TRI-CITIES AREA YEAR 2040 TRANSPORTATION PLAN

Adopted _____, 2017

Tri-Cities Metropolitan Planning Organization

1964 WAKEFIELD STREET
PETERSBURG, VA 23805
WWW.CRATERPDC.ORG

Acknowledgement

This report was prepared by the staff of the Crater Planning District Commission on behalf of the Tri-Cities Metropolitan Planning Organization in cooperation with the U.S. Department of Transportation, Federal Highway Administration (FHWA), Federal Transit Administration (FRA), the Virginia Department of Transportation (VDOT) and the Virginia Department of Rail and Public Transportation (VDR&PT).

Disclaimer

This document reflects the views of the Tri-Cities Area Metropolitan Planning Organization. The staff of the Crater Planning District Commission is responsible for the facts and the accuracy of the data presented. The contents may not reflect the views or policies of the Federal Highway Administration (FHWA), the Virginia Department of Transportation (VDOT), or the Crater Planning District Commission (CPDC). This report is not a standard, specification, or regulation. FHWA or VDOT acceptance of this report is evidence of fulfillment of the objectives of this planning study and is not an endorsement or approval of any recommended improvement approval of their location or design or a commitment to fund any improvements. Additional project level environmental impact assessments and/or studies of alternatives may be necessary.

Notice of Non-Discrimination – Title VI

The Tri-Cities Metropolitan Planning Organization (MPO) complies with Title VI of the Civil Rights Act of 1964 and related statutes and regulations in all programs and activities. For more information, see http://www.craterpdc.org/transportation/title_vi.htm

NO DISCRIMINACIÓN

La Organización Tri-Cities Area Metropolitana de Planificación (TCAMPO) Cumple totalmente con el Título VI de la Ley de Derechos Civiles de 1964 y los estatutos y los reglamentos relacionados con toda programas y actividades. El TCAMPO se esforzará para proporcionar ajustes razonables y servicios para personas que requieran asistencia especial para participar en este público oportunidad de participación. Para obtener más información sobre el cumplimiento de la accesibilidad, o para obtener una Formulario de Queja Título VI, ver http://www.craterpdc.org/transportation/title_vi.htm o llame al Título VI Coordinador en el 804-861-1666.

Table 1: Tri-Cities MPO Policy Board Members

Jurisdiction	Representative	
Chesterfield County	Mr. Steve Elswick	
Colonial Heights	Mr. John Wood	
Crater Planning District Commission	Mr. Dennis Morris	
Dinwiddie County	Mr. William Chavis (Chair)	
City of Hopewell	Ms. Brenda S. Pelham	
City of Petersburg	Mr. Samuel Parham	
Petersburg Area Transit		
Prince George County	Mr. T. J. Webb	
For the Secretary of Transportation	Mr. Bart Thrasher, PE	

Table 2: Self Certification Checklist

Federal Title/Requirement	Summary	Compliance Status
23 U.S.C. 134	Encourages safe, efficient, surface transportation systems.	Complies
49 U.S.C. 5303	Encourages safe, efficient transportation systems to meet mobility needs in urbanized areas.	Complies
42 U.S.C. 7504, 7506(c), 7506(d) ; 40 CFR § 93	General Conformity and Transportation Conformity	Not Applicable
Title VI of the Civil Rights Act of 1964 (as Amended) (42 U.S.C 2000d 01) (49CFR § 21)	Prohibits discrimination based on race, color, or national origin in programs receiving federal financial assistance	Complies
49 U.S.C. 5332	Prohibits discrimination based upon race, color creed, national origin, sex, or age in employment or business opportunity.	Complies
Section 1101(b) of the Fast Act & 49 CFR § 26	Encourages using disadvantaged business enterprises on USDOT funded projects.	Complies
23 CFR § 230	Equal employment opportunity in Federal & Federal- aid highway construction projects.	Complies

Federal Title/Requirement	Summary	Compliance Status
Americans with Disabilities Act (42 U.S.C. 6101) & 49 CFR §s 27, 37, & 38.	Prohibits age discrimination in programs receiving federal assistance.	Complies
Older Americans Act (42 U.S.C 6101)	Prohibits discrimination based upon age in programs receiving Federal financial assistance.	Complies
Title 23 U. S. C section 324	Prohibits discrimination based upon sex.	Complies
Section 504 of the Rehabilitation Act of 1973	Prohibits Discrimination against individuals with disabilities	Complies

Tri-Cities Area Metropolitan Planning Organization 2017 Self-Certification Resolution

TRI-CITIES AREA METROPOLITAN PLANNING ORGANIZATION 2018
SELF-CERTIFICATION RESOLUTION

The Tri-Cities Metropolitan Planning Organization and the Commonwealth of Virginia hereby certify that the transportation planning process for the southern portion of the Richmond, Virginia Urbanized Area is addressing transportation needs in the metropolitan planning area and is being conducted in accordance with applicable requirements including:

WHEREAS, The MPO Encourages safe, efficient surface transportation as required by 23 U.S.C 134, and 49 U.S.C 5303 and 5304; and

WHEREAS, The MPO is an attainment area and neither General Conformity nor Transportation Conformity Applies; and

WHEREAS, the MPO complies with Title VI of the Civil Rights Act of 1964 as Amended; and

WHEREAS, the MPO complies with 49 U.S.C 5332 (prohibiting discrimination based upon race, color, creed, national origin, sex, or age in employment or business opportunity; and

WHEREAS, the MPO encourages the use of disadvantaged business enterprises on USDOT funded projects as required by Section 1101(b) of the FAST ACT (Pub. L. 114-357) and 49CFR § 26; and

WHEREAS, the MPO complies with 23 CFR §230 regarding equal opportunity in Federal and Federal-Aid Highway Construction projects; and

WHEREAS, the MPO complies with the Americans with Disabilities Act 42 U.S.C. 6101); and

WHEREAS the MPO complies with the Older Americans Act (42 U.S.C. 6101); and

WHEREAS the MPO complies with Title 23 U.S.C. § 324; and

WHEREAS the MPO complies with Section 504 of the Rehabilitation Act of 1973

NOW, THEREFORE, BE IT RESOLVED that the Tri-Cities Area MPO Planning Process meets Federal Transportation Planning Requirements.

Upon a motion by John Wood, seconded by Mark Gilliland and carried by a voice vote, a motion was adopted on April 13th, 2017 with 5 of the 5 Tri-Cities Area MPO Policy Committee members present certifying that the transportation planning process in the Tri-Cities Area is being conducted in accordance with the above legislative provisions.

Tri-Cities Metropolitan Planning Organization

The Honorable John Wood
Vice-Chair, Tri-Cities Metropolitan Planning Organization

Date: April 13 2017

Virginia Department of Transportation

District Planner

Date: _____ __, 2017

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Resolution of the Tri-Cities Metropolitan Planning Adopting the 2040 Metropolitan Transportation Plan

WHEREAS, the U.S. Department of Transportation provides financial assistance to public agencies for transportation technical studies; and

WHEREAS, the U.S. Department of Transportation requires approval of regional transportation plans and programs by the Metropolitan Planning Organization (MPO) in accordance with 23 U.S. C. Part 450; and

WHEREAS, the Tri-Cities Area Transportation Policy Committee is the duly designated Metropolitan Planning Organization for the Tri-Cities Area; and

WHEREAS, the Tri-Cities Area Metropolitan Planning Organization, pursuant to its adopted participation process, has considered public comments received on the 2040 Transportation Plan.

NOW, THEREFORE BE IT RESOLVED, the Policy Committee of the Tri-Cities Area Metropolitan Planning Organization hereby endorses the Tri-Cities Area 2040 Transportation Plan.

_____

Upon a motion by _____ seconded by _____ and carried, a motion was adopted to endorse the 2040 Transportation Plan as presented on _____ with _____ of the 9 voting members present.

_____

Chair, Tri-Cities Area Metropolitan
Planning Organization

Date: _____

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Executive Summary Tri-Cities Area Year 2040 Transportation Plan

Report Section	Page(s)

Introduction

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The Policy Committee of the Metropolitan Planning Organization (See Table 1 on Page 2) is the transportation decision making body for the Tri-Cities MPO. This report is intended to describe the 2040 transportation plan and show that the Tri-Cities Metropolitan Planning Organization complies with the transportation planning requirements of 23 CFR Part 450 and other legal requirements (See Table 2 on Page 2).

Socio-Economic Estimates and Projections

9-12

The MPO expects population and employment to grow slowly for the next twenty years. We expect the counties to grow faster than the cities (See Figure 3). We emphasize this because the independent city concept affects the relationship between counties and cities with respect to annexation and economic development. The MPO expects growth of around 1% per year.

The population over 65 is expected to grow and need more paratransit services.

Most commuters drive alone. The percentage of commuters driving alone in higher in the MPO than in the US as is the number of carpoolers(See Figure 11 on page 13). The average commute time in the MPO is around twenty-two and a half minutes. This is below the average commute time for Virginia and for the US (See Figure 12 on page 13).

The Transportation System

12-28

The MPO's transportation system includes highways, transit, intercity bus, ridesharing, taxis, sidewalks, bikeways, passenger rail, and airports. There is also access to Port of Virginia facilities at Richmond and Norfolk.

The highway system (See Figure 15 on page 14) was mostly in place by 1970 and is coming to the end of its design life. The implication of this is that parts of the highway system are ready for reconstruction even without rapid growth.

Highway demand is growing slowly; however there is site specific congestion as shown in Figure 82 and Figure 83. Bridge conditions meet or exceed the Virginia Department of transportation's goal of having less than six percent (6%) of bridges deficient except in Dinwiddie County where eighteen percent (18%) of primary bridges are deficient (See Figure 27 on page 17). Pavement conditions on the Interstates are generally below the VDOT's goal of having eighty-two percent (82%) of pavement in fair or better condition. Furthermore pavement condition is getting worse in five of six member jurisdictions (Figure 31 and Figure 32 on page 18).

Petersburg Area Transit operates fixed route and demand response service to major employers and medical facilities in the MPO. The system operates thirteen routes out of its transit center on Washington Street in Petersburg. This facility also hosts intercity bus service provided by Greyhound and the Greater Richmond Transit System. The average fixed route ridership has been around 529,000 trips per year since 2003. The demand response system has served 11,600 riders per year since 2003. Both services have been flat or declining since 2003. The chief capital needs of the transit system will be maintaining rolling stock and facilities.

Sidewalks are mostly confined to the city limits and maintenance of the system depends upon local funding. There is a recreational trail system available as shown in Figure 44 on page 23. An important goal for the recreational system is to connect the proposed Lower Appomattox River Trail from Hopewell to the Virginia Capital Trail in Charles City/County (See Figure 87 on page 63).

The Scope of Transportation Planning

29-61

The Tri-Cities MPO is well positioned in the global markets given its access to the international gateway at the Port of Virginia and its proximity to the US population centers. It is less than ten hours from Boston, Atlanta, and Indianapolis; and situated at the crossing of I-95 and US 460. In addition the Port of Virginia is one of the few ports on the east coast capable of accepting post-Panamax shipping without dredging.

29, 30

The number and severity of traffic accidents in the Tri-Cities MPO is consistent with that of the Commonwealth of Virginia (Figure 54 page 50). The MPO has incorporated the *Virginia Strategic Highway Safety Plan* by reference as the safety element of the Metropolitan Transportation Plan.

30-32

The MPO has reviewed potential security risks to transportation and believes that there is a need for additional secure truck parking in the Commonwealth and inside the MPO. We have also evaluated to potential for terrorism and believe we should continue to support Fort Lee's security efforts as they relate to controlling post access.

31

The MPO is incorporating the 2014 regional consolidated human services transportation plan by reference.

31

Because the MPO is situated at the intersection of the Heartland Corridor and the Washington to North Carolina Corridor there are many logistics facilities in the region. For the region to be successful it is important to maintain and improve these corridors and access to Port of Virginia facilities.

33-35

The Metropolitan Transportation Plan discusses the key environmental issues facing the region:

35-49

- Threatened and Endangered Species;
- Energy Use;
- Air Quality; and
- Environmental Justice.

Figure 65 and Table 11 show environmentally sensitive areas of the MPO and pictures of sensitive

environmental resources in the area. Table 12 on page 45 lists the legal and regulatory requirements and suggests options for avoidance, minimization and mitigation.

Figures 74 through 80 show the likely underserved communities in the region. 49-57

The MPO's congestion management process it the key to managing operations. The congestion management process was updated while the transportation plan was being developed and its results have been used in developing the Metropolitan Transportation Plan and in writing this report. 58-61

The MPO has emphasized preserving our investment in transportation by focusing on pavement condition, bridge condition its choice of rehabilitation projects. Figures 26, 27, 28, 31, 32, 33 and 35 show this emphasis for highways and transit. 58

We have chosen to focus upon hurricane related flooding to address resiliency. The MPO straddles the fall line in Southside Virginia which creates two distinct flooding zones. West of the fall line the focus needs to be on maintaining drainage structures. East of the fall line the focus will be on maintaining evacuation routes and elevating roadways to avoid multi-day floods. 62, 63

Travel and tourism are important to the region. There are many colonial, revolutionary war, civil war and civil rights era sites in the area. Furthermore the Appomattox River is a tourist draw. The MPO's support of travel and tourism include support for the National Park Service's new information center, the Battlefield Trolley service and connecting the Lower Appomattox River Trail to the Virginia Capital Trail, the James River and ultimately to Colonial Williamsburg, Yorktown, and Jamestown. 63

Stakeholder involvement was performed as specific in the 2015 Public Participation Plan. Appendix A is a summary of the comments received and the MPO's response to them. 63

Goals Objectives and Performance Measures 62-67

The MPO has collected information for performance measures used to evaluate the how well the transportation system is working. The information comes from many sources and has been collected at for the smallest scope (the jurisdiction if possible). Table 15 beginning on page 63 shows the performance information. This information has been used to inform the discussion of the transportation system in earlier parts of the report. The MPO is using VDOT's performance measures as our performance goals. The report's discussion and that in the Transportation Improvement Program and in the Performance Measures report are intended to refine the performance goals to achieve the statewide goals.

The Financial Plan 68-76

The financial plan includes a list of the transportation projects proposed by the MPO between now and 2040 and the financial information needed to determine if the transportation program can actually be built, maintained and operated. This section also includes discussions of project prioritization and accounting for inflation.

The financial plan is divided into phases to simplify financial planning. The phases are 2017-2022(the current Metropolitan Transportation Improvement Program); 2023 to 2028; 2029 through 2034 and 2040. The prioritized project list in Table 17(starting on page 72) divides the projects into these same time periods. Some projects are shown as starting after 2040 because there is not enough money to start them earlier.

The financial plan also accounts for inflation. This means that although Figure 90 shows that even though revenues are growing the purchasing power of the money will only be three quarters of today's purchasing power. The problem is worse for transit because transit revenues are expected to be constant until 2040.

Appendices 79-119

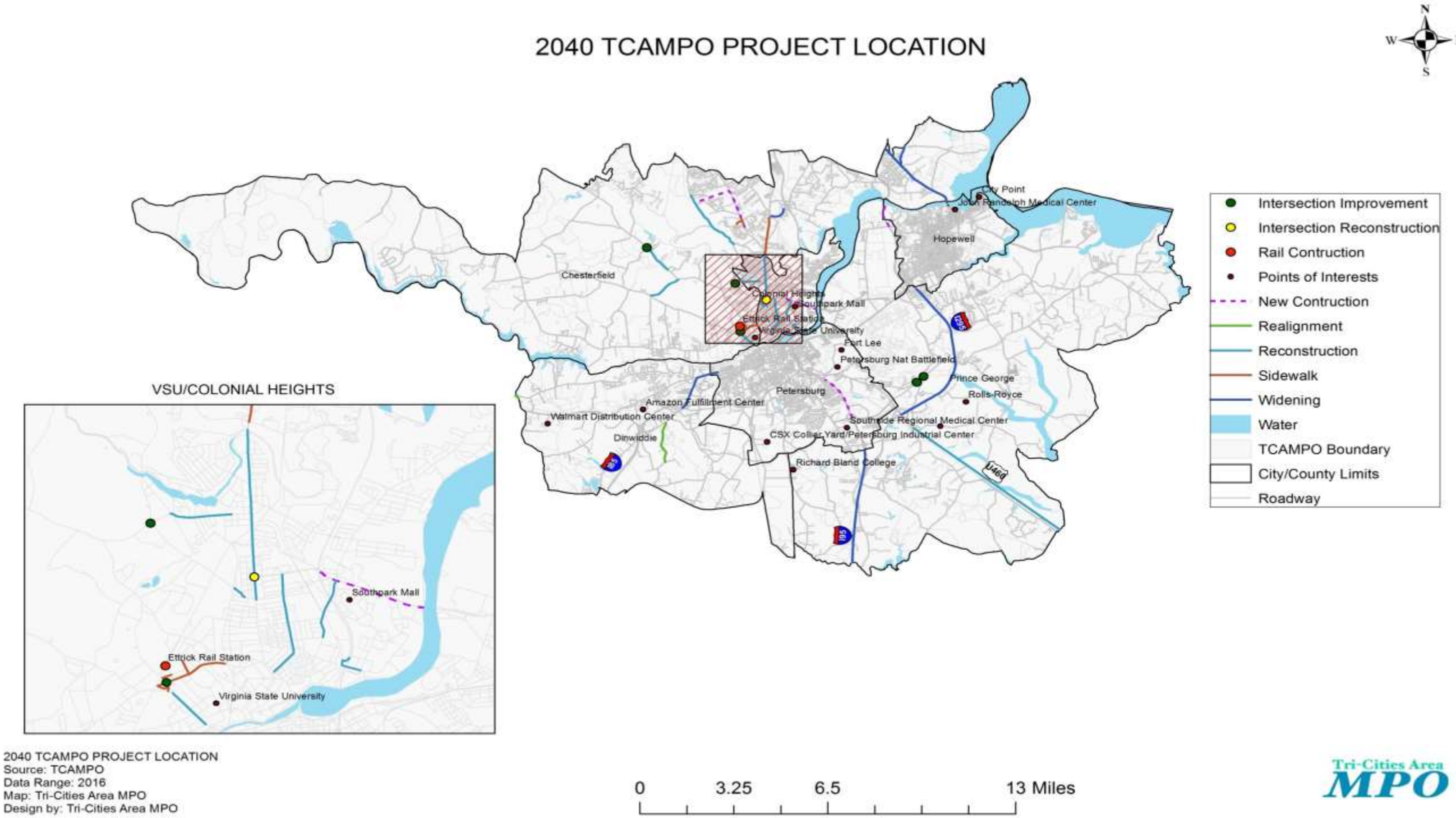


Figure 1: Project Location Map

Section 1 – Introduction

Congress intends that the Metropolitan Planning Process be:

- Continuous,
- Cooperative,
- Comprehensive
- Performance Based and
- Multimodal (USDOT, 2016).

The Tri-Cities Metropolitan Planning Organization was created on March 21, 1974, under Title 23 of the United States Code, by cooperative agreement between the Crater Planning District Commission and the Virginia Department of Highways. The Cities of Colonial Heights, Hopewell, Petersburg and the Counties of Chesterfield, Dinwiddie and Prince George entered into subsequent agreements in support of a continuing transportation planning process for the metropolitan area. On November 7, 1979 Virginia's Secretary of Transportation designated the Tri-Cities Area Policy Committee as the Metropolitan Planning Organization for the Tri-Cities Area.

The MPO consists of a Policy Committee, and a Technical Committee. The Policy Committee is responsible for transportation planning for the region including:

- the Unified Planning Work Program (UPWP);
- the Metropolitan Transportation Plan (MTP);
- the Transportation Improvement Program (TIP);
- the Congestion Management Process (CMP);
- the Stakeholder Participation Plan;
- the Title VI Compliance Plan; and
- Ensuring that all plans meet federal requirements.

Elected representatives from the six jurisdictions within the study area, appointed representatives from the Office of the Virginia Secretary of Transportation, the Crater Planning District Commission (CPDC) and Petersburg Area Transit (PAT) are the voting membership of the MPO – Policy Committee. Representatives from the Federal Transit Administration, the Federal Highway Administration and the Virginia Department of Rail and Public Transportation (VDR&PT) also participate on the MPO – Policy Committee as nonvoting members.

The Technical Advisory Committee is composed of representatives from public works, engineering, planning, or traffic engineering staffs of the six local jurisdictions, VDR&PT, VDOT, PAT and the CPDC. It provides technical support to Policy Committee. Representatives of Fort Lee and the National Park Service at Petersburg National Battlefield serve on the Technical Committee as advisory members because of their importance to the Tri-Cities area.

Title 23 Part 450 of the Code of Federal regulations describes the requirements of the metropolitan transportation planning process. This report documents and describes the Metropolitan Transportation Plan. The report includes an executive summary, six sections discussing parts the transportation plan and appendices containing additional information.

- Section 1 introduces the transportation planning process and the MPO.
- Section 2 discusses the trends that create the existing and future transportation demand.
- Section 3 describes the transportation system.
- Section 4 discusses how the Tri-Cities MPO met each federal requirement that applies to the region.
- Section 5 discusses our goals, objectives and performance measures.
- Section 6 is a financial plan showing how the system can be built and maintained.
- More information is included in Section 7 as appendices.

Section 2 – Tri-Cities Area Socio-Economic Estimates and Projections

Colonial Heights, Petersburg, Hopewell, and parts of Chesterfield County, Dinwiddie County, and Prince George County compose the Tri-Cities Metropolitan Planning Organization. The Tri-Cities study area is in south central Virginia along the I-85, I-95, and I-295 corridors. Other arterial routes serving the area are U.S. 1, US 301, U.S. 460, Virginia Route 10, Virginia Route 36, Virginia Route 156 and Virginia Route 144. The Tri-Cities transportation system is multi-modal with air, highway, rail, transit, pedestrian and bicycle facilities available to residents, visitors and businesses. Figure 2 shows the MPO's planning boundary and location in Virginia. The Tri-Cities Area forms the southern portion of the Richmond, Virginia Urbanized Area. The 2010 U.S. Census population estimate for the Richmond, Virginia Urbanized Area is 953,556.

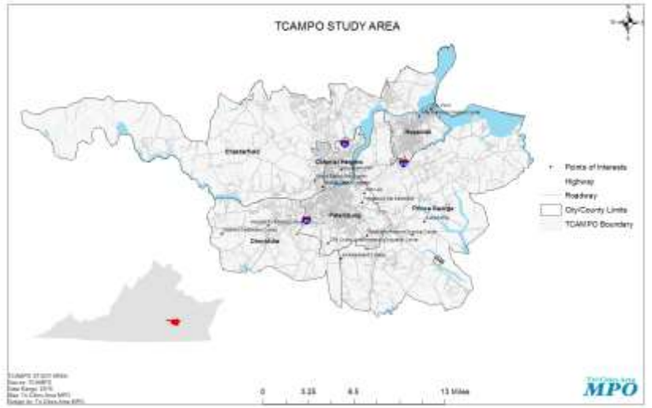
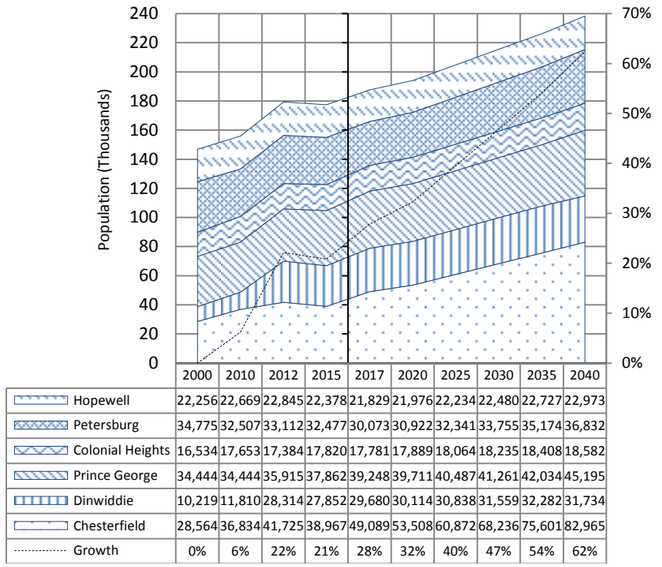


Figure 2: Tri-Cities MPO Location and Boundary

Population

The population of the Tri-Cities Area is projected to grow between 2016 and 2040. Most of the growth will be in the counties, with the largest increases expected in Chesterfield County and Dinwiddie County. The expected population for 2040 is 165,370. This is an increase of 74,355 persons from 2000 and is a growth of about 82% for 60 years or 1.2% per year. Figure 3 shows the population growth for each jurisdiction from 2000 to 2040. The vertical axis is at 2016 (the base year).



	2000	2010	2012	2015	2017	2020	2025	2030	2035	2040
Hopewell	22,256	22,669	22,845	22,378	21,829	21,976	22,234	22,480	22,727	22,973
Petersburg	34,775	32,507	33,112	32,477	30,073	30,922	32,341	33,755	35,174	36,832
Colonial Heights	16,534	17,653	17,384	17,820	17,781	17,889	18,064	18,235	18,408	18,582
Prince George	34,444	34,444	35,915	37,862	39,248	39,711	40,487	41,261	42,034	45,195
Dinwiddie	10,219	11,810	28,314	27,852	29,680	30,114	30,838	31,559	32,282	31,734
Chesterfield	28,564	36,834	41,725	38,967	49,089	53,508	60,872	68,236	75,601	82,965
Growth	0%	6%	22%	21%	28%	32%	40%	47%	54%	62%

Figure 3: Population Change

Figure 4 shows the same information as percentages.

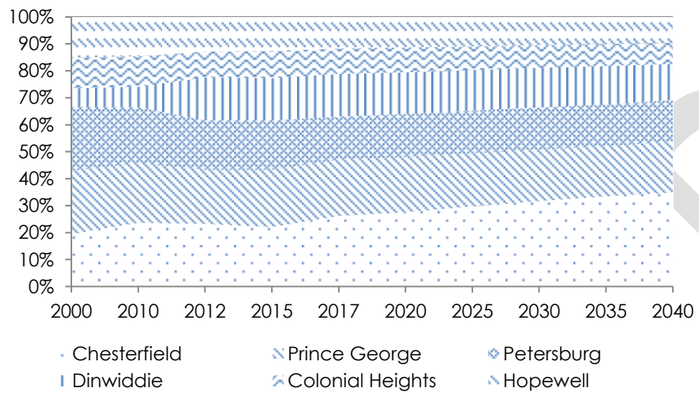


Figure 4: Percent of Population by Jurisdiction

The counties are expected to grow faster than the cities. Planning for some modes of transportation must be approached differently in a rural setting than in an urban setting. Special concerns arise when dealing with the elderly and the physically challenged in the rural areas. This implies more travel demand and greater difficulty meeting the demand using transit.

Table 3: TCMPO Population Growth

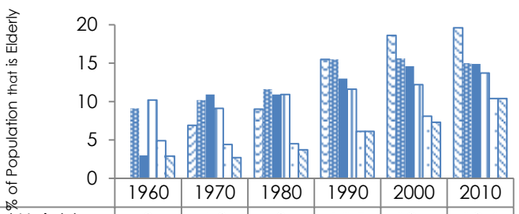
Jurisdiction	% Change	Annual Growth
Dinwiddie	211%	2.7%
Chesterfield	190%	2.9%
Prince George	31%	0.7%
Colonial Heights	12%	0.3%
Petersburg	6%	0.1%
Hopewell	3%	0.1%
Overall	62%	1.2%

Elderly Population

The proportion of elderly[1] in the Tri-Cities increased steadily from 1960 to 2010. As shown in Figure 5, the percentage population over 65 is higher in the cities than the counties. Between 2000 and 2010, however, the portion of the population that is elderly is increasing throughout the MPO. Chesterfield and Prince George experienced the largest percentage increases for the population 65 years of age and over.

The growing elderly population will need more paratransit or demand response transit services. However the reported demand on PAT's demand response transit service has fallen since 2008 (Figure 38 shows the change in demand response ridership.)

[1] The U.S. Census defines elderly as 65+ years of age.

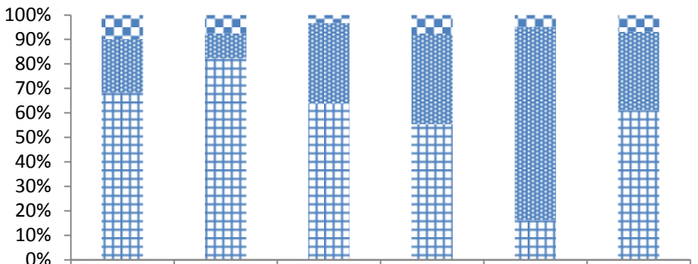


	1960	1970	1980	1990	2000	2010
Colonial Heights	0	6.9	9	15.5	18.6	19.6
Petersburg	9.1	10.2	11.6	15.5	15.6	15
Hopewell	3	10.9	10.9	13	14.6	14.9
Dinwiddie Co.	10.2	9.1	10.9	11.6	12.2	13.7
Chesterfield Co.	4.9	4.4	4.5	6.1	8.1	10.4
Prince George Co.	2.9	2.7	3.7	6.1	7.3	10.4

Figure 5: Elderly Population by Jurisdiction

Minority Population

The 2010 ethnic makeup by jurisdictions is shown in Figure 6. Petersburg has the largest Tri-Cities Area minority population and Colonial Heights the smallest.

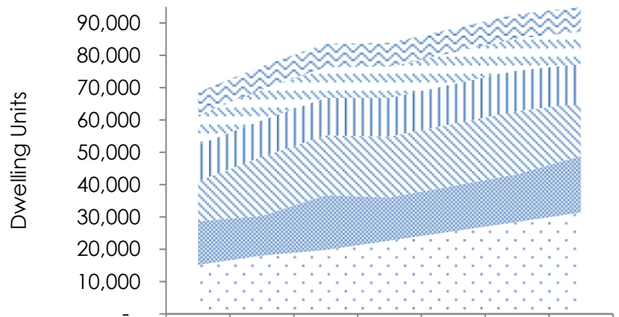


	Chesterfield Co.	Colonial Heights	Dinwiddie Co.	Hopewell	Petersburg	Prince George Co.
Other	9.8%	7.5%	3.2%	7.6%	4.8%	6.9%
Black	21.9%	10.2%	32.9%	37.0%	79.1%	32.0%
White	68.3%	82.3%	63.9%	55.4%	16.1%	61.1%

Figure 6: Ethnic Composition by Jurisdiction

Housing

The projected number of dwelling units (DU) for the Tri-Cities Area in 2040 is 94,866. This is an increase of 21,727 units over the 60,134 units that existed in 2000. As shown in Figure 7, Prince George County and Chesterfield County are expected to absorb most of the new housing.



