>		<i>Per Demand Unit</i>
945 Gas/Srv Station w/Conv Mkt (per Fueling Position)		\$33,636
<b>Other Nonresidential (per Square Foot)</b>		<i>Per Square Foot</i>
710 Office under 25,000 SF		\$7.47
710 Office 25,001 - 100,000 SF		\$5.43
710 Office 100,001+ SF		\$4.63
610 Hospital		\$7.15
560 Church		\$3.71
770 Business Park		\$5.19
151 Mini-Warehouse		\$1.02
150 Warehousing		\$2.02
140 Manufacturing		\$1.55
110 Light Industrial		\$2.84
<b>Other Nonresidential (per Demand Unit)</b>		<i>Per Demand Unit</i>
620 Nursing Home (bed)		\$964
565 Day Care (per student)		\$1,823
520 School (per student)		\$525
320 Lodging (per room)		\$2,291

\* Includes manufactured/mobile homes

Figure 2. Summary of Maximum Allowable Road Impact Fees by Land Use: Western Service Area

WESTERN Service Area		
ITE		
Code		
<b>Residential</b>	<b>Residential</b>	<b>Commercial / Shopping Centers</b>
	<i>Per Housing Unit</i>	<b>Other Nonresidential</b>
210 Single Family Detached*	\$4,013	
221 Multifamily/Other Residential	\$2,818	
<b>Commercial (per Square Foot)</b>		<i>Per Square Foot</i>
820 Commercial / Shopping Center under 25,000 SF		\$12.02
820 Commercial / Shopping Center 25,001 - 50,000 SF		\$10.44
820 Commercial / Shopping Center 50,001 - 100,000 SF		\$8.72
820 Commercial / Shopping Center 100,001 - 200,000 SF		\$7.46
820 Commercial / Shopping Center 200,001 - 400,000 SF		\$6.34
820 Commercial / Shopping Center 400,001+ SF		\$5.23
<b>Commercial (per Demand Unit)</b>		<i>Per Demand Unit</i>
945 Gas/Srv Station w/Conv Mkt (per Fueling Position)		\$17,729
<b>Other Nonresidential (per Square Foot)</b>		<i>Per Square Foot</i>
710 Office under 25,000 SF		\$3.95
710 Office 25,001 - 100,000 SF		\$2.87
710 Office 100,001+ SF		\$2.44
610 Hospital		\$3.78
560 Church		\$1.96
770 Business Park		\$2.74
151 Mini-Warehouse		\$0.54
150 Warehousing		\$1.07
140 Manufacturing		\$0.82
110 Light Industrial		\$1.50
<b>Other Nonresidential (per Demand Unit)</b>		<i>Per Demand Unit</i>
620 Nursing Home (bed)		\$509
565 Day Care (per student)		\$963
520 School (per student)		\$277
320 Lodging (per room)		\$1,210

\* Includes manufactured/mobile homes



The fees represent the highest amount allowable for each type of applicable land use, which represents new growth's fair share of the cost for capital facilities. The County may adopt fees that are less than the amounts shown. However, a reduction in impact fee revenue will necessitate an increase in other revenues, a decrease in planned capital expenditures, and/or a decrease in levels of service.

The fees for residential development are assessed per housing unit and should be collected when building permits are issued. For nonresidential development, where applicable, the fees are assessed per square feet of floor area, unless otherwise noted, and also should be collected when building permits are issued. Nonresidential development categories are consistent with the terminology and definitions contained in the reference book, *Trip Generation*, published by the Institute of Transportation Engineers. These definitions can be found in the Implementation and Administration section at the back of this report.

### *Credits and Geographic Area*

A general requirement common to impact fee methodologies is the evaluation of *credits*. Two types of credits should be considered, **future revenue credits** and **site-specific credits**. Revenue credits may be necessary to avoid potential double payment situations arising from a one-time impact fee plus the payment of other revenues (e.g., property taxes) that may also fund growth-related capital improvements. Because new development may provide front-end funding of infrastructure, there is a potential for double payment of capital costs due to future payments on debt for public facilities. No credits for existing or future principal and interest payments are necessary for the County's fees because no project included in the impact fee-funded portion of the road improvements plan will be debt financed.

The second type of credit is a **site-specific credit** for system improvements that have been included in the impact fee calculations. Policies and procedures related to site-specific credits for system improvements should be addressed in the ordinance that establishes the development fees. However, the general concept is that developers may be eligible for site-specific credits only if they provide system improvements that have been included in the impact fee calculations. Project improvements normally required as part of the development approval process are not eligible for credits against impact fees.

A note on rounding: Calculations throughout this report are based on an analysis conducted using Excel software. Results are discussed in the report using one-and two-digit places (in most cases), which represent rounded figures. However, the analysis itself uses figures carried to their ultimate decimal places; therefore the sums and products generated in the analysis may not equal the sum or product if the reader replicates the calculation with the factors shown in the report (due to the rounding of figures shown).

## INTRODUCTION TO IMPACT FEES

### DEFINITION

Development impact fees, also known as impact or development fees, are one-time payments used to fund capital improvements necessitated by new growth. Development impact fees have been utilized by local governments in various forms for at least fifty years. Impact fees do have limitations, and should not be regarded as the total solution for infrastructure financing needs. Rather, they should be considered one component of a comprehensive portfolio to ensure adequate provision of public facilities with the goal of maintaining current levels of service in a community. Any community considering development impact fees should note the following limitations:

- Development impact fees can only be used to finance capital infrastructure and cannot be used to finance ongoing operations and/or maintenance and rehabilitation costs;
- Development impact fees cannot be deposited in the local government's General Fund. The funds must be accounted for separately in individual accounts and earmarked for the capital expenses for which they were collected; and
- Development impact fees cannot be used to correct existing infrastructure deficiencies unless there is a funding plan in place to correct the deficiency for all current residents and businesses in the community.

### LEGAL FRAMEWORK

*U.S. Constitution.* Like all land use regulations, development exactions—including development impact fees—are subject to the Fifth Amendment prohibition on taking of private property for public use without just compensation. Both state and federal courts have recognized the imposition of impact fees on development as a legitimate form of land use regulation, provided the fees meet standards intended to protect against regulatory takings. To comply with the Fifth Amendment, development regulations must be shown to substantially advance a legitimate governmental interest. In the case of impact fees, that interest is in the protection of public health, safety, and welfare by ensuring that development is not detrimental to the quality of essential public services.

There is little federal case law specifically dealing with impact fees, although other rulings on other types of exactions (e.g., land dedication requirements) are relevant. In one of the most

important exaction cases, the U. S. Supreme Court found that a government agency imposing exactions on development must demonstrate an “essential nexus” between the exaction and the interest being protected. (See *Nollan v. California Coastal Commission*, 1987.) In a more recent case (*Dolan v. City of Tigard, OR*, 1994), the Court ruled that an exaction also must be “roughly proportional” to the burden created by development. However, the *Dolan* decision appeared to set a higher standard of review for mandatory dedications of land than for monetary exactions such as development impact fees.

## REQUIRED FINDINGS

There are three reasonable relationship requirements for development impact fees that are closely related to “rational nexus” or “reasonable relationship” requirements enunciated by a number of state courts. Although the term “dual rational nexus” is often used to characterize the standard by which courts evaluate the validity of development impact fees under the U.S. Constitution, we prefer a more rigorous formulation that recognizes three elements: “impact or need,” “benefit,” and “proportionality.” The dual rational nexus test explicitly addresses only the first two, although proportionality is reasonably implied, and was specifically mentioned by the U.S. Supreme Court in the *Dolan* case. The reasonable relationship language of the statute is considered less strict than the rational nexus standard used by many courts. Individual elements of the nexus standard are discussed further in the following paragraphs.

*Demonstrating an Impact.* All new development in a community creates additional demands on some, or all, public facilities provided by local government. If the supply of facilities is not increased to satisfy that additional demand, the quality or availability of public services for the entire community will deteriorate. Impact/development impact fees may be used to recover the cost of development-related facilities, but only to the extent that the need for facilities is a consequence of development that is subject to the fees. The *Nollan* decision reinforced the principle that development exactions may be used only to mitigate conditions created by the developments upon which they are imposed. That principle clearly applies to impact fees. In this study, the impact of development on improvement needs is analyzed in terms of quantifiable relationships between various types of development and the demand for specific facilities, based on applicable level-of-service standards.

*Demonstrating a Benefit.* A sufficient benefit relationship requires that facility fee revenues be segregated from other funds and expended only on the facilities for which the fees were charged. Fees must be expended in a timely manner and the facilities funded by the fees must serve the development paying the fees. However, nothing in the U.S. Constitution or the State enabling Act requires that facilities funded with fee revenues be available *exclusively* to development paying the fees. In other words, existing development may benefit from these improvements as well.

Procedures for the earmarking and expenditure of fee revenues are typically mandated by the State enabling act, as are procedures to ensure that the fees are expended expeditiously or refunded. All of these requirements are intended to ensure that developments benefit from the fees they are required to pay. Thus, an adequate showing of benefit must address procedural as well as substantive issues.

*Demonstrating Proportionality.* The requirement that exactions be proportional to the impacts of development was clearly stated by the U.S. Supreme Court in the *Dolan* case (although the relevance of that decision to impact fees has been debated) and is logically necessary to establish a proper nexus. Proportionality is established through the procedures used to identify development-related facility costs, and in the methods used to calculate impact fees for various types of facilities and categories of development. The demand for facilities is measured in terms of relevant and measurable attributes of development. For example, the need for school improvements is measured by the number of public school-age children generated by development.

## METHODOLOGIES AND CREDITS

Any one of several legitimate methods may be used to calculate development impact fees. The choice of a particular method depends primarily on the service characteristics and planning requirements for the facility type being addressed. Each method has advantages and disadvantages in a particular situation, and to some extent can be interchangeable, because each allocates facility costs in proportion to the needs created by development.

Reduced to its simplest terms, the process of calculating development impact fees involves two main steps: (1) determining the cost of development-related capital improvements and (2) allocating those costs equitably to various types of development. In practice, though, the calculation of impact fees can become quite complicated because of the many variables involved in defining the relationship between development and the need for facilities. The following paragraphs discuss three basic methods for calculating development impact fees and how those methods can be applied.

*Plan-Based Fee Calculation.* The plan-based method allocates costs for a specified set of improvements to a specified amount of development. The improvements are identified by a facility plan and development is identified by a land use plan. In this method, the total cost of relevant facilities is divided by total demand to calculate a cost per unit of demand. Then, the cost per unit of demand is multiplied by the amount of demand per unit of development (e.g., housing units or square feet of building area) in each category to arrive at a cost per specific unit of development (e.g., single family detached unit).

*Cost Recovery or Buy-In Fee Calculation.* The rationale for the cost recovery approach is that new development is paying for its share of the useful life and remaining capacity of facilities already built or land already purchased from which new growth will benefit. This methodology is often used for systems that were oversized such as sewer and water facilities.

*Incremental Expansion Fee Calculation.* The incremental expansion method documents the current level of service (LOS) for each type of public facility in both quantitative and qualitative measures, based on an existing service standard (such as square feet per student). This approach ensures that there are no existing infrastructure deficiencies nor surplus capacity in infrastructure. New development is only paying its proportionate share for growth-related infrastructure. The level of service standards are determined in a manner similar to the current replacement cost approach used by property insurance companies. However, in contrast to insurance practices, the fee revenues would not be for renewal and/or replacement of existing facilities. Rather, revenue will be used to expand or provide additional facilities, as needed, to accommodate new development. An incremental expansion cost method is best suited for public facilities that will be expanded in regular increments, with LOS standards based on current conditions in the community.

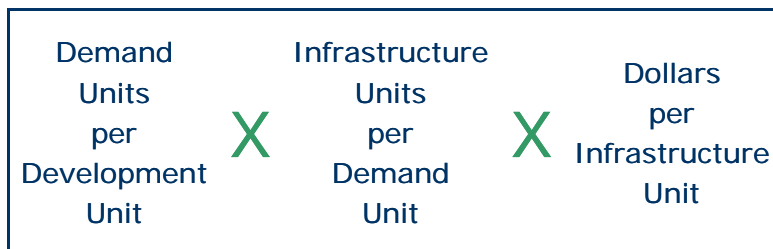
*Credits.* Regardless of the methodology, a consideration of “credits” is integral to the development of a legally valid impact fee methodology. There are two types of “credits” each with specific, distinct characteristics, but both of which should be addressed in the development of development impact fees. The first is a credit due to possible double payment situations. This could occur when contributions are made by the property owner toward the capital costs of the public facility covered by the impact fee. This type of credit is integrated into the impact fee calculation. The second is a credit toward the payment of a fee for dedication of public sites or improvements provided by the developer and for which the facility fee is imposed. This type of credit is addressed in the administration and implementation of a facility fee program.

## GENERIC IMPACT FEE CALCULATION

In contrast to development exactions, which are typically referred to as project-level improvements, impact fees fund growth-related infrastructure that will benefit multiple development projects, or even the entire jurisdiction. The basic steps in a generic impact fee formula are illustrated in Figure 3. The first step (see the left box) is to determine an appropriate demand indicator, or service unit, for the particular type of infrastructure. The demand/service indicator measures the number of demand or service units for each unit of development. For Roads, an appropriate indicator of demand is trips or vehicle miles of travel (VMT). The second step in the generic impact fee formula is shown in the middle box below. Infrastructure units per demand unit are typically called Level-Of-Service (LOS) standards. For

Roads, a common LOS standard is lane miles per VMT. The third step in the generic impact fee formula, as illustrated in the right box, is the cost of various infrastructure units. To complete the Roads example, this part of the formula would establish the cost per lane mile for road improvements.

Figure 3. Generic Impact Fee Formula



## UNIQUE REQUIREMENTS OF THE VIRGINIA IMPACT FEE ACT

Authority to enact Road Impact Fees in Virginia was expanded from 8 to 67 localities by House Bill 3202 in the 2007 legislative session. Virginia's Road Impact Fee Act (Sections 15.2-2317 through 15.2-2327) sets forth specific requirements for localities to enact a Road Impact Fee program. Like all impact fees, Virginia's enabling law requires satisfying rational nexus requirements, including the demonstration of impact/need, proportionality, and benefit.

### ROAD IMPROVEMENTS PROGRAM

The Virginia Impact Fee Act requires the development and adoption of a *Road Improvements Program*. Specific requirements, per the Act, are as follows:

- An analysis of existing capacity, current usage, and existing commitments for future usage of the existing road system.
- Inclusion of a plan to fund needed infrastructure for existing and committed development that exceeds the capacity of existing roads, where committed development is indicated by outstanding building permits and approved and pending site plans and subdivision plats.
- An assessment of road improvement needs benefiting the service areas, including new roads proposed to be constructed and existing roads proposed to be improved with additional capacity along with the proposed schedule for these improvements.
- Documentation of the need for and construction costs of road improvements attributable in whole or part to new development when fully developed and if full development is anticipated to occur more than 20 years in the future, at the end of a 20-year period.
- Documentation of the demographic and other assumptions on which the projections are made.
- Adoption of the road improvement program as an amendment to the locality's comprehensive plan and incorporation into the capital improvement plan.

The end result is a plan on which the impact fees are based. The fees are then calculated based on the projected road improvement costs identified relative to the projected growth. Virginia's requirements are fairly typical in state's that require a documented plan as part of the impact fee process. One major difference in the Virginia legislation is the inclusion of *committed development* in the analysis of existing and future capacity.



### *Credits*

As described above, standard procedure in determining impact fees is to consider two types of credits, and the Virginia Act is no different. The Act requires analysis of whether new development has or will in the future contribute to the types of road improvements included in the fee calculation. This determination will address potential double payment issues as discussed above.

In addition, the Act requires a credit for contributions of off-site road improvements. This is also standard with impact fees and should be addressed in the ordinance that enacts the impact fee program. Typically with impact fee programs, a credit is only necessary for system (i.e., off-site) improvements on which the impact fee is based. That is, there is a distinction between the projects for which the impact fees are being paid (per a road improvement plan) and other projects that may be off-site improvements, but may not be included in the adopted plan. However, the Virginia Act does not explicitly address this, instead states: “The locality shall treat as a credit *any* off-site transportation dedication, contribution, or construction . . . committed to the locality” (Sec. 15.2-2324, emphasis added). Again, this should be addressed in the ordinance that implements the impact fee program.