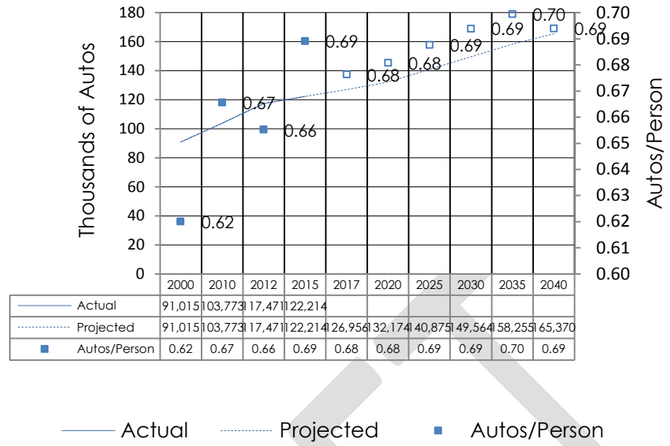
	2012	2017	2020	2025	2030	2035	2040
Colonial Heights	7,121	7,205	7,256	7,341	7,426	7,511	7,593
Hopewell	9,203	9,442	9,520	9,650	9,780	9,910	10,036
Dinwiddie	11,230	11,345	11,558	11,913	12,268	12,623	12,131
Prince George	12,408	18,253	18,466	18,827	19,184	19,540	16,188
Petersburg	13,480	12,290	16,947	13,355	14,022	14,685	17,546
Chesterfield	15,166	18,060	19,796	22,690	25,584	28,478	31,372

Figure 7: Expected Housing Units by Jurisdiction

As families get smaller the number of persons per dwelling units is falling. In 2012 the average number of people per dwelling unit was 2.61. By 2040 that average is expected to fall to 2.46 persons per DU.

Automobile Ownership

Auto ownership affects transportation planning as it provides information on the number of cars that may be using the area's transportation system. Increases in the number of autos in the Tri-Cities may be an indication of increasing traffic and congestion. Transportation plans must be developed taking into account the possible number of automobiles available for use in the system. Figure 8 shows the automobile ownership rate for the Tri-Cities area, the historical increase in the number of automobiles is expected to continue to increase. Between the years 2000 and 2040, the number of autos is projected to increase 32,838 over the 2000 figure of 91,015 for an increase of 36.08%.

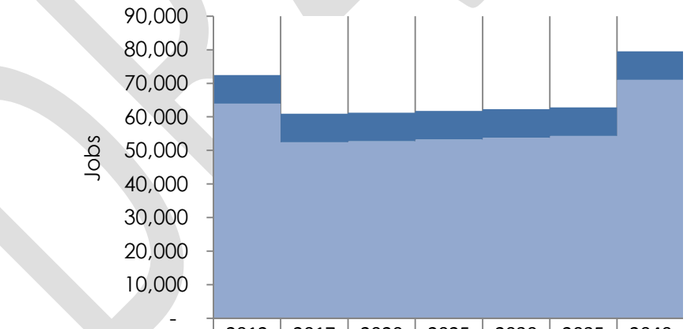


	2000	2010	2012	2015	2017	2020	2025	2030	2035	2040
Actual	91,015	103,773	117,471	122,214						
Projected	91,015	103,773	117,471	122,214	126,956	132,174	140,875	149,564	158,255	165,370
Autos/Person	0.62	0.67	0.66	0.69	0.68	0.68	0.69	0.69	0.70	0.69

Figure 8: Tri-Cities MPO Auto Ownership

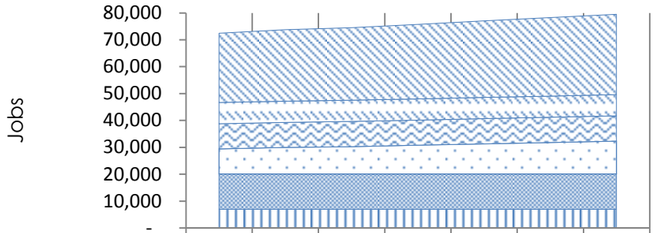
Employment

Workplaces generate traffic and affect travel demand. Projections of employment can be used to determine the location and timing of future transportation facilities.



	2012	2017	2020	2025	2030	2035	2040
Retail Employment	8,523	8,524	8,525	8,526	8,527	8,528	8,529
Other Employment	63,942	52,412	52,725	53,246	53,768	54,290	70,986

Figure 9: Tri-Cities Area Employment



	2012	2017	2020	2025	2030	2035	2040
Prince George	25,785	26,521	26,962	27,681	28,434	29,170	29,907
Hopewell	7,908	7,908	7,908	7,908	7,908	7,908	7,908
Colonial Heights	9,344	9,344	9,344	9,344	9,344	9,344	9,344
Chesterfield	9,338	9,861	10,175	10,697	11,220	11,743	12,266
Petersburg	13,130	13,130	13,130	13,130	13,130	13,130	13,130
Dinwiddie	6,960	6,960	6,960	6,960	6,960	6,960	6,960

Figure 10 Tri-Cities Employment by Jurisdiction

Most of the jurisdictions are land-locked and without changes in land use policy little job growth is expected. The strongest employment growth appears to be in Prince George County.

Commuting

By 2009 commuting to work accounted for less than twenty percent of travel. However, it is still a driver of demand system demand. According the US Bureau of Census commuting effectively determines peak demand on the transportation system. The morning traffic report routinely confirms this reality. Furthermore the vast majority of commuters drive alone to work. Figure 11 shows the mode choices of Tri-Cities residents between 2009 and 2015 from the American Factfinder Website. The automobile dominates commuting. Over 84% of TCMPO commuters drive, alone with another 8.6% carpooling. These rations have been consistent since at least 2009. This agrees well with mode choice in Virginia and the United States as a whole. However, because several jurisdictions are not served by public transportation the percentage of commuters using public transportation is lower than in Virginia and the United States.

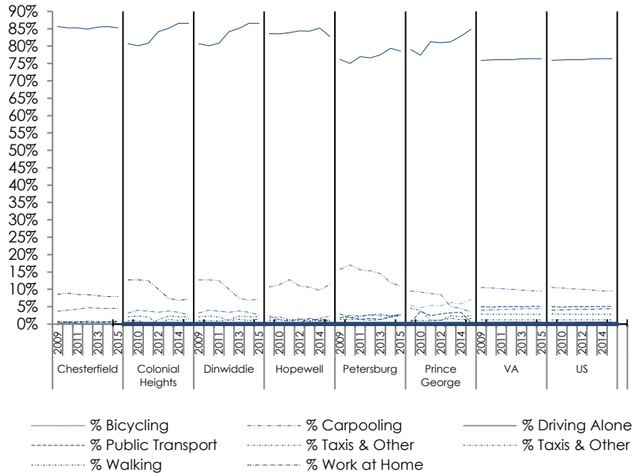


Figure 11: Tri-Cities Mode Choice

Figure 12[2] shows the average commute time for the MPO's jurisdictions and the average commute time for the whole MPO. The average commute time for the MPO has been between 22 and 23 minutes since 2009. This compares favorably with Virginia's average of 27.7 minutes and 25.4 minutes for the United States. Average commutes in Chesterfield County (26.0 minutes) are longer than those for the other jurisdictions. The commute numbers for Chesterfield County includes may probably reflect the congestion associated with Richmond. It is interesting to note that commute times in Colonial Heights, Dinwiddie County and Hopewell have been falling since 2009 while commute times in Chesterfield County, Petersburg and Prince George County are rising.

[2] Control plots show the trend, average, and variability of data over time. The MPO is using them to identify trends in transportation system data. These charts include the average, an upper extreme (3 standard deviations above the average, a lower extreme (3 standard deviations below the average, unusual variability (ranging from two standard deviations above the average to 2 standard deviations below the average, and a zone of expected variability that is within one standard deviation of the average (Stagliano, 2004).

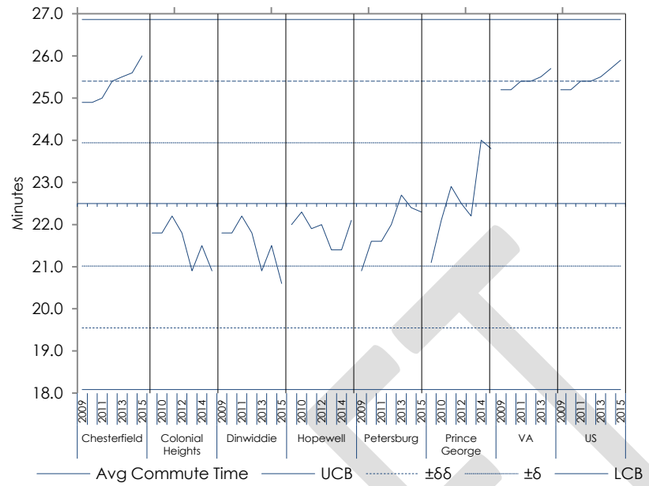


Figure 12: Average Commute Time

Section 3 – The Transportation System

Section 3 describes the transportation system to give context for developing the elements of the transportation plan.

The Highway System

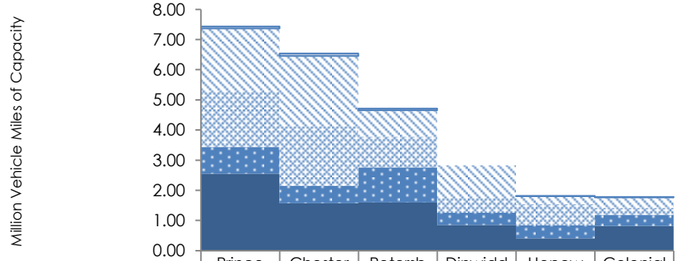
The Tri-Cities MPO highway system includes about 1330 miles of Interstates, Principal Arterials, Minor Arterials, Collectors and Local Roads. The Interstate System is defined by statute and the other systems are defined based upon the tradeoff between mobility and accessibility. Interstates, and other freeways, provide high mobility by limiting access to adjacent property. Local roads on the other hand provide limited mobility with high degrees of access to adjacent property. A completed discussion of roadway functional classification may be found at http://www.fhwa.dot.gov/planning/fcsec2_1.htm . The table below profiles the highway system by functional classification and by jurisdiction.

Figure 13 shows the capacity of the highway system by jurisdiction and functional classification as vehicle miles of travel. This capacity is a rough estimate of the actual capacity of the system.

	Prince George	Chesterfield	Petersburg	Dinwiddie	Hopewell	Colonial Heights
Local	4.7	5.66	3.93		0.72	0.9
Collector	113.96	128.12	47.99	59.42	14.48	19.04
Minor Arterial	84.9	90.58	46.97	22.75	32.26	10.8
Other Pricipal Arterial	49.08	31.68	63.93	21.8	23.95	20.16
Interstate	66.76	41.22	41.88	22.4	10.62	21.42

Figure 13: Tri-Cities Highway System Mileage

Figure 14 shows the approximate vehicle miles of capacity on each functional classification by jurisdiction.



	Prince George	Chesterfield	Petersburg	Dinwiddie	Hopewell	Colonial Heights
Local	68,364	82,327	57,164		10,473	13,091
Collector	2,072,000	2,329,455	872,545	1,080,364	263,273	346,182
Minor Arterial	1,852,364	1,976,291	1,024,800	496,364	703,855	235,636
Other Pricipal Arterial	892,364	576,000	1,162,364	396,364	435,455	366,545
Interstate	2,549,018	1,573,855	1,599,055	855,273	405,491	817,855

Figure 14: Vehicle Miles of Highway Capacity

Figure 15 shows the highway system.

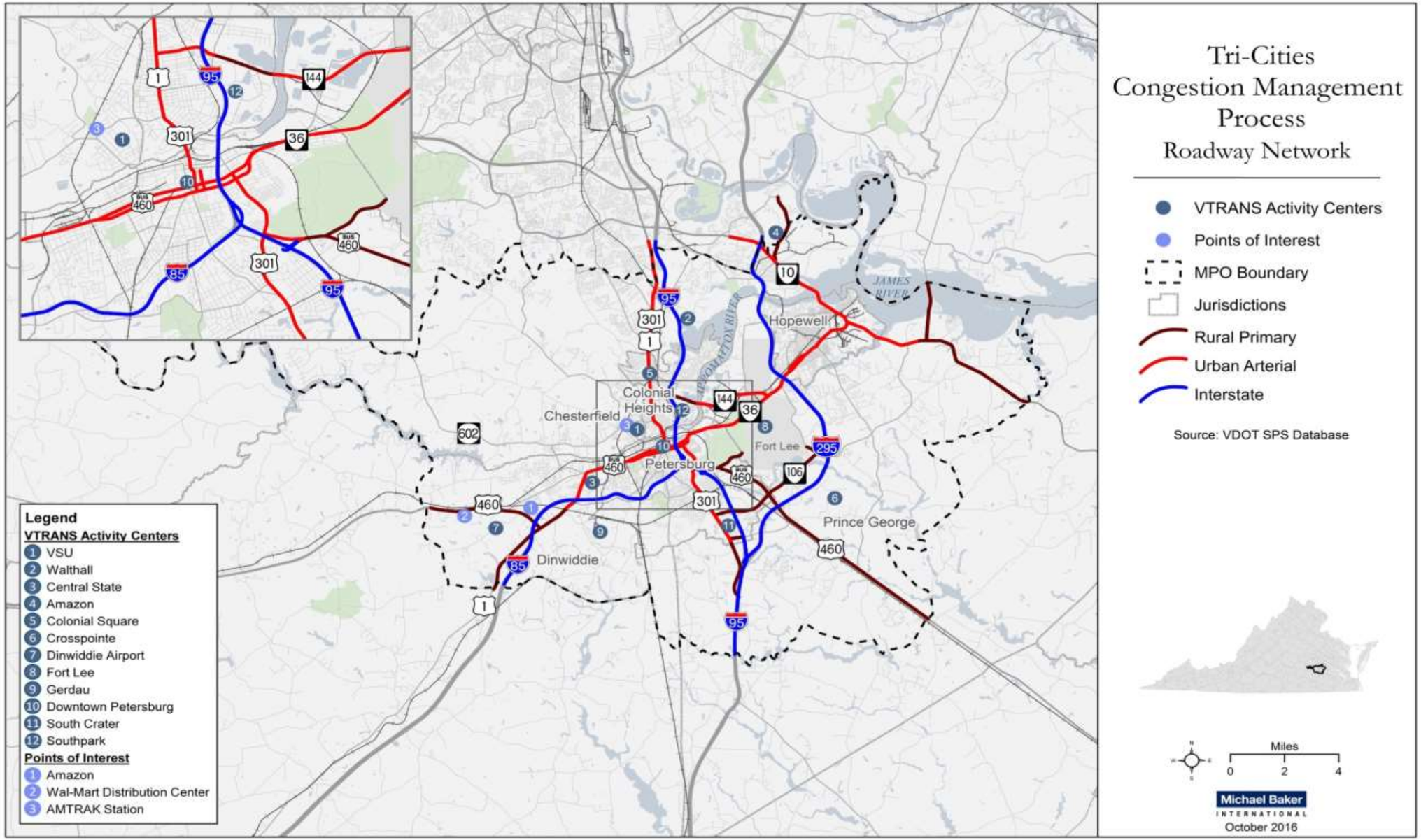


Figure 15: The Highway System with Points of Interest

Figure 16 shows the percentage of the system's capacity in each jurisdiction by functional classification.

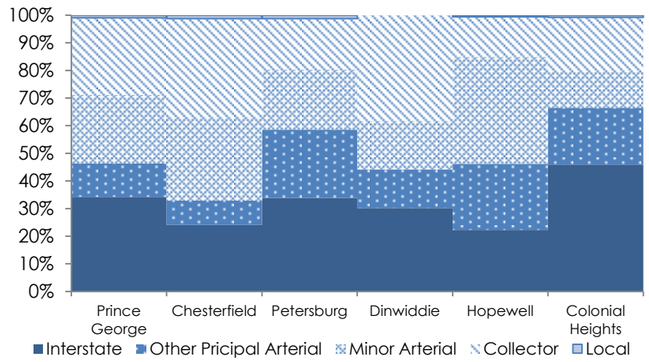
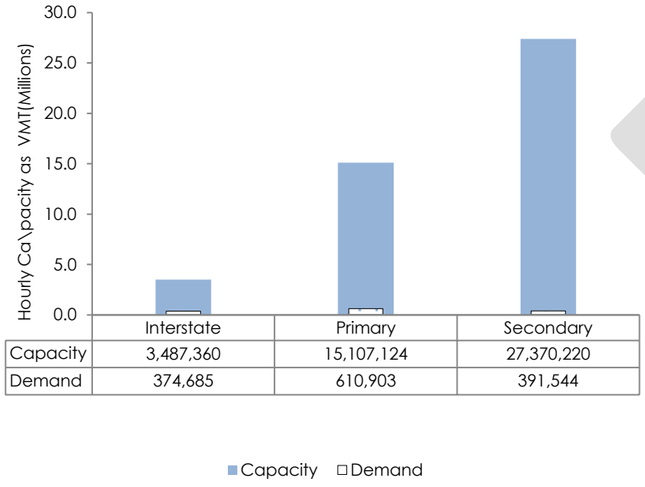


Figure 16: Percent of Capacity in Each Classification

Figure 17 compares peak hour capacity of the highway system with the likely peak travel demand on the system. This simple analysis ignores intersections and interchanges. It also assumes that ten percent (10%) of daily traffic occurs during the peak time period.



	Interstate	Primary	Secondary
Capacity	3,487,360	15,107,124	27,370,220
Demand	374,685	610,903	391,544

Figure 17: Hourly Capacity vs Hourly Demand

It seems that the highway system is performing well; however, there are local problems and bottlenecks that need to be fixed, as shown in Figures 82 and 83.

The Systemwide demand is about 13,770,000 vehicle miles of travel per day. This is equivalent to a line of cars stretching from the earth to the moon 57 times. Figure 18 shows the system demand by year between 2004 and 2015. Figure 19 projects the current growth rates out to 2040 showing possible high and low estimates[3]. 2040 the system demand is most likely to be around 17,600,000 vehicle miles of travel per day. The dark blue cone shows most likely range of future demand. The system does not appear to need much new capacity.

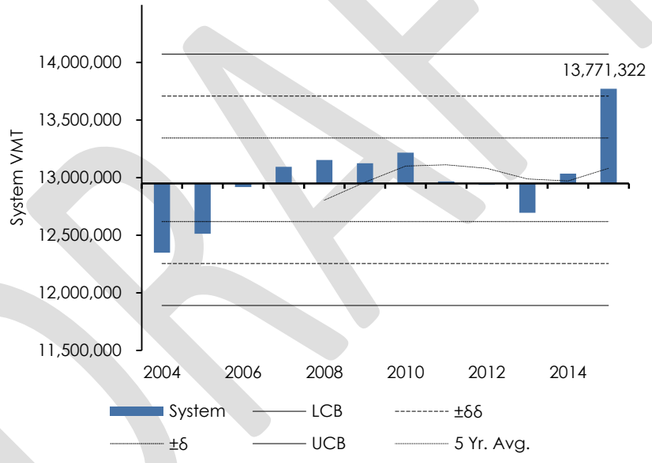


Figure 18: Demand on the System

3 The projections in the report use a simple Monte Carlo Simulation to estimate future demand using one thousand random iterations of the possible growth. Simulations show the uncertainty of projections and help decision-makers understand the possible outcomes.

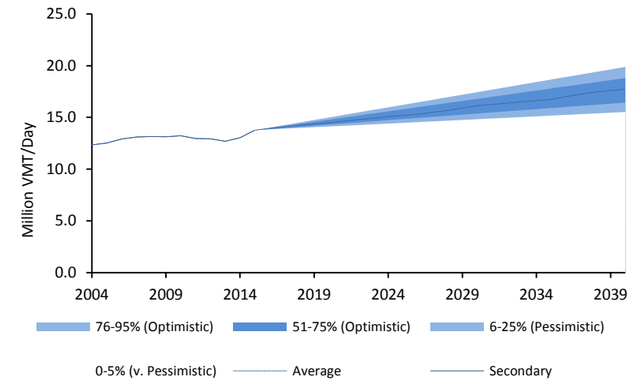


Figure 19: Future Travel Demand on the Highway System

Since 2004, travel on the Interstate System has grown at approximately 1% per year. The demand on the Interstate System in the Tri-Cities MPO is approximately 3,750,000 vehicle miles of travel per day. Figure 20 shows the daily demand on the MPO area's Interstates since 2004. The record shows growth around one percent (1%) per year. However, between 2014 and 2015 VMT grew by four (4) percent per year.

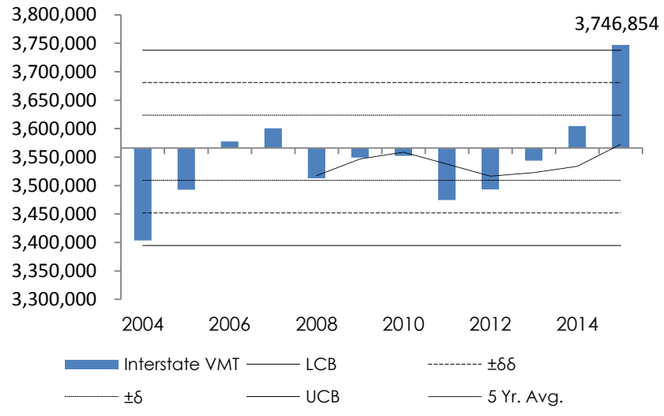


Figure 20: Demand on the Interstate System

Figure 21 shows projected Interstate VMT during life of the transportation Plan. By 2040 the most likely daily interstate

demand is around 4,760,000 vehicle miles of travel per day. Since 2004 travel on the Interstate System has grown at approximately 1% per year. As a whole the system does not appear to need new capacity. However, three sections of I-85 or I-95 experience congested conditions now and will likely continue to experience congestion into the future. The congested sections are:

- I-95 between the MPO boundary and I-295 (See Figure 82 and Figure 83)
- I-85/I95 north south of Wythe Street (See Figure 82 and Figure 83) and
- I-95 north of Temple Avenue (Figure 83).

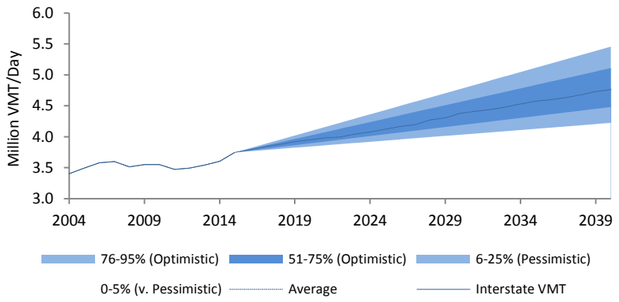


Figure 21: Future Travel Demand on the Interstate System

The demand on the Primary System in the Tri-Cities MPO is approximately 6,109,000 vehicle miles of travel per day. Figure 22 shows the daily demand on the MPO area's Primary Routes since 2004. The record shows growth around one percent (1%) per year. However, between 2014 and 2015 VMT grew by six (6) percent.

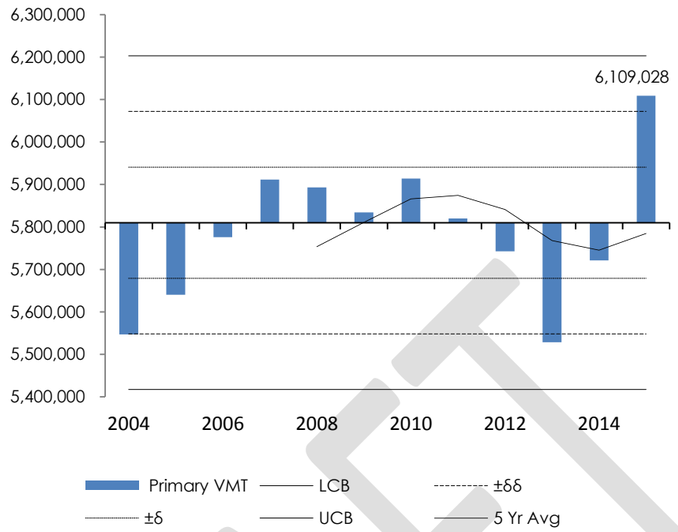


Figure 22: Demand on the Primary System

Figure 23 shows projected Primary VMT during the life of the transportation Plan. By 2040 the daily primary demand will be around 7,784,000 vehicle miles of travel per day.

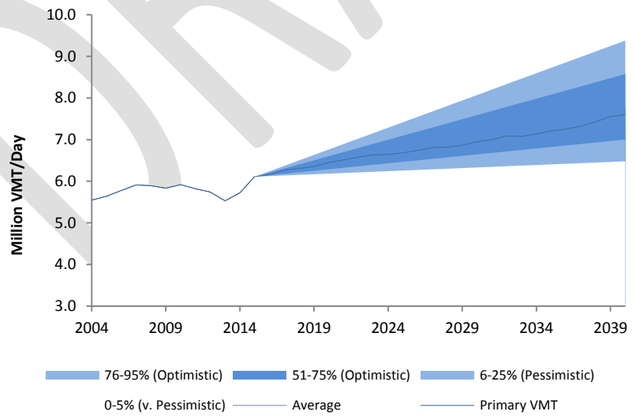


Figure 23: Future Travel Demand on the Primary System

Today the demand on the Secondary System in the Tri-Cities MPO is approximately 3,915,440 vehicle miles of travel per day. Figure 24 shows demand on the Secondary System from 2004 through 2015

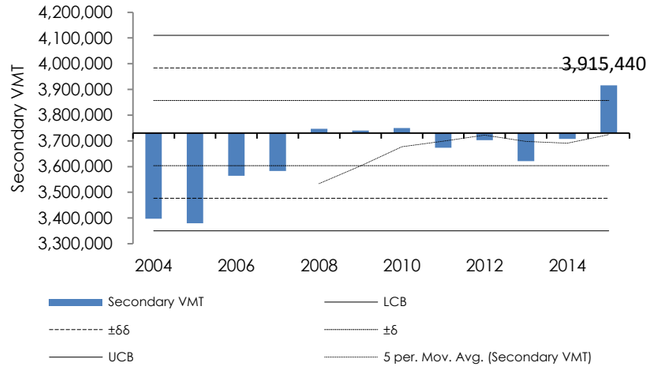


Figure 24: Demand on the Secondary System

Figure 25 shows projected values for secondary VMT during the life of transportation Plan. By 2040 the daily secondary demand will be around 5,000,000 vehicle miles of travel per day. Since 2004 travel on the Secondary System has grown at approximately 1% per year. However, between 2010 and 2014 demand on the secondary system decreased before rebounding in 2015.

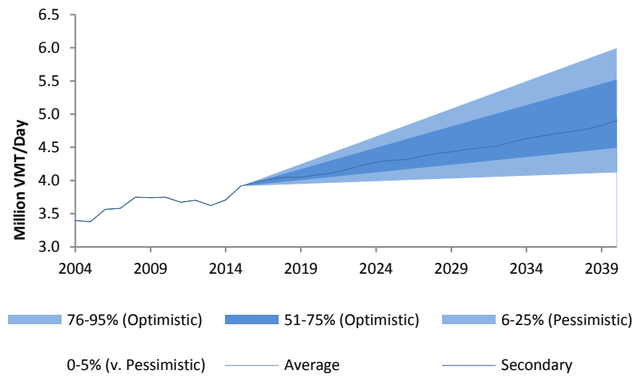


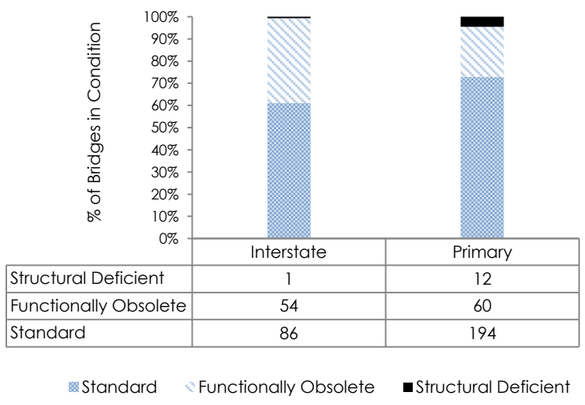
Figure 25: Future Demand on the Secondary System

The MPO's most likely needs are relieving bottlenecks and rebuilding outdated facilities.

Much of the roadway infrastructure was emplaced during the second half of the twentieth century: is nearing the end of its design life or does not meet current design standards. The following figures summarize the condition of the highway infrastructure of the jurisdictions in the Tri-Cities MPO.

Bridges are critical, long lived, transportation infrastructure. As of 2015 the average age of bridges in the Richmond District was forty-two (42) years. The typical design life of a bridge is fifty (50) years. VDOT's goal is for 94% of bridges to be in good or better condition. Figure 26 shows that 99% of Interstate Bridges and 95.4% of Primary bridges are not structurally deficient.

In three jurisdictions VDOT lists no deficient[4] interstate bridges. In the other three jurisdictions only 2% of Interstate Bridges are deficient. VDOT's goal is for less than six percent (6%) of bridges to be deficient.



	Interstate	Primary
Structural Deficient	1	12
Functionally Obsolete	54	60
Standard	86	194

Figure 26: Bridge Condition in the MPO

4 A deficient bridge is not necessarily dangerous. Deficient means that at least one rating criterion is not satisfactory.

Figure 27 shows the percentage of Interstate system bridges in the MPO that are not deficient from 2006 through 2016. Since 2006, VDOT has classified approximately 3% of the Interstate bridges in the MPO as either functionally obsolete or structurally deficient.

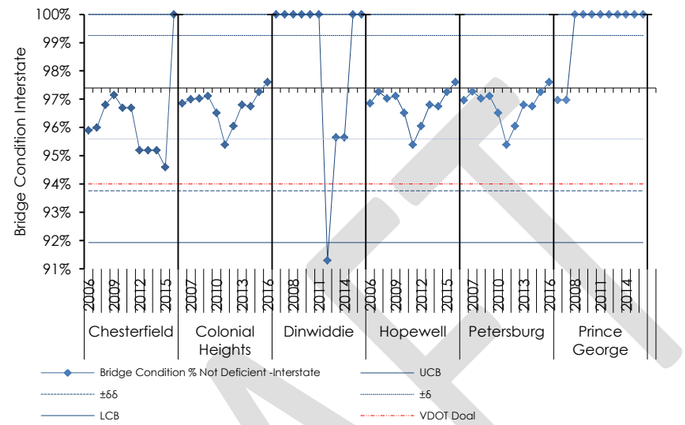


Figure 27: Interstate Bridge Condition by Jurisdiction

Figure 28 tracks the percentage of Primary system bridges in the MPO that are not deficient from 2006 through 2016. Since 2006, VDOT has classified approximately 8% of the non-Interstate bridges in the MPO functionally obsolete or structurally deficient. *Dinwiddie County is notable in that since 2006 18% its bridges there are deficient compared to VDOT's goal of 6%.*

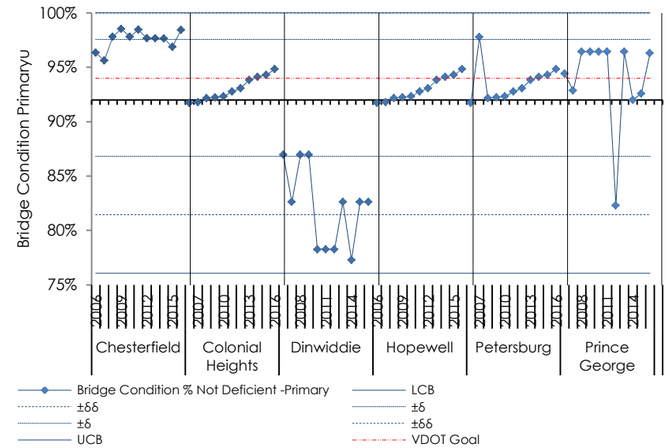


Figure 28: Primary Road Bridges by Jurisdiction

The Benjamin Harrison Bridge may need special attention. The fifty year old bridge does not meet current design standards. As shown in Figure 29, it is also a bottleneck and single point of failure for:

- Commuters;
- Highway freight; and
- Marine traffic.

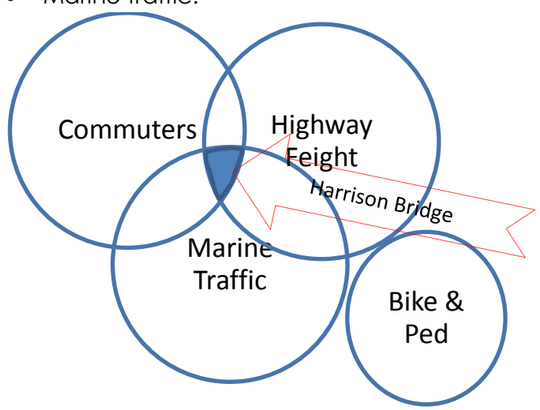


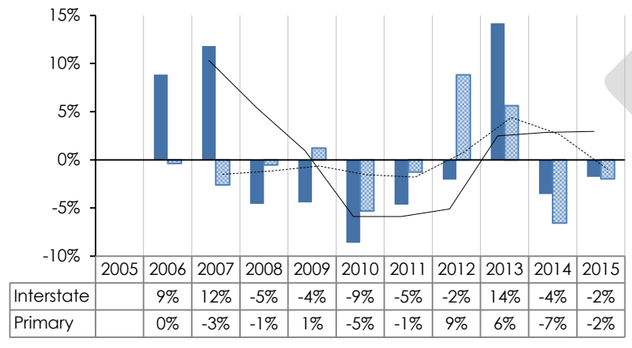
Figure 29: Modal Interactions at the Benjamin Harrison Bridge.

Because it is functionally obsolete it has no provision for bicycles or pedestrians and is a barrier for recreational bicycling or walking between Hopewell and Charles City Coun-

ty. The Benjamin Harrison Bridge is also a notable instance of environmental preservation, or restoration. The bridge towers host nesting boxes for Peregrine Falcons and have resulted in a number of hatchlings (called eyases) since 2003 (Wikipedia).

Figure 30: The Benjamin Harrison Bridge

Figure 31 shows year to year change pavement condition since 2005. Pavement Condition improved from 2010 through 2013 but has fallen since then.



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Interstate		9%	12%	-5%	-4%	-9%	-5%	-2%	14%	-4%	-2%
Primary		0%	-3%	-1%	1%	-5%	-1%	9%	6%	-7%	-2%

Source: VDOT Performance Dashboard

Figure 31: Change in Pavement Condition

VDOT's goal is to have 94% of pavement classified as fair or better. Since 2006, about 77% of Interstate pavement in the MPO has been classified as fair or better. While pavement quality in most of the MPO has improved, pavement in Dinwiddie County has gotten worse since 2011 as shown by the trend line in Figure 32.

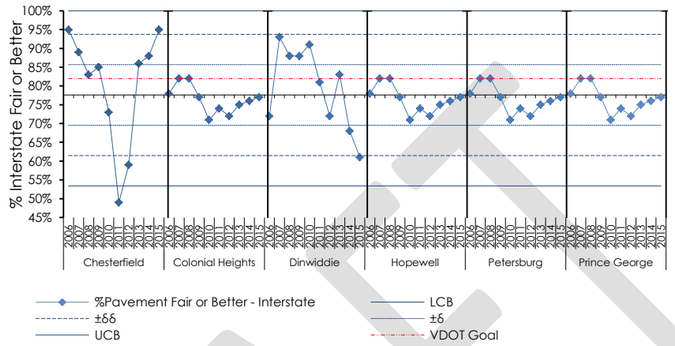


Figure 32: Interstate Pavement Condition by Jurisdiction

VDOT's goal is to have 94% of pavement classified as fair or better. Since 2006, about 75% of Primary Highway pavement in the MPO has been classified as fair or better. Figure 33 shows primary road pavement condition by jurisdiction. Pavement condition in all of the MPOs jurisdictions is below VDOT's goal. Furthermore, primary pavement condition has been worsening since 2013. *This implies that the MPO should focus more money on resurfacing across the MPO.*

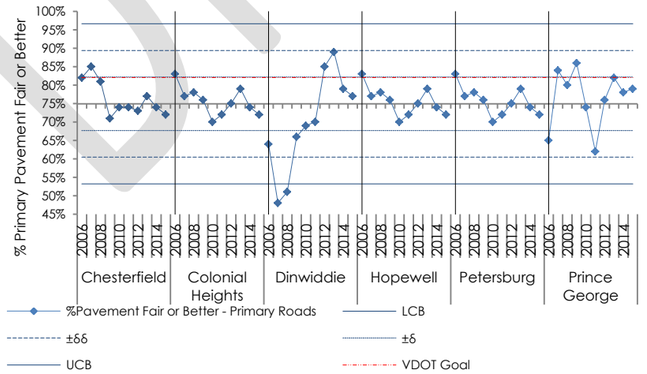


Figure 33: Primary Pavement Condition by Jurisdiction

Transit

The Petersburg Area Transit Authority provides fixed route and demand response transit service from the Multi-Modal Station at 110 E. Washington Street in Petersburg. This facility is a hub and transfer facility for PAT, Greater Richmond Transit System (GRTC) and Greyhound Intercity Bus Lines.

Figure 34: Petersburg Multi-Modal Station

According to the National Transit Database (NTD) PAT serves a seven square miles and a 32,948 people. Figure 37 shows PAT's fixed routes.

In 2014 PAT operated twelve fixed route buses and five demand response vehicles. Then the average age of fixed route vehicles was 5.8 years and the average age of the demand response vehicles was 7.4 years. PAT uses these vehicles to operate thirteen fixed routes for twelve hours each weekday as shown in Figure 35.

Table 4 shows PAT's fare structure.

Table 4: PAT Fare Structure

Fare Type	Cost	Discount
Regular	$1.75	$0.00
Senior(s)	$0.85	$0.90
Day Pass	$1.75	$1.75
Weekly Pass	$12.00	$6.00
Monthly Pass	$44.00	$22.00

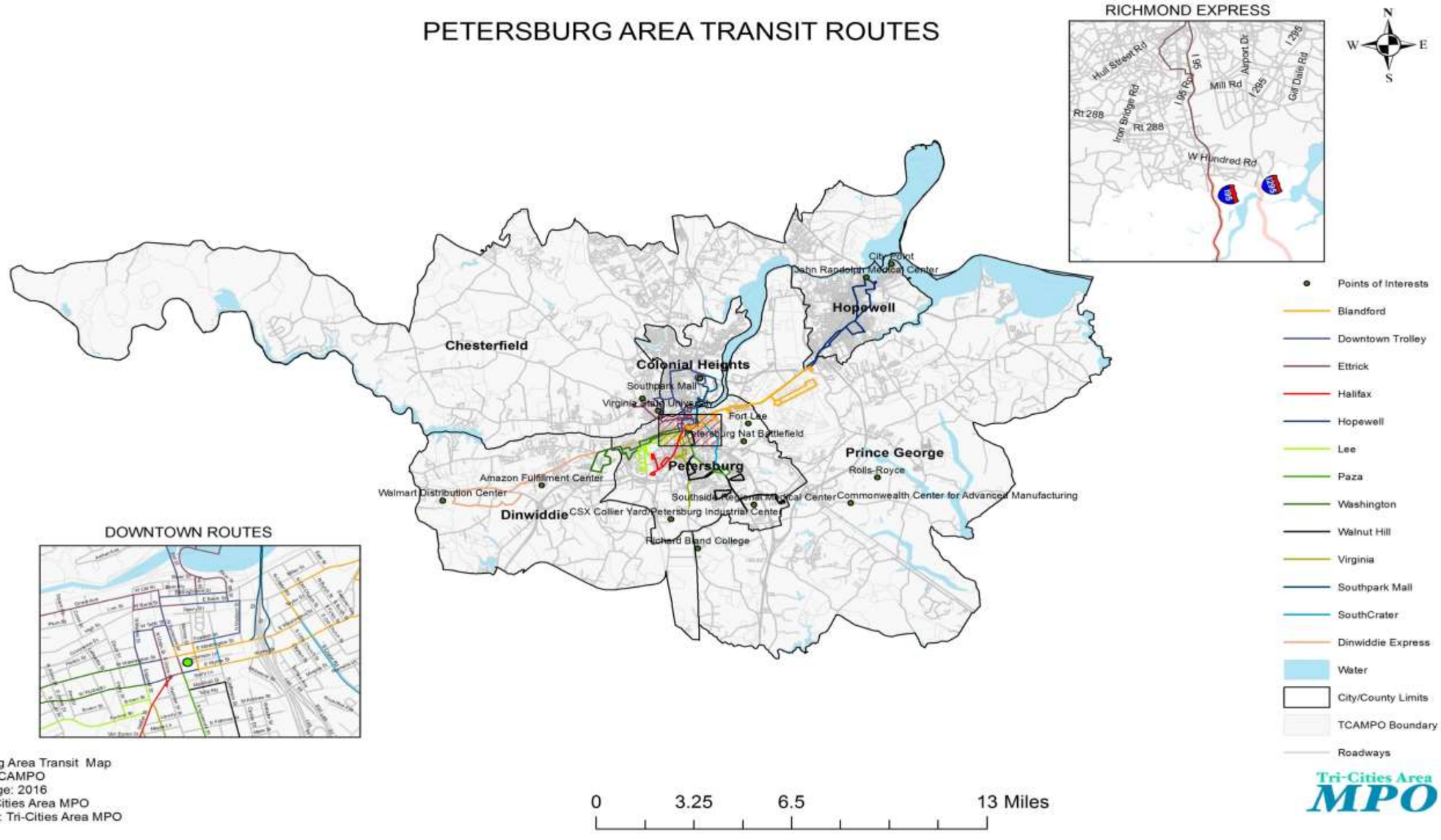


Figure 35: Transit Routes

In addition PAT has purchased three classic trolley buses as part of the Petersburg National Battlefield Trolley Service to support of Travel and Tourism.

Table 5 shows PAT's reported budgets for 2013 and 2014 from the NTD. Seventy to eighty percent of the capital budget (*e.g.*, buildings and vehicles) is comes from federal sources. For operating (*e.g.*, fuel, salaries and tires) between ten and twenty percent of the budget comes from federal sources. The remainder comes from advertising, fares, local funds or state funds.

Table 5: PAT Financial Information

		2013		2014
Capital	**$**	**701,047**	**$ 2,403,526**	
Fares	$	-	$ -	
Federal	$	568,952	$ 1,788,234	
Local	$	57,010	$ 125,549	
Other	$	-	$ -	
State	$	75,085	$ 489,743	
Operating	**$**	**2,743,658**	**$ 3,260,818**	
Fares	$	519,271	$ 499,146	
Federal	$	738,071	$ 738,071	
Local	$	792,160	$ 1,238,007	
Other	$	25,966	$ 29,323	
State	$	668,190	$ 756,271	
Grand Total	**$**	**3,444,705**	**$ 5,664,344**	

Figure 36 shows PAT's fixed route ridership between 2003 and 2015 (the last year of available data in the National Transit Database. Average ridership is about 529,000 riders per year[5]. However, ridership has fallen since 2013[6].

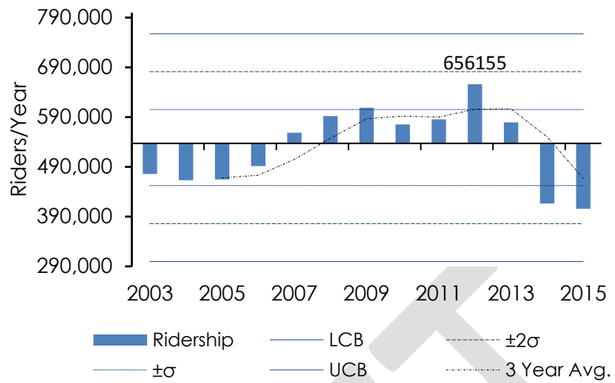


Figure 36: Yearly Transit Ridership

Figure 37 projects possible ridership for PAT to 2040. The dark blue cone, corresponding to the most likely range of future ridership ranges from 475,000 riders per year to 588,000 riders per year.

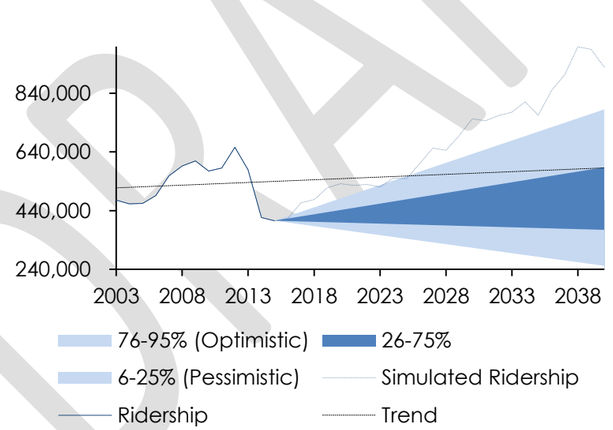


Figure 37: Projected Fixed Route Ridership

Figure 38 shows the average age of fixed route vehicles since 2004. The average bus age is (7.4 years) within FTA guidelines.

Figure 37 shows the average age of fixed route vehicles since 2004. Currently the average bus age is (7.6 years) within FTA guidelines.

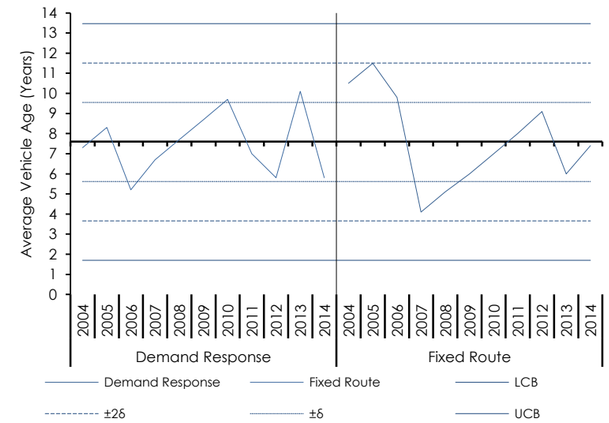


Figure 38: Age of PAT Vehicles

Figure 39 is a control plot showing the PAT demand response ridership from 2003 to 2014. Average ridership is approximately 9,200 riders per year[7]. However, ridership has declined since 2008.

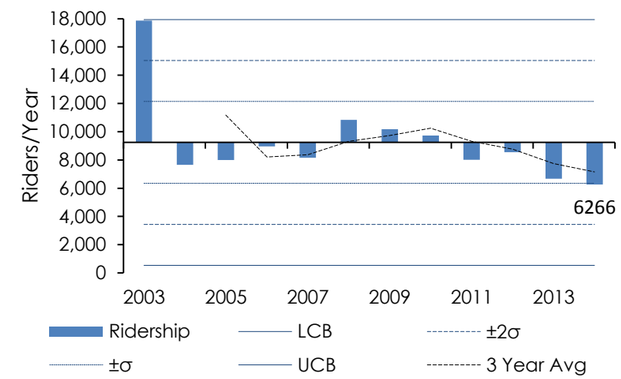


Figure 39: Historic Demand Response Ridership

Since 2003 demand response ridership has fallen 11,600 riders per year.

Figure 40 shows projects demand response ridership for PAT through 2040. The dark blue cone, corresponding to the

5 ~2,300 riders a day assuming 250 operating days per year.

6 Part of the drop is attributable to better control of transfers and some to route changes.

7 ~37 Riders a day assuming 250 days of service.

most likely range of future ridership ranges from 400 to 1,200 riders per year.

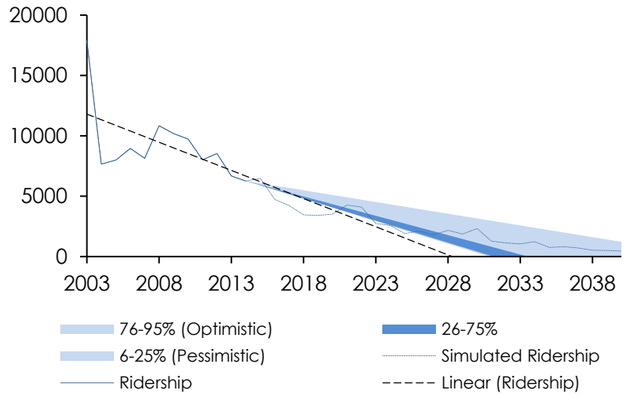


Figure 40: Projected Demand Response Ridership

Figure 38, above, shows the average age of demand response vehicles since 2004. The average bus age is (5.8 years) within FTA guidelines.

Figure 41 shows the seasonal variation of fixed route ridership based upon the NTD. The monthly information was only available for 2004 through 2011. However, the seasonal pattern shows that the best months for ridership are generally March and October while the worst ridership month is typically June.

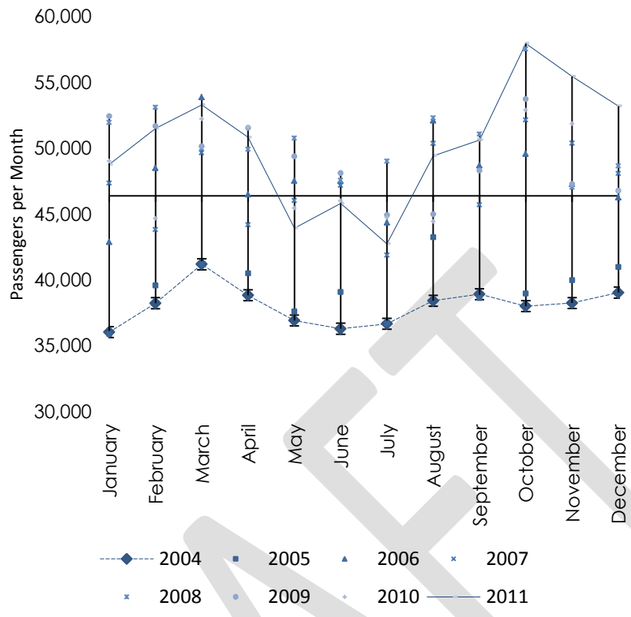


Figure 41: Seasonal Variation in Ridership

Intercity Bus

Two providers serve intercity bus passengers. GTRC Route 95x provides four round trips daily from Petersburg to Richmond. Route 95X (Figure 42) is an express route that connects downtown Petersburg to downtown Richmond. Greyhound is a private provider serving the continental United States.

Ridesharing Services

The Tri-Cities Area needs to explore alternatives for the provision of mobility manager services. Mobility management is a strategic approach to transportation and customer service. The mobility manager works with public and private agencies to organize a network of available transportation services and share this information with customers. The customer benefits by from 'one stop shopping' for mobility options, trip prices, and help in choosing the best travel options.

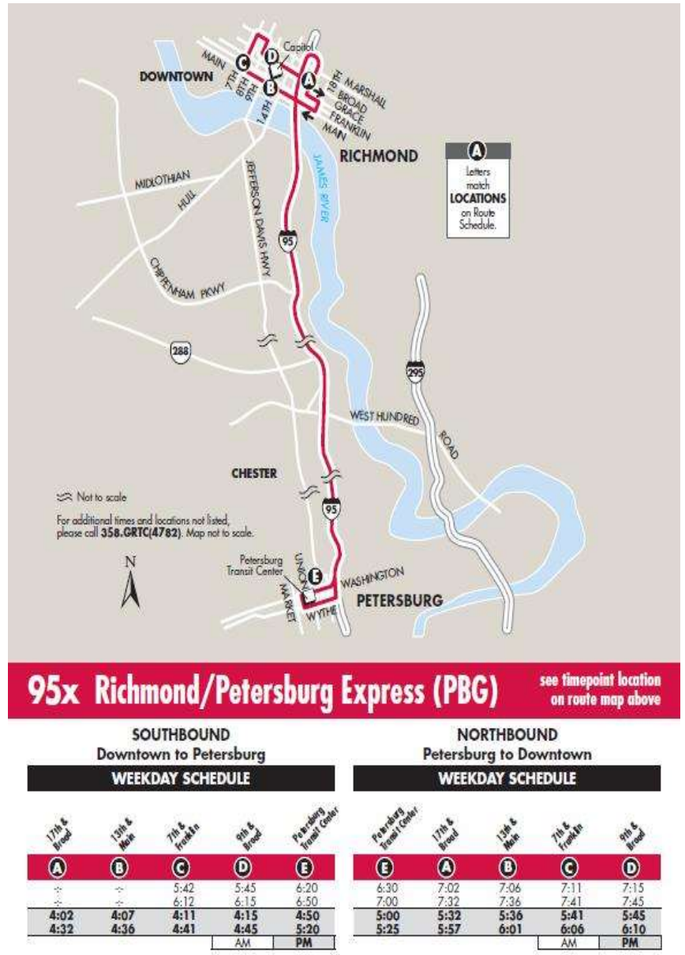


Figure 42: GTRC Bus Route 95X to Richmond

Ridefinders, a not for profit affiliated with the Greater Richmond Transit Company (GTRC), provides ridesharing services in the Tri-Cities MPO. Ridefinders' goal is make our transportation system more effective by moving more people in fewer vehicles. To accomplish this goal, Ridefinders:

- Helps establish carpools,

- vanpools,
- transit services, and
- Telecommuting programs.

Bicycle and Pedestrian

Sidewalks and multi-purpose trails give users the option of traveling by a mode other than the automobile and provide recreational opportunities and access to open spaces.

In 2016 the Tri-Cities Area MPO updated the regional bikeway plan (now called 2015 Bicycle, Transit & Pedestrian Connector Plan). The goal of this plan is to integrate the Bikeway and Pedestrian plan with transit. Linking bicycling, transit and walkability improves the quality of life by providing safe, convenient and transportation facilities and recreational alternatives.

The plan considers bikeways concepts such as urban and suburban settings, user group skill levels, facility types, such as Shared Use Path (off-street), Bike Lane (pavement markings for bicyclists, wide outside lane (additional pavement width with no strips delineating separate lane for bikes), shoulder improvements (use of shoulder area for biking) and ancillary facilities (supporting facilities such as bicycle parking and lockers). A future bikeway route structure that can be promoted by the localities as a safe and convenient substitute for motor vehicle travel for recreational and commuting has been recommended in the 2015 Bicycle, Transit & Pedestrian Connector Plan. The transit element of the document provides connection that can be used during the journey of biking or walking in the Tri Cities Area, recommendation for benches, adequate lighting, and transit route display information.

Figure 44 shows the recommended bikeway improvements in the study area and Figure 35 shows PAT's transit routes.

2015 Bicycle, Transit & Pedestrian Connector Plan Goals & Objectives: (the complete plan can be found at: www.craterpdc.org/

Table 7 summarizes the goals and objectives of the MPO's Bicycle Plan. In addition the proposed Appomattox River Trail is shown on Figure 43 and mentioned under travel and tourism on page 63.

For Hire (Taxi) Service

Taxicab and for hire services serve who need more flexibility than is offered by transit services but who cannot or do not wish to use a personal vehicle. These services charge a premium price for this flexibility. The market for "for hire" vehicles has changed rapidly with the advent of ride hailing services such as Uber and Lyft. Table 6, from the Human Services Transportation Plan lists the available taxicab service in the MPO.

Table 6: Private Transportation Providers

Location	Company	Telephone
Chester	Chester Taxi	(804) 536-3546
Chesterfield, Hanover, Henrico and Richmond	Napoleon Taxi *Offers a 20% discount to disabled, elderly, and vision impaired*	(804) 354-8294
Colonial Heights	Boulevard Cab Co	(804)732-3636
Hopewell	Marshall Cab LLC	(804) 458-3325
Petersburg	AAA Taxi Co	(804) 862-8111
	A Rainbow Taxi Co	(804) 862-1108
	Metro Cab Co.	(804) 861-2445
Richmond	At Your Service	(804) 423-9200
	J&M Transportation	(804) 737-2693 or
	Services, LLS	(804) 878-5020
	Junnie Ray	(804) 326-6414
	Forward Fleet	(804) 426-4313
	Saleh Medical Transportation, Inc.	(804) 334-9511
	Sam Transportation	(804) 715-9242
	Seasonal Transport, LLC	(804) 303-9591
Richmond	World Star Cab	(804) 393-4432
Richmond, Chesterfield, Chester and Henrico	Big Ben Taxi Cab	(804) 986-6667
Richmond, Henrico, Hanover	Richmond Taxicab *Wheelchair Accessible*	(804) 300-9900
Western Henrico, Goochland, Powhatan, Louisa, Amelia	West End Cab(804) 393-4432	(804) 833-1234

Passenger Rail

Amtrak provides passenger service at the Petersburg Station located off Route 36 (Chesterfield Avenue) in the historic Ettrick portion of Chesterfield County. Amtrak's 2014 ridership count at Ettrick was 29,286 boarding's and alightings. The Virginia Department of Rail and Public Transit (DRPT) estimates the total Tri-Cities ridership will increase to approximately 98,000 passengers per year by the year 2025 with the addition of planned higher speed (79 to 125 mph) passenger rail services. Ten Amtrak trains stop each day at the Ettrick Station. These trains include service connecting to New York and Florida; Charlotte, NC and New York; and, Boston, MA and Norfolk, VA. Figure 26 shows the Petersburg Station[8].

Figure 43: Petersburg Amtrak Station in Ettrick VA

Figure 45 shows passenger boardings and alightings from 2009 to 2015. Average yearly ridership has been nearly 24,800 per year and has increased as service has increased. The rate of growth has been over 6% per year

[8] http://www.railfanguides.us/va/petersburg/map1/index.htm#Map_

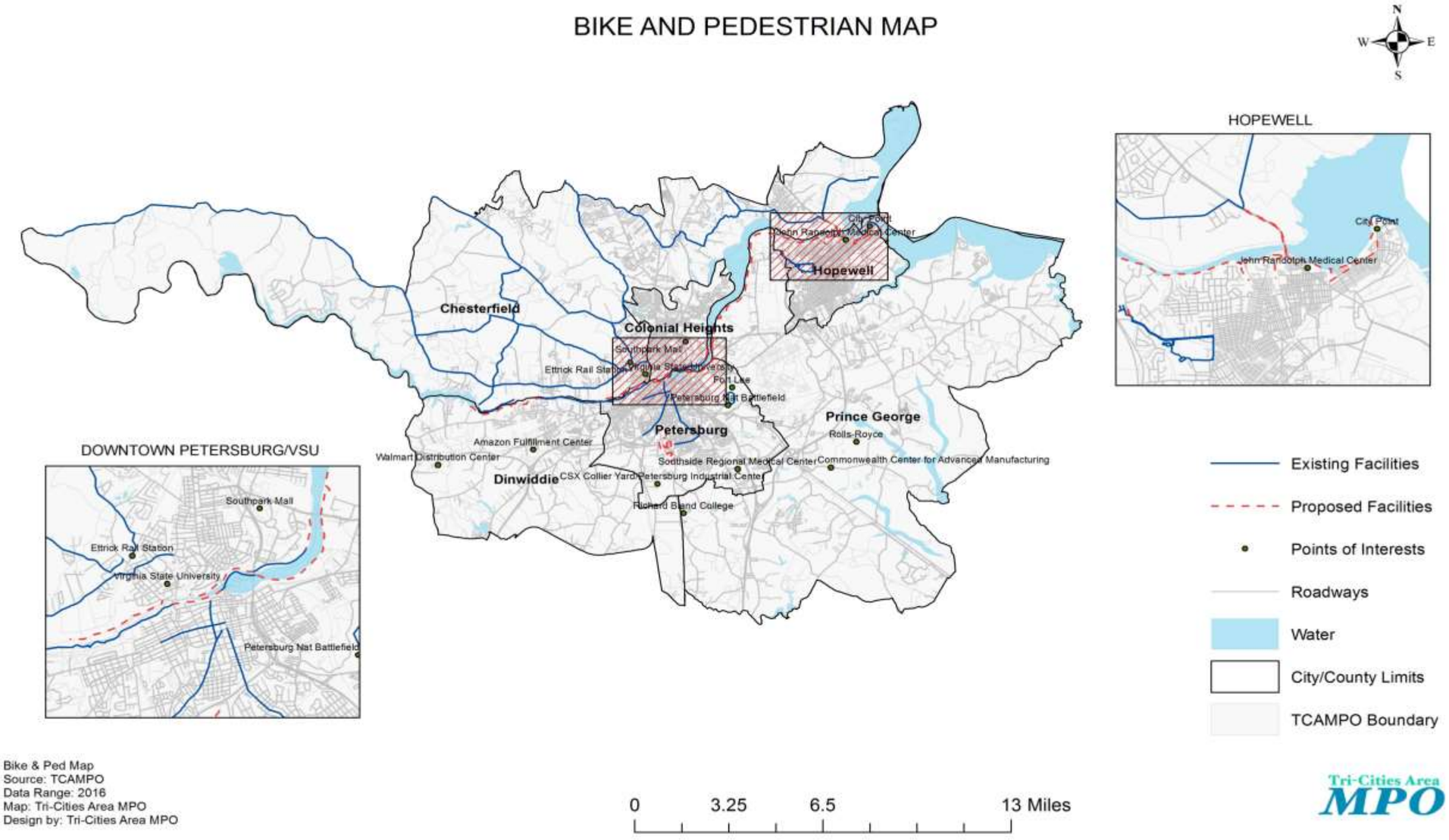


Figure 44: Proposed Bicycle and Pedestrian Facilities

Table 7: Bicycle and Pedestrian Goals, Objectives and Policies

Goal	Objective	Policy
Launch a Bikeway System in Tri-Cities Area	Improve and update Bikeway Plan for the Tri-Cities Urban Area	• Coordinate with local jurisdictions and interesting groups for their awareness, interest and ideas. • Use the MPO's Policy and Technical Committees to evaluate non-motorized issues. • Create a Bikeway committee to address bicycle needs. • Follow VDOT's recommended guidelines to establish and implement the bikeway system. • Mainstream, bikeway planning and greenway planning into transportation planning.
	Develop a bicycle routes, lanes, and paths/trails throughout the Tri-Cities Urban Area.	• Develop a bikeway system that provides access to and among major activity centers, public transportation routes and recreation facilities. • Give high priority to projects that close gaps in Tri-Cities Area Bikeway Network (especially projects that cross jurisdictional boundaries. • Encourage bikeways through scenic areas. • Encourage maintenance and monitoring efforts that support implementation and operation of the Tri-Cities Area Bikeway Network. • Request VDOT to include bicycle features on all highway construction, where there is support from the locality and the public.
	Develop direct, convenient, safe and easy to use bikeways	• Develop bikeway information graphics that clearly identify bikeways. • Encourage local jurisdictions to maintain and provide interested citizen with maps of the bikeway system. • Encourage using roadway-maintenance funds to make routes safer for bicyclists by realigning grates, repairing potholes, and making traffic signals more responsive to bicycles, *etc*. • Develop an off-street bike network integrated with the on-street system. • Support local government efforts to improve bicyclist safety by encouraging enforcement of the Virginia Vehicle Code for motorists and cyclist alike. • Encourage investment choices that help achieve the 2040 Long Rang Plan goals of reducing bicyclist fatalities, injuries and crashes by 5 percent from 2000 to 2040. • Encourage and support the creation comprehensive safety awareness, driver education, cyclist education and diversion training programs for cyclists and motorists.