## **BENEFIT**

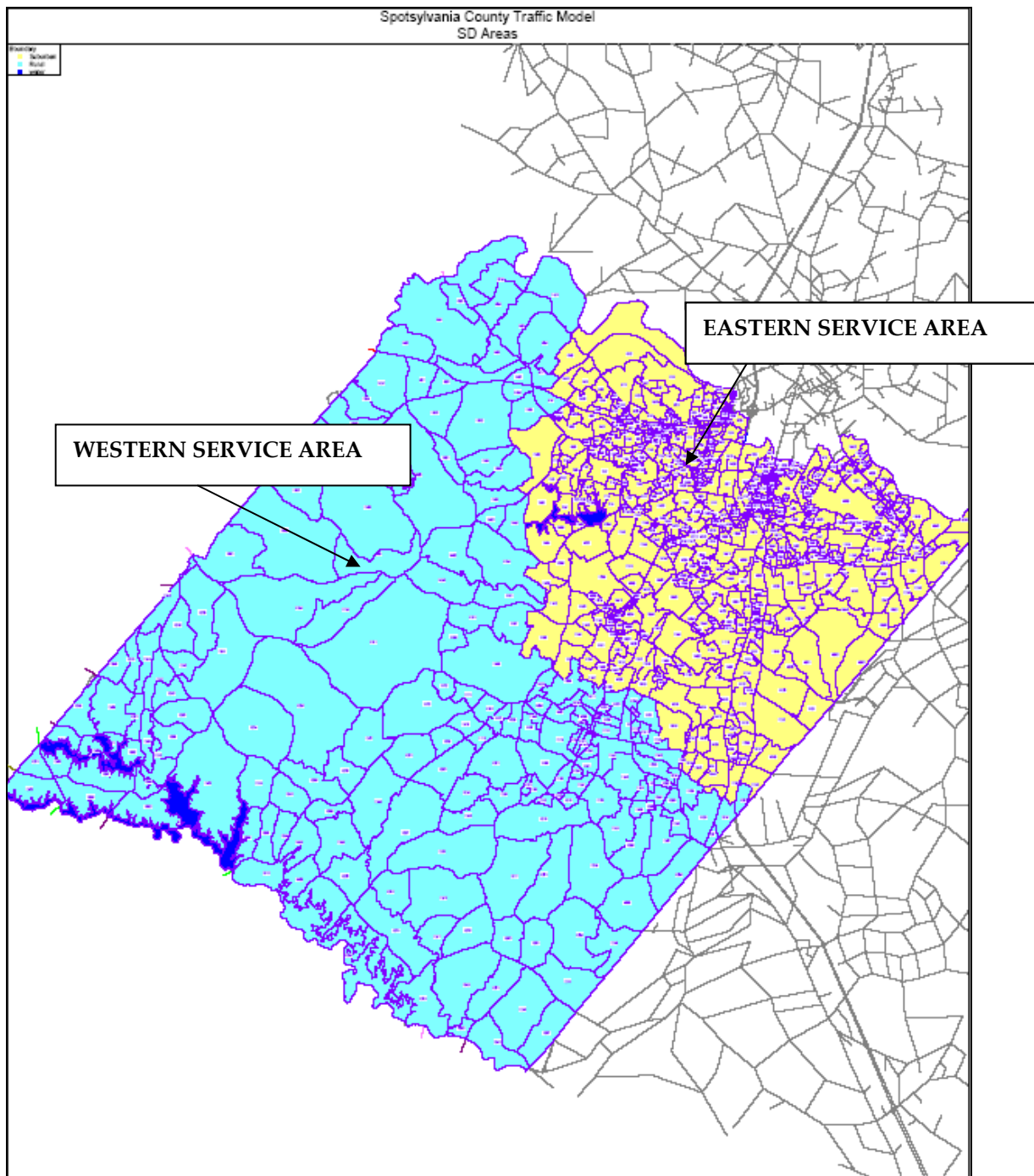
### *Service Areas*

The requirement in the Virginia Act to consider service areas addresses the benefit aspect of the rational nexus test. The Act requires that applicable impact fee service area(s) be delineated within a locality’s comprehensive plan, which could be a jurisdiction-wide area or multiple areas. The Act also states that a service area *may encompass more than one road improvement project*, which leaves open the possibility that a service area could in practice reflect only one project (Section 15.2-2320, emphasis added). An interesting aspect of the Act related to this is the provision that local governments can *exclude urban development areas (UDA)* that are designated per the new UDA legislation.

Spotsylvania County designated two service areas as shown in Figure 4. The County has been divided into Eastern and Western service areas that are generally based on land use and development patterns. The Eastern service area encompasses the more suburban area of the County, while the Western area represents the more rural portion. The boundary was established along the edge of Traffic Analysis Zones, using natural features to the extent possible.



Figure 4. Impact Fee Service Areas



### *Accounting*

Common to impact fee programs, the Act requires the establishment of a separate account for road impact fees. And with more than one service area designated, separate funds need to be established for each area. This is to ensure that funds paid by new development are spent on improvements benefiting the respective geographic area.

### *Refunds*

The Act also specifically requires refunds under two sets of circumstances. First, if funds are not committed within 7 years and projects completed within a maximum 15-year period for which impact fees are paid, a refund is required. In practice, because impact fees are accumulated and spent in a rolling manner (first in, first out), it is not likely that a locality would be required to provide refunds as long as there are ongoing capacity projects in all areas of the locality (where fees are collected). A positive aspect of the Act is the provision to allow “uncommitted” monies after year 7 to be directed to other capacity improvements benefiting the service area.<sup>1</sup>

The second refund situation identified in the Act occurs after completion of the project. Localities are required to recalculate the impact fee based on the *actual* cost of the project. If the impact fee paid exceeds actual costs by 15 percent, a refund is necessary. In practice, this is not likely to occur due to the fact that current dollars are used in the impact fee calculation. However, this requirement serves to ensure that cost estimates used in the impact fees are conservative.

## **IMPACT FEE ADOPTION PROCESS**

Prior to adoption of an impact fee ordinance, the locality is required to establish an impact fee advisory committee. The committee is required to have 40 percent of its representation from the development, building, or real estate professions. The committee is advisory in nature, and per the Act, no action of the advisory committee is considered a prerequisite for action taken by the local government in enacting an impact fee ordinance. Spotsylvania County appointed a Transportation Impact Fee Advisory Committee that participated in reviewing and advising on the road impact fee study.

As noted above, the road improvement plan must be adopted as an amendment to the locality’s comprehensive plan and incorporated into the capital improvement plan. A public hearing is required prior to adoption of the road improvement plan.

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<sup>1</sup> Section 15.2-2327

## IMPLEMENTATION

Common practice nationally is for impact fees to be collected at the time of building permit. An adopted impact fee schedule is published and the total amount of impact fees to be paid by a developer is calculated based on the number and type of residential units as well as the number of square feet and type of nonresidential development.

The Virginia Act (see Section 15.2-2323) requires a slightly different approach where the amount of impact fees to be paid by a particular development are *determined* before or at the time a site plan or subdivision is approved. The fees are then to be *collected* at the time of building permit. The Act also states (15.2-2325) that: “Any impact fees not yet paid shall be assessed at the updated rate.”

Related to the above, the Impact Fee Act requires an update of the road improvement plan and related analyses at least every two years. With this reevaluation, the impact fee schedule may also be amended and per the Act, any fees not yet paid would be assessed the updated amount. In states without the two-year update requirement, a typical approach is to apply a cost index to the fee schedule to keep up with rising costs.

## ANALYSIS OF ROAD IMPROVEMENT NEEDS

The Virginia Impact Fee Act requires an assessment of road improvement needs benefiting impact fee service areas as well as an analysis of existing conditions and commitments to future usage. The culmination of the analysis is a Road Improvements Plan on which the impact fees are based. This section provides information on existing conditions, existing and committed development, future growth and the applicable road improvement needs.

The growth-related capital improvements discussed below are based on the infrastructure standards and cost factors documented in the impact fee section of this report. As part of its annual budget process, Spotsylvania County will provide more detailed data on specific projects consistent with this planning-level CIP, which is required by Virginia Code §15.2-2321.

### DEMAND FOR INFRASTRUCTURE

The demand for improvements was determined through long-range and capital improvement plans provided by Spotsylvania County. Growth indicators for the development fee study are summarized in this section and discussed further in Appendix C. These projections are used to estimate potential revenue generated from the impact fees and determine levels of service.

Figure 5. Summary of Growth Indicators

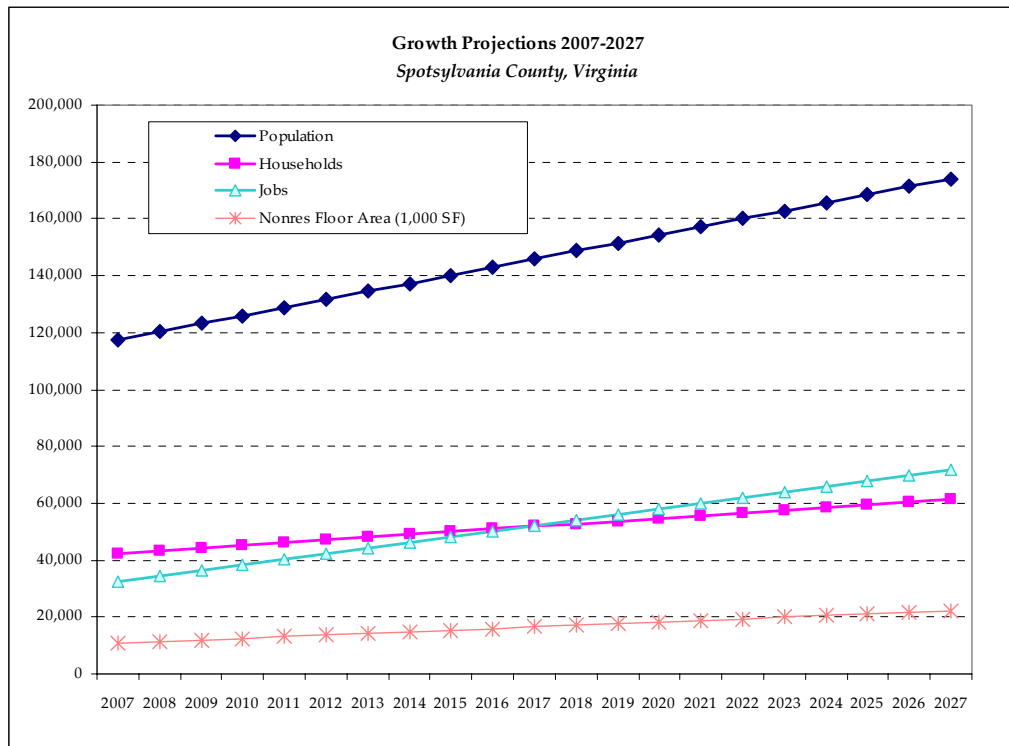


Figure 6. Summary of Current and Projected Demand

Year=>		Five-Year Increments ==>									Net	Avg. Ann.
		Base Yr. 2007	1 2008	2 2009	3 2010	4 2011	5 2012	10 2017	15 2022	20 2027	Increase 2007-2027	Increase 2007-2027
SUMMARY OF DEMAND PROJECTIONS												
TOTAL HOUSEHOLDS		42,406	43,350	44,294	45,237	46,181	47,125	51,844	56,563	61,282	18,876	944
TOTAL POPULATION		117,531	120,382	123,233	126,083	128,934	131,785	146,039	160,293	174,500	56,969	2,848
TOTAL JOBS		32,674	34,628	36,582	38,535	40,489	42,443	52,212	61,981	71,750	39,076	1,954
Jobs to Population Ratio		0.28	0.29	0.30	0.31	0.31	0.32	0.36	0.39	0.41		
RESIDENTIAL DEVELOPMENT												
Households												
Single Family Detached		32,967	33,901	34,835	35,769	36,702	37,636	42,306	46,975	51,644	18,677	934
Multifamily		9,439	9,449	9,459	9,469	9,479	9,489	9,539	9,588	9,638	199	10
TOTAL		42,406	43,350	44,294	45,237	46,181	47,125	51,844	56,563	61,282	18,876	944
Housing Units												
Single Family Detached		34,731	35,715	36,699	37,682	38,666	39,650	44,569	49,488	54,407	19,676	984
Multifamily		10,462	10,473	10,484	10,495	10,506	10,517	10,573	10,628	10,683	221	11
TOTAL		45,193	46,188	47,183	48,178	49,172	50,167	55,142	60,116	65,090	19,897	995
NONRESIDENTIAL DEVELOPMENT												
Employment By Type												
Retail		11,693	12,492	13,292	14,091	14,890	15,690	19,686	23,683	27,679	15,986	799
Office		12,751	13,820	14,890	15,959	17,029	18,098	23,446	28,793	34,140	21,389	1,069
Industrial		8,230	8,315	8,400	8,485	8,570	8,655	9,080	9,506	9,931	1,701	85
TOTAL		32,674	34,628	36,582	38,535	40,489	42,443	52,212	61,981	71,750	39,076	1,954
Nonres Floor Area (1,000 SF)		SF/Empl										
Retail (1,000 SF)		350	4,093	4,372	4,652	4,932	5,212	5,491	6,890	8,289	5,595	280
Office (1,000 SF)		241	3,073	3,331	3,588	3,846	4,104	4,362	5,650	6,939	5,155	258
Industrial (1,000 SF)		433	3,564	3,600	3,637	3,674	3,711	3,748	3,932	4,116	737	37
TOTAL			10,729	11,303	11,878	12,452	13,026	13,601	16,472	19,344	11,486	574
VEHICLE TRIPS												
Residential Trips		Trip Rates    Adj. %										
Single Family Detached		9.57    60%	199,425	205,074	210,723	216,372	222,021	227,670	255,916	284,161	312,406	112,981    5,649
Multifamily		6.72    60%	42,183	42,228	42,272	42,317	42,361	42,406	42,628	42,851	43,073	890    45
TOTAL Residential Trips			241,608	247,302	252,995	258,689	264,382	270,076	298,544	327,012	355,480	113,871    5,694
Nonresidential Trips												
Retail		86.56    31%	109,818	117,325	124,832	132,338	139,845	147,352	184,886	222,420	259,955	150,137    7,507
Office		18.35    50%	28,195	30,559	32,924	35,289	37,654	40,018	51,842	63,666	75,490	47,295    2,365
Industrial		6.97    50%	12,419	12,547	12,676	12,804	12,932	13,061	13,703	14,344	14,986	2,567    128
TOTAL Nonresidential Trips			150,432	160,432	170,431	180,431	190,431	200,431	250,431	300,430	350,430	199,998    10,000
GRAND TOTAL Trips			392,040	407,733	423,427	439,120	454,814	470,507	548,975	627,442	705,910	313,870    15,693

Sources: U.S. Census; Spotsylvania County; TischlerBise

### Existing and Committed Development

In addition, the Virginia Impact Fee Act requires an analysis of both existing and commitments to future usage of the existing roads (see §15.2-2321). The following data as provided by Spotsylvania County reflects current valid building permits outstanding and approved and pending site plans and subdivision plats. Residential is shown in Figure 7 and nonresidential is shown in Figure 8.

**Figure 7. Existing and Committed Residential Development**

	2007			Housing Unit Total
	Households	Housing Units	In Progress*	
Single Family Detached	32,967	34,731	874	35,605
Multifamily/Other	9,439	10,462	0	10,462
<b>Total</b>	<b>42,406</b>	<b>45,193</b>	<b>874</b>	<b>46,067</b>

\* Building permits, rezonings and approved site plans as of October 2007.

Source: Spotsylvania County

**Figure 8. Existing and Committed Nonresidential Development**

	Base Year	Estd Jobs	Square Feet	Estimated	Current &	Current &
	2007 Jobs	In Progress*	Per Employee**	Committed Nonres SF	Committed Total Jobs	Committed Ttl Nonres Floor Area (SF)
Retail	11,693	1,431	350	500,850	13,124	4,593,400
Office	12,751	1,857	241	447,537	14,608	3,520,528
Industrial	8,230	866	433	374,978	9,096	3,938,568
<b>Total</b>	<b>32,674</b>	<b>4,154</b>	<b>327</b>	<b>1,323,365</b>	<b>36,828</b>	<b>12,052,496</b>

\* Building permits, rezonings and approved site plans as of October 2007.

\*\* See the figure, "Floor Area Per Employee and Nonresidential Trip Rates" in Appendix

Source: Spotsylvania County

Further detail by Service Area is provided in the Impact Fee chapter.

## TRANSPORTATION SYSTEM ANALYSIS SUMMARY

William Allen, Transportation Consultant, analyzed transportation conditions in the Impact Fee Service Areas to determine existing road conditions and future road improvement needs due to growth. The County's Travel Demand Model, developed by Mr. Allen, was used for this purpose. Traffic models assist in transportation planning by simulating the effect of land use changes or system improvements.

### *Analysis of Existing Conditions*

To comply with the Virginia Impact Fee Act, the County road system was analyzed by service area to determine if current capacity exists to serve both current demand as well as demand from current usage plus existing commitments to future usage. Details are provided below in Figure 9. Current demand (volume) is expressed as Vehicle Miles of Travel, or VMT; capacity of the road system is expressed as Vehicle Miles of Capacity, or VMC. As shown below, there is excess capacity in the system to accommodate committed development. Volume to capacity (V/C) ratios are shown as well with the system operating at less than .4, representing a system operating under capacity.

**Figure 9. Analysis of Existing Capacity and Commitments to Future Usage on County Roads**

	<b>Existing (2007)</b>			<b>Existing + Committed Development</b>		
	<i>Eastern Serv Area</i>	<i>Western Serv Area</i>	<i>Countywide Total</i>	<i>Eastern Serv Area</i>	<i>Western Serv Area</i>	<i>Countywide Total</i>
Capacity (VMC)	5,920,708	4,279,790	10,200,498	5,920,708	4,279,790	10,200,498
Volume (VMT)	2,822,491	792,478	3,614,969	2,998,325	839,037	3,837,362
Excess capacity	3,098,217	3,487,312	6,585,529	2,922,383	3,440,753	6,363,136
V/C Ratio	0.48	0.19	0.35	0.51	0.20	0.38

Source: Spotsylvania County Travel Demand Model

### *Analysis of Future Conditions*

The future network modeled includes road improvements on all types of facilities including freeways, highway interchanges, major arterials, minor arterials, and collectors anticipated to be built by 2027. These improvements are assumed to be funded through a variety of sources including Federal, State, County, and private contributions. See Figure 10. Detail on the 2027 network is provided as Appendix A. (For further discussion on transportation modeling parameters and results, see the technical memo, "Spotsylvania Road Impact Fee Study: Travel Forecasting Documentation," issued separately.)