Goal	Objective	Policy
Encourage using the bicycle as an alternate means of everyday transportation	Provide bikeway access to and within major trip generators	• Encourage bicycle connectivity to school and recreational sites. • Encourage bicycle paths or trails within parks, recreational areas and school sites. • Connect commercial/educational areas (shopping center, central business district, universities) with nearby residential areas along safe transportation routes • Encourage localities to establish bikeways that link with major roadways.
	Plan support facilities and service for bicyclists	• Encourage bicycle-parking facilities in all new employment and commercial developments. • Encourage bicycle-parking facilities at new apartment complexes, schools, parks, churches, hospitals, public buildings, and other areas of large gatherings. • Encourage the installation of bicycle-parking in the public right-of-way • Work with Virginia State University, Richard Bland College and area schools to promote bicycle commuting and assist in siting bicycle parking areas. • Encourage localities adopting zoning requirements for lockers and showers to be added to new buildings • Consider requiring bicycle parking at major public events
Make bicycling and walking safer	Develop a public-awareness program involving bicyclist, motorist and pedestrians on the use and safety bikeways.	• Expand the bicycle-safety education program in public schools. • Use civic clubs and associations, as well as local police and sheriff's departments, for the continuation of bicycle-safety clinics. • Use mass media (e.g., television, radio and newspapers) to promote a bicycle safety public-awareness program.
	Increase enforcement of traffic laws for the protection and safety of bicyclists and pedestrians	• Apply the bicycle safety-enforcement program to children as well as to adults. • Promote citizen participation in planning, encouraging bicycle and pedestrian safety education and public awareness programs
	Increase awareness of the benefits of bicycling and walking and of available resources and facilities	• Market the health benefits of walking and bicycling.
	Complete a network of sidewalks and trails that serve short trips to employment centers, school, commercial districts, bus stops, and institutions.	• Complete missing sidewalk connections wherever possible to make direct route for walking. • Identify obstacles to walking to schools. • Consider the installation of sidewalks, as part of all transportation improvements.
Funding	Develop an equitable and effective regional funding and implementation process.	• Fund bicycle projects to complete the Tri-Cities Area Network • Consider the benefits of bicycling improvements in the allocation of transportation funding and in developing performance measures including vehicle trip community livability and public health. • Use Congestion Mitigation and Air Quality (CMAQ) funding for bikeway projects such as bicycle and pedestrian facilities (paths, bike rack, support facilities, etc.)

Goal	Objective	Policy
		• Identify new funding sources to support operation and maintenance of bicycle and pedestrian facilities. • Help local jurisdictions identify research state and federal funding source to help fund bikeways.
Multimodal integration	Develop seamless transfers between bicycling and public transportation	• Encourage transit agencies to provide, maintain and promote convenient, secure bicycle parking at transit stops and stations. • Ensure that bicycles are accommodated on all forms of public transit. • Foster collaboration between local jurisdictions and regional transit agencies to improve bicycle access to transit station in the last mile surrounding each station.
Enhance local and regional transit connectivity	Connectivity	• Shorten bus headways (the time between buses) on routes with strong ridership. • Install passenger information systems and other passenger support infrastructure at bus stops (*e.g.,* hardstands, shelter, lighting, seating bus schedules, routes connectivity maps etc.) • Maintain schedule adherence through operational improvements along arterials that are planned for transit improvements. • Encourage the PAT riders to use the PAT route schedule app, Route Shout (mobile app). • Develop or integrate Bicycle and Pedestrian Trails into the mobile app.

(NARP, 2016). This natural increase would double ridership by 2020. However, ridership increases may depend upon service increases since trains were added to the route in between 2012 and 2013.

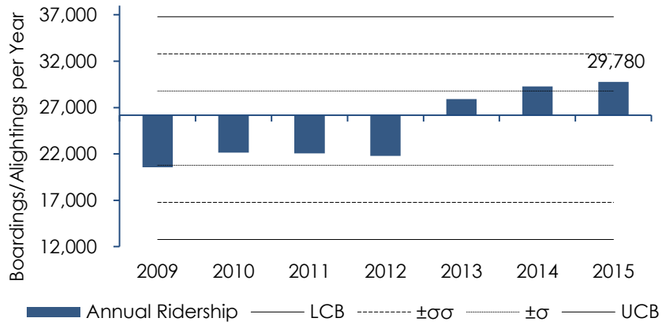


Figure 45: AMTRAK Boardings

Figure 46, projects boardings using a Monte Carlo Simulation based upon the previous growth, shows the possibility of achieving a given ridership. Because AMTRAK's load factor9 averaged fifty percent (50%) in 2014 the existing passenger consists10 only have capacity for around 60,000 passengers per year (Amtrak Revenue Passenger-Miles and Load Factor, 2014). Beyond that number more passengers will need larger trains or more trains[11].

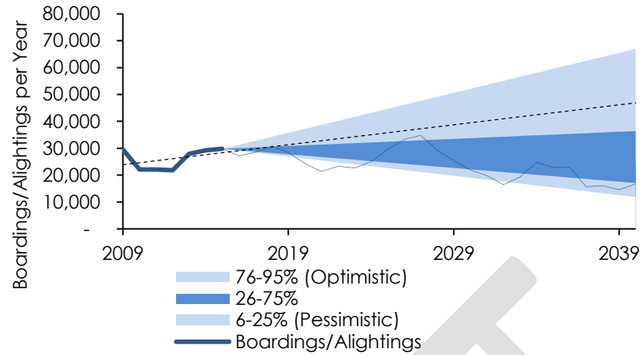


Figure 46: Projected AMTRAK Demand

The recommended alignment for the Richmond to Raleigh High Speed Rail goes through Chesterfield County, Colonial Heights, Petersburg and Dinwiddie County as shown in Figure 47 and 48 reproduced from the Southeast High Speed Rail Richmond, VA, to Raleigh Recommendation Report (NCDOT; VaDRPT, 2012).

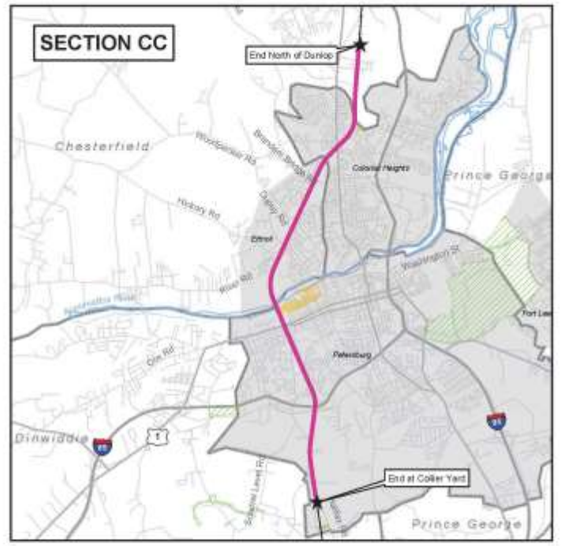


Figure 47: Proposed High Speed Rail Alignment in the MPO – North End

[10] The number of cars in a given train sometimes called a trainset.
[11] A personal conversation with an AMTRAK Conductor indicated that as many as 100 people could board a northbound train in Richmond.

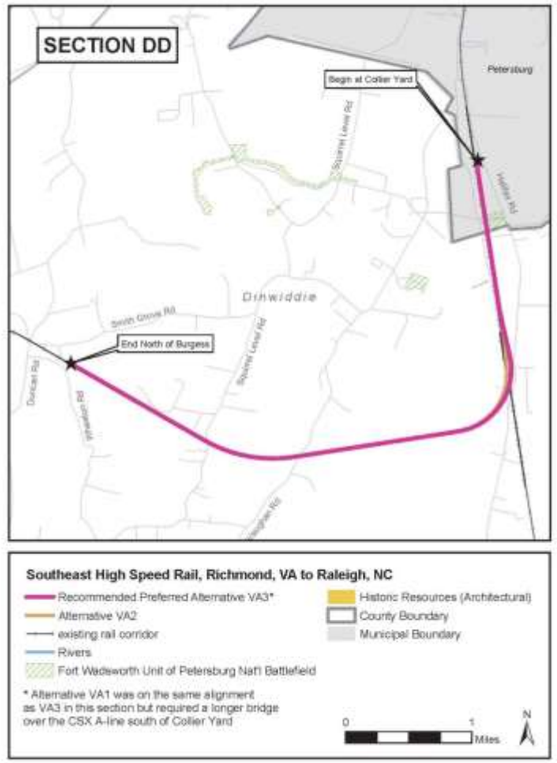


Figure 48: Proposed High Speed Rail Alignment in the MPO - South End

In 2014, the MPO Policy Committee started an environmental study (NEPA) of passenger station sites for a new station to serve the Tri-Cities. The purpose of this study is to:

- identify possible station sites;
- identify environmental impacts of the sites; and
- Select a preferred station location.

The Federal Railroad Administration (FRA) is the lead federal agency and the Crater Planning Development Commission, on behalf of the Tri-Cities MPO, agreed to be a cooperating agency and manage the study. The DPRT and VDOT helped fund the study. Work began in August 2014 and a Study Working Group comprised of local, State and Federal agencies was created. The consultant conducted a public meeting in December of 2014 to explain the project purpose and need and the evaluation criteria for station sites. A second public meeting was held in September of 2015 to review preliminary environmental findings regarding candidate station alternatives and to provide opportunity for public comment on recommendations to the FRA.

In August 2015, the consultant provided a preliminary draft environmental assessment document Study Working Group members for review and comment. Comments from agencies, local government and the public were collected, summarized and included in the draft report. The consultant sent the draft report to FRA for review and site selection[12].

Air Transportation

Two airports, the Richmond International Airport (RIC) and the Dinwiddie County Airport, serve the Tri-Cities MPO.

RIC (Figure 49) is seven miles southeast of Richmond and provides passenger, freight, and military facilities. In 2016 six passenger and three freight carriers served RIC. RIC also provides aviation facilities in support of U.S Army Reserve and Virginia Army National Guard Aviation Units.

RIC is 167 feet (50.9 m) above sea level and has three runways summarized in Table 8.

Table 8: Richmond International Airport Runways

Runway Direction[13]	Feet/Meters	Surface
16/34	9,003/2,744	Asphalt
2/20	6,607/2,014	Asphalt
7/26	6,326/1,623	Asphalt

In 2015 RIC served approximately 99,000 landings/takeoff operations (LTOs), 3.5 million passengers, 58,500 tons of freight and 945 tons of mail.

[12] Federal Rail Administration signed the EA/FONSI for this study on March 10th 2017. The executive summary for the EA/FONSI is included as Appendix K.

[13] The runway numbers indicate the direction of a landing airplane to the nearest 10 degrees. Thus runway 16 has an actual heading of 160°

Figure 49: Richmond International Airport

The Dinwiddie County Airport (Figure 50) is a General Aviation airport five miles southwest of Petersburg approximately 192 feet (58.5 m) above sea level. It has two asphalt runways summarized in Table 9.

Table 9: Dinwiddie County Airport Runways

Runway Direction[14]	Feet/Meters	Surface
05/23	5,002/1,525	Asphalt
14/32	3,031/933	Asphalt

Change Drivers

This section of the Metropolitan Transportation Plan discusses some technologies that are changing transportation. We hope to identify for decision-makers things that could dramatically change the policy and infrastructure needs of the MPO over the course of the plan. Since the last update of the Metropolitan Transportation Plan at least four new technologies have begun to show up.

[14] The runway numbers indicate the direction of a landing airplane to the nearest 10 degrees. Thus runway 05 has an actual heading of 5°

Figure 50: Dinwiddie County Airport

Autonomous Vehicles

Autonomous vehicles are moving from design to reality. Within the past year there have been successful implementation of auto-piloted personal and commercial vehicles. Today there are competing opinions of what autonomous vehicles will bring. The only certainty is that autonomous vehicles will change the business model of personal transportation that has been in effect for the last century. In the twentieth century the business model of personal transportation was that the government provided the infrastructure and the individual provided the vehicle. In developed countries this meant that one of a family's biggest expenses has been transportation. The automobile also affected every aspect of life from location to housing design to urban design (e.g., vehicle parking).

Table 10 shows some example speculation about how autonomous vehicles will affect us.

Big Data

The smartphone has changed the world in many ways. One of those ways is the ability to track the devices as they move across the planning area. This improves our ability to change the way transportation demand is measured.

Table 10: Possible Effects of Autonomous Vehicles

	Possible Negative	Possible Benefit
Economy	The Fall of Existing Industries	New Companies take their place
Environment	More emissions	Less emissions
Jobs	Fewer trucking and delivery jobs	More opportunities in new industries
Personal Finances	Cars will be more expensive and	You be able to share a car with several people
Transportation Finance	Lower revenues from fuel tax. Need for new infrastructure	Phasing out older infrastructure
Safety	In the short term there may be more incidents	In the long term incidents may decline
Travel	Short term more delay More vehicle miles of travel	Less delay over time Less vehicle miles of travel
Urban Design	We may need more roads	We may be able to convert parking to other land uses.

Unmanned Aerial Vehicles (Drones)

These are remotely controlled vehicles, usually aircraft. They are used for jobs may not need a pilot, or jobs that require the ability to be onsite for extended periods. In transportation drones will fill four niches. First, they can help monitor and inspect infrastructure. Second they can improve design and environmental data. Third, they can improve our ability to monitor system performance, and finally they may provide 'last mile service for parcel or freight delivery.

Ride Haling Services

Ride haling services (*e.g.*, Uber or Lyft) have become popular. These services can best be described as Smartphone enabled car sharing services. They seem popular with business travelers and others willing to pay a premium for good service. Ride haling services compete with taxicabs and line haul transit services. These services are weakly regulated now and it is unclear how the market for them will change as regulators address public concerns.

Shale Oil/Gas

For years the United States has imported the oil needed to fuel its economy. However, US oil production has increased fifty percent (50%) since 2008. Within five years the United States may be energy independent (Yergin, 2013). Energy independence will stabilize energy costs across the economy and may make U.S. manufacturing more competitive (Zeihan, 2016).

Section 4 – The Scope of Transportation Planning

Section 4 shows the MPO's compliance with the requirements of transportation Planning. Paragraph §450.306 (b) of the Code of Federal Regulations lists eight factors that MPOs must consider when developing transportation plans. The eight planning factors are discussed below. The Federal Register citation for each factor is included as a subheading for its section.

§450.306(b) (1) Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency

The cities and counties of the Tri-Cities MPO have benefited from strong transportation infrastructure since their founding[15]. Historically, in south central Virginia, transportation supported agriculture, textiles, and tobacco. Our economy has changed significantly since 1990. As the regional economy changes this region is well placed to become part of the Atlantic logistics gateway into the mid-Atlantic and the Midwest. The drivers for this shift are:

- Changes in shipping patterns caused by the Panama Canal third set of locks;
- Proximity to the Port of Hampton Roads and the Port of Richmond;

[15] Petersburg was founded in the 17th Century at the head of navigation on the Appomattox River. There was an active port at Petersburg until the end of sail powered coasting vessels.

- Our location on the I-85/I-95 corridor (significant commuter and freight corridors on the Atlantic Seaboard);
- Our location within the CSX National Gateway to the Tri-Cities MPO (including Collier Intermodal Yard);
- The human capital at the US Army's Logistics Command at Fort Lee and the Commonwealth Center for Advanced Logistics Systems(CCALS);
- The human capital at the advanced manufacturing cluster and the Commonwealth Center for Advanced Manufacturing (CCAM); and
- Logistics/distribution centers for Ace Hardware, Amazon, and Walmart.

Figures 51, 52 and 59 show how well placed the Tri-Cities area is to develop a logistics based economy

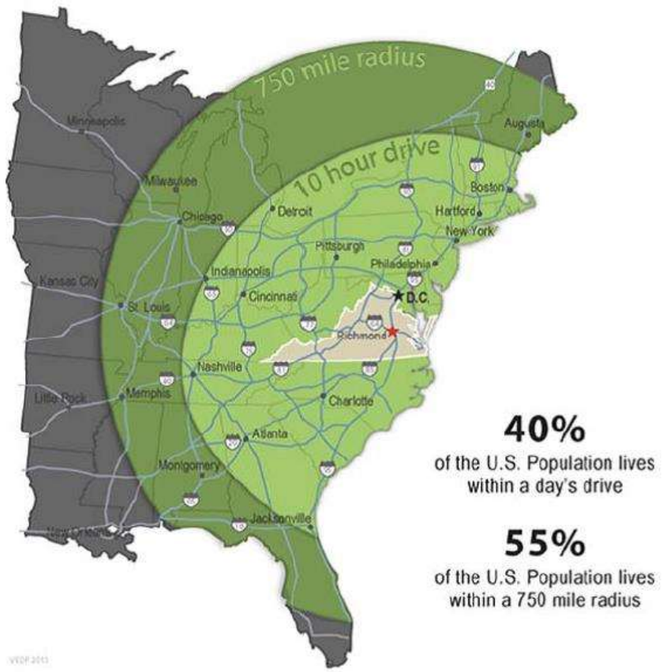


Figure 51: Driving Times from VA.

The Port of Virginia complex at Norfolk and Hampton Roads is a significant driver of Virginia's economy. Figure 52 shows east coast port tonnages for 2009 (Bureau of Transportation Stastics, 2010). By 2015 tonnage at Norfolk had risen from 29.1 million tons per year to almost 71 million tons per year. Fifty-seven percent (57%) of the cargo at Norfolk is exports. *Improving access to the Port of Virginia is important for the economy the Tri-Cities and Virginia.*

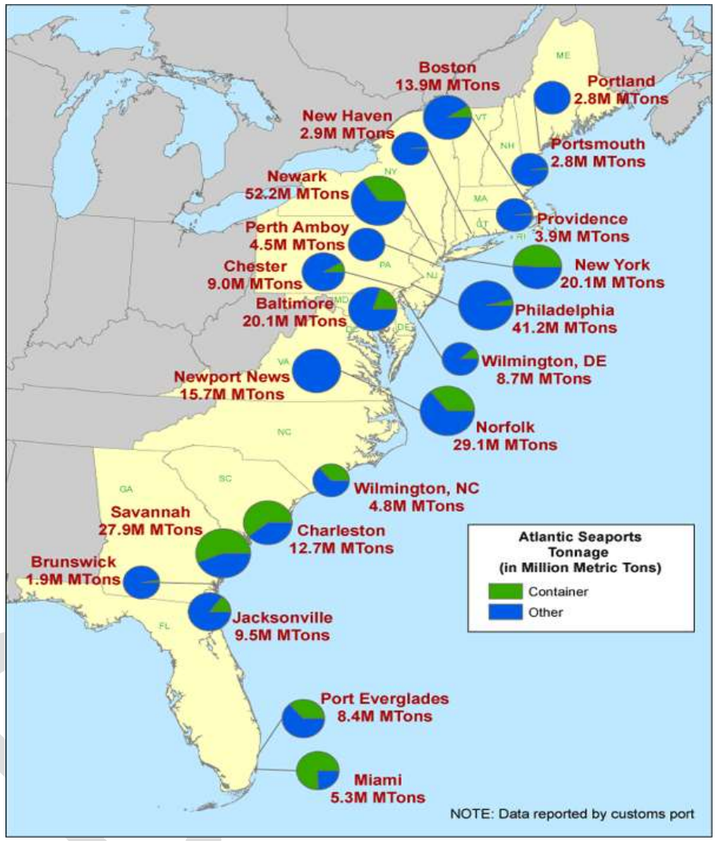


Figure 52: US Atlantic Port Tonnages-2009

§450.306 (b) (2) Increase the safety of the transportation system for motorized and non-motorized users

Transportation related incidents cause pain, suffering, and loss in the United States. In 2010 the National Highway Traffic Safety Administration estimated the total quality of life cost, lost household income, productivity, property damage and environmental consequences of traffic accidents at $836 billion.

MPO staff reviewed the National Highway Traffic Safety Administration's information for the MPO planning area. This information allowed the MPO staff:

- Identify transportation fatality trends over time;
- Compare the MPO's jurisdictions with Virginia and the United States; and
- Identify factors contributing to traffic fatalities.

Figure 52 shows highway fatalities in the Tri-Cities MPO from 2010 to 2014; the MPO area averaged 40 traffic fatalities per year over the period. The bars show the fatalities during each year. The standard deviation lines a frame of reference. *Based upon Figure 52 traffic fatalities in the Tri-Cities MPO will likely continue at the same level for the foreseeable future.*

The Commonwealth's 2011Strategic Highway Safety plan The Strategic Highway Safety Plan identifies six emphasis areas:

- Alcohol-related;
- Intersections;
- Speeding;
- Unrestrained occupants and
- Young drivers (Virginia 2012-2016 Strategic Highway Safety Plan, 2012).

The *Virginia's Strategic Highway Safety Plan* lists strategies and actions by emphasis area. The strategies are summarized below.

- Roadway Departure
  - Systematically review roadway departure crashes,
  - Make systemic improve inadequate or unsafe roadway shoulders,
  - Include safety in resurfacing projects.
- Speeding
  - Review roadway design and geometry to determine whether it contributes to speeding.
  - Develop support for proven countermeasures that can change the safety culture and result in greater acceptance of speed limits, i.e., automated speed enforcement, red light running …

- Intersections
    - Examine intersection design to ensure safety for all users including pedestrians and bicyclists.
    - Ensure VDOT policy to consider roundabouts at each intersection upgrade is widely known by regional and local transportation agencies and organizations.

The SHSP also identifies focus areas for each District. The Richmond District's Focus areas are:

- Distracted driving,
- Judicial education,
- Safety data, and
- Young drivers.

Figure 53 shows the highway related fatalities in the MPO's jurisdictions from 2010 to 2014.

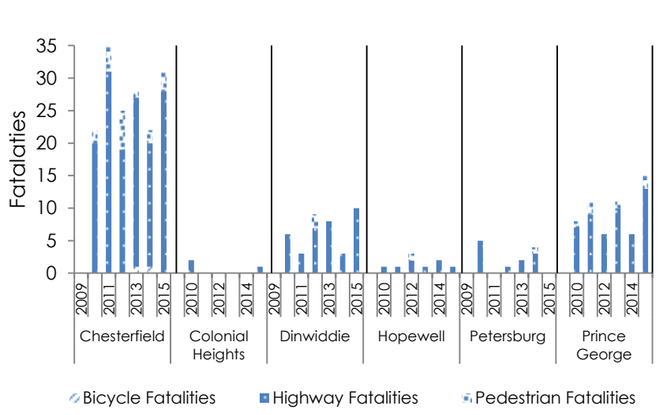


Figure 53: Fatalities by Jurisdiction

Walking and bicycling make up a small percentage of transportation but they are overrepresented in transportation related fatalities. Of the one hundred ninety-five (195) fatalities in the Tri-Cities Planning Area between 2010 and 2014 13% are either pedestrians or bicyclists[16]. Figure 54 shows the transportation related fatalities by mode in the Tri-Cities MPO.

The MPO also performed a correlation analysis to identify common factors that contribute to fatalities within the MPO's planning area. The correlation tables for the Tri-Cities MPO are shown in Appendix C. In the tables darker the color indicates stronger relationships between factors. For example, pedestrian fatalities (0.01) are not related to rollover accidents and are shown in white. However, fatalities are strongly correlated running off the road which has a correlation score of 0.99. Correlation points out a relationship. It does not show causality. For example bicycling fatalities in the Tri-Cities are correlated with speeding (score 0.91). This implies that motor vehicle speed was a factor in the incident.

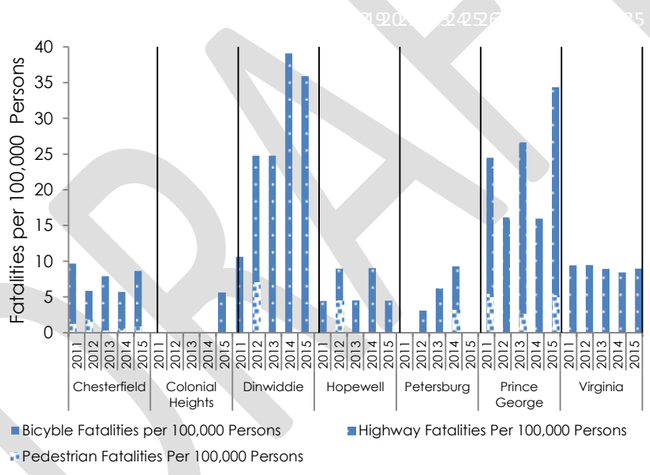


Figure 54: Fatality Rate by Jurisdiction

Appendix C supports these conclusions:

- Many fatalities involve a speeding vehicle leaving the roadway;
- Most fatalities involve either passenger cars or light trucks;
- Alcohol is most likely to be associated with passenger car accidents; and
- Heavy trucks are correlated to fatalities in Chesterfield and Dinwiddie Counties.

The information in Appendix C indicates that *enforcement and education should form the backbone of the effort to minimize traffic crashes in the Tri-Cities MPO.*

§450.306 (b) (3) Increase the security of the transportation system for motorized and non-motorized users

The MPO has tried to assess security for common risks and in the context of our current sense of concern.

The most significant security risk is for safe secure truck parking in across the Commonwealth of Virginia and the MPO's service area. The need for truck parking will be discussed in more detail under freight.

Because of the events of the last decade it seems prudent for the MPO to assess risk of an intentional attack on the transportation system. The Federal Bureau of Investigation defines terrorism *as the unlawful threat of or use of force of violence against people or property with the intention of coercing society or government* (Terrorism). To help assess the threat to transportation from terrorism the MPO analyzed terrorist incidents in the United States that occurred between 1982 and 2014 (Global Terrorism Database). The graphs from that analysis are shown in Appendix D.

It appears that an attack on the Tri-Cities transportation network is unlikely. However, Fort Lee is a potential target. Historically the Tri-Cities MPO has cooperated with Fort Lee's security efforts at the Sisisky and Mahone gates. *The MPO will continue to collaborate with Fort Lee on force protection.*

§450.306 (b) Increase accessibility and mobility of people and freight

In industrial countries there is significant pressure to separate industrial land use from residential and commercial land uses. This separation means that transportation planning must balance competing needs for accessibility and mobility.

[16] In 2013 2.8% of MPO commuters walked to work and 0.6% of MPO commuters bicycled

Human Service Transportation

Human services transportation planning is covered under FTA's Section 5310 guidance. The Human Services Transportation plan identifies the transportation needs of individuals with disabilities, older adults, and people with low incomes; provides strategies for meeting those needs; and prioritizes services for implementation. There are four plan elements:

1. Assessment of available services ;
2. Assessment of the transportation needs of individuals with disabilities and older adults;
3. Strategies,
    a. activities, and/or projects to address the gaps between services and needs,
    b. identification of opportunities to more efficiently deliver service; and
4. Implementation Priorities.

The MPO is incorporating the 2014 Coordinated Human Services Transportation Plan for the Tri-Cities MPO by reference. The 2014 Coordinated Human Services Transportation Plan is a cooperative effort of The Tri-Cities MPO, the Richmond Transportation Planning Organization and the DRPT. The study was launched in 2013 and the final report was issued in June of 2014 (KFH Group, 2014). The list of Human Services Transportation Providers is included in Appendix E as Table 18.