Figure 10. Future (2027) Network: All Improved Projects

Project Number	Project	From	To	Future Classification	Existing # of Lanes	Future # of Lanes	Existing Length (mi)	Future Length (mi)
<b>EASTERN SERVICE AREA</b>								
1 *	Va 208 Bypass	Burnside Dr	Po River	Major Arterial	2	4	1.01	3.76
3 *	US 17 Relocated	Hickory Hill	US 1	Major Arterial	0	4	0.00	2.70
4 *	US 17 Relocated	US 1 interchange		Ramp	0	1	0.00	0.60
5 *	US 17 Relocated	I-95 interchange		Ramp	0	1	0.00	2.86
6 *	Spotsylvania Pkwy Extended	US 1	Hospital Blvd	Major Collector	0	4	0.00	0.79
7 *	Hospital Blvd	Spotsy Pkwy Ext	US 17	Major Collector	0	4	0.00	0.12
8 *	Rt 607 (Guinea Station)	Rt 608	US 1	Major Collector	0	2	0.00	1.15
9 *	Market St Extension	Rt 636	US 1	Minor Arterial	0	2	0.00	0.51
10 *	Rt 606 Relocated	Nellies Ln	Caroline Co Line	Minor Arterial	0	4	0.00	2.96
11 *	I-95	Build new ramps at Rt 606 interchange		Ramp	1	1	1.03	3.10
12 *	Rt 608 (Massaponax Church)	Va 208 Bypass	Va 208	Major Collector	0	2	0.00	1.47
13 *	Germanna Point Dr Ext	Cotter	Spotsylvania Ave	Minor Collector	0	2	0.00	0.91
14 *	I-95	Build new ramps at US 1 interchange		Ramp	1	1	0.30	1.01
15 *	Harrison Crossing	Bragg Rd	Harrison Rd	Major Collector	0	4	0.00	1.69
31	US 1	Mass. Church (608)	Spotsylvania Pkwy (628)	Major Arterial	4	6	1.95	1.95
33	US 1 Business (Lafayette)	Fbg/Spotsy line	US 1 Bypass	Minor Arterial	2	4	1.51	1.51
34 *	I-95	Spotsy/Fbg line	N of new I-95/US 17 interchange	Freeway (HOT Ins)	6	8	0.00	4.91
35 *	Va 3 (Germanna)	Single Oak Dr (688)	Harrison Rd (620)	Major Arterial	4	6	1.17	1.17
39	US 17/Va 2 (Tidewater Trail)	Mills Dr (17)	Jim Morris (609)	Major Arterial	2	4	1.11	1.11
42 *	Rt 639 (Bragg)	Plank Rd (3)	River Rd (618)	Major Arterial	2	4	0.91	0.91
43	Rt 612 (Catharpin)	Piney Branch Rd (624)	Old Plank Rd (610)	Minor Arterial	2	4	2.28	2.28
45 *	Rt 627 (Gordon)	Smith Station (628)	Harrison Rd (620)	Minor Arterial	2	4	2.35	2.35
48 *	Rt 636 (Hood)	Va 208	US 1 Bypass	Major Arterial	2	4	0.44	0.44
49	Rt 636 (Mine)	US 1 Bypass	Lansdowne (638)	Major Arterial	2	4	1.46	1.46
50	Rt 610 (Old Plank)	Plank Rd (3)	(E to) Catharpin Rd (612)	Major Collector	2	2	1.89	1.89
52	Rt 628 (Smith Station)	Gordon Rd (627)	Mass. Church (608)	Minor Arterial	2	4	5.95	5.95
64	Rt 608 (Massaponax Church)	US 1	Hickory Hill Dr	Major Collector	2	2	3.47	3.47
65	Rt 608 (Massaponax Church)	Smith Station (628)	US 1	Major Arterial	2	4	0.98	0.98
66	Rt 620 (Harrison)	Salem Church Rd (639)	I-95	Major Arterial	2	4	1.30	1.30
67	US 17/Va 2 (Tidewater Trail)	Jim Morris (609)	Benchmark (608)	Major Arterial	2	4	0.76	0.76
68	US 17/Va 2 (Tidewater Trail)	Benchmark (608)	Fredericksburg City line	Major Arterial	2	4	2.65	2.65
69	Rt 639 (Leavells)	Courthouse Rd (208)	Smith Station Rd (628)	Major Arterial	2	4	2.50	2.50
70	Rt 620 (Harrison)	Bridge over I-95		Major Arterial	2	4	0.06	0.06
71	Rt 620 (Harrison)	I-95	Jeff Davis Hwy (1 Byp)	Major Arterial	2	4	1.09	1.09
72	Rt 620 (Harrison)	Jeff Davis Hwy (1 Byp)	Lafayette Blvd (1 Bus)	Minor Arterial	2	4	0.18	0.18
96	Rt 673 (Piedmont Dr)	Smith Station Rd (628)	Harrison Rd (620)	Major Collector	2	2	2.24	2.24
<b>WESTERN SERVICE AREA</b>								
2 *	Va 208 Bypass	Po River	Ta River	Minor Arterial	2	2	1.12	3.14
51	Rt 610 (Elys Ford/ Old Plank)	Spotswood Furn (620N)	Plank Rd (3)	Minor Collector	2	2	3.29	3.29
55	Rt 606 (Post Oak)	Stubbs Bridge	Pamunkey	Major Collector	2	2	0.93	0.93
57 *	Rt 653 (Jones Powell)	Belmont (652)	Lawyers (601)	Minor Collector	2	2	1.65	1.65
97	Rt 738 (Partlow Rd)	Caroline Co line	Courthouse Rd (208)	Minor Arterial	2	2	12.55	12.55
98	Rt 601 (Lewiston Rd)	Fairview Rd (622)	Courthouse Rd (208)	Minor Arterial	2	2	6.90	6.90
40 *	Rt 606 (Morris)	Courthouse Rd (208)	Rt 606 Relocated	Minor Arterial	2	4	3.50	3.50

\* Projects funded through non-County funding (State, Federal, private contributions)

The projects indicated above are assumed to be funded through local (County) and non-local means (State, Federal, private contributions). The Road Improvements Plan to be funded partially through impact fees is a subset of this program and reflects only those projects that are locally funded. Thus impact fees are based only on costs to be incurred by the County and attributed to new development's share of those costs. (Further detail is provided in the next chapter.)

Figure 11 provides detail on Spotsylvania County's plan to provide additional capacity in part to accommodate new development over the next twenty years. As shown, the County's Road Improvements Plan for capacity improvements totals \$527 million in road improvement costs needed to serve new development, with \$400 million in the Eastern Service Area and \$127 million in the Western Service Area. The total costs reflect County share of the costs over the next twenty years and *are expressed in current dollars (2007).*<sup>2</sup> Projects funded through non-local means (including proffers) as well as portions of projects funded through the 2005 General Obligation Bond referenda are *not included in the Road Improvements Plan.*

These costs reflect capacity road improvement projects that will benefit both new and existing development. To ensure that new growth does not pay for an increased level of service, the impact fee analysis identified current volume to capacity ratios for both existing development as well as existing plus committed development (as required by the Impact Fee Act). While there are no existing deficiencies, the share of the costs attributed to new development is calibrated to levels of service provided for existing plus committed development. Further detail is provided in the Impact Fee chapter.

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<sup>2</sup> As noted, costs are provided in current dollars. By year 20, the total costs to construct the plan will be higher, given inflationary pressures. Therefore, annual adjustments should be made to account for increased costs in materials, labor, etc. Further discussion is provided in the Implementation section.

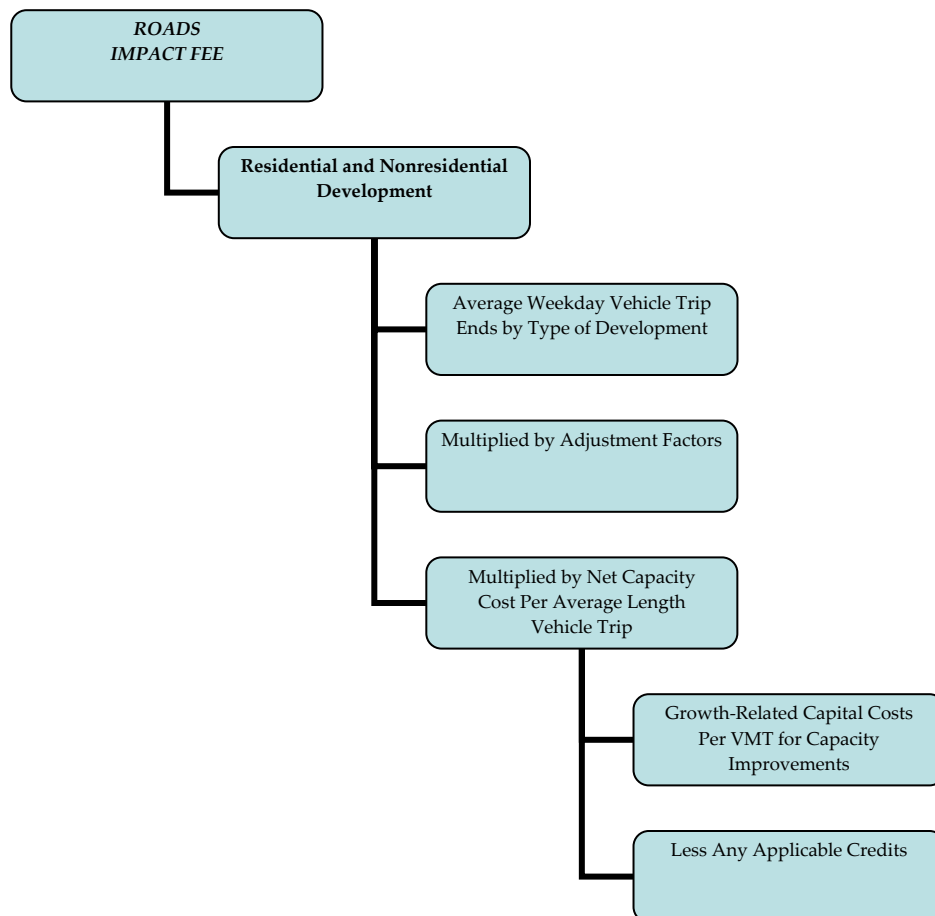
Figure 11. Road Improvements Plan: County Funded/Constructed Projects to Accommodate Growth

Project Number	Project	From	To	Future Classification	Existing # of Lanes	Future # of Lanes	Existing Length (mi)	Future Length (mi)	Total County Cost (2007\$)
<b>EASTERN SERVICE AREA</b>									
31	US 1	Mass. Church (608)	Spotsylvania Pkwy (628)	Major Arterial	4	6	1.95	1.95	\$33,150,000
33	US 1 Business (Lafayette)	Fbg/Spotsy line	US 1 Bypass	Minor Arterial	2	4	1.51	1.51	\$21,140,000
39	US 17/Va 2 (Tidewater Trail)	Mills Dr (17)	Jim Morris (609)	Major Arterial	2	4	1.12	1.12	\$15,680,000
43	Rt 612 (Catharpin)	Piney Branch Rd (624)	Old Plank Rd (610)	Minor Arterial	2	4	2.28	2.28	\$12,101,538
49	Rt 636 (Mine)	US 1 Bypass	Lansdowne (638)	Major Arterial	2	4	1.46	1.46	\$22,000,375
50	Rt 610 (Old Plank)	Plank Rd (3)	(E to) Catharpin Rd (612)	Major Collector	2	2	1.90	1.90	\$10,084,615
52	Rt 628 (Smith Station)	Gordon Rd (627)	Mass. Church (608)	Minor Arterial	2	4	5.95	5.95	\$68,080,525
64	Rt 608 (Massaponax Church)	US 1	Hickory Hill Dr	Major Collector	2	2	3.03	3.03	\$21,867,452
65	Rt 608 (Massaponax Church)	Smith Station (628)	US 1	Major Arterial	2	4	1.01	1.01	\$11,556,526
66	Rt 620 (Harrison)	Salem Church Rd (639)	I-95	Major Arterial	2	4	1.40	1.40	\$14,859,999
67	US 17/Va 2 (Tidewater Trail)	Jim Morris (609)	Benchmark (608)	Major Arterial	2	4	0.78	0.78	\$10,920,000
68	US 17/Va 2 (Tidewater Trail)	Benchmark (608)	Fredericksburg City line	Major Arterial	2	4	2.66	2.66	\$37,240,000
69	Rt 639 (Leavells)	Courthouse Rd (208)	Smith Station Rd (628)	Major Arterial	2	4	2.51	2.51	\$40,739,230
70	Rt 620 (Harrison)	Bridge over I-95		Major Arterial	2	4	0.06	0.06	\$7,960,000
71	Rt 620 (Harrison)	I-95	Jeff Davis Hwy (1 Byp)	Major Arterial	2	4	1.10	1.10	\$26,790,000
72	Rt 620 (Harrison)	Jeff Davis Hwy (1 Byp)	Lafayette Blvd (1 Bus)	Minor Arterial	2	4	0.17	0.17	\$34,160,001
96	Rt 673 (Piedmont Dr)	Smith Station Rd (628)	Harrison Rd (620)	Major Collector	2	2	2.24	2.24	\$11,889,230
									<b>\$400,219,491</b>
<b>WESTERN SERVICE AREA</b>									
51	Rt 610 (Elys Ford/ Old Plank)	Spotswood Furn (620N)	Plank Rd (3)	Minor Collector	2	2	3.42	3.42	\$18,152,307
55	Rt 606 (Post Oak)	Stubbs Bridge	Pamunkey	Major Collector	2	2	0.93	0.93	\$4,936,154
97	Rt 738 (Partlow Rd)	Caroline Co line	Courthouse Rd (208)	Minor Arterial	2	2	12.56	12.56	\$66,664,612
98	Rt 601 (Lewiston Rd)	Fairview Rd (622)	Courthouse Rd (208)	Minor Arterial	2	2	7.02	7.02	\$37,259,998
									<b>\$127,013,070</b>
<b>COUNTYWIDE TOTALS</b>									<b>\$527,232,560</b>

## ROAD IMPACT FEES

Spotsylvania County road impact fee addresses the need for road improvements as identified in the Road Improvements Plan. Improvements are on arterials and collectors and include widenings, adding lanes, upgrades, realignments, intersection improvements, and other related appurtenances. All improvements will provide additional capacity and are needed in part to serve new development. Projects included in the Road Improvements Plan are priority *system-level* improvements benefiting the County within each service area over the next 20 years. Road impact fees are derived using a plan-based methodology. As shown in Figure 12, impact fees are calculated for both residential and nonresidential development by multiplying trip generation rates (demand factors) by the capital cost per average length trip.

**Figure 12. Streets Impact Fee Methodology Chart**



## PROJECTED NEEDS FOR ROADS

Calibration of impact fees requires projected development in each impact fee service area to be converted into average weekday vehicle trips and vehicle miles of travel as described in the following sections.

### *Trip Generation*

Trip generation rates used to calculate Spotsylvania County impact fees are average weekday vehicle trip ends from the reference book, *Trip Generation, 7<sup>TH</sup> Edition*, published by the Institute of Transportation Engineers (ITE) in 2003. A vehicle trip end represents a vehicle either entering or exiting a development (as if a traffic counter were placed across a driveway). To calculate impact fees, trip generation rates are adjusted to avoid double counting each trip at both the origin and destination points—thereby allocating the trip to the appropriate land use. The basic trip adjustment factor is 50 percent. Further adjustments are made by type of land use to account for travel demand and development characteristics thus making the fees proportionate to the infrastructure demanded for particular types of development. Each is discussed in turn below.

### *Adjustment for Journey-To-Work Commuting*

Residential development has a larger trip adjustment factor of 60 percent to account for commuters leaving Spotsylvania County for work. According to the National Household Travel Survey (2001), published in December 2004 (see Table 29), home-based work trips are typically 31 percent of “production” trips, in other words, out-bound trips (which are 50 percent of all trip ends). Also, Census 2000 data from Table P27 in Summary File 3 indicates that 64 percent of Spotsylvania County’ workers travel outside the County for work. In combination, these factors ( $0.31 \times 0.50 \times 0.60 = 0.10$ ) account for 10 percent of additional production trips supporting the higher allocation of trips to residential development. The total adjustment factor for residential includes attraction trips (50% of trip ends) plus the journey-to-work commuting adjustment (10% of production trips) for a total of 60 percent. See Figure 13. for commuter adjustment calculation.

**Figure 13. Trip Adjustment Factor for Journey-to-Work Commuting**

Spotsylvania County Workers (2000) [1]	45,409
Spotsylvania County Residents Working in County (2000) [1]	16,449
Spotsylvania County Residents Commuting Outside County for Work	28,960
<b>Percent Commuting out of the City</b>	<b>64%</b>
Additional Production Trips	10%
Residential Trip Adjustment Factor	60%

[1] U.S. Census, 2000, Table P27 from Summary File 3 (SF3).

### *Adjustment for Pass-By Trips*

For all nonresidential development except commercial/shopping center development, the trip adjustment factor is 50 percent. For commercial/shopping center development, the trip adjustment factor is less than 50 percent because retail uses attract vehicles as they pass by on arterial and collector roads. For example, when someone stops at a convenience store on the way home from work, the convenience store is not the primary destination. For a shopping center of 50,000 square feet of floor area, the ITE manual indicates that on average 39 percent of the vehicles that enter are passing by on their way to some other primary destination. The remaining 61 percent of attraction trips have the shopping center as their primary destination. Because attraction trips are half of all trips, the trip adjustment factor is 61 percent multiplied by 50 percent, or approximately 31 percent of the trip ends.

**Figure 14. Commercial/Shopping Center Trip Rates and Pass-By Adjustments**

Floor Area in thousands (KSF)	Commercial Pass-by Trips*	Commercial Trip Adj Factor**	Weekday - 2003 Data	
			Shopping Centers (ITE 820)***	
			Trip Ends	Rate/KSF
25	45%	28%	2,758	110.32
50	39%	31%	4,328	86.56
100	34%	33%	6,791	67.91
200	29%	36%	10,656	53.28
400	23%	39%	16,722	41.80
800	18%	41%	26,239	32.80

\* Based on data published by ITE in *Trip Generation Handbook* (2004), the best trendline correlation between pass-by trips and floor area is a logarithmic curve with the equation  $((-7.6812 \cdot \ln(KSF)) + 69.293)$ .