The Coordinated Human Services Mobility Plan identified the following strategies for meeting mobility needs:

1. Continue to support and maintain capital needs of existing coordinated human service/public transportation providers.

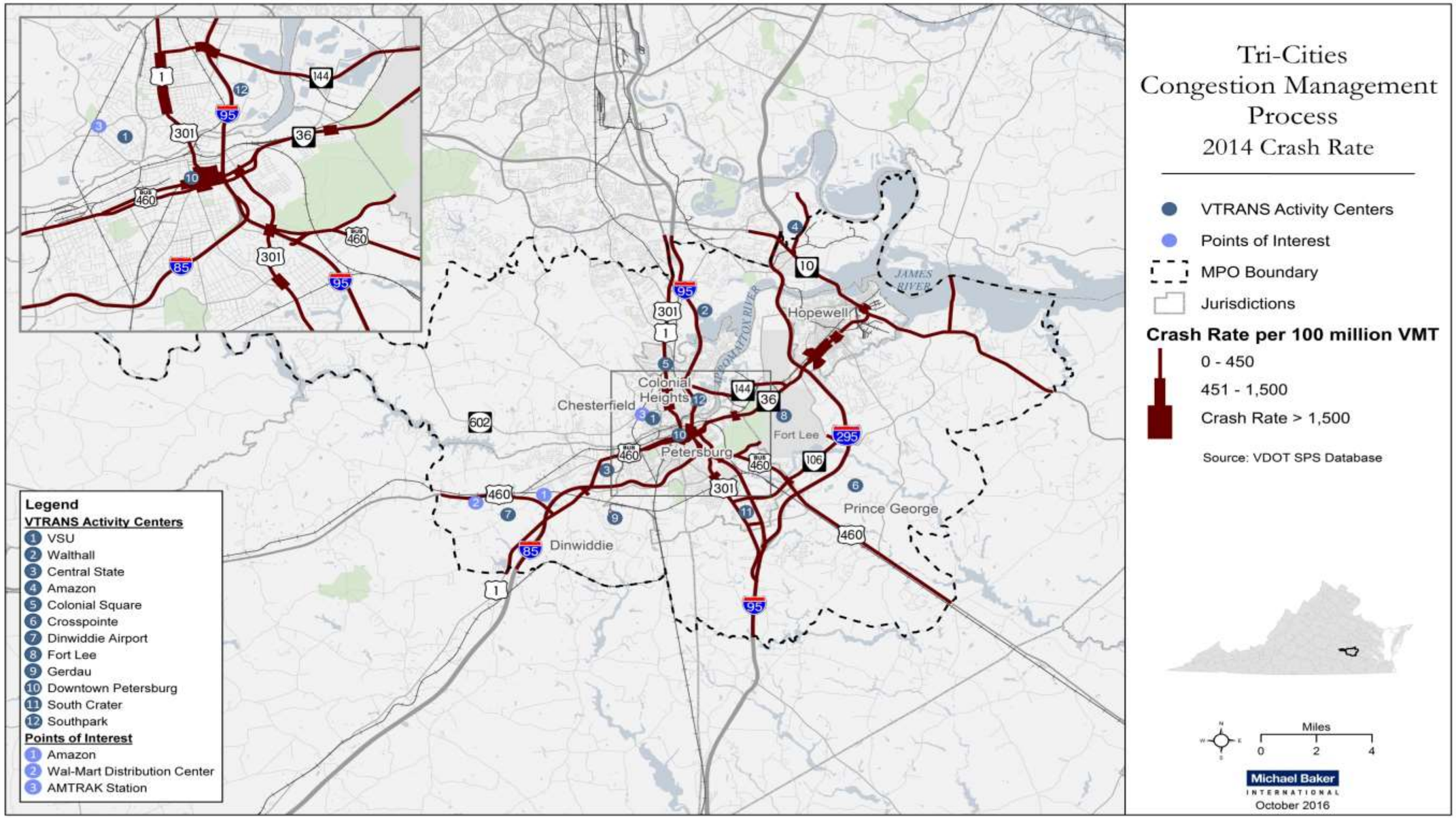


Figure 55: Highway Crash Rates for the Tri-Cities MPO

2. Increase the availability of demand/response and specialized transportation for seniors, people with disabilities, and people with lower incomes.
3. Find new funding partners to public transit/human service transportation.
4. Expand outreach and information on available transportation options in the region.
5. Improve programs providing travel training to customers, human service agency staff, medical facility personnel, and others.
6. Improve coordination among public transit, private and human service transportation providers.
7. Provide targeted shuttle services to employment opportunities.
8. Use the Veteran's Transportation and Community Living Initiative Program to establish regular trips to the McGuire VAMC.
9. Provide more and more frequent public transportation services.
10. Improve built environment to enable access to available transportation options.
11. Expand access to taxis and private transportation operators.
12. Provide taxicab vouchers, travel training and bus buddies as potential solutions for the transportation dependent.
13. Provide flexible transportation options and more specialized transportation services or one-to-one services using volunteers (KFH Group, 2014).

Freight

Freight is critical to the economy. Colonial Heights, Petersburg, and Hopewell[17] exist, in part, because of the economics of freight movement in the seventeenth and eighteenth centuries.

The Virginia Multimodal Freight Plan identified nine issues affecting freight movement. The nine issues are:

1. System Performance,
2. System Management,
3. Truck Operations,
4. Rail System Capacity/Modernization,
5. Port Accessibility,
6. Multimodal Connectivity,
7. Land Use and Transportation Coordination,
8. Multistate coordination, and
9. Funding (Cambridge Systematics, 2014).

The Washington to North Carolina Corridor and the Heartland Corridor cross one another in the Tri-Cities MPO. This intersection gives the Port of Virginia access to the mid-Atlantic, the Southeast, and the Midwest.

The Washington to North Carolina (I-95) Corridor

The Washington to North Carolina Corridor (Figure 56) is a critical link in the national freight system and connects producers with users, warehouses and ports all along the east coast. Because of the diverse economies in the corridor about 54% of the freight in the corridor is passing through (Cambridge Systematics, 2014).

VDOT's truck parking study found a shortage of truck parking along the I-95 and I-295 (Kimley Horn, 2015). The MPO has also identified a potential need for truck parking for oversize and overweight loads near the North Carolina state line because of differing regulations on the hours of movement of oversize/overweight vehicles in the Commonwealth and North Carolina (Edwards, 2017).

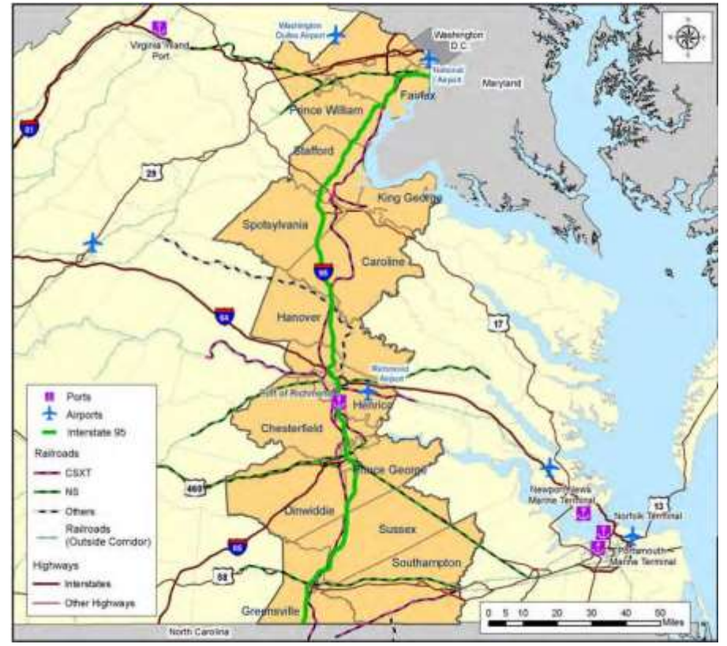


Figure 56: Washington to NC Corridor (Cambridge Systematics, 2014)

The Port of Richmond (Richmond Marine Terminal) is south of the City of Richmond on the James River on Deep Water Terminal Road (Figure 57). This facility is owned by the City of Richmond and is leased to the Virginia Port Authority (VPA).

In 2009, the Richmond Area Metropolitan Planning Organization gave money to start a barge service from the Port of Virginia to the Port of Richmond. The VPA has been continued this service and expanded it to a three-day per week service), with a goal to expand this service to five days per week.

As volumes increase at the Port of Virginia, the opportunities to shift freight from highway to barge increase. As volumes to the Port of Richmond increase, significant job development opportunities will be created near the Port in the logistics, transportation, and warehousing sectors.

[17] All were near the head of navigation on the Appomattox River. Colonial Heights and Petersburg also had a busy trade in transferring cargoes across the river before the CSX A Line bridge was built.

Figure 57: Richmond Marine Terminal

The Heartland Corridor

The Heartland (US 460) Corridor runs east to west across the Commonwealth and connects the Port of Virginia to the Mid-west. Because the corridor serves as an international gateway about 71% of the freight in the corridor is in transit (passing through). The Heartland corridor crosses the Washington to North Carolina Corridor at Petersburg.

The Port of Virginia is the east end of the Heartland Corridor. The Port of Virginia is a key shipping gateway for the United State and is one of ports at which exports exceed imports (Bureau of Tranpsortation Statistics, 2017/2018).

VDOT's truck parking study identified gaps along the Heartland corridor where there is no truck parking. There are gaps on US 460, without truck parking immediately east and west of the Tri-Cities MPO (Kimley Horn, 2015). Although trucking dominates freight movement rail it is more to move freight long distances. Figure 56 shows rail travel times from the Port of Virginia to the mid-continent rail yards at Chicago, Kansas City and Dallas.

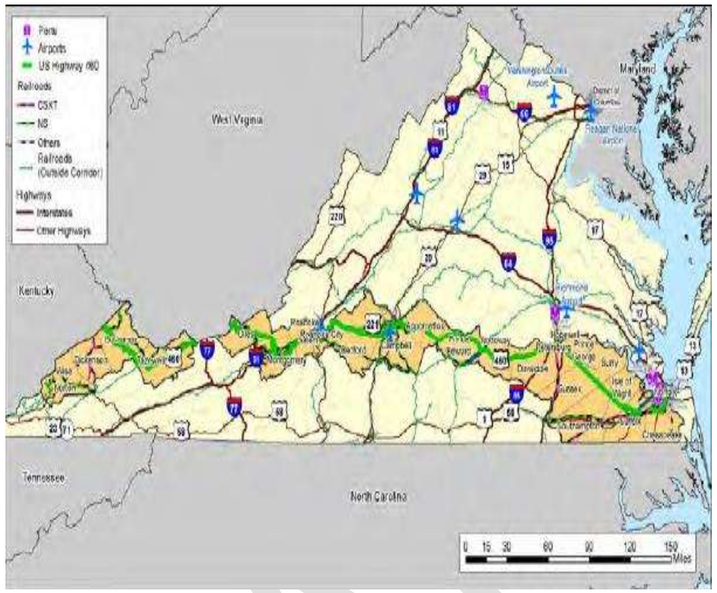


Figure 58: Heartland Corridor (Cambridge Systematics, 2014)

Both CSX and Norfolk Southern are improving their tracks to carry double-stack containers. In 2016 60.6% of cargo at the Port of Virginia moved by truck, 36.7% by rail and 2.7% by barge (Port of Virginia, 2017) .Several yard facilities are in the MPO area as shown in Figures 60, 61 and 62.

Graphic Source: Port of Virginia

Figure 59: Rail Distances from VA (Virginia Advantages: Distribution & Global Logistics, 2015)

Figure 60 shows the location of the Norfolk Southern Broad Street Yard on Route 36 in Petersburg.

Figure 60: NS Broad Street Yard

Figure 61 shows the Norfolk Southern Automobile Distribution facility off Wagner Road in Petersburg. The 40 acre secure site operates round the clock. It has capacity for sixty (60) rail cars and 1,780 automobile parking spaces (NS Automotive Group, 2008).

Figure 61: NS Automobile Distribution Facility

Figure 62 shows the CSX Collier Yard near I-85 south of Petersburg.

Figure 62: CSX Collier Yard

Figure 64, following, shows heavy truck flows within the Tri-Cities MPO. Figure 63 shows that freight is moving on I-85, I-95 and I-295; facilities intended to carry freight. However, around eighteen percent (18%) of vehicles on US 460 east are heavy trucks indicating a strong movement towards Norfolk. Also about twelve percent (12%) of traffic on the two-lane Benjamin Harrison Bridge is heavy vehicles.

§450.306 (b) (5) Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns

Protect and Enhance the Environment

The lifetime of the *Tri-Cities Area Transportation Plan* is 23 years[18]. The recommendations of the planning process are preliminary. Including a project in the Metropolitan Transportation Plan is an expression of project support by MPO members. Environmental analysis is handled under the National Environmental Policy Act (NEPA) after a project is scheduled for implementation. Figure 63 outlines the project development process.

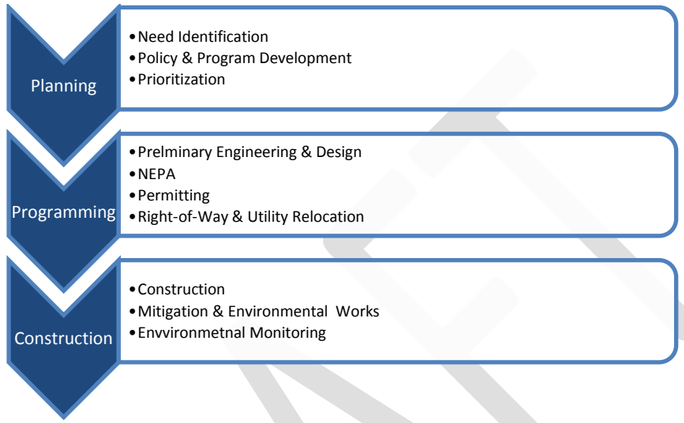


Figure 63: Project Development

Aside from ambient air quality, offsetting environmental impacts during the long range planning is not required by law. While detailed environmental analysis of the metropolitan plan is not required, MPOs are encouraged to consult with resource agencies when they develop the metropolitan transportation plan.

Interagency consultation provides an opportunity to compare transportation plans with environmental resource plans, identify environmental mitigation options, and opportunities with potential to restore and maintain environmental resources. The Tri-Cities MPO asked the resource agencies listed in Table 19 (Appendix F) to review the draft Metropolitan Transportation Plan as part of the stakeholder involvement process.

In addition to NEPA, Virginia's State Environmental Review Process directs the project-by-project interagency review, study and identification of environmental concerns. Related requirements that typically apply at this stage involve public hearings, environmental permit-processing, and NEPA studies. Usually, a variety of environmental documentation, permit and mitigation needs are identified and environmental findings are considered and evaluated. Environmental concerns differ by project and location. As environmental studies are conducted and reviewed, mitigation plans are developed and committed to in the project documents. In the end the environmental commitments become part of the project specifications and contracts. Environmental management systems then are used to monitor, and ensure compliance with the environmental mitigation commitments.

In order of preference environmental work includes:

1. Avoiding impacts by choosing another project or design;
2. Minimizing the impacts by adjusting the project's footprint, employing special features or scheduling work to avoid certain timeframes; or
3. Mitigate the impacts by replacement or substitute environmental resources of equivalent or greater value.

Figure 65 shows sensitive species and habitats in relation to the projects in the MTP. Table 11 illustrates each of the natural resources shown on Figure 65. The table gives decision-makers and residents an idea of the natural resources in the planning area. Table 11 is only a guide. During NEPA each project will be studied to ensure the accuracy and completeness of the information.

Table 12 gives examples of avoidance, minimization and mitigation for each regulation that affects transportation projects.

[18] By law the minimum lifespan is 20 years when the MPO adopts the plan.

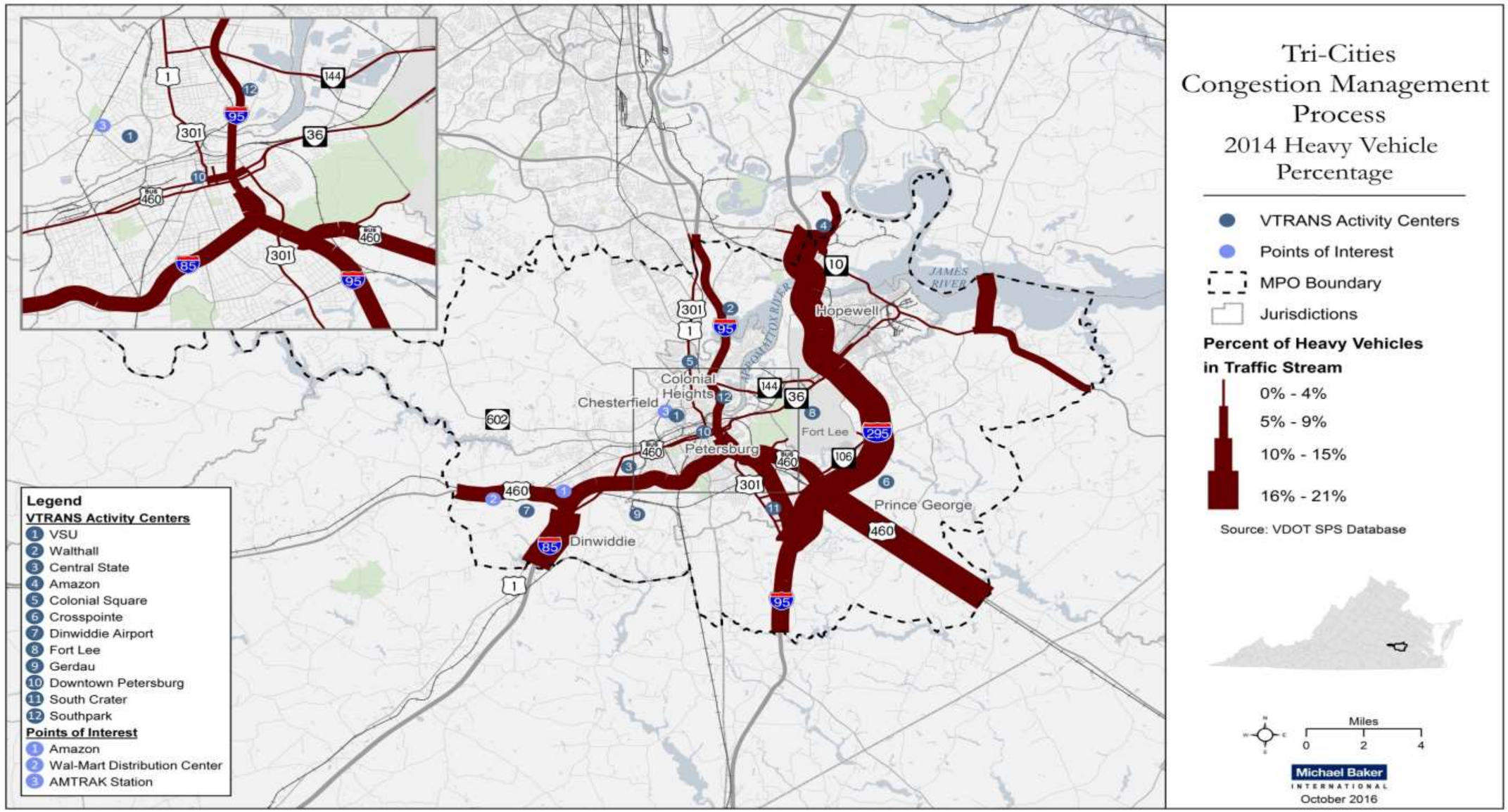


Figure 64: Heavy Truck Flows

ENVIRONMENTAL SENSITIVTY MAP

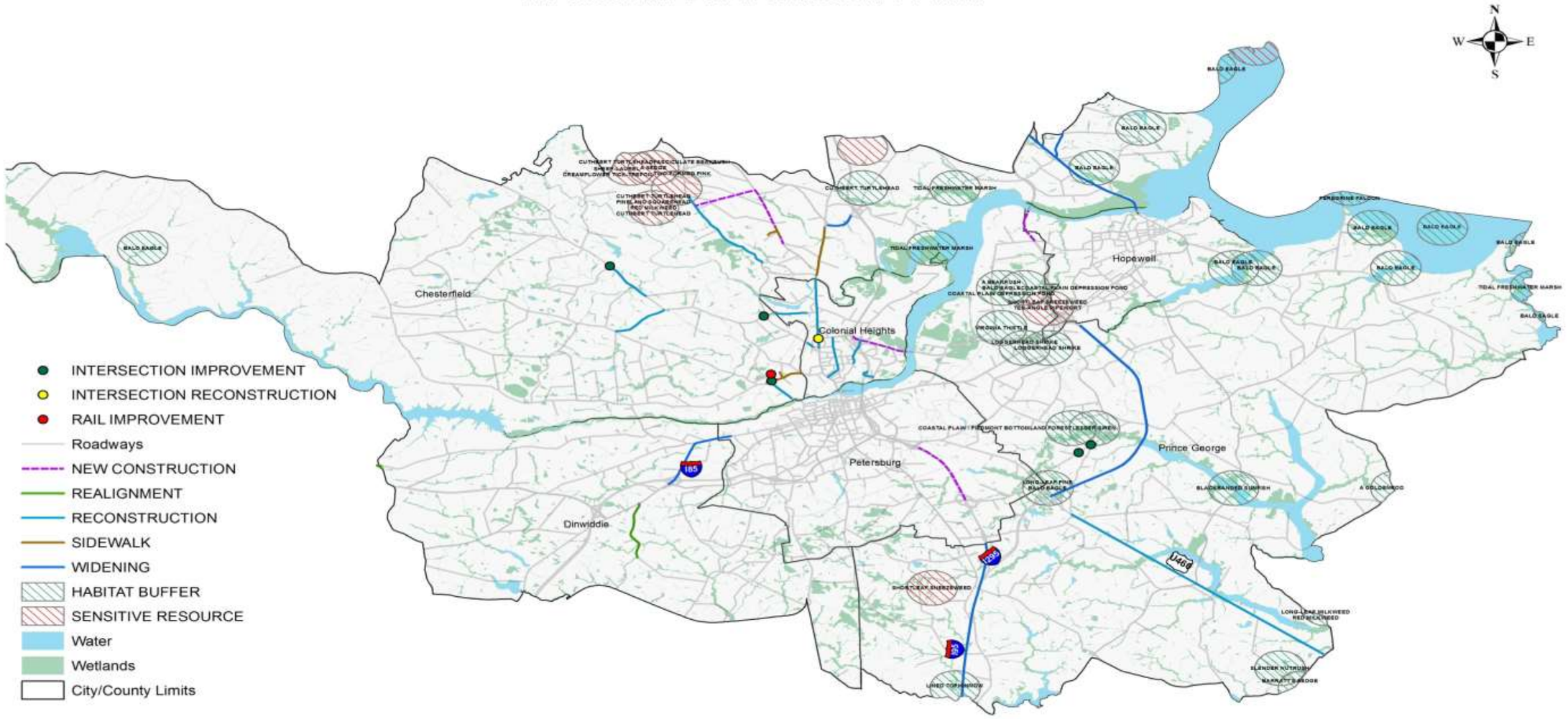


Figure 65: Environmental Sensitivity Map

Table 11: Sensitive Species

Resource	Chesterfield	Colonial Heights	Dinwiddie	Hopewell	Petersburg	Prince George
A. Goldenrod 	Yes	Not Reported within the MPO	Not Reported within the MPO	Yes	Yes	Yes
Bald Eagle 	Yes	Not Reported within the MPO	Not Reported within the MPO	Yes	Yes	Yes
Barking Tree Frog	Yes	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO
Barratt's Sedge 	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Yes	Not Reported within the MPO	Yes

Resource	Chesterfield	Colonial Heights	Dinwiddie	Hopewell	Petersburg	Prince George
Black-Banded Sunfish 	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Yes	Not Reported within the MPO	Yes
Bottomland Forrest: Piedmont / Coastal Plain 	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Yes
Broadleaf Sneezeweed 	Not Reported within the MPO	Yes	Not Reported within the MPO	Yes	Not Reported within the MPO	Not Reported within the MPO
Coastal Plain Recessional Pond 	Not Reported within the MPO	Not Reported within the MPO	NA	Not Reported within the MPO	Not Reported within the MPO	Yes

Resource	Chesterfield	Colonial Heights	Dinwiddie	Hopewell	Petersburg	Prince George
Cuthbert Turtlehead 	Yes	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO
Lesser Siren 	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Yes	Not Reported within the MPO	Yes
Lined Topminnow 	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Yes	Not Reported within the MPO	Not Reported within the MPO
Little Leaf Sensitive Briars 	Yes	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO
Loggerhead Shrike 	Yes	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Yes

Resource	Chesterfield	Colonial Heights	Dinwiddie	Hopewell	Petersburg	Prince George
Longleaf Pine 	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Yes	Yes
Peregrine Falcon 	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Yes	Not Reported within the MPO	Not Reported within the MPO
Pineland Squarehead 	Yes	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO
Red Milkweed 	Yes	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO

Resource	Chesterfield	Colonial Heights	Dinwiddie	Hopewell	Petersburg	Prince George
Sheep Laurel Sedge 	Yes	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO
Shortleaf Sneezeweed 	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Yes
Slender Nutrush 	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Yes	Not Reported within the MPO	Yes
Ten Angled Pipewort 	Yes	Not Reported within the MPO	Not Reported within the MPO	Yes	Not Reported within the MPO	Yes

Resource	Chesterfield	Colonial Heights	Dinwiddie	Hopewell	Petersburg	Prince George
Tidal Freshwater Marsh 	Yes	Yes	NA	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO
Virginia Thistle 	Yes	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO	Yes
Wild Mugwort 	Not Reported within the MPO	Not Reported within the MPO	NA	Not Reported within the MPO	Not Reported within the MPO	Not Reported within the MPO

Table 12: Environmental Mitigation Strategies

Resource	Key Applicable Requirements	Potential mitigation strategies	Potential mitigation areas for project implementation
Neighborhoods and communities, and homes and businesses	**Uniform Relocation Assistance and Real Property Acquisition Policy Act at 42 USC 4601 et seq.** **Executive Order 12898 (Environmental Justice)**	• Avoid	• Choose an alternative that minimizes property takings/relocation
		• Minimize	• Minimize the project's footprint • Select lower design criteria • Use Context sensitive designs solutions for communities (appropriate functional and/or esthetic design features)
		• Mitigate (for homes and businesses in accord with 49 CFR 24)	• Mitigation on-site or in the community • Sound barriers or visual screening
Cultural resources	**National Historic Preservation Act at 16 USC 470**	• Avoid	• Choose an alternative that avoids the site, district or resource
		• Minimize	• Landscaping for historic properties; • In place preservation for Archaeological Sites • Minimize the project footprint
		• Mitigate	• Excavation and recording for archaeological sites • Use design features (e.g., weathered guardrail, stamped pavement, or street furniture to maintain context) • Relocate or reuse transportation infrastructure for other purposes • Re-purpose rights-of-way (e.g., rails trails)
Parks and recreation areas	**Section 4(f) of the U.S. Department of Transportation Act at 49 USC 303**	• Avoid	• Cooperative Planning (*i.e.*, ensuring that park master plans include future transportation facilities) • Choose an alternative that avoids the site, district or resource
		• Minimize	• On site screening or on-site replacement of facilities
		• Mitigate	• Replace the affected property • Improve the affected property by adding facilities
	Section 6f of the Land and Water Conservation Act	• Avoid	• Cooperative Planning (*e.g.*, ensuring that park master plans include future transportation facilities) • Choose an alternative that avoids the site, district or resource
		• Minimize	• Minimization the project footprint before required mitigation.
		• Mitigate	• Replace the affected property adjacent to existing (requires replacement with a property with at least the same area and of equivalent use)
Wetlands and water resources	**Clean Water Act at 33 USC 1251-1376; Rivers and Harbors Act at 33 USC 403 Chesapeake Bay Act, VA.**	• Avoid	• Choose an alternative that avoids the site, district or resource • Choose an alignment that avoids the site, district or resource

		• Minimize	• Choose designs that limit the extent of encroachment into wetlands and riparian buffers
			  ○ Cross jurisdictional wetlands a their narrowest point
			  ○ Use bridging to minimize takings of jurisdictional wetlands
			  ○ Reduce median and lane widths where needed and practical
			  ○ Use asymmetrical widening (i.e., widen on the side away from jurisdictional wetlands)
			  ○ Avoid stream relocations
			• Design outfalls and filters to comply with NPDES requirements
			  ○ Locate stormwater management structures outside jurisdictional wetlands

		• Mitigate	• In kind replacement at ratios greater than 1:1 • Restoration of damaged wetlands • Recreation of destroyed wetlands • Creation of artificial wetlands

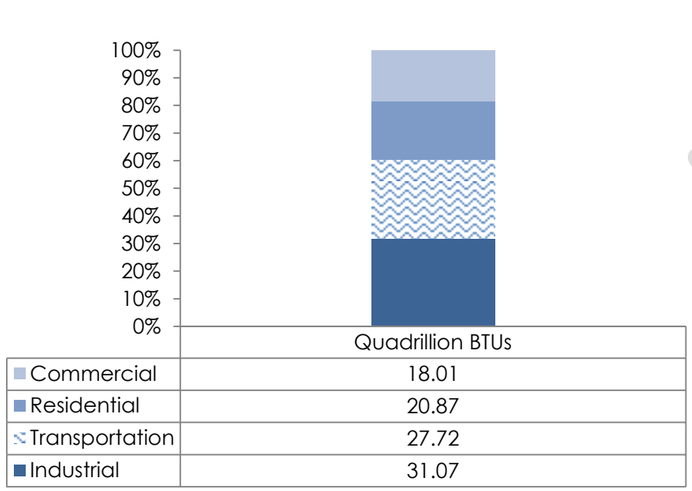
Resource	Key Applicable Requirements	Potential mitigation strategies	Potential mitigation areas for project implementation
			• Replace the property in kind and nearby • Replace the property in kind and offsite • Use mitigation banks to replace the property
Forested and other natural areas	**Agricultural and Forest District Act (Code of VA Sections 15.2-4305; 15.2-439; 15.2-4313); Open Space Land Act (Section 10.1-1700-1705, 1800-1804)**	• Avoid	• Choose an alternative that avoids the site, district or resource
		• Minimize	• Use a context sensitive design approach to minimize the project footprint • Use design exceptions and variances
		• Mitigate	• Replace the property in kind and nearby • Replace the property in kind and offsite • Use mitigation banks to replace the property
Prime and Unique Farmland	**Farmland Protection Policy Act of 1981 at 7 USC 4201-4209, Agricultural and Forest District Act (Code of VA Sections 15.2-4305; 15.2-4307 – 4309; 15.2-4313)**	• Avoid	• Choose alignments that avoid the impact
		• Minimize	• Use a context sensitive design approach to minimize the project footprint • Use design exceptions and variances
		• Mitigate	• Replace the forestry operation within existing agricultural/forestal district replacement property for open spaces easements to be contiguous with easement • Landscaping within existing rights of way; • Environmental compliance monitoring
Threatened and Endangered Species	**Endangered Species Act at 16 USC 1531-1544**	• Avoid	• Choose alignments that avoid the impact • Memoranda of Agreements for species management;
		• Minimize	• Time of year restrictions; construction sequencing • Minimize footprint using design exceptions and variances; • Environmental compliance monitoring
		• Mitigate	• Relocation of species to suitable habitat adjacent to project limits • Develop habit(s) on transportation right-of-way and structures(e.g., nesting sites on bridge structures)
Air Quality	**Clean Air Act at 42 USC 7401-7671, and Conformity regulations at 40 CFR 93**	• Avoid	• Voluntary shifts to other modes • Clean Fuel & Alternative Fuel Vehicles
		• Minimize	• Alternative Fuel program • transportation emission reduction measures
		• Mitigate	• Transportation control measures

Promote energy conservation

The reasons to conserve energy are simple:

- money used to purchase fuel is not available for other purposes,
- The demand for energy contributes to the need to import energy,
- Wasted Energy Contributes to a large greenhouse gas footprint.

According to the United States Energy Information Administration, the United States used 97.72 quadrillion British Thermal Units (Quad Btus) of energy in 2015. Transportation is the second largest energy user in the United States. Only the Industrial Sector uses more energy than transportation. Despite advances in battery technology, the transportation sector depends upon liquid fuels. Figure 66 shows the energy use by economic sector for 2015. As shown in the tab le transportation used 27.72 quads of energy or 28.6%. Because most transportation is fossil fuel based this means that transportation is a big oil user and a big contributor to greenhouse gas emissions.



	Quadrillion BTUs
Commercial	18.01
Residential	20.87
Transportation	27.72
Industrial	31.07

Figure 66: Energy Use by Economic Sector

Figure 67 shows how much transportation in the Tri-Cities MPO area contributes to our greenhouse gas footprint.

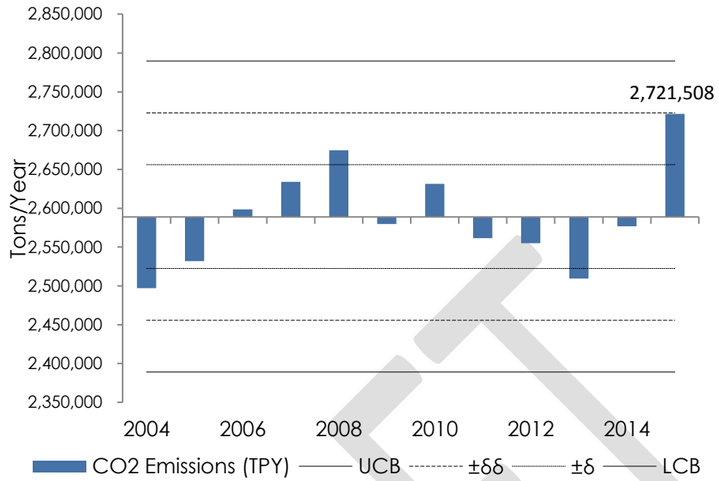


Figure 67: Tri-Cities MPO Tailpipe CO2 per Year

As shown in Figure 68 the MPO can encourage fuel efficiency in: vehicle fleets, vehicle fuels, operations & maintenance and travel.

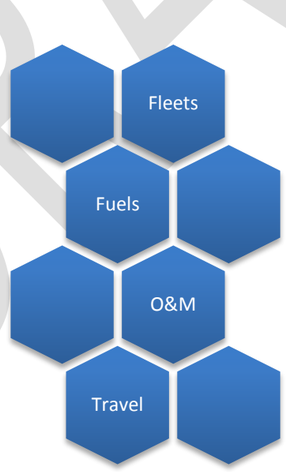


Figure 68: Energy Efficiency Paths of Influence

USDOT studied the transportation related to energy conservation and greenhouse gas reduction. The MPO believes that the measures USDOT suggests are beneficial because of more than energy conservation or emissions reductions.

Vehicles and Fleets

More efficient motor vehicles and fleets are critical in conserving fuel, lowering transportation's environmental footprint and meeting our economic goals. Since 1970 fleet fuel economy risen from twelve (12) miles per gallon to Seventeen and one-half (17.5) miles per gallon. This is an improvement of 0.94% per year. The new Corporate Fuel Economy (CAFE) standards should result in a 31% reduction in carbon dioxide emissions across the United States. For smaller MPOs that are growing slowly the CAFE standards will save energy because fuel economy is improving faster than travel is growing (David T. Hartgen, M. Gregory Fields, Adiran Moore, 2011).

Vehicle efficiency means different things for different vehicle types as shown in Table 13. Because vehicle strategies nationally, the MPO has mentioned them only for completeness.

Table 13: Fuel Efficiency Strategies for Vehicles

	Weight Reduction	Hybridization /Electrification	Aerodynamic \ Improvement
Passenger Cars	Yes	Yes	Yes
Buses	Yes	Yes	No
Heavy Trucks	No	Maybe	Yes

Fuels

Transportation has focused energy conservation on travel and fuel because they are the most obvious to us. The goal is to move from 100 percent fossil fuel to 100 percent renewable electric. There are several steps along this route:

1. 100 Percent Fossil Fuel
2. Fuel Blends
    a. Ethanol Blends
    b. Bio-Diesel Blends
3. Hybrid Vehicles
4. Fuel Cell Vehicles
5. Electric Vehicles.

The MPO has supported Clean Fuels by funding a clean fuel conversion project using CMAQ money.

Operations and Maintenance

Figure 69 shows a typical roadway construction and maintenance lifecycle. The lifecycle offers opportunities to reduce energy consumption by using different methods or materials.

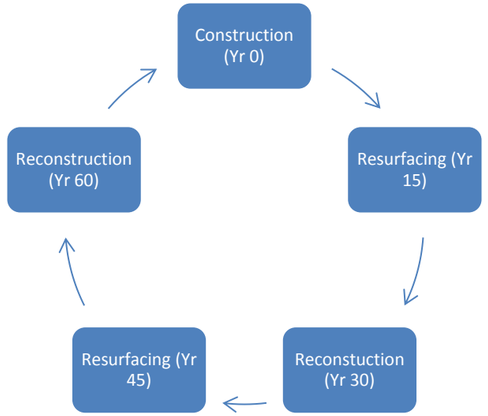


Figure 69: Typical Roadway Lifecycle

Each phase of transportation operations has many opportunities to conserve energy and eliminate greenhouse gas emissions. A complete treatment of these opportunities is beyond the scope of the transportation plan. However, a concise source of information is FHWA's Carbon Estimator Final Report and User's Guide (Frank Gallivan, Eliot Rose, James Choe, Scott Williamson, Jack Faucett, Jeff Houk, 2014).

Travel

Figure 70 shows TTI's estimate of the extra fuel used in the Richmond Urban Area because of congestion. Energy conservation benefits from congestion reduction and quality improvement. Reducing delay by implementation projects from the Congestion Management Process (CMP) is part of the Tri-Cities MPO's strategy to save energy.

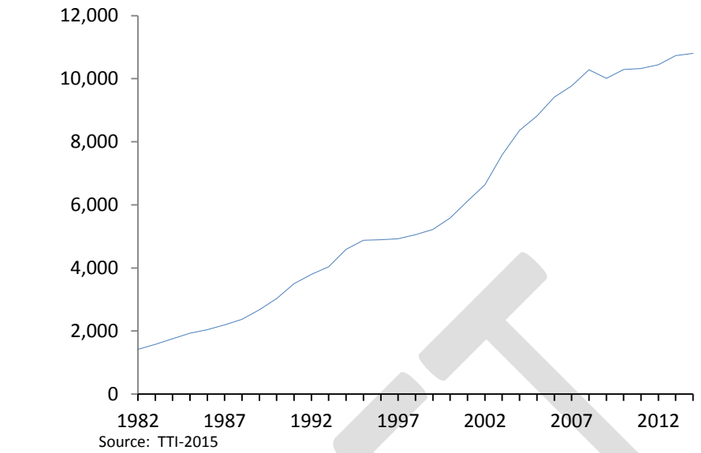


Figure 70: Excess Fuel Used due to Congestion

Improve the quality of life

Congestion

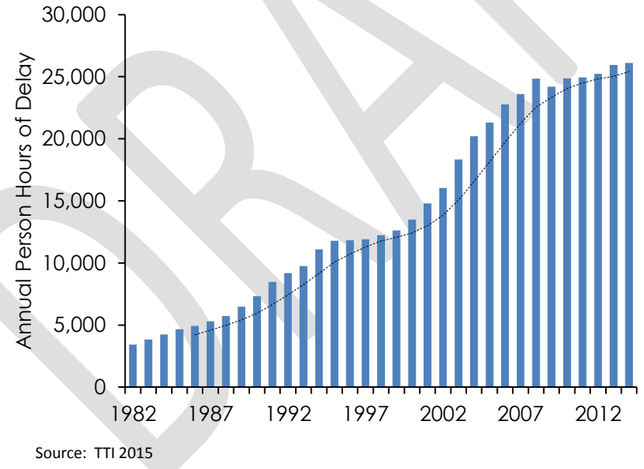


Figure 71: Hours of Delay per Person

Air Quality

USEPA designated the Richmond Metropolitan as attainment for the eight-hour ozone standard on May 29, 2007. The Tri-Cities MPO as part of the Richmond Metropolitan Region is also classified as attainment for ozone, and all other criteria pollutants.

The National Ambient Air Quality standard for ozone is that the average of the fourth highest hour of the year, for three consecutive years, must below the ozone standard[19]. Figure 10 shows the most recent monitoring data for the Tri-Cities MPO, collected by the Virginia Department of Environmental Quality. Figure 72 shows five years of ozone values for the four monitoring stations covering the Tri-Cities MPO. The data for 2010 are included to show the downward trend in ozone values for the Tri-Cities area. The figure shows the ozone standard in light blue. It also shows the variability of ozone measurements in the Tri-Cities area based upon the twelve values that EPA would use to make a designation. The information presented in Figure 10 leads to the following conclusions:

1. Current ozone values in the Tri-Cities MPO are below both the 2008 ozone standard and the stricter 2016 standard;
2. Because 99% of ozone values are below 69 parts per billion (ppb) it is unlikely that a single ozone season will result is designation to nonattainment.

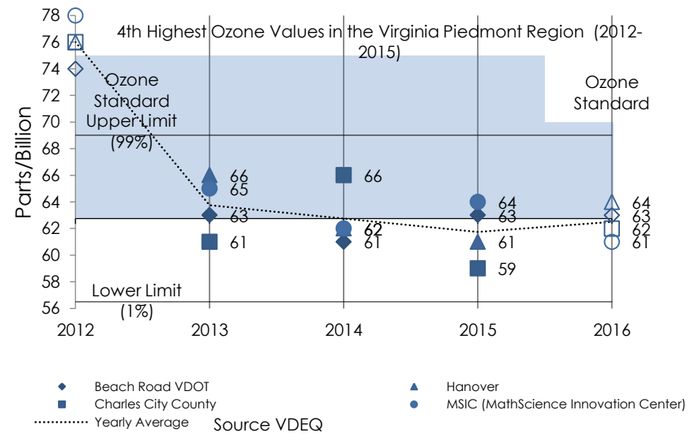


Figure 72: Ozone Trend in the Tri-Cities MPO

[19] In 2016 USEPA lowered the ozone standard to 70 parts per billion but kept the fourth highest hour and the rolling three year average. A violation at a single monitor is sufficient for an area to be declared nonattainment; however, a monitor may exceed the standard without violating the standard.

Promote consistency between transportation improvements and State and local planned growth and economic development patterns

Figure 73 shows the land use and transportation feedback loop. Because each influences the other they must be considered together.

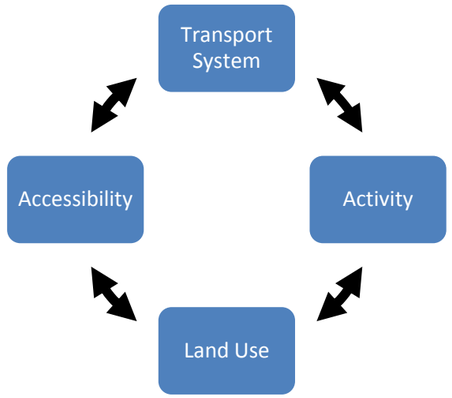


Figure 73: Land Use Transportation Cycle

Transportation decisions impact land use and development and must take these plans into consideration. Transportation and land use plans must be coordinated to ensure that the benefits accompanying a new transportation project are not negated by inconsistent land use along the improvement corridor. Coordination between land use and transportation is a necessity to create and maintain strong communities.

Land Use and Comprehensive Planning in the Tri-Cities Area

Local governments have authority over land use in Virginia. The Code of Virginia defines their authority, and the tools available to them to control land use. The land use and transportation tools available are listed alphabetically with a short summary.

- Capital Improvement Programs
  Local capital improvement programs include information on the schedule and financing for public facilities needed to support land development over a five-year period. The Petersburg and Hopewell capital improvement programs include consideration of redevelopment of existing areas.
- Comprehensive Plan
  Each local government in the MPO study area has a comprehensive plan. Comprehensive Plans guide growth and development. They outline a jurisdiction's long-term development plan and define the goals and objectives for achieving the desired level of land use and development. According to Title 15.2 of the Code of Virginia, the plan must be reviewed at least every five years.
- Official Maps
  An official map may be prepared and used to indicate future location of transportation facilities and utilities. Local governments are required to consult with State agencies regarding facilities under their purview and to submit the official map for review. The official is useful coordinating State and local plans along transportation corridors.
- Site Plan Reviews
  Site plan review process may be established and used by a locality to require land developers to submit a visual plan for developing land parcels. The site plan indicates the location of the parcel to be developed, existing and proposed roadways, drainage, vegetation and other factors pertinent to how the development of the parcel will meet applicable requirements of local land development ordinances.
- Subdivision Ordinances
  Subdivision ordinances regulate land parcel division to promote orderly development consistent with local goals. These ordinances include standards for lot size and specifications for infrastructure needed to support land development.
- VDOT Review
  In 2012 session the Virginia General Assembly, approved legislation requiring local and regional transportation plans to be reviewed by Virginia Department of Transportation for consistency with the State transportation plan and Six-Year Improvement Programs.
- Zoning Ordinances
  Local governments are authorized to enact zoning ordinances to implement the land use and other elements of the comprehensive plan. Zoning ordinances separate the land area within a jurisdiction into different zones and specifies the type of land use activities permitted. The intent of zoning is to promote an arrangement of compatible land uses that benefit the entire community by separating incompatible land uses.

Access Management

Access management controls the number, spacing and type of entrances to roadways. The purposes of access management are to maintain mobility, minimize vehicle conflicts and improve safety for the traveling public.

The Virginia General Assembly has authorized VDOT to implement access regulations to:

- Reduce congestion;
- Improve safety by reducing traffic conflicts;
- Reduce the need for new roadway capacity;
- Promote the efficient movement of goods and people;
- Preserve public investments in highways; and
- Ensure that private property receives reasonable access to highways.

VDOT's access management regulations apply to State maintained highways. The access management rules address:

- Spacing (entrances, intersections, median openings and traffic signals);
- Safe location of entrances (relative to intersection turning movements and from interchange ramps);
- Providing vehicular and pedestrian circulation between adjoining properties; and
- Sharing highway entrances.

Joint Land Use Study

Fort Lee, home of the US Army's Logistics command, is one of the Department of Defense's major east coast training facilities. Like many Army facilities created to support World War I (*e.g., Fort Belvoir,* Fort Bragg) what was originally a rural landscapes has changed to a more urban or suburban landscape. Fort Lee has also benefited from the Base Closing and Realignment

(BRAC) process. It added missions, commands and staff. Fort Lee contributes $2.4 Billion and 28,000 jobs to the local economy. In response to the BRAC process the Tri-Cities region, including Fort Lee, instituted the Joint Land Use Study. The study found that:

- Most of Fort Lee's operational impacts are contained within its boundaries;
- Fort Lee is surrounded by strong boundary features; and
- Fort Lee and the region have compatible growth patterns.

The recommendations of the Joint Land Use Study are:

- Formalize communications and land use coordination between Fort Lee and the surrounding communities;
- Develop a regional Geographic Information Systems database to monitor land use changes around Fort Lee;
- Inform the public of the location of noise, safety and other impacts related to Fort Lee's Mission;
- Local governments are encouraged to adopt Comprehensive Plan Amendments supporting the JLUS study recommendations;
- Fort Lee should regularly update its impact assessments to ensure the sustainability of its training mission.

Rural Transportation Program

Developing a transportation plan for the rural portion of the Crater Planning District was undertaken by a joint effort of VDOT, CPDC and rural localities in PDC #19 and completed in 2011. The program is currently conducting prioritization to identify the most important projects. VDOT will use the rural plan as a foundation for identifying Interstate and Primary system priorities for the Six-Year Improvement Program. The plan is also useful to counties and their respective Residency Administrator when developing the Secondary Six-Year Program. More information can be found at www.craterpdc.org/transportation/rural.htm.

By coordinating with the rural program, the Tri-Cities MPO is better able to provide a safe and efficient transportation system connecting the Tri-Cities with jurisdictions outside of the metropolitan area. The Crater Planning District provides staff support to the Rural Transportation Technical Assistance Committee which includes staff contacts from Dinwiddie, Greensville, Prince George, Surry, Sussex, Emporia, the Virginia Department of Transportation, Virginia Department of Rail and Public Transportation and the Federal Highway Administration. This group coordinates the rural transportation planning process with the Tri-Cities Area MPO transportation planning process.

In addition to preparation of a rural transportation plan, this program provides technical assistance including:

- Coordination with local governments, project consultants and VDOT regarding the development of a transportation plan for the City of Emporia;
- Coordination with High Speed Rail Studies in the Southeast High Speed Rail and Route 460 corridors;
- Transportation project specific mapping;
- Development monitoring along the U.S. Route 460 improvement project corridor;
- Transportation planning assistance as requested by local governments; and,
- Assistance to the Virginia Department of Transportation in the development of a Statewide Plan and Six-Year Improvement Program.

Environmental Justice Assessment of the Transportation Plan

Figures 65 through 77 are the basis of the environmental justice assessment of the Metropolitan Transportation Plan. The maps show the concentration or distribution of:

- minority populations (Figure 74),
- employment (Figure 75),
- zero vehicle households (Figure 76),
- limited English proficiency (Figure 77),
- percent of persons in living poverty (Figure 78),
- percent population over 65 years old (Figure 79), and
- percent of persons with disabilities (Figure 80).

Each figure also shows the transit routes and other proposed projects.