\*\* To convert trip ends to vehicle trips, the standard adjustment factor is 50%. Due to pass-by trips, commercial trip adjustment factors are lower, as derived from the following formula  $(0.50 \cdot (1 - \text{passby pct}))$ .

\*\*\* Trip Generation, Institute of Transportation Engineers, 2003.

### Vehicle Miles of Travel

A Vehicle Mile of Travel (VMT) is simply a measurement unit equal to one vehicle traveling one mile. In the aggregate, VMT is the product of vehicle trips multiplied by the average trip length. The estimated number of vehicle trips to development in the County is documented in Figure 15. A lane mile is a rectangular area of pavement, one lane wide and one mile long. The average trip length to development in the County was determined using data on the number of lane miles planned to be constructed per the County Road Improvements Plan by 2027 and the lane capacity standard discussed below.<sup>3</sup> VMT is the appropriate demand indicators or “service units,” as defined by the Virginia Impact Fee Act. Projected service units over the next twenty years are also provided in Figure 15.

**Figure 15. Travel Demand Summary: Countywide**

Year->	Base 2007	Existing + Committed	20 2027
<b>DEMAND DATA</b>			
SFD UNITS	34,731	35,605	54,407
MF/OTHER RES UNITS	10,462	10,462	10,683
COMMERCIAL KSF	4,093	4,625	9,688
OFFICE KSF	3,073	3,521	8,228
INDUSTRIAL KSF	3,564	3,939	4,300
SFD TRIPS	199,425	204,443	312,406
MF/OTHER RES TRIPS	42,183	42,183	43,073
<b>RES TRIPS</b>	<b>241,608</b>	<b>246,627</b>	<b>355,480</b>
COMMERCIAL TRIPS	109,818	124,093	259,955
OFFICE TRIPS	28,195	32,305	75,490
INDUSTRIAL TRIPS	12,419	13,726	14,986
<b>NONRES TRIPS</b>	<b>150,432</b>	<b>170,124</b>	<b>350,430</b>
<b>TOTAL TRIPS</b>	<b>392,040</b>	<b>416,751</b>	<b>705,910</b>
<b>County VMT (Rd Imp Pln)</b>			
	<b>595,849</b>	<b>625,489</b>	<b>1,010,683</b>

<sup>3</sup> Typical VMT calculations for development-specific traffic studies, along with most transportation models of an entire urban area, are derived from traffic counts on particular road segments multiplied by the length of that road segment. For the purpose of impact fees, VMT calculations are based on attraction (inbound) trips to development located in the County, with the trip lengths calibrated to the road network considered to be system improvements. This refinement eliminates pass-through or external-external trips, travel to development within municipalities and travel on roads that are not County system improvements (e.g. interstate highways and local streets).

### *Average Trip Length on System of Improvements*

Determining average trip length for the purpose of impact fees requires consideration of the functional classification of roads and the community's criteria for system improvements, as discussed above. A typical vehicle trip, such as a person leaving their home and traveling to work, generally begins on a local street that connects to a collector street, which connects to an arterial road and eventually to a state or interstate highway. This progression of travel up and down the functional classification chain limits the average trip length question to the following, "What is the average vehicle trip length on impact fee system improvements (i.e., arterials and collectors included in the Road Improvements Program)?"

To derive the average utilization (i.e., average trip length expressed in miles) of the system improvements, we divide vehicle miles of travel by the vehicle trips associated with existing and committed development in Spotsylvania County as of 2007. As explained further below and shown in Figure 15, existing and committed development in the County currently attracts an estimated 416,751 vehicle trips on an average weekday. Dividing 625,489 vehicle miles of travel by the average weekday vehicle trips yields an unweighted average trip length of approximately 1.50 miles. However, the calibration of average trip length includes the same adjustment factors used in the impact fee calculations (i.e., journey-to-work commuting, commercial pass-by adjustment and average trip length adjustment by type of land use (discussed below)). Using a series of spreadsheet iterations, the weighted average trip length is 1.49 miles, as shown in Figure 16.

### *Trip Length Weighting Factor by Type of Land Use*

The road impact fee methodology includes a percentage adjustment, or weighting factor, to account for trip length variation by type of land use. As documented in Table 6 of the 2001 National Household Travel Survey (published December 2004 by the Federal Highway Administration), vehicle trips from residential development are approximately 122 percent of the average trip length. The residential trip length adjustment factor includes data on home-based work trips, social and recreational purposes.

Conversely, shopping trips associated with commercial development are roughly 68 percent of the average trip length while other nonresidential development typically accounts for trips that are 75 percent of the average trip length. Note, the national travel survey was not the source of the trip length used in the impact fee calculations. Rather, average trip length is based on a specific plan of system improvements in Spotsylvania County and the estimated and projected development in the County.



### Vehicle Trips to Development

The relationship between the amount of development in Spotsylvania County and the projected demand for infrastructure is documented in the following two figures. Figure 16 summarizes the input variables used in the analysis. The variables with blue shading are ITE trip rates; adjustment factors are shown in pink; average length per trip on system of road improvements is shown in yellow; trip length weighting factors are shown in peach; and lane capacity standard is in green. All have been discussed above.

**Figure 16. Input Variables for County Road Improvements Plan**

	Weekday
SFD Weekday VTE per Unit	9.57
Multifamily/Other Res Weekday VTE per Unit	6.72
Commercial Weekday VTE/KSF*	86.56
Office Weekday VTE/KSF**	18.35
Ind Weekday VTE/KSF***	6.97
Residential Trip Adj Factor	60%
Commercial Trip Adj Factor	31%
All Other Trips Adj	50%
Avg Miles/Trip	1.49
Residential Trip Length	122%
Retail Trip Length	68%
Other Nonresidential Trip Length	75%
Capacity Per Lane	8050

\* Trip rate per 1,000 sf for 25-50 ksf shopping center (ITE 820)

\*\* Trip rate per 1,000 sf 10-25 ksf Office (ITE 710)

\*\*\* Trip rate per 1,000 sf for Light Industrial (ITE 110)

VTE=Vehicle Trip Ends

Sources: ITE; USDOT

The following two figures show projected travel demand (average weekday trips) based on the input variables above for Eastern and Western service areas, respectively. Development projections at the top of the figure are multiplied by the input variables from the previous table to yield average weekday travel demand on the system of Roads included in the Road Improvements Plan. (The demographic data shown at the top of Figure 17 is from the demographic projections further detailed in the Appendix C.) Trip generation rates and trip adjustment factors convert projected development into average weekday vehicle trips and vehicle miles of travel, shown in the bottom portion of the figure. For example in Eastern area, in the base year, single-family (SFD) detached housing units will produce 151,896 weekday trips ( $26,454 \times 9.57 \times 60\% = 151,896$ ). The same calculation is done for each land use type. Total VMT are shown in the bottom row of the table.

**Figure 17. Projected Travel Demand Summary: Eastern Service Area**

Year->	Base 2007	Existing + Committed	20 2027
<b>DEMAND DATA: Eastern Impact Fee Service Area</b>			
SFD UNITS	26,454	27,140	41,394
MF/OTHER RES UNITS	10,459	10,459	10,692
COMMERCIAL KSF	3,644	4,141	8,787
OFFICE KSF	2,715	3,163	7,914
INDUSTRIAL KSF	2,551	2,904	3,134
SFD TRIPS	151,896	155,835	237,686
MF/OTHER RES TRIPS	42,170	42,170	43,108
<b>RES TRIPS</b>	<b>194,066</b>	<b>198,005</b>	<b>280,795</b>
COMMERCIAL TRIPS	97,768	111,105	235,780
OFFICE TRIPS	24,913	29,024	72,611
INDUSTRIAL TRIPS	8,890	10,120	10,922
<b>NONRES TRIPS</b>	<b>131,571</b>	<b>150,248</b>	<b>319,313</b>
<b>TOTAL TRIPS</b>	<b>325,637</b>	<b>348,253</b>	<b>600,108</b>
<b>County VMT (Rd Imp Pln)</b>			
	489,607	516,247	842,669

**Figure 18. Projected Travel Demand Summary: Western Service Area**

Year->	Base 2007	Existing + Committed	20 2027
<b>DEMAND DATA: Western Impact Fee Service Area</b>			
SFD UNITS	8,277	8,465	13,000
MF/OTHER RES UNITS	3	3	3
COMMERCIAL KSF	449	484	901
OFFICE KSF	358	358	358
INDUSTRIAL KSF	1,013	1,035	1,166
SFD TRIPS	47,529	48,608	74,647
MF/OTHER RES TRIPS	13	13	13
<b>RES TRIPS</b>	<b>47,542</b>	<b>48,622</b>	<b>74,661</b>
COMMERCIAL TRIPS	12,050	12,989	24,174
OFFICE TRIPS	3,281	3,281	3,285
INDUSTRIAL TRIPS	3,530	3,606	4,064
<b>NONRES TRIPS</b>	<b>18,861</b>	<b>19,876</b>	<b>31,523</b>
<b>TOTAL TRIPS</b>	<b>66,403</b>	<b>68,498</b>	<b>106,184</b>
<b>County VMT (Rd Imp Pln)</b>			
	106,242	109,242	168,424

## COST OF GROWTH-RELATED IMPROVEMENTS

As discussed above, a County Road Improvements Plan has been developed that identifies growth-related road improvements that the County will fund through local means. A portion of the costs will be paid through impact fees. Costs are in current (2007) dollars as provided by County staff and include design, engineering, right-of-way acquisition, utility relocation, and

construction. The full list of improvements is needed to serve growth over the next twenty years. Costs by service area are shown in Figure 19 and Figure 20.

### *Cost Allocation Considerations*

Vehicular travel within the County requires a system of controlled access roads, major and minor arterials, collectors, major access roads, and local streets. However, the impact fee analysis and calculations are based solely on the improvements included in the County Road Improvements Plan.

Reasonably allocating the cost of transportation system improvements requires consideration of several transportation planning challenges. Because road networks are “open” systems, newly expanded capacity can be readily absorbed by driver adaptations. For example, drivers may change their route of travel, departure times and even mode (i.e., automobile, bicycle, walking or transit) to take advantage of road improvements. Per the analysis as part of this assignment, there are currently no existing deficiencies on the system. Growth-related improvements identified in the Road Improvements Plan are due in part to new development.

Costs are allocated to growth assuming the current level of service as exists today as determined by the analysis of the demand from existing and committed development (volume) in relation to the current capacity. For the Eastern Service Area, the current V/C (volume to capacity) ratio of .60 is assumed to be the level of service in the future to ensure that new development does not pay more than its fair share—or for a higher level of service. In reality, the V/C ratio is projected to decrease (to .51, thus indicates an improved level of service) due to improvements on the system relative to the projected growth (see Appendix B). However, if the excess amount of capacity were allocated to new development, new growth would be paying more than its fair share or the level of service for existing development would have to be increased, placing a financial burden on the County since funding would have to come from non-impact fee funds.

For the Western Service Area, levels of service are projected to decrease slightly by 2027 and therefore the capacity assumed in 2027 is the actual projected future capacity. Details are provided below.

### *Cost Per Vehicle Mile of Travel*

Estimated total costs for capacity road improvement projects needed to accommodate growth over the next 20 years are estimated at \$527 million (in 2007 dollars) countywide as summarized below. Projects are delineated by Service Area with the Eastern area accounting for

approximately \$400 million and the Western, \$127 million. These costs reflect projects that are intended to be funded wholly by the County. Detail by service area is shown below.

Total cost for Eastern Service Area road improvements total approximately \$400 million. An analysis of current and future volume and capacity on the system of improvements serving the Eastern area was conducted. (Detailed data is provided in Appendix B.) Based on current volume (VMT) from existing and committed development and current capacity (VMC), the resulting volume to capacity ratio is .60. This level of service is used to calculate the amount of future capacity needed by new development at these current levels of service. That is, 1.3 million vehicle miles of capacity are needed to maintain current levels of service. Existing and committed development accounts for 41 percent of the future capacity, therefore 59 percent is attributable to new development. Applying this share to the total costs yields a growth-related cost of approximately \$237 million. Dividing this cost by the projected volume on the system from development in the Eastern Service Area, expressed in VMTs (see Figure 17), yields a cost per VMT of \$726.

**Figure 19. Cost Per VMT of Capacity Road Improvements: Eastern Service Area**

Project Number	Project	Future Classification	Existing Lane Miles	Future Lane Miles	Increase in Lane Miles	Total County Cost (2007\$)	PE COST	R/W & UTILITY RELOC. COST	CONST'N COST
<b>EASTERN SERVICE AREA</b>									
31	US 1	Major Arterial	7.8	11.7	3.9	\$33,150,000	\$3,315,000	\$6,630,000	\$23,205,000
33	US 1 Business (Lafayette)	Minor Arterial	3.0	6.0	3.0	\$21,140,000	\$2,114,000	\$4,228,000	\$14,798,000
39	US 17/Va 2 (Tidewater Trail)	Major Arterial	2.2	4.5	2.2	\$15,680,000	\$1,568,000	\$3,136,000	\$10,976,000
43	Rt 612 (Catharpin)	Minor Arterial	4.6	9.1	4.6	\$12,101,538	\$1,210,154	\$2,420,308	\$8,471,076
49	Rt 636 (Mine)	Major Arterial	2.9	5.8	2.9	\$22,000,375	\$2,200,038	\$4,400,075	\$15,400,263
50	Rt 610 (Old Plank)	Major Collector	3.8	3.8	0.0	\$10,084,615	\$1,008,461	\$2,016,923	\$7,059,230
52	Rt 628 (Smith Station)	Minor Arterial	11.9	23.8	11.9	\$68,080,525	\$6,808,052	\$13,616,105	\$47,656,367
64	Rt 608 (Massaponax Church)	Major Collector	6.1	6.1	0.0	\$21,867,452	\$2,186,745	\$4,373,490	\$15,307,217
65	Rt 608 (Massaponax Church)	Major Arterial	2.0	4.0	2.0	\$11,556,526	\$1,155,653	\$2,311,305	\$8,089,568
66	Rt 620 (Harrison)	Major Arterial	2.8	5.6	2.8	\$14,859,999	\$1,486,000	\$2,972,000	\$10,401,999
67	US 17/Va 2 (Tidewater Trail)	Major Arterial	1.6	3.1	1.6	\$10,920,000	\$1,092,000	\$2,184,000	\$7,644,000
68	US 17/Va 2 (Tidewater Trail)	Major Arterial	5.3	10.6	5.3	\$37,240,000	\$3,724,000	\$7,448,000	\$26,068,000
69	Rt 639 (Leavells)	Major Arterial	5.0	10.0	5.0	\$40,739,230	\$4,073,923	\$8,147,846	\$28,517,461
70	Rt 620 (Harrison)	Major Arterial	0.1	0.2	0.1	\$7,960,000	\$796,000	\$1,592,000	\$5,572,000
71	Rt 620 (Harrison)	Major Arterial	2.2	4.4	2.2	\$26,790,000	\$2,679,000	\$5,358,000	\$18,753,000
72	Rt 620 (Harrison)	Minor Arterial	0.3	0.7	0.3	\$34,160,001	\$3,416,000	\$6,832,000	\$23,912,001
96	Rt 673 (Piedmont Dr)	Major Collector	4.5	4.5	0.0	\$11,889,230	\$1,188,923	\$2,377,846	\$8,322,461
			<b>66.2</b>	<b>114.1</b>	<b>47.9</b>	<b>\$400,219,491</b>	<b>\$40,021,949</b>	<b>\$80,043,898</b>	<b>\$280,153,643</b>

Total Cost	\$400,219,491 [1]
Existing + Committed Capacity (VMC)	529,695 [2]
Future Capacity at Current E + C LOS (VMC)	1,297,772 [3]
Existing + Committed Share of Future Capacity	41% [4]
New Development Share of Capacity	59% [5]
Cost Attributed to Growth	\$236,866,974 [6]
Increase in VMT (Future Development)	326,421 [7]
Cost per VMT	\$726 [8]

Sources/Notes:

[1] Spotsylvania County

[2] Travel Demand Model

[3] Assumes current V/C ratio of .60

[4] Existing + Committed Capacity / Future Capacity

[5] 100% - 41%

[6] Total cost x 59%

[7] Projected travel demand in Service Area on County improved network

[8] Cost attributed to growth / increase in VMT

Total cost for Western Service Area road improvements total approximately \$127 million. An analysis of current and future volume and capacity on the system of improvements serving the Western area was conducted. (Detailed data is provided in Appendix B.) Based on current volume (VMT) from existing and committed development and current capacity (VMC), the resulting volume to capacity (V/C) ratio is .16. By the year 2027, the V/C ratio is projected to be .18, a slight decrease in level of service. The lower future level of service is used to determine new development's share of the future capacity and therefore the costs. Existing and committed development accounts for 82 percent of the future capacity, therefore 18 percent is attributable to new development. Applying this share to the total costs yields a growth-related cost of \$22.6 million. Dividing this cost by the projected volume on the system from development in the Western Service Area, expressed in VMTs (see Figure 18), yields a cost per VMT of \$381.

**Figure 20. Cost Per VMT of Capacity Road Improvements: Western Service Area**

Project Number	Project	Future Classification	Existing Lane Miles	Future Lane Miles	Increase in Lane Miles	Total County Cost (2007 \$'s)	PE COST	R/W & UTILITY RELOC. COST	CONST'N COST
<b>WESTERN SERVICE AREA</b>									
51	Rt 610 (Elys Ford/ Old Plank)	Minor Collector	6.84	6.84	0.00	<b>\$18,152,307</b>	\$1,815,231	\$3,630,461	\$12,706,615
55	Rt 606 (Post Oak)	Major Collector	1.86	1.86	0.00	<b>\$4,936,154</b>	\$493,615	\$987,231	\$3,455,307
97	Rt 738 (Partlow Rd)	Minor Arterial	25.12	25.12	0.00	<b>\$66,664,612</b>	\$6,666,461	\$13,332,922	\$46,665,228
98	Rt 601 (Lewiston Rd)	Minor Arterial	14.04	14.04	0.00	<b>\$37,259,998</b>	\$3,726,000	\$7,452,000	\$26,081,998
			<b>47.9</b>	<b>47.9</b>	<b>0.0</b>	<b>\$127,013,070</b>	<b>\$12,701,307</b>	<b>\$25,402,614</b>	<b>\$88,909,149</b>

Total Cost	\$127,013,070 [1]
Existing + Committed Capacity (VMC)	511,892 [2]
Future Capacity (2027) (VMC)	622,540 [3]
Existing + Committed Share of Future Capacity	82% [4]
New Development Share of Capacity	18% [5]
Cost Attributed to Growth	\$22,574,842 [6]
Increase in VMT	59,182 [7]
Cost per VMT	<b>\$381 [8]</b>

Sources/Notes:

[1] Spotsylvania County

[2] Travel Demand Model

[3] Travel Demand Model

[4] Existing + Committed Capacity / Future Capacity

[5] 100% - 82%

[6] Total cost x 18%

[7] Projected travel demand in Service Area on County improved network

[8] Cost attributed to growth / increase in VMT

*Cost for Impact Fee Study*

Included in the impact fee is the cost for preparation of the impact fee study as allowed by the Virginia Act. This is calculated based on the projected growth in vehicle miles of travel in Spotsylvania County over the next two years, which represents the prescribed period of time when the Road Improvements Plan and fees should be updated per the Act to reflect changes in development and levels of service. The cost per VMT of \$3.45 is derived by dividing the cost to conduct the impact fee study by the projected increase in VMT over two years ( $\$131,540 / 38,172 = \$3.45$ ). See Figure 21.

**Figure 21. Development Fee Preparation Cost (Streets Portion)**

Consultant cost	<b>\$131,540</b>
Increase in VMT (2 yrs)	38,172
Cost per VMT	\$3.45

**CREDIT EVALUATION**

A general requirement that is common to impact fee methodologies is the evaluation of credits. A revenue credit may be necessary to avoid potential double payment situations from one-time impact fees plus on-going payments of other revenues that may also fund growth-related capital improvements. Because the County's share of the growth-related costs of road improvements as outlined in the County Road Improvements Plan will be funded by impact fees, a credit for other revenues is not applicable. In addition, costs in the Road Improvements Plan represent the County's share of the costs with no offsets from other funding sources. Furthermore, per the County, no portion of the projects included in the Plan has been or will be funded through general obligation bonds, other property-tax backed debt, or proffers. Therefore, no past, future, or external revenue credit is necessary.

## ROAD IMPACT FEES: EASTERN SERVICE AREA

### *Input Variables*

Infrastructure standards used to calculate the Roads impact fees are shown in the boxed area of Figure 22. For the impact fees, a “service unit” is a vehicle mile of travel. As specified in the Virginia Impact Fee Act, the variables shown in the table below are used to convert service units to development units. The capital cost per average length trip is derived from standards as set forth below. The gross capital cost is the product of average trip length multiplied by the trip length adjustment factor, which is then multiplied by the total costs per VMT. As discussed above, a revenue credit is not necessary.

It should be noted that impact fees for nonresidential development are typically based on floor area (i.e., per square foot). However, the impact fees for several types of nonresidential development have unique demand units. For example, impact fees for lodging are based on the number of rooms and fees for day care facilities are based on the number of students.

Figure 22. Roads Input Variables: Eastern Service Area

ITE Code	Standards:		
	Residential	Commercial / Shopping Centers	Other Nonresidential
<b>Average Weekday Vehicle Trip Ends</b>			
<b>Residential (per Housing Unit)</b>			
210 Single Family Detached*	9.57		
221 Multifamily/Other Residential	6.72		
<b>Commercial (per 1,000 Sq Ft)</b>			
820 Commercial / Shopping Center under 25,000 SF		110.32	
820 Commercial / Shopping Center 25,001 - 50,000 SF		86.56	
820 Commercial / Shopping Center 50,001 - 100,000 SF		67.91	
820 Commercial / Shopping Center 100,001 - 200,000 SF		53.28	
820 Commercial / Shopping Center 200,001 - 400,000 SF		41.80	
820 Commercial / Shopping Center 400,001+ SF		32.80	
<b>Commercial (per Demand Unit)</b>			
945 Gas/Srv Station w/Conv Mkt (per Fueling Position)		162.78	
<b>Other Nonresidential (per 1,000 Sq Ft)</b>			
710 Office under 25,000 SF			18.35
710 Office 25,001 - 100,000 SF			13.34
710 Office 100,001+ SF			11.37
610 Hospital			17.57
560 Church			9.11
770 Business Park			12.76
151 Mini-Warehouse			2.50
150 Warehousing			4.96
140 Manufacturing			3.82
110 Light Industrial			6.97
<b>Other Nonresidential (per Demand Unit)</b>			
620 Nursing Home (bed)			2.37
565 Day Care (per student)			4.48
520 School (per student)			1.29
320 Lodging (per room)			5.63
<b>Trip Adjustment Factors</b>			
Residential	60%		
Commercial / Shop Ctr 25,000 SF or less		28%	
Commercial/Shop Ctr 25,001-50,000 SF		31%	
Commercial / Shop Ctr 50,001-100,000 SF		33%	
Commercial / Shop Ctr 100,001-200,000 SF		36%	
Commercial / Shop Ctr 200,001-400,000 SF		39%	
Commercial / Shopping Center 400,001+ SF		41%	
All Other Nonresidential			50%
<b>Level Of Service-Plan Based</b>			
Average Miles per Vehicle Trip	1.49	1.49	1.49
Average Trip Length Adjustment	122%	68%	75%
Road Capital Cost per VMT	\$726	\$726	\$726
Consultant Cost per VMT	\$3.45	\$3.45	\$3.45
Gross Capital Cost per Avg Length Trip	\$1,325	\$738	\$814
Revenue Credit per Trip (n/a)	-	-	-
<b>Net Capital Cost per Trip</b>	<b>\$1,325</b>	<b>\$738</b>	<b>\$814</b>

\* Includes manufactured/mobile homes



**Maximum Allowable Road Impact Fees by Type of Land Use: Eastern Service Area**

The input variables discussed above are used to derive the allowable impact fees shown in Figure 23. The impact fees are the product of the trip generation rate by type of land use multiplied by the trip adjustment factor, multiplied by the net capital cost per vehicle trip. For example, the impact fee for a detached house is 9.57 multiplied by 0.60 multiplied by \$1,325, which equals \$7,608 per housing unit.

**Figure 23. Roads Maximum Allowable Impact Fees by Type of Land Use: Eastern Service Area**

EASTERN Service Area		
ITE		
Code		
<b>Residential</b>	<b>Residential</b>	<b>Commercial / Shopping Centers</b>
	<i>Per Housing Unit</i>	<b>Other Nonresidential</b>
210 Single Family Detached*	\$7,608	
221 Multifamily/Other Residential	\$5,342	
<b>Commercial (per Square Foot)</b>	<i>Per Square Foot</i>	
820 Commercial / Shopping Center under 25,000 SF	\$22.80	
820 Commercial / Shopping Center 25,001 - 50,000 SF	\$19.80	
820 Commercial / Shopping Center 50,001 - 100,000 SF	\$16.54	
820 Commercial / Shopping Center 100,001 - 200,000 SF	\$14.16	
820 Commercial / Shopping Center 200,001 - 400,000 SF	\$12.03	
820 Commercial / Shopping Center 400,001+ SF	\$9.92	
<b>Commercial (per Demand Unit)</b>	<i>Per Demand Unit</i>	
945 Gas/Srvc Station w/Conv Mkt (per Fueling Position)	\$33,636	
<b>Other Nonresidential (per Square Foot)</b>		<i>Per Square Foot</i>
710 Office under 25,000 SF		\$7.47
710 Office 25,001 - 100,000 SF		\$5.43
710 Office 100,001+ SF		\$4.63
610 Hospital		\$7.15
560 Church		\$3.71
770 Business Park		\$5.19
151 Mini-Warehouse		\$1.02
150 Warehousing		\$2.02
140 Manufacturing		\$1.55
110 Light Industrial		\$2.84
<b>Other Nonresidential (per Demand Unit)</b>		<i>Per Demand Unit</i>
620 Nursing Home (bed)		\$964
565 Day Care (per student)		\$1,823
520 School (per student)		\$525
320 Lodging (per room)		\$2,291

\* Includes manufactured/mobile homes

## ROAD IMPACT FEES: WESTERN SERVICE AREA

### *Input Variables*

Infrastructure standards used to calculate the Roads impact fees are shown in the boxed area of Figure 22. For the impact fees, a “service unit” is a vehicle mile of travel. As specified in the Virginia Impact Fee Act, the variables shown in the table below are used to convert service units to development units. The capital cost per average length trip is derived from standards as set forth below. The gross capital cost is the product of average trip length multiplied by the trip length adjustment factor, which is then multiplied by the total costs per VMT. As discussed above, a revenue credit is not necessary.

It should be noted that impact fees for nonresidential development are typically based on floor area (i.e., per square foot). However, the impact fees for several types of nonresidential development have unique demand units. For example, impact fees for lodging are based on the number of rooms and fees for day care facilities are based on the number of students.

Figure 24. Roads Input Variables: Western Service Area

ITE Code	Standards:		
	Residential	Commercial / Shopping Centers	Other Nonresidential
<b>Average Weekday Vehicle Trip Ends</b>			
<b>Residential (per Housing Unit)</b>			
210 Single Family Detached*	9.57		
221 Multifamily/Other Residential	6.72		
<b>Commercial (per 1,000 Sq Ft)</b>			
820 Commercial / Shopping Center under 25,000 SF		110.32	
820 Commercial / Shopping Center 25,001 - 50,000 SF		86.56	
820 Commercial / Shopping Center 50,001 - 100,000 SF		67.91	
820 Commercial / Shopping Center 100,001 - 200,000 SF		53.28	
820 Commercial / Shopping Center 200,001 - 400,000 SF		41.80	
820 Commercial / Shopping Center 400,001+ SF		32.80	
<b>Commercial (per Demand Unit)</b>			
945 Gas/Srv Station w/Conv Mkt (per Fueling Position)		162.78	
<b>Other Nonresidential (per 1,000 Sq Ft)</b>			
710 Office under 25,000 SF			18.35
710 Office 25,001 - 100,000 SF			13.34
710 Office 100,001+ SF			11.37
610 Hospital			17.57
560 Church			9.11
770 Business Park			12.76
151 Mini-Warehouse			2.50
150 Warehousing			4.96
140 Manufacturing			3.82
110 Light Industrial			6.97
<b>Other Nonresidential (per Demand Unit)</b>			
620 Nursing Home (bed)			2.37
565 Day Care (per student)			4.48
520 School (per student)			1.29
320 Lodging (per room)			5.63
<b>Trip Adjustment Factors</b>			
Residential	60%		
Commercial / Shop Ctr 25,000 SF or less		28%	
Commercial/Shop Ctr 25,001-50,000 SF		31%	
Commercial / Shop Ctr 50,001-100,000 SF		33%	
Commercial / Shop Ctr 100,001-200,000 SF		36%	
Commercial / Shop Ctr 200,001-400,000 SF		39%	
Commercial / Shopping Center 400,001+ SF		41%	
All Other Nonresidential			50%
<b>Level Of Service-Plan Based</b>			
Average Miles per Trip	1.49	1.49	1.49
Average Trip Length Adjustment	122%	68%	75%
Road Capital Cost per VMT	\$381	\$381	\$381
Consultant Cost per trip	\$3.45	\$3	\$3
Gross Capital Cost per Avg Length Trip	\$699	\$389	\$430
Revenue Credit per Trip (n/a)	-	-	-
<b>Net Capital Cost per Trip</b>	<b>\$699</b>	<b>\$389</b>	<b>\$430</b>

\* Includes manufactured/mobile homes

**Maximum Allowable Road Impact Fees by Type of Land Use: Western Service Area**

The input variables discussed above are used to derive the allowable impact fees shown in Figure 23. The impact fees are the product of the trip generation rate by type of land use multiplied by the trip adjustment factor, multiplied by the net capital cost per vehicle trip. For example, the impact fee for a detached house is 9.57 multiplied by 0.60 multiplied by \$699, which equals \$4,013 per housing unit.

**Figure 25. Roads Maximum Allowable Impact Fees by Type of Land Use: Western Service Area**

WESTERN Service Area		
ITE		
Code		
<b>Residential</b>	<b>Residential</b>	<b>Commercial / Shopping Centers</b>
	<i>Per Housing Unit</i>	<b>Other Nonresidential</b>
210 Single Family Detached*	\$4,013	
221 Multifamily/Other Residential	\$2,818	
<b>Commercial (per Square Foot)</b>	<i>Per Square Foot</i>	
820 Commercial / Shopping Center under 25,000 SF	\$12.02	
820 Commercial / Shopping Center 25,001 - 50,000 SF	\$10.44	
820 Commercial / Shopping Center 50,001 - 100,000 SF	\$8.72	
820 Commercial / Shopping Center 100,001 - 200,000 SF	\$7.46	
820 Commercial / Shopping Center 200,001 - 400,000 SF	\$6.34	
820 Commercial / Shopping Center 400,001+ SF	\$5.23	
<b>Commercial (per Demand Unit)</b>	<i>Per Demand Unit</i>	
945 Gas/Srvc Station w/Conv Mkt (per Fueling Position)	\$17,729	
<b>Other Nonresidential (per Square Foot)</b>		<i>Per Square Foot</i>
710 Office under 25,000 SF		\$3.95
710 Office 25,001 - 100,000 SF		\$2.87
710 Office 100,001+ SF		\$2.44
610 Hospital		\$3.78
560 Church		\$1.96
770 Business Park		\$2.74
151 Mini-Warehouse		\$0.54
150 Warehousing		\$1.07
140 Manufacturing		\$0.82
110 Light Industrial		\$1.50
<b>Other Nonresidential (per Demand Unit)</b>		<i>Per Demand Unit</i>
620 Nursing Home (bed)		\$509
565 Day Care (per student)		\$963
520 School (per student)		\$277
320 Lodging (per room)		\$1,210

\* Includes manufactured/mobile homes

## CASH FLOW PROJECTIONS

This section summarizes the potential cash flow to Spotsylvania County, if the Roads impact fee is implemented at the maximum allowable amounts. The cash flow projections are based on the assumptions detailed in this study and provide an indication of the impact fee revenue and capital expenditures necessary to meet the demand for infrastructure brought about by new development. To the extent the rate of development either accelerates or slows down, there will be a corresponding change in impact fee revenue and capital costs. The development projections on which the cash flow summary is based can be found in the Appendix to this report.

Figure 26 provides a summary of the projected twenty-year cash flows from the impact fee and associated capital costs. Also shown is an average annual figure for revenues and costs. The projections represent fee revenue from development after the “committed” development has been absorbed. Therefore, with regard to timing, there may be a lag in revenue until all approved development is absorbed.

As shown under “% covered,” fee revenue is projected to cover approximately 59 percent of capital costs in Eastern area and 18 percent of costs in Western. Overall, fees are projected to cover a little under half of the costs.

The figures shown in red in parentheses at the bottom of the figure (Net CASH FLOW) reflect the amounts the County will need to fund to cover the shortfall (averaging approximately \$13 million per year). The shortfall is due to a portion of the costs benefiting existing development.

Figure 26. Cash Flow Summary for Roads

(Current \$ in thousands)		20-Year Cumulative Total (\$000s)	20-Year Average Annual (\$000s)	
<b>REVENUES</b>				
<b>EASTERN</b>				
ROADS Projected Impact Fees-Eastern		\$237,834	\$11,892	
<b>WESTERN</b>				
ROADS Projected Impact Fees-Western		\$22,748	\$1,137	
<b>GRAND TOTAL FEE REVENUE</b>		<b>\$260,582</b>	<b>\$13,029</b>	
<b>CAPITAL COSTS</b>				
<b>EASTERN</b>				% covered
Total Estimated Road Costs-Eastern		\$400,219	\$20,011	59%
<b>WESTERN</b>				
Total Estimated Road Costs-Western		\$127,013	\$6,351	18%
<b>GRAND TOTAL CAPITAL COSTS</b>		<b>\$527,233</b>	<b>\$26,362</b>	<b>49%</b>
<b>NET CAPITAL FACILITIES CASH FLOW-Eastern</b>				
Annual Surplus (or Deficit)			(\$8,119)	
Cumulative Surplus (or Deficit)		(\$162,385)		
<b>NET CAPITAL FACILITIES CASH FLOW-Western</b>				
Annual Surplus (or Deficit)			(\$5,213)	
Cumulative Surplus (or Deficit)		(\$104,266)		
<b>NET CAPITAL FACILITIES CASH FLOW-County Total</b>				
Annual Surplus (or Deficit)			(\$13,333)	
Cumulative Surplus (or Deficit)		(\$266,651)		

## IMPLEMENTATION AND ADMINISTRATION

### OVERVIEW

All costs in the road impact fee calculations are given in current dollars with no assumed inflation rate over time.<sup>4</sup> The state enabling law requires that at least once every two years, the local government update: (1) the adopted Road Improvement Plan to reflect current assumptions and projections; (2) the needs assessment and the assumptions and projections; and (3) the impact fee schedule to reflect any substantial changes in such assumptions and projections.<sup>5</sup> Necessary cost adjustments can also be made as part of the recommended annual evaluation and update of impact fees. One approach is to adjust for inflation in construction costs by means of an index like the one published by the Marshall Valuation Service or Engineering News Record (ENR). This index can be applied against the calculated impact fee. Since the statute does not require an annual adjustment but requires the locality to update the needs assessment and road improvement plan on which the fees are based at least every two years, an annual adjustment is left to the discretion of the County. However, if the County anticipates changes in costs, it is recommended that the County redo the fee calculations annually.