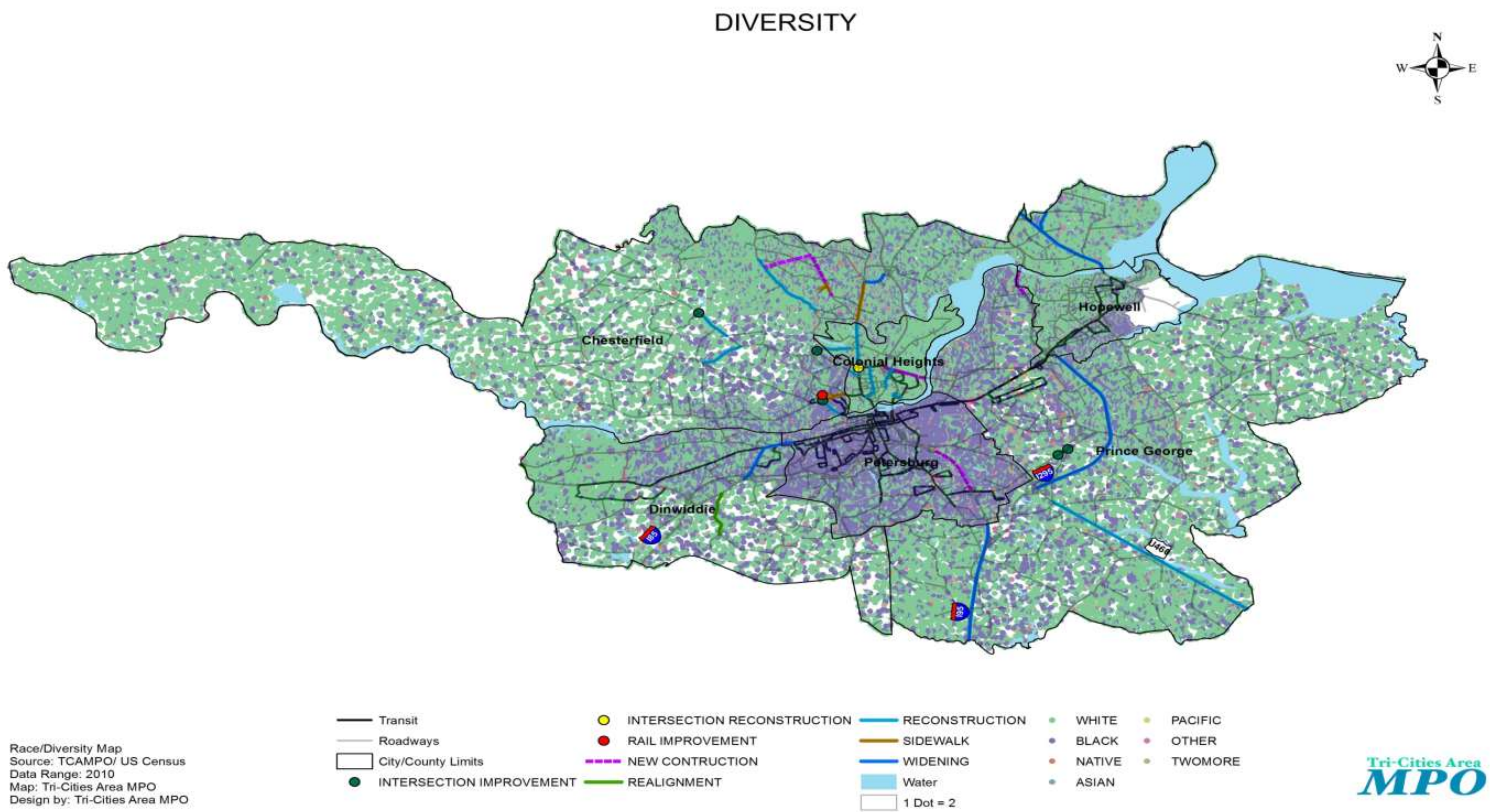


Figure 74: Diversity

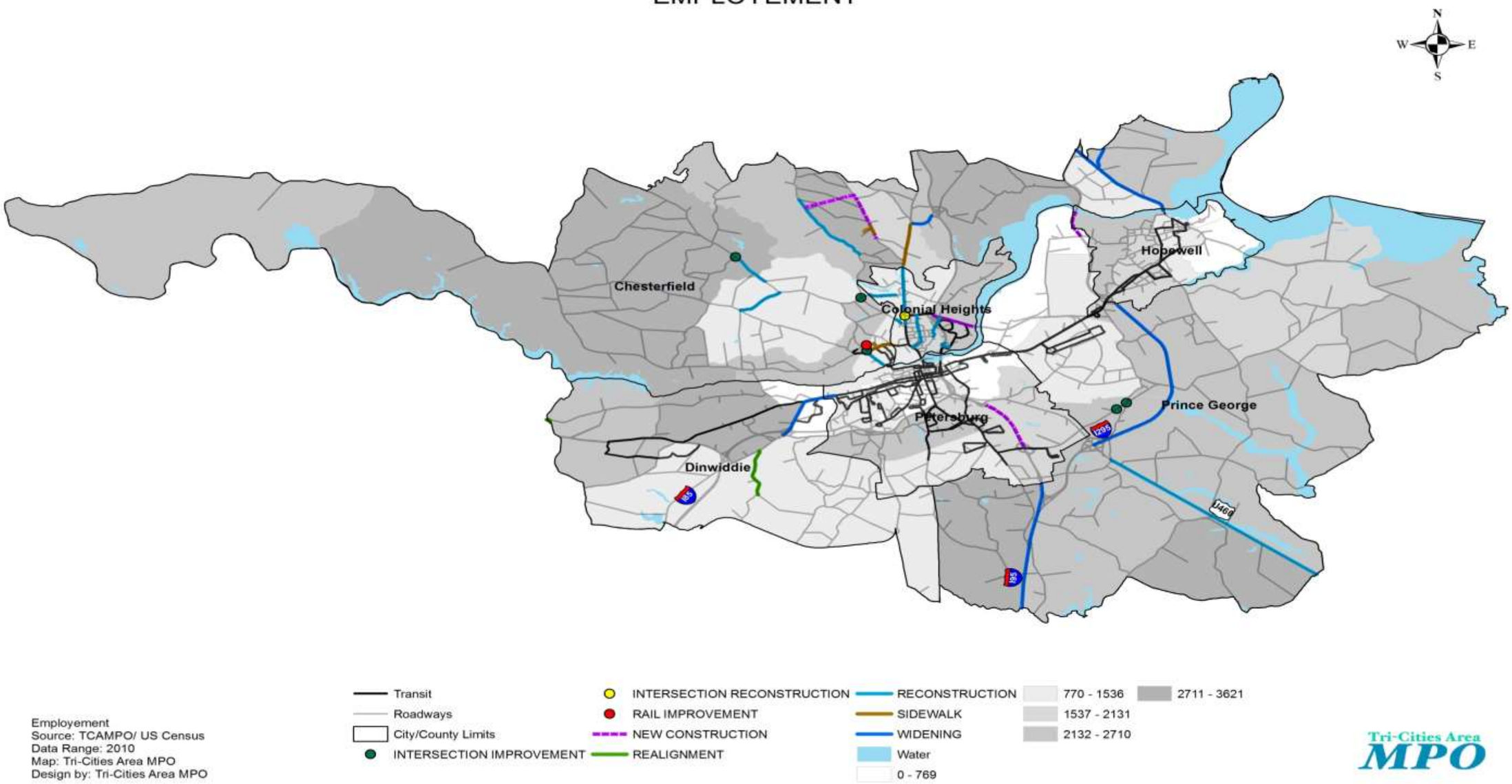


Figure 75: Employment

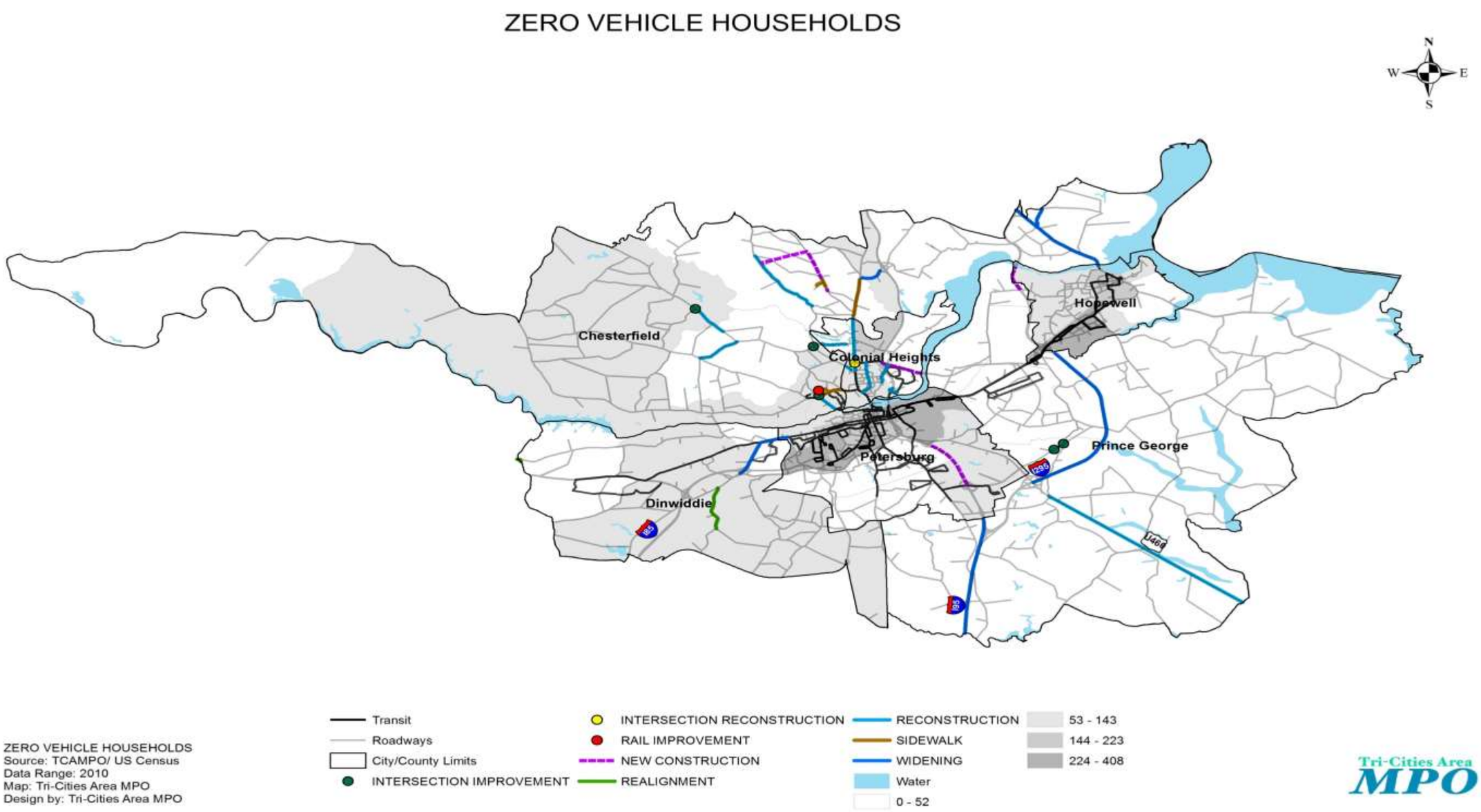


Figure 76: Zero Vehicle Households

LIMITED ENGLISH PROFICIENCY

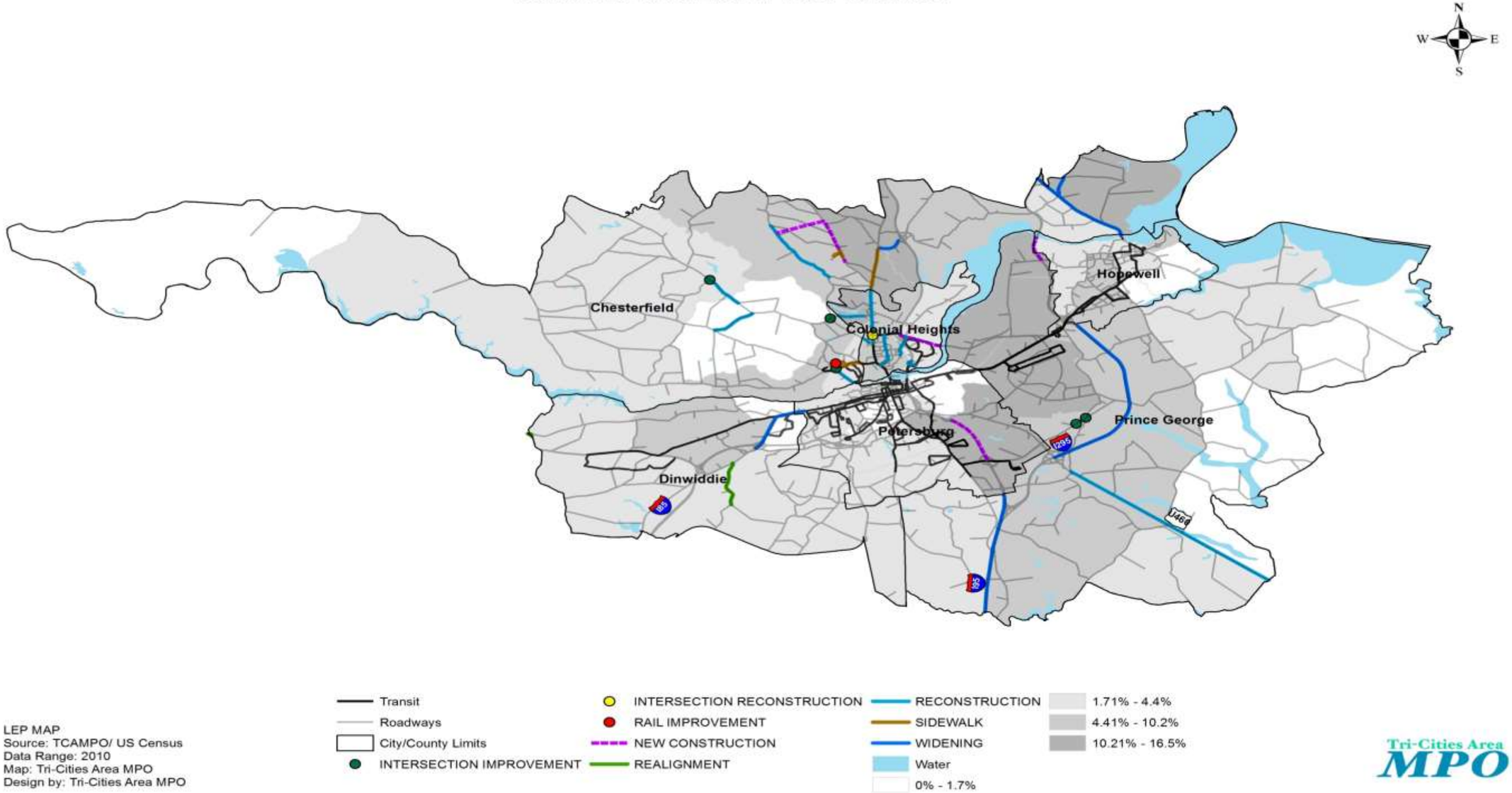


Figure 77: Limited English Proficiency

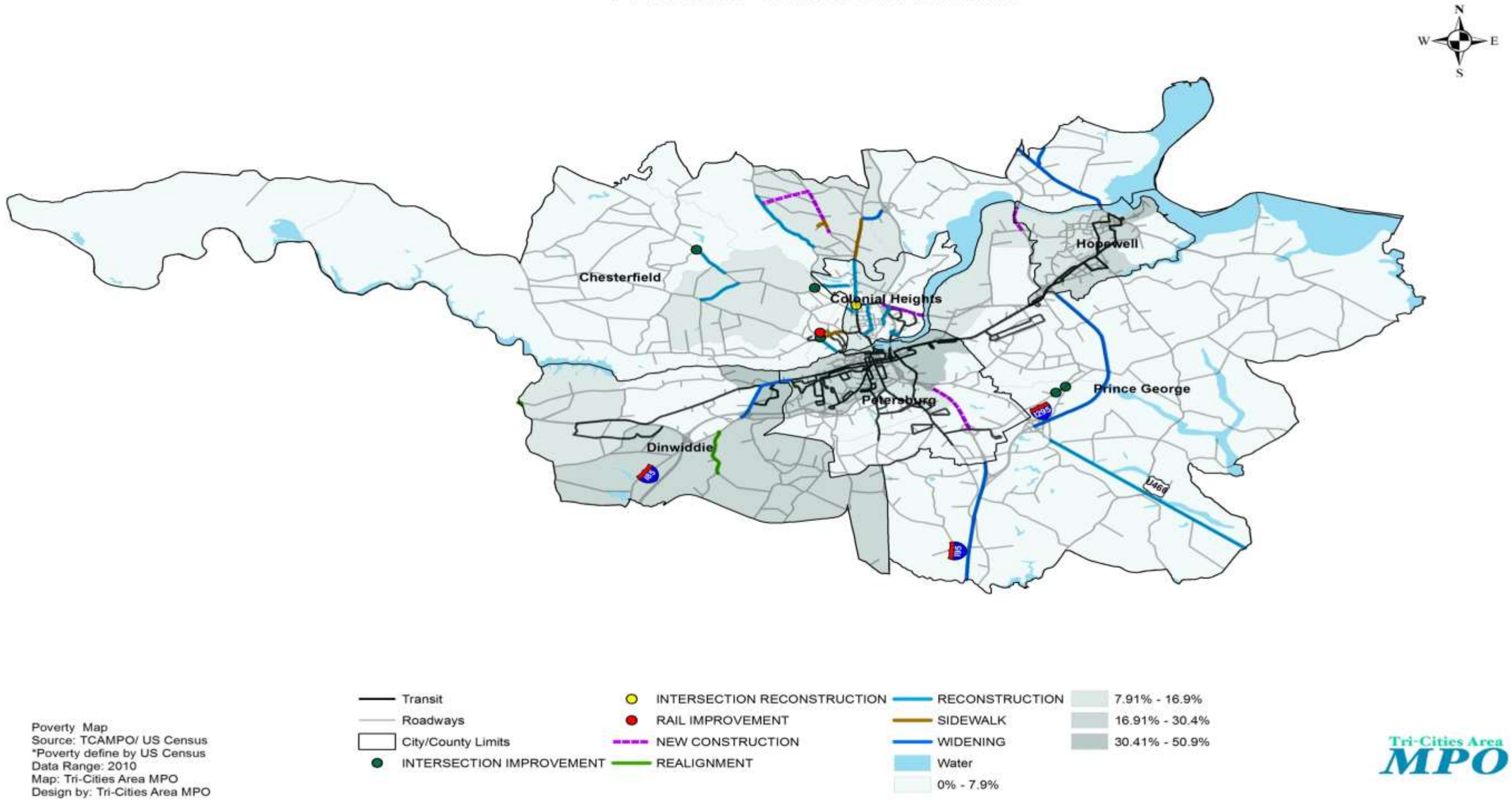


Figure 78: Poverty

POPULATION OVER 65

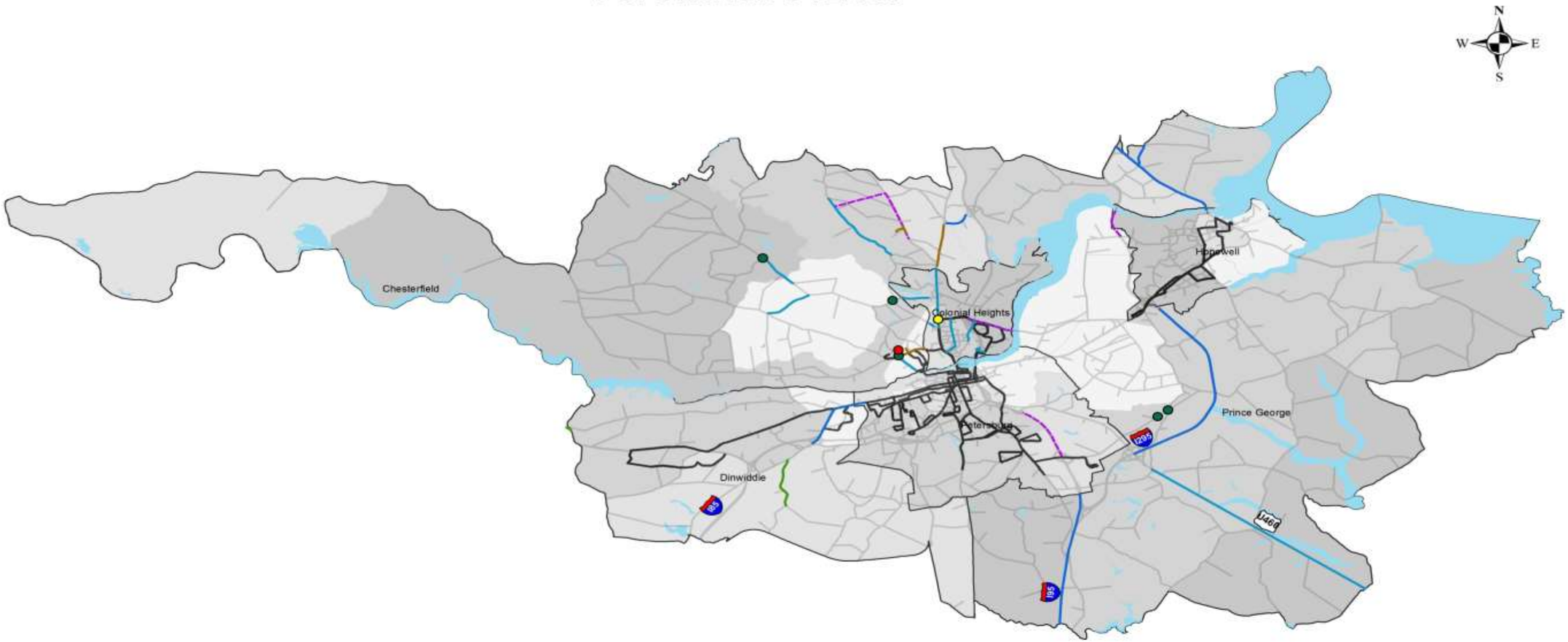


Figure 79: Population Over 65

PERSONS WITH DISABILITIES

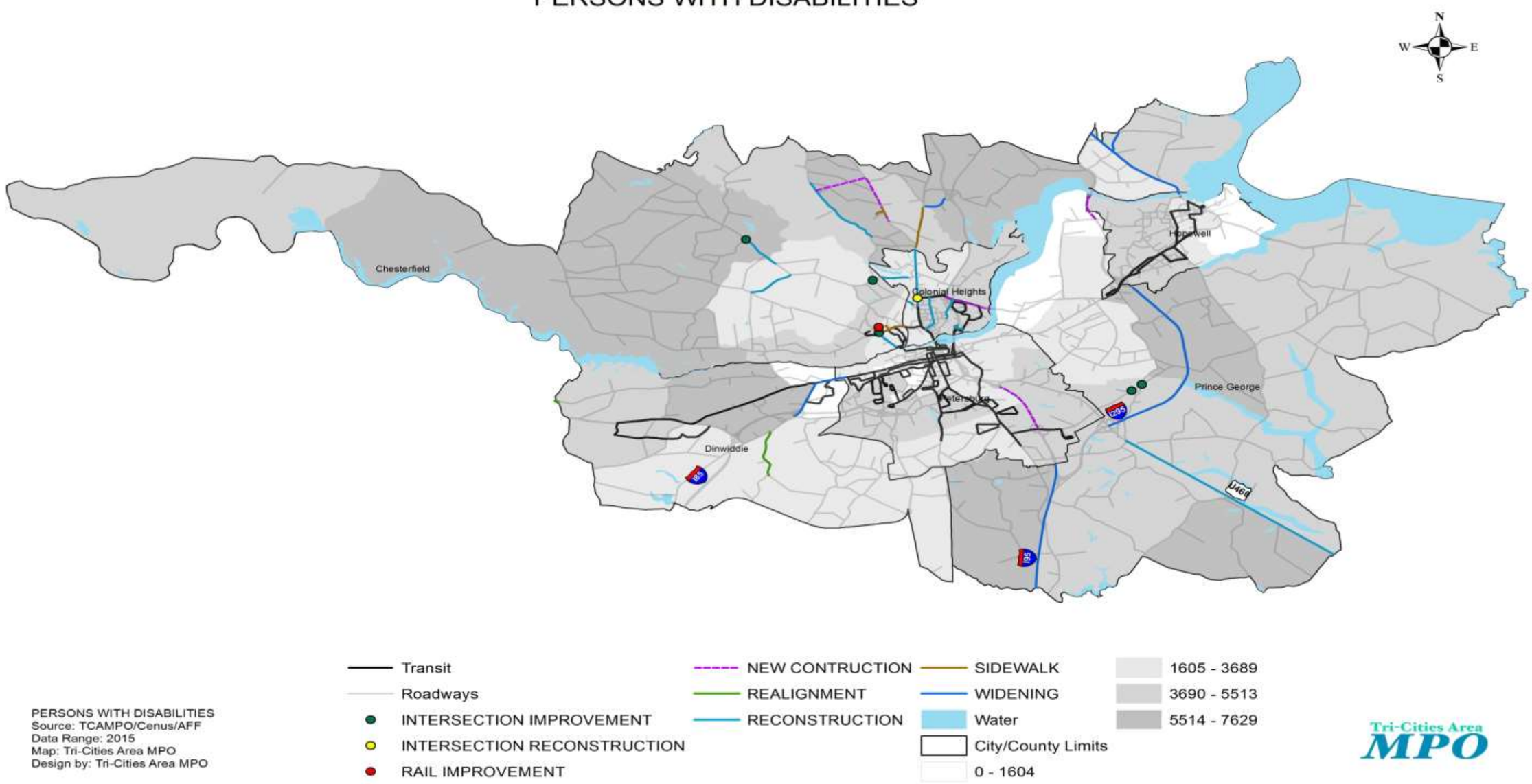


Figure 80: Persons with Disabilities

§450.306 (b) (6) Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight

Monitoring growth and travel patterns; maintenance a travel forecasting model; establishing a Congestion Management Process; using Intelligent Transportation Systems; implementing transportation improvements promote system efficiency.

§450.306 (b) (7) Promote efficient system management and operation

Federal transportation planning rules require the application of processes for the Tri-Cities Area. The intent of these processes is to assemble information on the performance of the transportation system to support future statewide and regional transportation planning for existing and future facility improvements.

The Federal Highway Administration (FHWA) defines a CMP as:

> "... a systematic process that provides information on transportation system performance and alternative strategies to alleviate congestion and enhance the mobility of persons and goods. A CMP includes methods to monitor and evaluate performance, identify alternative actions, assess and implement cost-effective actions, and evaluate the effectiveness of implemented action."

Congestion is the level of demand at which performance is no longer acceptable because of traffic interference. The CMP identifies roadway segments where congestion has occurred or is forecasted to occur and suggests strategies to relieve the traffic congestion.

The components of a CMP are:

1. Application Area
2. Transportation System Definition
3. Performance Measures
4. Data Collection and System Monitoring
5. Identification and Evaluation of Proposed Strategies
6. Implementation of Strategies
7. Evaluation of the Effectiveness of Implemented Strategies

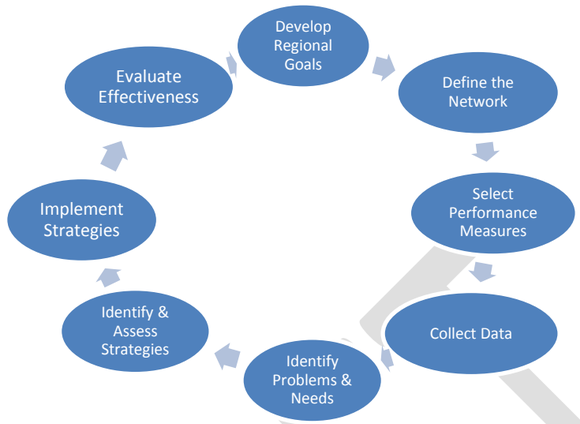


Figure 81: The Congestion Management Process

Congestion Management Strategies include:

a. *Transportation Demand Management*
Carpooling, vanpooling, alternate work hours, telecommuting, parking management, congestion pricing, growth management and land use planning, trip reduction ordinances

b. *Traffic Operational Improvement*
Intersection and road widening and other improvements to existing facilities, HOV facilities, traffic surveillance and control systems, traffic signal improvements, traffic redirection (see Appendix C for information on existing efforts in traffic operational improvement practices)

c. *Public Transportation and Non-traditional Modes*
Exclusive rights-of-way, new and/or expanded transit opportunities, park and rides, intermodal transfer facilities, traffic signal preemption, fare reductions, transit information systems, new and/or expanded bicycle and pedestrian facilities

d. *Intelligent Transportation System Technology (ITS)*

e. *Additional Roadway System Capacity*

The MPO revised its Congestion Management Process in 2016 updating much of the data and refining earlier work. Figures 82 and 83 show the current (2016) and short term congestion (2020) on the roadway system during peak periods, are outputs of the process. The figures use eighty percent (80%) of the hourly capacity as the basis for identifying congested roadways. The data is consistent with earlier work and comparing Table 14 (Potentially Congested Roadways) with the projects outlined in the transportation plan and in the 2018 to 2021 TIP (a separate product) shows that the MPO is working to fix congested areas.

§450.306 (b) (8) Emphasize the preservation of the existing transportation system

The transportation infrastructure is a significant investment of public funds, an investment that is difficult to maintain because of the demands upon the system and the funds available to maintain it. The condition of the transportation system is discussed in detail in Section 3. Both demands on the system and the condition of the system are discussed there. Based Section three the MPO should set the following priorities:

1. Focus on resurfacing to improve pavement condition,
2. Focus on replacing functionally obsolete bridges, and
3. Use new construction to eliminate bottlenecks.

§450.306 (b) (9) Improve the resiliency and reliability of the transportation system and reduce or mitigate storm water impacts of surface transportation

Since Hurricane Floyd, in 1999, there have been at least four hurricanes resulting in significant flooding and damage to transportation infrastructure. To plan these events it is important to understand the physical geography, geology and hydrology that influences the effect of weather its effects on this region. Therefore, a brief, general description of some critical elements of our physical environment follows, as well as the history of and the propensity for future hurricane activity.

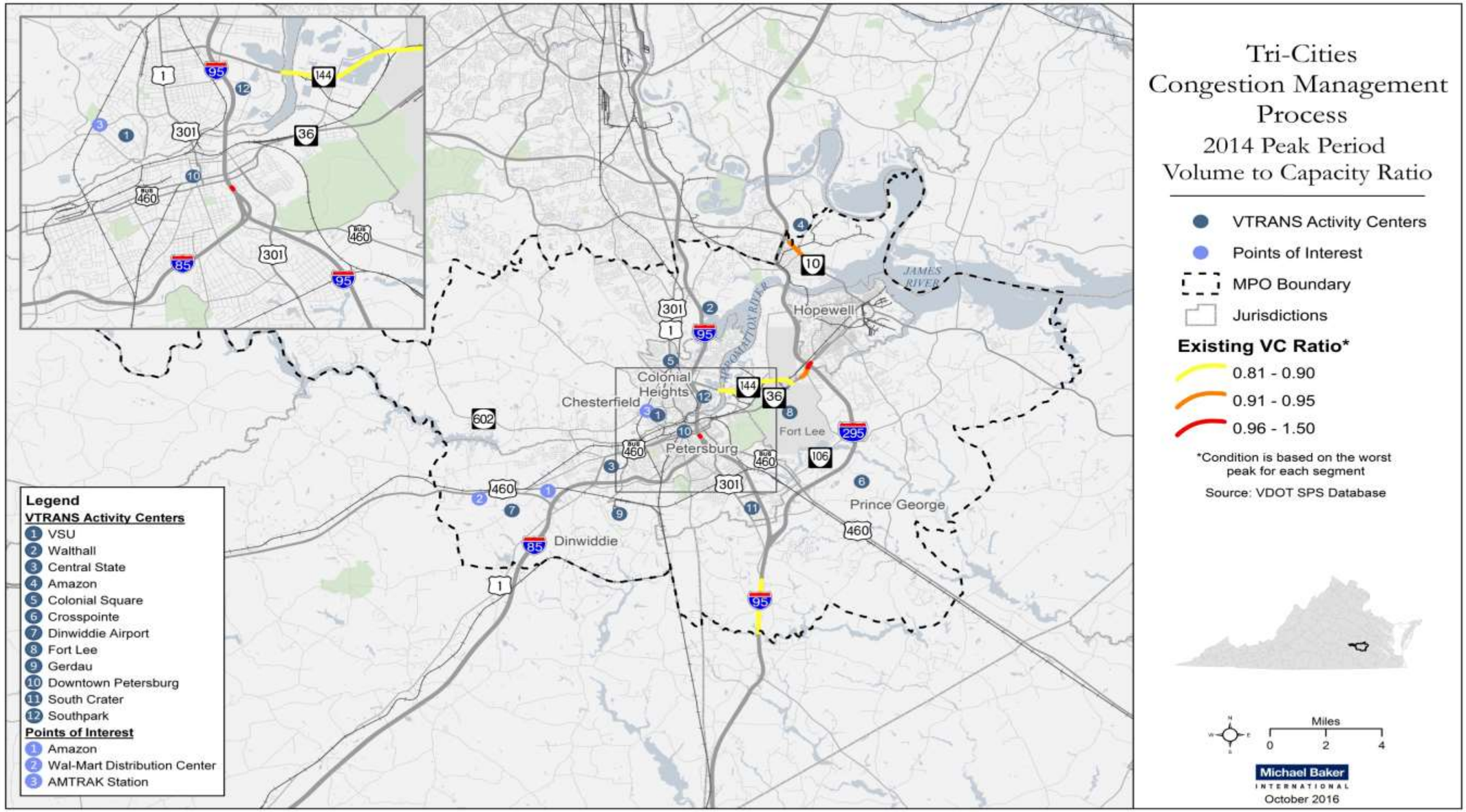


Figure 82: 2014 Volume Capacity Ratios

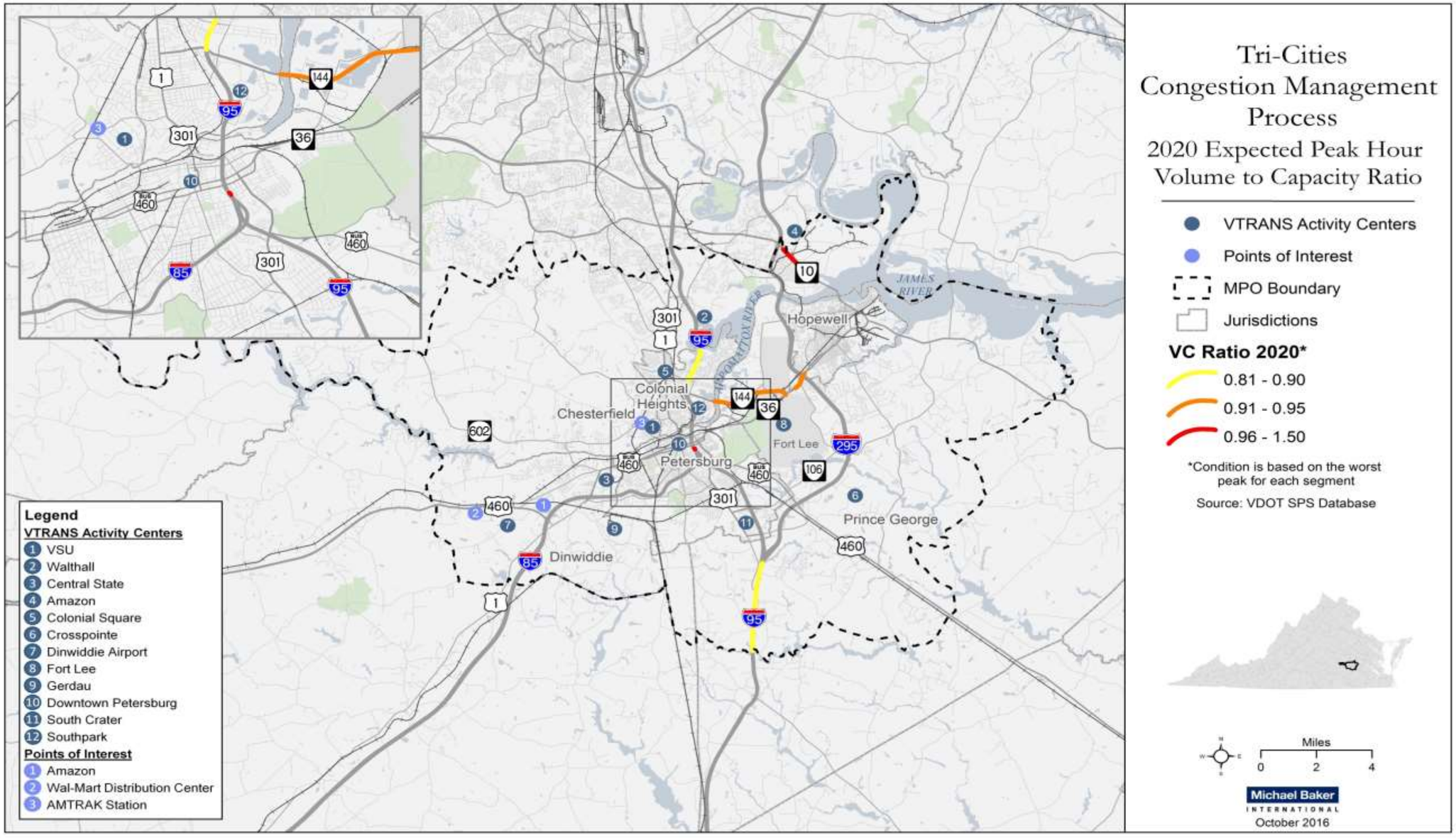


Figure 83: 2020 Volume Capacity Ratios

Table 14: Potentially Congested Roadways

Facility Type	Jurisdiction	Route	Start	End	Length (miles)	Cross Section (number of lanes)	2014 AADT	2014 VMT	2014 Peak Hourly Flow Rate (vehicles/hour)	2014 V/C Ratio	2020 AADT	2020 VMT	2020 Peak Flow Rate (vehicles/hour)	2020 V/C Ratio
Freeway	Prince George County	I-95	Warwick Swamp	NB Off Ramp @ US 301	2.17	4	40,321	87,497	4,959	0.82	42,794	92,863	5,263	0.87
		I-95	NB Off Ramp @ US 301	SB On Ramp I-95	1.38	4	42,931	59,245	5,108	0.76	46,647	64,373	5,551	0.83
	Colonial Heights	I-95	Temple Ave. Ramp	NCL Colonial Heights	2.38	6	95,926	228,304	9,593	0.80	104,201	247,998	10,421	0.87
	Petersburg	I-95	0.25 mi. North of I-85	Mingea St. OP	0.09	4	87,555	7,880	7,968	0.95	95,193	8,564	8,659	1.03
Urban Arterial	Chesterfield County	East Hundred Road	Rte. 746	RTE I-295 Ramp	0.90	4	28,214	25,393	3,301	0.94	30,660	27,594	3,587	1.02
		Temple Avenue	Prince George CL	ECL Colonial Heights	0.19	4	32,593	6,193	3,194	0.85	35,418	6,729	3,471	0.92
	Prince George County	Temple Avenue	ECL Colonial Heights	Puddledock Rd. (Rte. 645)	0.59	4	32,593	19,230	3,194	0.85	36,148	21,327	3,542	0.94
		Temple Avenue	Puddledock Rd. (Rte. 645)	Route 36	1.99	4	32,593	64,860	3,194	0.85	34,148	71,935	3,542	0.95
	Hopewell	Oaklawn Boulevard	WCL Hopewell	Jefferson Park Rd	0.52	4	34,590	1,7987	3,079	0.92	35,840	18,637	3,190	0.95
		Oaklawn Boulevard	Jefferson Park Rd	Rte. I-295	0.22	4	33,293	7,324	3,296	0.95	33,414	7,351	3,308	0.95

Although the hurricanes experienced in Virginia are usually weaker, they can bring torrential rainfall that is more devastating than the hurricane. Floods account for nearly 70 percent of presidentially declared disasters and are the deadliest form of natural disaster. FEMA lists five factors that determine the scope of local flooding:

1. Watershed size,
2. Development within the watershed affecting storm water runoff,
3. Soil characteristics,
4. Topographic characteristics affecting the flow and direction of floodwaters, and
5. Regional climate (Allison Boyd, J. Barry Hokanson, Laurie A. Johanson, James C. Schwab, Kenneth C. Topping, 2014).

Topography

Figure 84 shows Fall Line in Virginia (Ries, 1906), running through the middle of the Crater Planning District, and the MPO, creating two provinces, the Piedmont and Coastal Plain. Generally speaking, the Coastal Plain consists of low-lying land near sea level (< 200 feet) and the Piedmont Province consists of higher land where elevations vary between 200 and 350 feet (60 to 100 meters). Chesterfield County and part of Dinwiddie County lie within the Piedmont. The other jurisdictions in the MPO lie below the Fall Line. East of the fall line flood events may be sharp bur are often of longer duration and may spread broadly across the Coastal Plain. West of the Fall Line flood events will be shorter, sharper, and confined to stream valleys and narrow flood plains.

Hydrology

The MPO lies in the Appomattox sub-basin of the James River Basin and averages approximately 46 inches of rain annually.

The land around the James River Basin is flat to moderately rolling with elevations rising to about 200 feet (61 m). The Appomattox sub-basin drains 1,344 square miles (3,480 km2). The confluence of the Appomattox River and the James River is just east of Hopewell where it flows toward the Atlantic with flood plains stretching widely around shallow streams.

Hydrology cannot be discussed without also including the type of soil found beneath the streams. Many of the 150 underlying soil types are composed of clay.

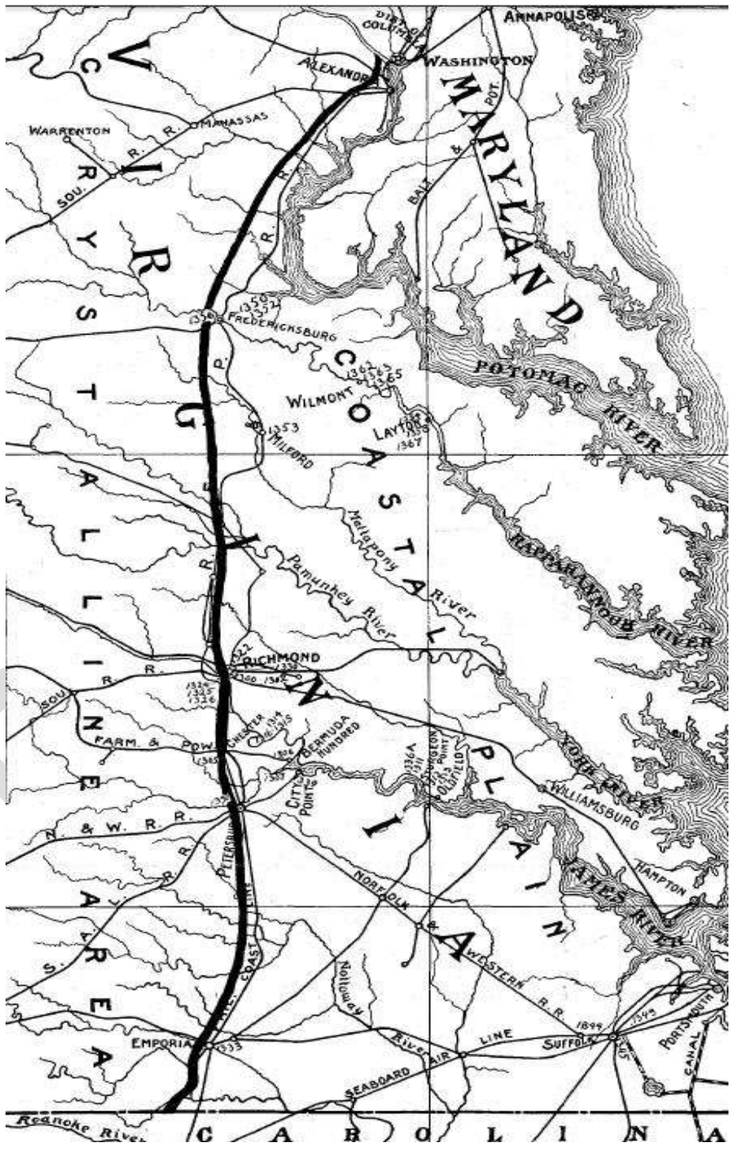


Figure 84: The Fall Line

Hurricane and Floods

A tropical storm becomes a hurricane when maximum winds reach or exceed 75 miles (approximately120 kilometers) per hour. According to the U.S. Geological Survey, Louisiana, Florida and North Carolina are at a particular risk, but parts of Virginia also fall into the high and even highest hurricane activity categories.