As noted previously and as documented in this report, the enabling statute also requires the following.

- An Impact Fee Service Area (or areas) be established for purposes of imposing the fees.
- The fees be calculated (through an impact fee schedule) based upon the Road Improvements Plan.
- The impact fee ordinance adopted to implement the Road Improvement Plan and road impact fee program should:
  - Require the impact fees paid by new development be determined before or at the time of approval of a site plan or subdivision, and collected at issuance of a building permit.<sup>6</sup>

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<sup>4</sup> The road “costs” that can be incorporated in the calculation of the road impact fees include ...“in addition to all labor, materials, machinery and equipment for construction, (i) acquisition of land, rights-of-way, property rights, easements and interests, including the costs of moving or relocating utilities, (ii) demolition or removal of any structure on land so acquired, including acquisition of land to which such structure may be moved, (iii) survey, engineering, and architectural expenses, (iv) legal, administrative, and other related expenses, and (iv) interest charges and other financing costs if impact fees are used for the payment of principal and interest on bonds, notes or other obligations issued by the locality to finance the road improvement.” Section 15.2-2318.

<sup>5</sup> Section 15.2-2325.

<sup>6</sup> Section 15.2-2323.

- Allow fees to be paid in one of two ways: (1) through a lump sum payment (which is the typical way of payment) or (2) through installments, at a reasonable rate of return, for a fixed number of years.<sup>7</sup>
- Establish a separate road improvement account for each Impact Fee Service Area, and require that all impact fee funds collected in the service area be deposited in the interest-bearing account. Interest earned on deposits shall become funds of the account.
- Require that expenditure of funds from the account only be for road improvements benefiting the Impact Fee Service Area, as set out in the Road Improvements Plan for the Impact Fee Service Area.<sup>8</sup>
- Provide for appeals of administrative determinations regarding the impact fees to be imposed, either to the governing body or another body designated by the ordinance.<sup>9</sup>
- Provide credits against the impact fees due to be paid for the value of dedications, contributions, or construction by the developer of off-site road improvements benefiting the Impact Fee Service Area (see discussion below).<sup>10</sup>
- The Act also specifically requires refunds under two sets of circumstances. First, if projects are not completed within a maximum 15-year period for which impact fees are paid, a refund is required. In practice, because impact fees are accumulated and spent in a rolling manner (first in, first out), it is not likely that a locality would be required to provide refunds as long as there are ongoing capacity projects in all areas of the locality (where fees are collected). The Act also requires fees to be committed to road improvements within 7 years. This requirement is standard with impact fees (either explicit through legislation or implied due to case law). A positive aspect of the Act is the provision to allow “uncommitted” monies after year 7 to be directed to other capacity improvements benefiting the service area.<sup>11</sup>

The second refund situation identified in the Act occurs after completion of the project. Localities are required to recalculate the impact fee based on the *actual* cost of the project. If the impact fee paid exceeds actual costs by 15 percent, a refund is necessary. In practice, this is not likely to occur due to the fact that current dollars are used in the impact fee calculation. However, this requirement serves to ensure that cost estimates used in the impact fees are conservative.

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<sup>7</sup> Section 15.2-2323.

<sup>8</sup> Section 15.2-2326.

<sup>9</sup> Section 15.2-2323.

<sup>10</sup> Section 15.2-2324.

<sup>11</sup> Section 15.2-2327



In addition, the County may also consider including several other administrative features in the ordinance. One is an independent impact analysis. Under this provision, if a specific development proposal is expected to have significantly different demand generators than those used in this study, the County could allow or require a developer to submit an independent impact fee analysis with adequate documentation of alternative factors. Administrative procedures for the independent analysis would be included in the ordinance, and a decision of the independent impact analysis could be appealed as an administrative decision.

## CREDITS AND REIMBURSEMENTS

As is highlighted above, the state enabling law requires that if a developer/subdivider provides land dedications for right-of-way, contributions, or construction for off-site road improvements within the Impact Fee Service Area, the local government is required to provide a credit against any impact fees due and owing for the development.<sup>12</sup>

The statute defines road improvements as road improvements that increase capacity on the existing road system to meet the increased demand for new roads attributable to new development. Credit is not required to be provided for the on-site construction of roads required as part of subdivision approval:

*“Road improvement” includes construction of new roads or improvement or expansion of existing roads and related appurtenances as required by applicable standards of the Virginia Department of Transportation, or the applicable standards of a locality with road maintenance responsibilities, to meet increased demand attributable to new development. Road improvements do not include on-site construction of roads which a developer may be required to provide pursuant to Secs. 15.2-2241 through 15.2-2245.<sup>13</sup>*

The statute is silent about what specifically constitutes an “off-site road improvement,” providing the local government some discretion to define the off-site road system within the Impact Fee Service Areas. While this credit is standard with impact fees and should be addressed in the ordinance that enacts the impact fee program, typically a credit is only necessary for system (i.e., off-site) improvements *on which the impact fee is based*. That is, there is a distinction between the projects for which the impact fees are being paid (per a road improvement plan) and other projects that may be off-site improvements, but may not be included in the adopted plan. However, the Virginia Act does not explicitly address this,

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<sup>12</sup> Section 15.2-2324.

<sup>13</sup> Section 15.2-2318.

instead states: “The locality shall treat as a credit *any* off-site transportation dedication, contribution, or construction . . . committed to the locality” (Sec. 15.2-2324, emphasis added).

To implement the credit requirement, the ordinance should include the relevant standards for the provision of a credit against impact fees, as well as administrative procedures for reimbursement. This is usually done through a credit or reimbursement agreement. The administrative procedures require the developer/subdivider to provide sufficient documentation of the actual cost incurred for dedication or improvement, and other relevant information. For improvements, the County should only agree to pay the lesser of the actual construction cost or the estimated cost used in the Road Improvements Plan. Credits for land dedications should be based on the fair market value of the right-of-way dedicated. The credit or reimbursement agreement should only obligate the county to reimburse developers/subdividers annually according to actual fee collections.

Finally, it should be noted that the statute also states that credits *may* be provided against impact fees in instances where a developer provides on-site improvements in excess of those required for the development. We suggest such a provision not be included in the ordinance, as it could result in the dilution of impact fee monies to fund needed off-site road improvements.

## NONRESIDENTIAL DEVELOPMENT CATEGORIES

Nonresidential development categories used throughout this study are based on land use classifications from the book *Trip Generation* (ITE, 2003). A summary description of each development category is provided below.

***Shopping Center*** (820) – A shopping center is an integrated group of commercial establishments that is planned, developed, owned and managed as a unit. A shopping center provides on-site parking facilities sufficient to serve its own parking demands. Shopping centers may contain non-merchandizing facilities, such as office buildings, movie theaters, restaurants, post offices, banks, health clubs and recreational facilities. In addition to the integrated unit of shops in one building or enclosed around a mall, many shopping centers include out-parcels. For smaller centers without an enclosed mall or peripheral buildings, the Gross Leaseable Area (GLA) may be the same as the Gross Floor Area (GFA) of the building.

***General Office*** (710) – A general office building houses multiple tenants including, but not limited to, professional services, insurance companies, investment brokers and tenant services such as banking, restaurants and service retail facilities. In the impact fees study, this category is used as a proxy for institutional uses that may have more specific land use codes.

***Business Park*** (770) – A group of flex-type buildings served by a common roadway system. The tenant space includes a variety of uses with an average mix of 20-30% office/commercial and 70-80% industrial/warehousing.

***Light Industrial*** (110) – Light industrial facilities usually employ fewer than 500 persons and have an emphasis on activities other than manufacturing. Typical light industrial activities include, but are not limited to printing plants, material-testing laboratories and assembling of data processing equipment.

***Warehousing*** (150) – Warehouses are primarily devoted to the storage of materials.

***Manufacturing*** (140) – In manufacturing facilities, the primary activity is the conversion of raw materials or parts into finished products. In addition to the actual production of goods, manufacturing facilities may have office, warehouse, research, and associated functions.

## APPENDIX A: 2027 IMPROVED NETWORK

The 2027 Network includes those projects assumed to be funded by all sources including Federal, State, County, and private contributions. This list of improvements is used to model traffic conditions in the year 2027 to determine growth-related needs and resulting levels of service.

Project Number	Project	From	To	Future Classification	Existing # of Lanes	Future # of Lanes	Existing Length (mi)	Future Length (mi)	Existing Lane Miles	Future Lane Miles	Increase in Lane Miles	Existing (2007)			Existing + Committed			Future (2027)							
												Daily Vehicle-Mi	Daily Capacity-Mi	Daily Vol/Cap	Daily Vehicle-Mi	Daily Capacity-Mi	Daily Vol/Cap	Daily Vehicle-Mi	Daily Capacity-Mi	Daily Vol/Cap					
EASTERN SERVICE AREA																									
1 *	Va 208 Bypass	Burnside Dr	Po River	Major Arterial	2	4	1.01	3.76	2.02	15.04	13.02	9,294	24,800	0.37	9,542	24,800	0.38	73,185	235,373	0.31					
3 *	US 17 Relocated	Hickory Hill	US 1	Major Arterial	0	4	0.00	2.70	0.00	10.80	10.80	0	0	0	0	0	0	54,734	167,398	0.33					
4 *	US 17 Relocated	I-95 interchange		Ramp	0	1	0.00	0.60	0.00	0.60	0.60	0	0	0	0	0	0	4,683	8,727	0.53					
5 *	US 17 Relocated	I-95 interchange		Ramp	0	1	0.00	2.86	0.00	2.86	2.86	0	0	0	0	0	0	18,577	41,324	0.44					
6 *	Spotsylvania Pkwy Extended	US 1	Hospital Blvd	Major Collector	0	4	0.00	0.79	0.00	3.16	3.16	0	0	0	0	0	0	10,819	27,297	0.40					
7 *	Hospital Blvd	Spotsy Pkwy Ext	US 17	Major Collector	0	4	0.00	0.12	0.00	0.48	0.48	0	0	0	0	0	0	1,574	3,679	0.43					
8 *	Rt 607 (Guinea Station)	Rt 608	US 1	Major Collector	0	2	0.00	1.15	0.00	2.30	2.30	0	0	0	0	0	0	10,090	22,585	0.45					
9 *	Market St Extension	Rt 636	US 1	Minor Arterial	0	2	0.00	0.51	0.00	1.02	1.02	0	0	0	0	0	0	7,511	8,462	0.89					
10 *	Rt 606 Relocated	Nellies Ln	Caroline Co Line	Minor Arterial	0	4	0.00	2.96	0.00	11.84	11.84	0	0	0	0	0	0	45,247	154,431	0.29					
11 *	I-95	Build new ramps at Rt 606 interchange		Ramp	1	1	1.03	3.10	1.03	3.10	2.07	0	0	0	0	0	0	12,520	44,717	0.28					
12 *	Rt 608 (Massaponax Church)	Va 208 Bypass	Va 208	Major Collector	0	2	0.00	1.47	0.00	2.94	2.94	0	0	0	0	0	0	5,644	30,063	0.19					
13 *	Germanna Point Dr Ext	Cotter	Spotsylvania Ave	Minor Collector	0	2	0.00	0.91	0.00	1.82	1.82	0	0	0	0	0	0	7,882	10,106	0.78					
14 *	I-95	Build new ramps at US 1 interchange		Ramp	1	1	0.30	1.01	0.30	1.01	0.71	0	0	0	0	0	0	9,383	10,663	0.88					
15 *	Harrison Crossing	Bragg Rd	Harrison Rd	Major Collector	0	4	0.00	1.69	0.00	6.76	6.76	0	0	0	0	0	0	18,084	67,194	0.27					
31	US 1	Mass. Church (608)	Spotsylvania Pkwy (628)	Major Arterial	7	8	1.95	1.95	7.80	11.70	3.90	19,235	80,641	0.24	20,713	80,641	0.26	180,583	3,339	0.33					
33	US 1 Business (Lafayette)	Fbg/Spotsy line	US 1 Bypass	Minor Arterial	2	4	1.51	1.51	3.02	6.04	3.02	29,016	31,212	0.93	30,436	31,208	0.98	57,022	58,056	0.98					
34 *	I-95	Spotsy/Fbg line	N of new I-95/US 17 interchange	Freeway (HOT Ins)	6	8	0.00	4.91	0.00	39.28	39.28	0	0	0.00	0	0	0	33,662	479,421	0.07					
35 *	Va 3 (Germanna)	Single Oak Dr (688)	Harrison Rd (620)	Major Arterial	4	6	1.17	1.17	4.68	7.02	2.34	44,824	61,261	0.73	46,148	61,261	0.75	53,403	86,922	0.61					
39	US 17/Va 2 (Tidewater Trail)	Mills Dr (17)	Jim Morris (609)	Major Arterial	2	4	1.11	1.11	2.22	4.44	2.22	8,472	30,828	0.27	8,408	30,828	0.27	22,663	70,521	0.32					
42 *	Rt 639 (Bragg)	Plank Rd (3)	River Rd (618)	Major Arterial	2	4	0.91	0.91	1.82	3.64	1.82	8,193	15,228	0.54	8,608	15,228	0.57	24,480	46,271	0.53					
43	Rt 612 (Catharpin)	Piney Branch Rd (624)	Old Plank Rd (610)	Minor Arterial	2	4	2.28	2.28	4.56	9.12	4.56	12,955	29,866	0.43	13,079	29,866	0.44	16,679	120,100	0.14					
45 *	Rt 627 (Gordon)	Smith Station (628)	Harrison Rd (620)	Minor Arterial	2	4	2.35	2.35	4.70	9.40	4.70	42,558	58,593	0.73	41,369	56,800	0.73	58,496	100,336	0.58					
48 *	Rt 636 (Hood)	Va 208	US 1 Bypass	Major Arterial	2	4	0.44	0.44	0.88	1.76	0.88	5,572	6,906	0.81	5,194	6,266	0.83	9,530	15,935	0.60					
49	Rt 636 (Mine)	US 1 Bypass	Lansdowne (638)	Major Arterial	2	4	1.46	1.46	2.92	5.84	2.92	22,050	27,401	0.80	23,144	26,698	0.87	44,312	80,832	0.56					
50	Rt 610 (Old Plank)	Plank Rd (3)	(E to) Catharpin Rd (612)	Major Collector	2	2	1.89	1.89	3.78	3.78	0.00	11,047	18,211	0.61	11,352	18,211	0.62	38,528	41,098	0.61					
52	Rt 628 (Smith Station)	Gordon Rd (627)	Mass. Church (608)	Minor Arterial	2	4	5.95	5.95	11.90	23.80	11.90	44,399	68,218	0.65	46,316	67,739	0.68	168,999	310,140	0.54					
64	Rt 608 (Massaponax Church)	US 1	Hickory Hill Dr	Major Collector	2	2	3.47	3.47	6.94	6.94	0.00	21,229	42,109	0.50	22,273	42,109	0.53	34,870	75,134	0.46					
65	Rt 608 (Massaponax Church)	Smith Station (628)	US 1	Major Arterial	2	4	0.98	0.98	1.96	3.92	1.96	10,147	21,247	0.48	11,218	21,247	0.53	24,037	59,178	0.41					
66	Rt 620 (Harrison)	Salem Church Rd (639)	I-95	Major Arterial	2	4	1.30	1.30	2.60	5.20	2.60	20,256	24,988	0.81	20,858	24,988	0.83	65,787	75,718	0.87					
67	US 17/Va 2 (Tidewater Trail)	Jim Morris (609)	Benchmark (608)	Major Arterial	2	4	0.76	0.76	1.52	3.04	1.52	6,655	18,157	0.37	6,720	18,157	0.37	17,686	41,674	0.42					
68	US 17/Va 2 (Tidewater Trail)	Jim Morris (609)	Fredericksburg City line	Major Arterial	2	4	2.65	2.65	5.30	10.60	5.30	45,040	64,006	0.70	46,984	60,350	0.78	93,477	150,684	0.53					
69	Rt 639 (Leavells)	Courthouse Rd (208)	Smith Station Rd (628)	Major Arterial	2	4	2.50	2.50	5.00	10.00	5.00	13,227	31,956	0.41	13,738	31,627	0.43	12,862	136,267	0.33					
70	Rt 620 (Harrison)	Bridge over I-95		Major Arterial	2	4	0.06	0.06	0.12	0.24	0.12	610	1,613	0.38	1,259	1,613	0.78	3,096	3,630	0.85					
71	Rt 620 (Harrison)	I-95	Jeff Davis Hwy (1 Byp)	Major Arterial	2	4	1.09	1.09	2.18	4.36	2.18	21,651	24,167	0.90	22,331	24,167	0.92	56,726	62,383	0.91					
72	Rt 620 (Harrison)	Jeff Davis Hwy (1 Byp)	Lafayette Blvd (1 Bus)	Minor Arterial	2	4	0.18	0.18	0.36	0.72	0.36	1,630	2,947	0.55	1,786	2,947	0.61	4,737	5,447	0.87					
96	Rt 673 (Piedmont Dr)	Smith Station Rd (628)	Harrison Rd (620)	Major Collector	2	2	2.24	2.24	4.48	4.48	0.00	14,484	17,299	0.84	14,840	17,299	0.86	32,199	46,549	0.69					
												82.09	239.05	156.96	412,544	701,654	0.59	426,316	694,050	0.61	1,232,160	3,073,537	0.40		
WESTERN SERVICE AREA																									
2 *	Va 208 Bypass	Po River	Ta River	Minor Arterial	2	2	1.12	3.14	2.24	6.28	4.04	9,691	27,351	0.35	9,989	27,351	0.37	52,871	96,679	0.58					
51	Rt 610 (Elys Ford/ Old Plank)	Spotswood Furn (620N)	Plank Rd (3)	Minor Collector	2	2	3.29	3.29	6.58	6.58	0.00	20,462	28,454	0.72	20,793	28,454	0.73	26,350	49,594	0.53					
55	Rt 606 (Post Oak)	Stubbs Bridge	Pamunkey	Major Collector	2	2	0.93	0.93	1.86	1.86	0.00	2,405	14,405	0.17	2,578	14,405	0.18	4,437	22,638	0.20					
57 *	Rt 653 (Jones Powell)	Belmont (652)	Lawyers (601)	Minor Collector	2	2	1.65	1.65	3.30	3.30	0.00	1,271	14,631	0.09	1,345	14,631	0.09	3,257	22,287	0.15					
97	Rt 738 (Parlow Rd)	Courthouse Rd (208)	Courthouse Rd (208)	Minor Arterial	2	2	12.55	12.55	25.10	25.10	0.00	42,343	306,259	0.14	43,064	306,259	0.14	43,064	359,627	0.15					
98	Rt 601 (Lewiston Rd)	Fairview Rd (622)	Courthouse Rd (208)	Minor Arterial	2	2	6.90	6.90	13.80	13.80	0.00	17,335	162,774	0.11	17,331	162,774	0.11	28,851	191,851	0.15					
40 *	Rt 606 (Morris)	Courthouse Rd (208)	Rt 606 Relocated	Minor Arterial	2	4	3.50	3.50	7.00	14.00	7.00	30,665	83,091	0.37	32,543	83,091	0.39	56,700	194,633	0.29					
												68.53	96.75	59.88	70.92	11.04	123,972	636,965	0.19	127,643	636,965	0.20	224,723	930,109	0.24

## APPENDIX B: COUNTY ROAD IMPROVEMENTS PLAN

Project Number	Project	From	To	Future Classification	Existing # of Lanes	Future # of Lanes	Existing Length (mi)	Future Length (mi)	Existing Lane Miles	Future Lane Miles	Increase in Lane Miles	Total County Cost (2007\$)	PE COST	R/W & UTILITY RELOC. COST	CONSTN COST	Existing			Existing + Committed			Future					
																Daily Vehicle-Mi	Daily Capacity-Mi	Daily Vol/Cap	Daily Vehicle-Mi	Daily Capacity-Mi	Daily Vol/Cap	Daily Vehicle-Mi	Daily Capacity-Mi	Daily Vol/Cap			
EASTERN SERVICE AREA																											
31	US 1	Mass. Church (608)	Spotsylvania Pkwy (628)	Major Arterial	4	6	1.95	1.95	7.8	11.7	3.9	\$33,150,000	\$3,315,000	\$6,630,000	\$23,205,000	19,235	80,641	0.24	20,713	80,641	0.26	60,306	180,583	0.33			
33	US 1 Business (Lafayette)	Fbg/Spotsy line	US 1 Bypass	Minor Arterial	2	4	1.51	1.51	3.0	6.0	3.0	\$21,140,000	\$2,114,000	\$4,228,000	\$14,798,000	29,016	31,212	0.93	30,436	31,208	0.98	57,022	58,056	0.98			
39	US 17/Va 2 (Tidewater Trail)	Mills Dr (17)	Jim Morris (609)	Major Arterial	2	4	1.12	1.12	2.2	4.5	2.2	\$15,680,000	\$1,568,000	\$3,136,000	\$10,976,000	8,472	30,828	0.27	8,408	30,828	0.27	22,663	70,521	0.32			
43	Rt 612 (Catharpin)	Piney Branch Rd (624)	Old Plank Rd (610)	Minor Arterial	2	4	2.28	2.28	4.6	9.1	4.6	\$12,101,538	\$1,210,154	\$2,420,308	\$8,471,076	12,955	29,866	0.43	13,079	29,866	0.44	16,679	120,100	0.14			
49	Rt 636 (Mine)	US 1 Bypass	Lansdowne (638)	Major Arterial	2	4	1.46	1.46	2.9	5.8	2.9	\$22,000,375	\$2,200,038	\$4,400,075	\$15,400,263	22,050	27,401	0.80	23,144	26,698	0.87	44,912	80,832	0.56			
50	Rt 610 (Old Plank)	Plank Rd (3)	(E to) Catharpin Rd (612)	Major Collector	2	2	1.90	1.90	3.8	3.8	0.0	\$10,084,615	\$1,008,461	\$2,016,923	\$7,059,230	11,047	18,211	0.61	11,352	18,211	0.62	26,828	41,098	0.65			
52	Rt 628 (Smith Station)	Gordon Rd (627)	Mass. Church (608)	Minor Arterial	2	4	5.95	5.95	11.9	23.8	11.9	\$68,080,525	\$6,808,052	\$13,616,105	\$47,656,367	44,399	68,218	0.65	46,316	67,739	0.68	168,999	310,140	0.54			
64	Rt 608 (Massaponax Church)	US 1	Hickory Hill Dr	Major Collector	2	2	3.03	3.03	6.1	6.1	0.0	\$21,867,452	\$2,186,745	\$4,373,490	\$15,307,217	21,229	42,109	0.50	22,273	42,109	0.53	34,870	75,134	0.46			
65	Rt 608 (Massaponax Church)	Smith Station (628)	US 1	Major Arterial	2	4	1.01	1.01	2.0	4.0	2.0	\$11,556,526	\$1,155,653	\$2,311,305	\$8,089,568	10,147	21,247	0.48	11,218	21,247	0.53	24,037	59,178	0.41			
66	Rt 620 (Harrison)	Salem Church Rd (639)	I-95	Major Arterial	2	4	1.40	1.40	2.8	5.6	2.8	\$14,859,999	\$1,486,000	\$2,972,000	\$10,401,999	20,256	24,988	0.81	20,858	24,988	0.83	65,787	75,718	0.87			
67	US 17/Va 2 (Tidewater Trail)	Jim Morris (609)	Benchmark (608)	Major Arterial	2	4	0.78	0.78	1.6	3.1	1.6	\$10,920,000	\$1,092,000	\$2,184,000	\$7,644,000	6,655	18,157	0.37	6,720	18,157	0.37	17,686	41,674	0.42			
68	US 17/Va 2 (Tidewater Trail)	Benchmark (608)	Fredericksburg City line	Major Arterial	2	4	2.66	2.66	5.3	10.6	5.3	\$37,240,000	\$3,724,000	\$7,448,000	\$26,068,000	45,040	64,006	0.70	46,984	60,350	0.78	93,147	150,614	0.62			
69	Rt 639 (Leavells)	Courthouse Rd (208)	Smith Station Rd (628)	Major Arterial	2	4	2.51	2.51	5.0	10.0	5.0	\$40,739,230	\$4,073,923	\$8,147,846	\$28,517,461	13,227	31,956	0.41	13,788	31,827	0.43	43,182	130,965	0.35			
70	Rt 620 (Harrison)	Bridge over I-95		Major Arterial	2	4	0.06	0.06	0.1	0.2	0.1	\$7,960,000	\$796,000	\$1,592,000	\$5,572,000	6,101	1,613	0.38	1,259	1,613	0.78	3,096	3,630	0.85			
71	Rt 620 (Harrison)	I-95	Jeff Davis Hwy (1 Byp)	Major Arterial	2	4	1.10	1.10	2.2	4.4	2.2	\$26,790,000	\$2,679,000	\$5,358,000	\$18,753,000	21,651	24,167	0.90	22,331	24,167	0.92	56,726	62,383	0.91			
72	Rt 620 (Harrison)	Jeff Davis Hwy (1 Byp)	Lafayette Blvd (1 Bus)	Minor Arterial	2	4	0.17	0.17	0.3	0.7	0.3	\$34,160,001	\$3,416,000	\$6,832,000	\$23,912,001	1,630	2,947	0.55	1,786	2,947	0.61	4,737	5,447	0.87			
96	Rt 673 (Piedmont Dr)	Smith Station Rd (628)	Harrison Rd (620)	Major Collector	2	2	2.24	2.24	4.5	4.5	0.0	\$11,889,230	\$1,188,923	\$2,377,846	\$8,322,461	14,484	17,239	0.84	14,840	17,299	0.86	32,195	46,540	0.69			
												66.2	114.1	47.9	\$400,219,491	\$40,021,949	\$80,043,898	\$280,153,643	302,103	534,866	0.56	315,455	529,695	0.60	772,876	1,512,623	0.51
WESTERN SERVICE AREA																											
51	Rt 610 (Elvis Ford/ Old Plank)	Spotswood Fum (620N)	Plank Rd (3)	Minor Collector	2	2	3.42	3.42	6.84	6.84	0.00	\$18,152,307	\$1,815,231	\$3,630,461	\$12,706,615	20,462	28,454	0.72	20,793	28,454	0.73	26,350	49,594	0.53			
55	Rt 606 (Post Oak)	Stubbs Bridge	Pamunkey	Major Collector	2	2	0.93	0.93	1.86	1.86	0.00	\$4,936,154	\$493,615	\$987,231	\$3,455,307	2,405	14,405	0.17	2,578	14,405	0.18	4,437	22,638	0.20			
97	Rt 738 (Partlow Rd)	Caroline Co line	Courthouse Rd (208)	Minor Arterial	2	2	12.56	12.56	25.12	25.12	0.00	\$66,664,612	\$6,666,461	\$13,332,922	\$46,665,228	42,343	306,259	0.14	43,064	306,259	0.14	52,457	358,627	0.15			
98	Rt 601 (Lewiston Rd)	Fairview Rd (622)	Courthouse Rd (208)	Minor Arterial	2	2	7.02	7.02	14.04	14.04	0.00	\$37,259,998	\$3,726,000	\$7,452,000	\$26,081,998	17,135	162,774	0.11	17,331	162,774	0.11	28,651	191,681	0.15			
												47.86	47.86	0.00	\$127,013,070	\$12,701,307	\$25,402,614	\$98,908,149	82,345	511,892	0.16	83,766	511,892	0.16	111,895	622,540	0.18
COUNTYWIDE TOTALS												114.02	161.94	47.92	\$527,232,560	\$52,723,256	\$105,446,512	\$369,062,792	384,448	1,046,758	0.37	399,221	1,041,587	0.38	884,771	2,135,163	0.41

Note: Volume and capacities are from the analysis of 2027 network of all types of improvements from the County Travel Demand Model. (See Appendix A above.)

## APPENDIX C: LAND USE ASSUMPTIONS & DEMOGRAPHICS

As part of the Road Impact Fee Work Scope, the Consultant team has reviewed data available on residential and nonresidential development in Spotsylvania County and has prepared documentation on the demographic data. The data reviewed are from the following sources: Spotsylvania County Travel Demand Model; “in progress” data provided by the County; and the U.S. Census. Other sources were consulted to provide further context on development in the County. Further discussion is provided herein.

The current year estimate, projections of approved/pending development (i.e., estimates of approved and pending site plans and subdivision plats), and 20-year projections are used in the development of the Road Improvement Plan on which the fees are based. Documentation of the land use assumptions is required by the Virginia Impact Fee Act.

It should be noted that calculations throughout this technical memo are based on an analysis conducted using Excel software. Results are discussed in the memo using one-and two-digit places (in most cases), which represent rounded figures. However, the analysis itself uses figures carried to their ultimate decimal places; therefore the sums and products generated in the analysis may not equal the sum or product if the reader replicates the calculation with the factors shown in the report (due to the rounding of figures shown, not in the analysis).

## RESIDENTIAL DEVELOPMENT

### Housing Growth

Household data was provided by the County for 2005 (base year of the model) to William Allen for development of the Travel Demand Model. The detailed data is by Traffic Analysis Zone (TAZ) and summarized here on a countywide basis.<sup>14</sup> (The data for the Travel Demand Model was provided in summer 2007.) To show residential growth over time, TischlerBise also analyzed Census 2000 data. Households, defined as occupied housing units, and housing units by type and population in 2000 per the Census are shown in Figure 27. Also shown are vacancy rates for single family units and multifamily/other (used to convert households to housing units).

**Figure 27. Census 2000 Housing by Type**

Units in Structure	Renter & Owner Occupied				Units % of Ttl	Vacant Units
	Persons	Hseholds	Hsg Units	PPHU		
1-Detached	75,625	25,007	26,345	2.87	79%	1338
1-Attached	5,258	2,289	2,411	2.18	7%	122
Two	185	103	111	1.67	0%	8
3-4	546	246	266	2.05	1%	20
5-9	609	314	339	1.80	1%	25
10-19	1,137	584	651	1.75	2%	67
20-49	154	113	131	1.18	0%	18
50 or more	584	402	596	0.98	2%	194
Mobile Homes	5,681	2,230	2,459	2.31	7%	229
Other	69	20	20	1.00	0%	0
Total SF3 Sample Data	89,848	31,308	33,329	2.70	100%	2,021
		Vacant HU	2,021			
		Vacancy Rate	6.1%			
		Vacancy Rate	6%			

#### Housing Units by Type in 2000

	Persons	Hseholds	Hsg Units	PPHU	Unit Mix	Vac Rate
Single Family Detached	75,625	25,007	26,345	2.87	79%	5.1%
Multifamily/Other	14,223	6,301	6,984	2.04	21%	9.8%
Total Less Group Quarters	89,848	31,308	33,329	2.70	100%	6.1%
Group Quarters	547					
TOTAL	90,395	31,308	33,329			

Source: 2000 US Census

<sup>14</sup> The County's TAZs reflect new zones that were developed as part of the effort to develop the Travel Demand Model. Existing, larger TAZs were split into sub-zones in the County. The result is a total of 1,059 TAZs in Spotsylvania County.

Growth from 2000 to 2005 in households, housing units, and population is shown below in Figure 28. As shown, it is estimated that there were 40,504 households in 2005 with a population of 111,783. This represented a five-year net increase in households of 9,196, or an average annual growth of 1,839 units (5.9 percent). Housing unit data is also included, which is converted from household figures assuming the vacancy rates shown. Detail by type of unit is shown below.

**Figure 28. Residential Growth 2000-2005**

		2000*	2005**	Net Increase 2000-05	Avg Annual 2000-05
<b>Households</b>					
Single Family Detached		25,007	31,180	6,173	1,235
Multifamily/Other		6,301	9,324	3,023	605
<b>Total</b>		<b>31,308</b>	<b>40,504</b>	<b>9,196</b>	<b>1,839</b>
<i>Percent Growth</i>				29.4%	5.9%
<b>Housing Units</b>					
	<i>Vac Rate*</i>	2000*	2005***	2000-05	2000-05
Single Family Detached	5.1%	26,345	32,848	6,503	1,301
Multifamily/Other	9.8%	6,984	10,335	3,351	670
<b>Total</b>		<b>33,329</b>	<b>43,183</b>	<b>9,854</b>	<b>1,971</b>
<i>Percent Growth</i>				29.6%	5.9%
<b>Population</b>					
		90,395	111,783	21,388	4,278

\* U.S. Census 2000 (April 2000)

\*\* Spotsylvania County (December 2005)

\*\*\* TischlerBise assuming Census vacancy rates by type of unit.



**Base Year Residential Estimates**

The household estimate for 2007 is an interpolation between data provided by the County used in the Travel Demand Model for 2005 and 2027. As shown, it is estimated that there are a total of 42,406 households in the County with an estimated population of 117,531. Housing units are also shown and are derived using vacancy rates as shown.

**Figure 29. Base Year Estimate of Housing Units and Population (2007)**

		Base Year
<i>Households*</i>		2007
Single Family Detached		32,967
Multifamily/Other		9,439
<b>Total</b>		<b>42,406</b>
<i>Housing Units</i>		<i>Vac Rate**</i>
Single Family Detached	5.1%	34,731
Multifamily/Other	9.8%	10,462
<b>Total</b>		<b>45,193</b>
<i>Population*</i>		117,531

\* Spotsylvania County Travel Demand Model; interpolated by TischlerBise

\*\* U.S. Census 2000 (April 2000)

As part of this analysis, TischlerBise reviewed other data sources (i.e., Census, Virginia Employment Commission, and Weldon Cooper Center) that provide current population and/or housing unit estimates for comparison purposes. Per discussions with County staff, these other sources are considered to be high and therefore are not used by the County.

**Approved and Pending Development**

The Virginia Impact Fee Act requires an analysis of “current usage and existing commitments to future usage of existing roads, as indicated by (i) current and projected service levels, (ii) current valid building permits, and (iii) approved and pending site plans and subdivision plats.” County staff provided data on the above at the TAZ level, which is summarized below.

This data is used to determine whether the demand from current development *plus* approved development exceeds the existing capacity of the roads. If this is the case, the

locality is required to determine the costs of improving the roads to meet this demand. As shown, an estimated 874 single family units are approved and/or pending.

**Figure 30. Current plus In Progress Residential Development**

	2007			Housing Unit Total
	Households	Units	In Progress*	
Single Family Detached	32,967	34,731	874	35,605
Multifamily/Other	9,439	10,462	0	10,462
<b>Total</b>	<b>42,406</b>	<b>45,193</b>	<b>874</b>	<b>46,067</b>

\* Building permits, rezonings and approved site plans as of October 2007.

Source: Spotsylvania County

### Projected Development

Residential development is projected to grow at an approximate annual rate of approximately 2 percent per data provided by the County. By 2027, a total of 61,282 households (65,090 housing units) are projected, representing a net increase in households of 18,876 from 2007 to 2027. Population is projected to be 174,500 by 2027. Interim years were interpolated. Detail is shown below in Figure 31.

**Figure 31. Projected Residential Development**

		Five-Year Increments ==>										Net	Avg
		Base Year	1	2	3	4	5	10	15	20	Increase	Annual	
Households		2005	2007	2008	2009	2010	2011	2012	2017	2022	2027	2007-2027	2007-2027
Single Family Detached		31,180	32,967	33,901	34,835	35,769	36,702	37,636	42,306	46,975	51,644	18,677	934
Multifamily/Other		9,324	9,439	9,449	9,459	9,469	9,479	9,489	9,539	9,588	9,638	199	10
Total		40,504	42,406	43,350	44,294	45,237	46,181	47,125	51,844	56,563	61,282	18,876	944
Percent Growth												45%	2%
Housing Units	Vac Rate**												
Single Family Detached	5.1%	32,848	34,731	35,715	36,699	37,682	38,666	39,650	44,569	49,488	54,407	19,676	984
Multifamily/Other	9.8%	10,335	10,462	10,473	10,484	10,495	10,506	10,517	10,573	10,628	10,683	221	11
Total		43,183	45,193	46,188	47,183	48,178	49,172	50,167	55,142	60,116	65,090	19,897	995
Percent Growth												44%	2%
Population		111,783	117,531	120,382	123,233	126,083	128,934	131,785	146,039	160,293	174,500	56,969	2,848

Source: Spotsylvania County Travel Demand Model; interpolation by TischlerBise

\*\* U.S. Census 2000 (April 2000)

## NONRESIDENTIAL DEVELOPMENT

In addition to data on residential development, the calculation of road impact fees requires data on employment (number of jobs) and nonresidential square footage in Spotsylvania County.

### *Current Employment and Nonresidential Floor Area*

As was done for residential development, the County provided employment data by TAZ for 2005 and 2027 for use in the Travel Demand Model. To derive current (2007) employment and nonresidential floor area estimates, job data was interpolated between 2005 and 2027. To convert jobs to gross nonresidential floor area, TischlerBise uses average square feet per employee multipliers. The multipliers are shown in Figure 32 and are derived from national data published by the Institute of Transportation Engineers (ITE) and the Urban Land Institute (ULI).

**Figure 32. Floor Area Per Employee and Nonresidential Trip Rates**

ITE Code	Land Use / Size	Demand Unit	Wkdy Trip Ends Per Dmd Unit*	Wkdy Trip Ends Per Employee*	Emp Per Dmd Unit**	Sq Ft Per Emp
<b>Commercial / Shopping Center</b>						
820	25K gross leasable area	1,000 Sq Ft	110.32	na	3.33	300
820	50K gross leasable area	1,000 Sq Ft	86.56	na	2.86	350
820	100K gross leasable area	1,000 Sq Ft	67.91	na	2.50	400
820	200K gross leasable area	1,000 Sq Ft	53.28	na	2.22	450
820	400K gross leasable area	1,000 Sq Ft	41.80	na	2.00	500
<b>General Office</b>						
710	10K gross floor area	1,000 Sq Ft	22.66	5.06	4.48	223
710	25K gross floor area	1,000 Sq Ft	18.35	4.43	4.15	241
710	50K gross floor area	1,000 Sq Ft	15.65	4.00	3.91	256
710	100K gross floor area	1,000 Sq Ft	13.34	3.61	3.69	271
<b>Industrial</b>						
770	Business Park***	1,000 Sq Ft	12.76	4.04	3.16	317
151	Mini-Warehouse	1,000 Sq Ft	2.50	56.28	0.04	22,512
150	Warehousing	1,000 Sq Ft	4.96	3.89	1.28	784
140	Manufacturing	1,000 Sq Ft	3.82	2.13	1.79	558
110	Light Industrial	1,000 Sq Ft	6.97	3.02	2.31	433
<b>Other Nonresidential</b>						
720	Medical-Dental Office	1,000 Sq Ft	36.13	8.91	4.05	247
620	Nursing Home	bed	2.37	6.55	0.36	na
610	Hospital	1,000 Sq Ft	17.57	5.20	3.38	296
565	Day Care	student	4.48	28.13	0.16	na
530	High School	student	1.71	19.74	0.09	na
520	Elementary School	student	1.29	15.71	0.08	na
320	Lodging	room	5.63	12.81	0.44	na

\* *Trip Generation*, Institute of Transportation Engineers, 2003.

\*\* Employees per demand unit calculated from trip rates, except for Shopping Center data, which are derived from *Development Handbook* and *Dollars and Cents of Shopping Centers*, published by the Urban Land Institute.

\*\*\* According to ITE, a Business Park is a group of flex-type buildings served by a common roadway system. The tenant space includes a variety of uses with an average mix of 20-30% office/commercial and 70-80% industrial/warehousing.

The square feet per employee multipliers shown in the last column on the right of Figure 32 are used to convert employment to nonresidential floor area. Shaded items on the above table represent prototypical development types for each category of land use in the County, which are used in the cash flow analysis to project expenditures and impact fee revenue from future development. For example, TischlerBise assumes new office development is typically located in a building of approximately 25,000 to 50,000 square feet. This size office building has an average of 241 square feet per employee.

To determine current estimated number of jobs by major categories in the County, TischlerBise used the data provided by the County and interpolated between the Travel Demand Model's base year data (2005) and projected jobs in 2027. Using this approach, current number of estimated jobs in 2007 is 32,674. Detail by type of job (retail, office, and industrial) is shown below. In addition, estimated nonresidential square footage is derived

using the multipliers described above. Nonresidential floor area will be used in the cash flow analysis of the impact fee study. The estimated square footage in 2007 for each major category of nonresidential development is shown in Figure 33 below. The current estimated nonresidential floor area in the County is approximately 10.7 million square feet. The average square feet per job is assumed to remain constant through the projection period.

**Figure 33. Estimated Employment and Nonresidential Floor Area**

	2005	Pct at Nonres	2007	Pct at Nonres	Square Feet	2007
	Jobs*	Locations	Jobs**	Locations	Per Employee***	Nonresidential Floor Area (SF)
Retail	10,138	35%	11,693	36%	350	4,092,550
Office	10,592	37%	12,751	39%	241	3,072,991
Industrial	8,038	28%	8,230	25%	433	3,563,590
<b>TOTAL</b>	<b>28,768</b>	<b>100%</b>	<b>32,674</b>	<b>100%</b>	<b>328</b>	<b>10,729,131</b>

\* Spotsylvania County

\*\* Interpolated by TischlerBise based on 2005 and 2027 data provided by Spotsylvania County

\*\*\* See the figure, "Floor Area Per Employee and Nonresidential Trip Rates"

### *Approved and Pending Development*

As noted above, the Virginia Impact Fee Act requires an analysis of "current usage and existing commitments to future usage of existing roads, as indicated by (i) current and projected service levels, (ii) current valid building permits, and (iii) approved and pending site plans and subdivision plats." County staff provided data on the above at the TAZ level, which is summarized below.

This data is used to determine whether the demand from current development *plus* approved development exceeds the existing capacity of the roads. If this is the case, the locality is required to determine the costs of improving the roads to meet this demand. As shown, an estimated 1.3 million square feet is projected to be in the pipeline.

**Figure 34. Current plus Committed Nonresidential Development**

	<i>Base Year 2007 Jobs</i>	<i>Estd Jobs In Progress*</i>	<i>Square Feet Per Employee**</i>	<i>Estimated Committed Nonres SF</i>	<i>Current &amp; Committed Total Jobs</i>	<i>Current &amp; Committed Ttl Nonres Floor Area (SF)</i>
Retail	11,693	1,431	350	500,850	13,124	4,593,400
Office	12,751	1,857	241	447,537	14,608	3,520,528
Industrial	8,230	866	433	374,978	9,096	3,938,568
<b>Total</b>	<b>32,674</b>	<b>4,154</b>	<b>327</b>	<b>1,323,365</b>	<b>36,828</b>	<b>12,052,496</b>

\* Building permits, rezonings and approved site plans as of October 2007.

\*\* See the figure, "Floor Area Per Employee and Nonresidential Trip Rates" in Appendix

Source: Spotsylvania County

### ***Projected Nonresidential Growth***

As noted elsewhere, employment projections were provided by the County for 2027. TischlerBise interpolated interim years. By 2027, a total of 71,750 jobs are projected, representing a projected net increase of 39,076 from 2007 to 2027. Nonresidential floor area is projected to increase by approximately 11.5 million square feet to a total of 22.2 million square feet by 2027. As shown, the County's job to population ratio is anticipated to increase over time. Detail is shown below in Figure 35.

Figure 35. Projected Nonresidential Development

Employment	Year =>	Five-Year Increments ==>										Net Increase 2007-2027	Avg Annual 2007-2027
		Base Yr. 2005	1 2007	2 2008	3 2009	4 2010	5 2011	10 2012	15 2017	20 2022	20 2027		
<b>Jobs</b>													
Retail		10,138	11,693	12,492	13,292	14,091	14,890	15,690	19,686	23,683	27,679	15,986	799
Office		10,592	12,751	13,820	14,890	15,959	17,029	18,098	23,446	28,793	34,140	21,389	1069
Industrial		8,038	8,230	8,315	8,400	8,485	8,570	8,655	9,080	9,506	9,931	1,701	85
<b>TOTAL Jobs</b>		<b>28,768</b>	<b>32,674</b>	<b>34,628</b>	<b>36,582</b>	<b>38,535</b>	<b>40,489</b>	<b>42,443</b>	<b>52,212</b>	<b>61,981</b>	<b>71,750</b>	<b>39,076</b>	<b>1,954</b>
<b>Distribution by Type of Job</b>		Percent Growth										120%	6%
Retail		35%	36%	36%	36%	37%	37%	37%	38%	38%	39%		
Office		37%	39%	40%	41%	41%	42%	43%	45%	46%	48%		
Industrial		28%	25%	24%	23%	22%	21%	20%	17%	15%	14%		
<b>TOTAL</b>		<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>		
<b>Jobs to Population Ratio</b>													
County Population		111,783	117,531	120,382	123,233	126,083	128,934	131,785	146,039	160,293	174,500		
County Jobs		28,768	32,674	34,628	36,582	38,535	40,489	42,443	52,212	61,981	71,750		
<b>Jobs to Population Ratio</b>		<b>0.26</b>	<b>0.28</b>	<b>0.29</b>	<b>0.30</b>	<b>0.31</b>	<b>0.31</b>	<b>0.32</b>	<b>0.36</b>	<b>0.39</b>	<b>0.41</b>		
<b>Nonres Floor Area (1,000 SF)</b>	<b>SF/Empl</b>												
Retail	350	3,548	4,093	4,372	4,652	4,932	5,212	5,491	6,890	8,289	9,688	5,595	280
Office	241	2,553	3,073	3,331	3,588	3,846	4,104	4,362	5,650	6,939	8,228	5,155	258
Industrial	433	3,480	3,564	3,600	3,637	3,674	3,711	3,748	3,932	4,116	4,300	737	37
<b>TOTAL Floor Area</b>		<b>9,581</b>	<b>10,729</b>	<b>11,303</b>	<b>11,878</b>	<b>12,452</b>	<b>13,026</b>	<b>13,601</b>	<b>16,472</b>	<b>19,344</b>	<b>22,216</b>	<b>11,486</b>	<b>574</b>

Sources: Spotsylvania County; TischlerBise

It should be noted that other data sources were consulted, namely the Virginia Employment Commission (VEC), to compare the employment figures provided. Totals for 2005 from the County and VEC were consistent. However, growth from 2002 to 2006 in employment as reported by VEC varies from a low of 1.4 percent to a high of 6.1 percent and averages approximately 4 percent. This represents a lower growth rate than is assumed for short-term employment growth in the County.

## OTHER INFORMATION

Our work scope for this task also calls for us to also make recommendations for future data collection, if appropriate. For ongoing data collection, one recommendation would be to track current units using building permits. If this can be done by TAZ, the required two-year update to the Impact Fees using the Travel Demand Model will be greatly facilitated.

## SUMMARY

Annual demographic and development projections for the study are summarized in below. The development projections are used in the Travel Demand Model to determine road improvement needs due to growth as well as for purposes of understanding the cash flows resulting from potential impact fee revenues and related expenditures.



Figure 36. Annual Demand Factors (2007-2027)

Year=>	Five-Year Increments ==>>																Net	Avg. Ann.
	2000	2005	Base Yr. 2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2022	2027		Increase 2007-2027	Increase 2007-2027
<b>SUMMARY OF DEMAND PROJECTIONS</b>																		
TOTAL HOUSEHOLDS	31,308	40,504	42,406	43,350	44,294	45,237	46,181	47,125	48,069	49,013	49,956	50,900	51,844	56,563	61,282		18,876	944
TOTAL POPULATION	90,395	111,783	117,531	120,382	123,233	126,083	128,934	131,785	134,636	137,486	140,337	143,188	146,039	160,293	174,500		56,969	2,848
TOTAL JOBS	na	28,768	32,674	34,628	36,582	38,535	40,489	42,443	44,397	46,351	48,304	50,258	52,212	61,981	71,750		39,076	1,954
Jobs to Population Ratio	na	0.26	0.28	0.29	0.30	0.31	0.31	0.32	0.33	0.34	0.34	0.35	0.36	0.39	0.41			
<b>RESIDENTIAL DEVELOPMENT</b>																		
<b>Households</b>																		
Single Family Detached	25,007	31,180	32,967	33,901	34,835	35,769	36,702	37,636	38,570	39,504	40,438	41,372	42,306	46,975	51,644		18,677	934
Multifamily	6,301	9,324	9,439	9,449	9,459	9,469	9,479	9,489	9,499	9,509	9,519	9,529	9,539	9,588	9,638		199	10
<b>TOTAL</b>	31,308	40,504	42,406	43,350	44,294	45,237	46,181	47,125	48,069	49,013	49,956	50,900	51,844	56,563	61,282		18,876	944
<b>Housing Units</b>																		
Single Family Detached	26,345	32,848	34,731	35,715	36,699	37,682	38,666	39,650	40,634	41,618	42,601	43,585	44,569	49,488	54,407		19,676	984
Multifamily	6,984	10,335	10,462	10,473	10,484	10,495	10,506	10,517	10,528	10,539	10,550	10,561	10,573	10,628	10,683		221	11
<b>TOTAL</b>	33,329	43,183	45,193	46,188	47,183	48,178	49,172	50,167	51,162	52,157	53,152	54,147	55,142	60,116	65,090		19,897	995
<b>NONRESIDENTIAL DEVELOPMENT</b>																		
<b>Employment By Type</b>																		
Retail	na	10,138	11,693	12,492	13,292	14,091	14,890	15,690	16,489	17,288	18,087	18,887	19,686	23,683	27,679		15,986	799
Office	na	10,592	12,751	13,820	14,890	15,959	17,029	18,098	19,168	20,237	21,307	22,376	23,446	28,793	34,140		21,389	1,069
Industrial	na	8,038	8,230	8,315	8,400	8,485	8,570	8,655	8,740	8,825	8,910	8,995	9,080	9,506	9,931		1,701	85
<b>TOTAL</b>	na	28,768	32,674	34,628	36,582	38,535	40,489	42,443	44,397	46,351	48,304	50,258	52,212	61,981	71,750		39,076	1,954
<b>Nonres Floor Area (1,000 SF) SF/Empl</b>																		
Retail (1,000 SF)	na	3,548	4,093	4,372	4,652	4,932	5,212	5,491	5,771	6,051	6,331	6,610	6,890	8,289	9,688		5,595	280
Office (1,000 SF)	na	2,553	3,073	3,331	3,588	3,846	4,104	4,362	4,619	4,877	5,135	5,393	5,650	6,939	8,228		5,155	258
Industrial (1,000 SF)	na	3,480	3,564	3,600	3,637	3,674	3,711	3,748	3,785	3,821	3,858	3,895	3,932	4,116	4,300		737	37
<b>TOTAL</b>	na	9,581	10,729	11,303	11,878	12,452	13,026	13,601	14,175	14,749	15,324	15,898	16,472	19,344	22,216		11,486	574
<b>VEHICLE TRIPS</b>																		
<b>Residential Trips</b> Trip Rates Adj. %																		
Single Family Detached	188,614	199,425	205,074	210,723	216,372	222,021	227,670	233,319	238,968	244,617	250,266	255,916	284,161	312,406			112,981	5,649
Multifamily	41,669	42,183	42,228	42,272	42,317	42,361	42,406	42,450	42,495	42,539	42,584	42,628	42,851	43,073			890	45
<b>TOTAL Residential Trips</b>	230,283	241,608	247,302	252,995	258,689	264,382	270,076	275,770	281,463	287,157	292,850	298,544	327,012	355,480			113,871	5,694
<b>Nonresidential Trips</b>																		
Retail	95,214	109,818	117,325	124,832	132,338	139,845	147,352	154,859	162,366	169,873	177,379	184,886	222,420	259,955			150,137	7,507
Office	23,421	28,195	30,559	32,924	35,289	37,654	40,018	42,383	44,748	47,113	49,477	51,842	63,666	75,490			47,295	2,365
Industrial	12,129	12,419	12,547	12,676	12,804	12,932	13,061	13,189	13,317	13,446	13,574	13,703	14,344	14,986			2,567	128
<b>TOTAL Nonresidential Trips</b>	130,764	150,432	160,432	170,431	180,431	190,431	200,431	210,431	220,431	230,431	240,431	250,431	300,430	350,430			199,998	10,000
<b>GRAND TOTAL Trips</b>	361,047	392,040	407,733	423,427	439,120	454,814	470,507	486,201	501,894	517,588	533,281	548,975	627,442	705,910			313,870	15,693
<b>ANNUAL INCREASES</b>																		
				07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	21-22	26-27		2007-2027 Avg Annual	
Households				944	944	944	944	944	944	944	944	944	944	944	941		944	
Population				2,851	2,851	2,851	2,851	2,851	2,851	2,851	2,851	2,851	2,851	2,851	2,804		2,848	
Jobs				1,954	1,954	1,954	1,954	1,954	1,954	1,954	1,954	1,954	1,954	1,954	1,954		1,954	
Nonres Floor Area (1,000 SF)				574	574	574	574	574	574	574	574	574	574	574	574		574	

Sources: U.S. Census; Spotsylvania County; TischlerBise

Figure 37. Annual Demand Projections Chart, 2007-2027