Typically the storms reaching the Virginia coast have weakened as they have moved, north, towards colder water. The most likely storm surge would be one to three feet, with a worst-case scenario bringing eight to ten feet, according to the Wakefield Weather Office (2001).

Hurricane Cycles

Figure 85 shows the history of Atlantic hurricanes since 1916. Global weather, such as the Pacific Ocean El Nino and La Nina influence the number and strength of hurricanes.

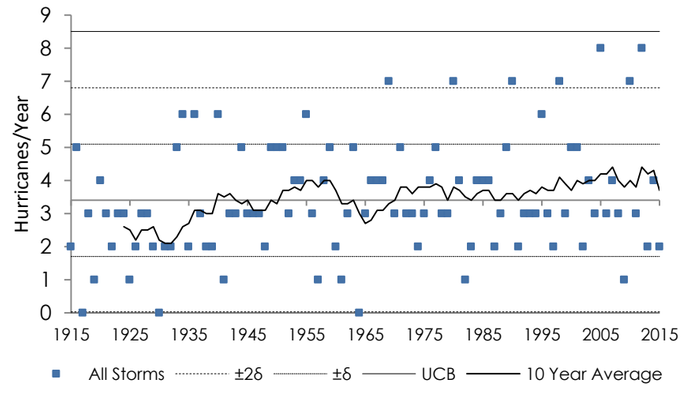


Figure 85: Atlantic Hurricanes (1916 - 2015)

These cycles occur from two to seven years apart. During El Nino, warm waters flowing through the equatorial region of the Pacific create a rippling effect that causes strong westerly winds in the upper atmosphere to rip apart hurricanes. As a result, hurricanes are fewer and father between. During the alternate La Nina phase, in the Pacific waters are colder, resulting in a dramatic rise in hurricane activity. For instance, during the La Nina cycle of 1954-1956, the Eastern Seaboard experienced destruction from such storms as Hazel, Connie, Diane and Flossy.

100 Year Flood Map of the Tri-Cities MPO

Based upon previous experience (Hurricane Floyd in 1999) the MPO could expect to see many road closings, pavement damage, and bridge or culvert damage from major flooding. Figure 56 shows the 100 year flood plains (Figure 86) around the MPO. The shows that I-95, US 450 and Route 10 may be vulnerable to flood damage in the event of a major rain event such as Hurricane Floyd. North Carolina's experience with Hurricane Floyd (1999) and Hurricane Matthew (2016) show that these concerns are valid.

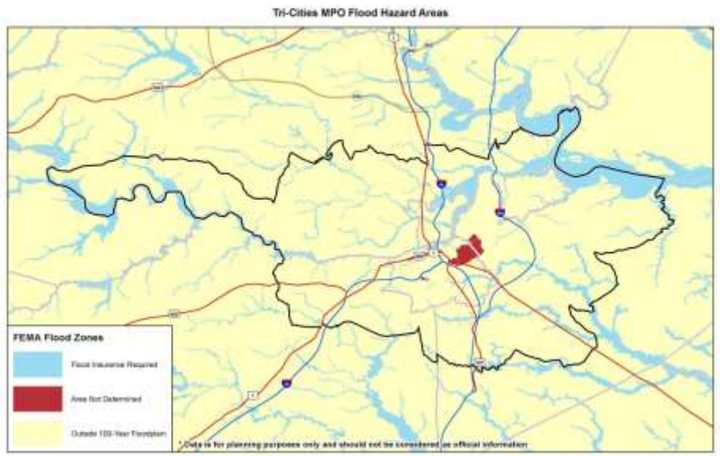


Figure 86: 100 Year Flood Map

Recommendations

Based upon earlier work the MPO has five recommendations for improving the resiliency of the transportation system. The recommendations are:

1. Keep a Current Detailed Emergency Operation Plan
2. Keep Accurate and Detailed Road Closure Reports
3. Keep Digital Flood Plain Maps Current
4. Keep Drainage Ditches Cleared
5. Flood Proof Roads, Especially Hurricane Evacuation Routes (Crater Planning District Commission, 2001).

§450.306 (b) (10) Enhance travel and tourism

The travel and tourism requirement was added to the Federal Register in 2016. The Tri-Cities MPO serves the southern part of the Richmond Urban Area. Because of its role in American history, natural resources, and location in the I-85/I-95/I-295 Corridor there is significant opportunity for the Transportation System to contribute to and enhance travel and tourism. Projects intended to enhance Travel and Tourism include:

- Building the Appomattox River Trail along the floodplain of the Appomattox River (See the Bicycle and Pedestrian Map Figure 44);
- Renovate the historic Southside Depot as a visitors center for the Petersburg National Battlefield;
- Providing (through Petersburg Area Transit) trolley service to the Petersburg National Battlefield and other historic sites;
- Improve wayfinding signage to historic sites in the MPO service area;
- Establish a Bike Share program; and
- Connect the Appomattox River Trail, through Hopewell, to the Virginia Capital Trail. Figure 87 shows the Virginia Capital Trail north of the James River to illustrate the importance of the connection to travel and tourism.

Figure 87: Virginia Capital City Trail

§450.316 Participation of Interested Parties

The Public Participation Plan (PPP) guides the TCAMPO public outreach strategies Effective transportation planning recognizes the critical link between transportation and other goals.

23 CFR § 450.326 (b) requires that MPOs give interested parties the opportunity to comment on the proposed TIP. Tri-Cities MPO has a stakeholder involvement process intended to ensure that all interested parties can see and comment upon the proposed TIP. The current Stakeholder Involvement Plan is included as part of the *2015 Title VI Plan Update* approved by the MPO's Policy Committee in August 2015. As required by our stakeholder involvement plan the MPO's Technical Advisory Committee and the MPO's Policy Board meet at handicapped accessible locations located near transit routes. The Technical Advisory Committee meets at the Colonial Heights Public Library (off PAT's Downtown Trolley Route) and the Policy Committee meets at the PAT Transit Center. The meetings of both groups are open to the public. Meeting times, locations and agendas are shared with the media so that they may attend the meetings and inform their readership of transportation projects.

Appendix A is a comment log summarizing comments received from stakeholders the MPO's response(s). The purposes of this log are to:

1. Document comments received by the MPO,
2. Ensure that the Policy Board is aware of comments received,
3. Form a part of the administrative record for projects, and
4. Share that information with planning partners.

The MPO may respond to a comment by:

1. Implementing the comment, in whole or in part;
2. Refer the comment to another document or forum; or
3. Note receipt the comment without action.

If the MPO receives multiple comments with the same substance the MPO may include the basic summary of the comment and the number of times the comment was received.

The Draft Transportation Plan made available to the public after the Policy Board Meeting of _____, 2017. Physical copies of the draft document were placed in public libraries, member jurisdiction planning departments, and the Crater Planning District Commission Office. Electronic notification of the TIP was provided on the MPO's Facebook Page and on the MPO's Website. The availability of the TIP for public comment was advertised at the media outlets listed in Appendix C. Example copies of the paid advertisements are included in Appendix C. Also the *Hopewell News, Progress Index, and Richmond Times Dispatch*

receive electronic meeting notifications that included copies of draft and preliminary products.

The MPO routinely interfaces with resource agencies and other planning entities. The MPO Technical Advisory Committee includes advisory members from Human Services Transportation Providers, the Department of Defense and the National Park Service. In addition other resource agencies were asked to review and comment in the draft transportation plan. Summaries of their comments are included in the comment log and a list of the resource agencies asked to comment is included in Appendix A.

The Public Participation Plan and Title VI Plan can be found on the MPO's website (http://www.craterpdc.org/transportation/title_vi.htm).

Section 5 – Metropolitan Transportation Goals, Objectives and Performance Measures

Implementing projects from this plan is intended to improve the economic, environmental and social well-being of the Tri-Cities MPO. The performance targets and performance measures discussed below are intended to give the MPO objective measures of their success.

Transportation Goals, and Objectives

This transportation goals and objectives were developed under the direction of the Tri-Cities Area Transportation MPO and Technical Committee to determine the purpose and need for transportation improvement projects listed in the Transportation Plan update and for compliance with federal transportation performance measures. The goals and objectives reflect community values and complement local comprehensive development plans. Further, others may use this statement as an indication of the public interest when performing legislated responsibilities.

Performance Measures

As required by the FAST Act, and Virginia Statute, the Tri-Cities MPO monitors land use and transportation performance measures. The MPO staff reports them each year to policy board. The previous performance reports are on the MPO's webpage (www.craterpdc.org/transportation/mpo.htm). The first report was completed in October 2011. The MPO finds performance measures to be most useful when they give the following information:

- Context,
- Status,
- Trends and,
- Direction.

When this information is available the Policy Board and stakeholders it improves decision-making.

While we support performance measures, there are limitations of time and money that make performance measures hard to implement in a small MPO. To meet the goals of the statute and the regulation the MPO has chosen to rely upon public data sources rather than to develop an independent data collection effort. Table 15 shows the performance measures from 2010 through 2015. The most recent data is 2015. At this writing there is no information available later than 2015. Although some data is available as long ago as 2004 the earlier information has many gaps. Thus the MPO made a decided to show the information only to 2010. The MPO collects performance information at the lowest feasible level so some measures refer to several lines of Information. General goals or trends for each performance were endorsed by the MPO Policy Board in May 2012.

Table 15 is organized to help the user find information as easily as possible. Going from left to right it includes the performance dimension, a description of the measure, the geographic scope of the measure and the source of the information and the values of the information by year.

There are six performance dimensions: Economy, Quality of Life, Reliability, Safety, Sustainability and System Preservation. The dimensions are subjective, but group the information reasonably.

The description describes the performance measure including the units the information is collected in.

The MPO has collected data from many national sources. We believe these sources to be reliable. However, because the sources have different points of view they may have different geographic scope. The scope of the data is useful in deciding which pieces of information can be meaningfully compared. The scope of the data ranges from jurisdiction to regional. Whenever possible the MPO needs data collected at the jurisdictional level. This allows us to aggregate the data upward to MPO or regional level.

The MPO has chosen not to specify goals at this time to avoid conflict with other agencies. Our approach is to use the goals set by our partner agencies for those performance measures that we have collected data for. We have chosen to use control plots as our basis for analysis and communication because they give staff and decision makers much more information than just comparing this year's information with an arbitrary goal. Many of the figures in this report are control charts that help us know where we were; where we are, and where we are headed. In some cases we have also simulated where we are headed using Monte Carlo Simulations. We believe doing this informs staff, residents and decision-makers on what we can expect in the future and helps them better allocate scarce resources.

Table 15: Tri-Cities MPO Performance Measures

				Year					
Dimension	Description	Scope	Source	2010	2011	2012	2013	2014	2015
Economy	Dollars- Air	Richmond UA	BTS	0.00	0.00	732.98	715.01	679.12	674.97
	Dollars- Rail	Richmond UA	BTS	0.00	0.00	425.75	481.14	869.03	892.21
	Dollars- Truck	Richmond UA	BTS	0.00	0.00	59005.80	58931.66	59319.74	59468.14
	Jobs Served by PAT	MPO	PAT	29,000	29,972	29,972	29,972	29,972	
	Persons Working Inside the Jurisdiction	Chesterfield	Bureau of Census	0.00	0.00	0.00	0.00	0.00	0.00
		Colonial Heights	Bureau of Census	2,095	2,095	2,095	2,095	2,095	2,095
		Dinwiddie	Bureau of Census	3,585	3,585	3,585	3,585	3,585	3,585
		Hopewell	Bureau of Census	2,095	2,095	2,095	2,095	2,095	2,095
		Petersburg	Bureau of Census	5,197	5,197	5,197	5,197	5,197	5,197
		Prince George	Bureau of Census	7,180	7,180	7,180	7,180	7,180	7,180
	Persons Working Outside the Jurisdiction	Chesterfield	Bureau of Census	-	-	-	-	-	-
		Colonial Heights	Bureau of Census	5,985	5,985	5,985	5,985	5,985	5,985
		Dinwiddie	Bureau of Census	7,729	7,729	7,729	7,729	7,729	7,729
		Hopewell	Bureau of Census	5,985	5,985	5,985	5,985	5,985	5,985
		Petersburg	Bureau of Census	7,979	7,979	7,979	7,979	7,979	7,979
		Prince George	Bureau of Census	8,763	8,763	8,763	8,763	8,763	8,763
	Ratio of Jobs by Place of Work to Households at the Transportation Study Area and Jurisdictional Levels	MPO	Bureau of Census	1.00	1.00	1.08	1.00	1.08	
	Regional Linear Jobs-Households Dissimilarity Index (0.0 to 1.0)	MPO		0.00	0.90	0.89	0.90	0.89	
	Registered Vanpools	MPO	Richmond Ridefinders	29	56	41	56	41	0
	Tons - Air	Richmond UA	BTS	0.00	0.00	5.61	5.55	5.18	5.12
	Tons - Rail	Richmond UA	BTS	0.00	0.00	2374.07	2437.46	2792.50	2520.30
	Tons - Truck	Richmond UA	BTS	0.00	0.00	39914.82	41163.78	42789.17	42080.64
	% Jobs Served by PAT	MPO	PAT	0.49	0.49	0.49	0.49	0.49	
Quality of Life	Daily Vehicle Miles of Travel Per Capita on Arterials	Richmond UA	TTI	10.20	10.20	10.00	9.60	9.50	0.00
	Daily Vehicle Miles of Travel Per Capita on Freeways	Richmond UA	TTI	12.10	12.10	11.80	11.70	11.70	0.00
	Households Served by PAT	MPO	PAT	-	13,534	55,000	55,000	55,010	
	Walk to Work	Jurisdiction	Bureau of Census	0.00	0.00	0.00	0.00	0.00	0.00

				Year					
Dimension	Description	Scope	Source	2010	2011	2012	2013	2014	2015
			sus						
	VMT- Secondary	Chesterfield	VDOT	2,688,424	2,639,776	2,660,006	2,608,757	2,646,640	2,755,060
		Colonial Heights	VDOT	136,398	133,951	131,392	127,409	130,056	127,507
		Dinwiddie	VDOT	268,357	267,905	265,352	253,180	276,477	288,022
		Hopewell	VDOT	115,712	110,873	106,799	103,359	111,549	132,159
		Petersburg	VDOT	252,940	243,039	226,350	219,732	222,884	263,701
		Prince George	VDOT	288,226	276,373	313,537	309,618	321,225	348,991
	VMT- Primary	Chesterfield	VDOT	4,450,289	4,405,142	4,372,630	4,170,988	4,320,552	4,591,738
		Colonial Heights	VDOT	132,020	123,392	122,451	116,244	114,912	120,906
		Dinwiddie	VDOT	397,499	381,617	373,802	379,386	388,141	404,029
		Hopewell	VDOT	136,010	130,612	124,730	119,797	126,041	148,864
		Petersburg	VDOT	281,974	266,971	257,518	248,975	265,109	308,238
		Prince George	VDOT	616,367	508,293	495,138	497,211	510,545	535,253
	VMT-Interstate	Chesterfield	VDOT	1,298,200	1,276,867	1,274,796	1,307,703	1,339,818	1,395,375
		Colonial Heights	VDOT	332,480	326,152	324,791	329,546	336,779	353,985
		Dinwiddie	VDOT	663,541	633,634	627,218	642,601	650,834	670,806
		Hopewell	VDOT	101,660	102,313	102,199	107,105	107,822	109,483
		Petersburg	VDOT	487,404	472,030	488,211	495,464	504,552	527,776
		Prince George	VDOT	669,023	663,363	662,047	661,445	664,693	689,429
	% Households Served by PAT	MPO	PAT	24.60%	24.60%	24.60%	24.60%	24.60%	
	% of Workers Driving Alone	Chesterfield	Bureau of Census	85.30%	85.30%	84.90%	85.50%	85.60%	85.30%
		Colonial Heights	Bureau of Census	75.00%	77.00%	76.60%	77.50%	79.40%	78.60%
		Dinwiddie	Bureau of Census	87.00%	87.20%	86.40%	85.90%	85.60%	87.10%
		Hopewell	Bureau of Cen-	83.50%	83.90%	84.40%	84.30%	85.20%	82.80%

				Year					
Dimension	Description	Scope	Source	2010	2011	2012	2013	2014	2015
			sus						
		Petersburg	Bureau of Census	75.00%	77.00%	76.60%	77.50%	79.40%	78.60%
		Prince George	Bureau of Census	75.00%	77.00%	76.60%	77.50%	79.40%	78.60%
Reliability	Hours of Delay Per Peak Period Traveler	Richmond UA	TTI	3300.00%	3300.00%	3300.00%	3400.00%	3400.00%	0.00%
	Thousand Gallons of Excess Fuel Per Peak Period Traveler	Richmond UA	TTI	10,287	10,322	10,444	10,731	10,802	-
	Vehicles Operating in Maximum Service	MPO	NTD				20.00	17.00	
	Travel Time Index	Richmond UA	TTI	1.12	1.12	1.12	1.13	1.13	0.00
	Freeway Planning Time Index (95th Percentile)	Richmond UA	TTI	0.00	0.00	0.00	0.00	1.76	0.00
Safety	Bicycle and Pedestrian Fatalities	Chesterfield	VDOT	2.00	4.00	6.00	2.00	3.00	0.00
		Colonial Heights	VDOT	0.00	0.00	0.00	0.00	0.00	
		Dinwiddie	VDOT	0.00	0.00	2.00	0.00	0.00	
		Hopewell	VDOT	0.00	0.00	1.00	0.00	0.00	
		Petersburg	VDOT	0.00	0.00	0.00	0.00	1.00	
		Prince George	VDOT	1.00	2.00	0.00	1.00	0.00	
	Bicycle Crashes and Pedestrian Injuries in Crashes	Jurisdiction	VDOT	34	58	-	58	6,474	-
	Highway Crashes in the Crater Planning District	MPO	VDOT	2,714	2,790	2,780	2,790	2,780	-
	Highway Crashes Per 100 Million VMT	MPO	VDOT	109	112	112	112	112	-
	Highway Fatalities	Chesterfield	VDOT	20	31	19	26	19	28
		Colonial Heights	VDOT	2	-	-	-	-	1
		Dinwiddie	VDOT	6	3	7	8	3	10
		Hopewell	VDOT	1	1	2	1	2	1
		Petersburg	VDOT	5	-	1	2	3	-
		Prince George	VDOT	7	9	6	10	6	13
	Highway Fatalities Per 100 Million VMT	MPO	VDOT	1.45	0.80	0.84	1.01	1.08	0.00
	PAT Fatalities	MPO	NTD	0.00	0.00	0.00	0.00	0.00	0.00
	Petersburg Area Transit (PAT) Crashes	MPO	NTD	2.00	0.00	0.00	0.00	0.00	0.00
	Transit Crashes Per 100 Million PMT	MPO	NTD	0.00	4.12	0.00	0.00	0.00	0.00
	Transit Fatalities Per 100 Million PMT	MPO	NTD	0.00	0.00	0.00	0.00	0.00	0.00
	Highway Fatalities Per 100,000 Persons	Chesterfield	NHTSA	6.31	9.68	5.87	7.93	5.71	8.64
		Colonial Heights	NHTSA	11.50	0.00	0.00	0.00	0.00	5.61

				Year					
Dimension	Description	Scope	Source	2010	2011	2012	2013	2014	2015
		Dinwiddie	NHTSA	21.30	10.65	24.76	28.39	19.72	40.37
		Hopewell	NHTSA	4.42	4.45	8.98	4.52		
		Petersburg	NHTSA	15.35	0.00	3.11	6.23	9.30	0.00
		Prince George	NHTSA	19.65	24.48	16.14	26.65	15.97	34.34
		VA	NHTSA		9.42	9.47	8.95	8.44	8.98
Sustainability	Passenger Rail Ridership	MPO	National Association of Railroad Passengers	22,148	22,065	21,787	27,909	29,286	29,780
	PAT Transit Trips Per Capita	MPO	NTD	18.31	17.78	0.00	17.78	0.00	0.00
	Transit PMT Per Capita	MPO	NTD	0.00	21.27	0.00	21.27	0.00	0.00
	Transit Revenue Miles	MPO	NTD	370,139	490,079	510,235	490,079	510,235	0.00
	Transit Revenue Miles Per Capita	MPO	NTD	11.91	15.31	15.24	15.31	15.24	0.00
	Tailpipe CO2 Emissions (English Short Tons/Year)	MPO	Calculation Using VDOT Data	806,650,000	784,750,000	781,100,000	770,150,000	788,400,000	832,200,000
	Ozone Exceedance Days-8Hr Std.	Richmond UA	VDEQ	7	1	1	0	0	0
System Preservation	%Pavement Fair or Better - Interstate	Chesterfield	VDOT	73.00%	49.00%	59.00%	86.00%	88.00%	95.00%
		Colonial Heights	VDOT	71.00%	74.00%	72.00%	75.00%	76.00%	77.00%
		Dinwiddie	VDOT	91.00%	81.00%	72.00%	83.00%	68.00%	61.00%
		Hopewell	VDOT	71.00%	74.00%	72.00%	75.00%	76.00%	77.00%
		Petersburg	VDOT	71.00%	74.00%	72.00%	75.00%	76.00%	77.00%
		Prince George	VDOT	71.00%	74.00%	72.00%	75.00%	76.00%	77.00%
	%Pavement Fair or Better - Primary Roads	Chesterfield	VDOT	74.00%	74.00%	73.00%	77.00%	74.00%	72.00%
		Colonial Heights	VDOT	70.00%	72.00%	75.00%	79.00%	74.00%	72.00%
		Dinwiddie	VDOT	69.00%	70.00%	85.00%	89.00%	79.00%	77.00%
		Hopewell	VDOT	70.00%	72.00%	75.00%	79.00%	74.00%	72.00%
		Petersburg	VDOT	70.00%	72.00%	75.00%	79.00%	74.00%	72.00%
		Prince George	VDOT	74.00%	62.00%	76.00%	82.00%	78.00%	79.00%
	Bridge Condition % Not Deficient -Interstate	Chesterfield	VDOT	96.70%	96.70%	95.20%	95.20%	95.20%	94.60%
		Colonial Heights	VDOT	96.52%	95.39%	96.05%	96.80%	96.75%	97.26%
		Dinwiddie	VDOT	100.00%	100.00%	91.30%	95.65%	95.65%	100.00%
		Hopewell	VDOT	96.52%	95.39%	96.05%	96.80%	96.75%	97.26%
		Petersburg	VDOT	96.52%	95.39%	96.05%	96.80%	96.75%	97.26%
		Prince George	VDOT	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

				Year					
Dimension	Description	Scope	Source	2010	2011	2012	2013	2014	2015
	Bridge Condition % Not Deficient -Primary	Chesterfield	VDOT	97.81%	98.46%	97.67%	97.66%	97.64%	96.88%
		Colonial Heights	VDOT	92.32%	92.76%	93.08%	93.83%	94.11%	94.30%
		Dinwiddie	VDOT	78.26%	78.26%	78.26%	82.61%	77.27%	82.61%
		Hopewell	VDOT	92.32%	92.76%	93.08%	93.83%	94.11%	94.30%
		Petersburg	VDOT	92.32%	92.76%	93.08%	93.83%	94.11%	94.30%
		Prince George	VDOT	96.43%	96.43%	82.29%	96.43%	92.00%	92.59%
	% of Projects Delivered on Time	Chesterfield	VDOT			44.00%	86.00%	89.00%	82.00%
		Colonial Heights	VDOT			0.00%	0.00%	0.00%	0.00%
		Dinwiddie	VDOT			60.00%	75.00%	100.00%	100.00%
		Hopewell	VDOT			0.00%	0.00%	0.00%	0.00%
		Petersburg	VDOT			0.00%	0.00%	0.00%	0.00%
		Prince George	VDOT			50.00%	67.00%	100.00%	100.00%
	% of Projects Delivered on Budget	Chesterfield	VDOT			78.00%	93.00%	100.00%	100.00%
		Colonial Heights	VDOT			0.00%	0.00%	0.00%	0.00%
		Dinwiddie	VDOT			80.00%	100.00%	100.00%	100.00%
		Hopewell	VDOT			0.00%	0.00%	0.00%	0.00%
		Petersburg	VDOT			0.00%	0.00%	0.00%	0.00%
		Prince George	VDOT			100.00%	100.00%	100.00%	100.00%
	Fleet Age-Demand Response	MPO	NTD	9.70	7.00	5.80	10.10	5.80	
	Fleet Age-Fixed Route	MPO	NTD	7.00	8.00	9.10	6.00	7.40	

Section 6 – §450.324(f) (11) the Financial Plan

The financial plan ensures that a transportation plan can built and maintained. Section 6 describes the steps that the MPO has taken to ensure that we can build the projects in the plan.

It is important, for a transportation plan, to explain how transportation improvements are identified, selected and funded. This section of the report summarizes project selection, funding programs and expected funding.

Project Prioritization

Often, transportation plans have presented capital costs for recommended improvements without identifying enough revenue to build and maintain the project. Under federal transportation planning guidelines, MPOS, transit operators and state transportation agencies must identify reasonably available funding for planned transportation improvements the financially constrained metropolitan transportation plans. In the Tri-Cities, 38 candidate projects were prioritized for the 2040 metropolitan plan based on the following criteria:

- Support the Economic Vitality of the Metropolitan Area;
- Increase the Safety and Security of the Transportation System;
- Increase the Accessibility and Mobility Options Available to People and for Freight;
- Protect and Enhance the Environment, Promote Energy Conservation, and Improve the Quality of Life;
- Enhance the integration and Connectivity of the Transportation System;
- Promote Efficient System Management and Operation; and,
- Benefit/Cost.

The MPO divided the funding stream into four phases:

1. 2017 to 2022 (matching the 2017 to 2020 MTIP),
2. 2023 to 2028,
3. 2029 to 2034, and
4. 2035 to 2040.

Figure 88 shows the interactive process of assigning projects to a band. At first project were rank ordered. Because there is not enough money to build all the projects in the transportation plan and because project costs may not match the funding bands the project list for each funding band was adjusted to use as much money as possible during a phase. Any projects unfunded at the end of the process were included as vision projects. A vision project may be built as priorities change, or additional funds are identified. The projected revenue allocations and cost estimates are shown in Table 12. Each project has a unique identifier number and shown on Figure 2 (above). Each project is consistent with regional transportation goals, objectives and performance measures listed in Section 5.

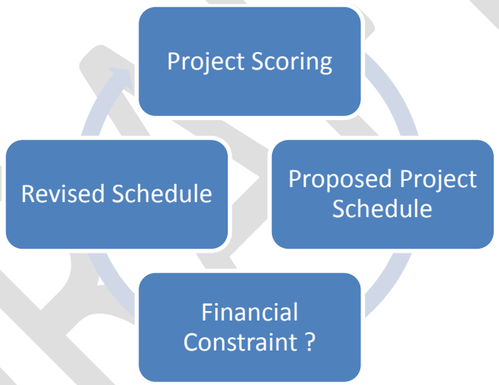


Figure 88: Fiscal Constraint Cycle

Funding Programs

The transportation programs and funding streams discussed below are all reasonably available to the MPO.

Congestion Mitigation and Air Quality (CMAQ) Program

Virginia sub-allocates Federal and State funding the Tri-Cities MPO under the Congestion Mitigation and Air Quality (CMAQ) Program. The purpose of the CMAQ program is fund transportation projects that reduce motor vehicle emissions carbon monoxide, ozone precursors, or fine particulates. The MPO has used CMAQ money to fund programs like the Ozone Alert Program, a Ridesharing, traffic signalization improvements, traffic flow improvements and a transit demonstration projects. Candidate projects are submitted by local governments and regional agencies and prioritized by MPO. Rating criteria include volume to capacity improvement and benefit cost ratio. All CMAQ projects must meet federal requirements including a reduction in motor vehicle emissions. Presently, the MPO receives approximately $1.6 million in federal and State CMAQ funds each year.

Regional Surface Transportation Program (RSTP) Program

Virginia also sub-allocations approximately $2.7 million each year in federal and State RSTP funds to the MPO. The RSTP program provides funding to MPOs serving urban areas over 200,000 in population for regionally prioritized transportation improvement projects. Local and regional agencies identify candidate projects and the MPO prioritizes them for the program. The RSTP program is very flexible. The MPO can use RSTP for any project that is eligible for federal transportation funding. Candidate projects are prioritized using the same criteria used for the long-range transportation plan.

Smart Scale

Per legislation adopted by the Virginia General Assembly several years ago, a new method was devised by the Commonwealth Transportation Board for selecting transportation improvement investments. This prioritization program is called Smart Scale. The intent of Smart Scale is to use a data-driven process to select projects for transportation investments. The Smart Scale process is transparent and accountable. Smart Scale does not apply to funding programs with established prioritization processes, such as CMAQ, RSTP, TAP and the State safety improvement program.

Six Year Improvement Program

The Six-Year Improvement Program (SYIP) is a State list of planned transportation investments, including road construction, public transportation programs, and transportation studies over the next six-years. Each year the Commonwealth Transportation Board (http://www.ctb.virginia.gov) endorses the SYIP as it fulfills allocates transportation funds under the Code of Virginia. Funding priorities are updated annually in the SYIP based on the results of the most recent Smart Scale prioritization; MPO pri-

oritization for CMAQ, RSTP and Regional TAP projects; public comments, and consideration by Commonwealth Transportation Board (CTB) membership.

Transportation Alternatives Program (TAP)

The Tri-Cities MPO also receives approximately $150,000 each year for the transportation alternatives program (TAP). Eligible TAP projects on and off-road pedestrian and bicycle facilities; projects that improve non-driver access to public transportation; environmental mitigation of transportation facilities; and, safe routes to school. Candidate projects are submitted annually by local governments and prioritized by the MPO using the following criteria:

- Clarity and completeness
- Problem solving
- Safety
- Readiness for implementation
- Ability to administer provision for all project phases and percentile rank of State TAP score.

Examples of TAP projects Tri-Cities include restoration of the Petersburg Union Train Station; sidewalk improvements and streetscape enhancements.

VTrans 2040

VTrans 2040 is Virginia's multi-modal transportation plan. This process establishes principals for investments for future transportation infrastructure and services. There are two parts of VTRANS. The Vision Plan and the Multi-modal Transportation Plan (VTMP). The Virginia Office of Intermodal Planning and Investment (OIPI) is responsible for developing VTRANS 2040. Only projects that help address needs identified in VTRANS 2040 are eligible for funding under the State Smart Scale prioritization process.

Available Funds

The Tri-Cities MPO has worked cooperatively with VDOT and VDRPT to develop a financial plan allowing the transportation plan to be implemented and the existing transportation system to be kept in good repair. The financial plan is based upon the financial projections prepared by VDOT and VDRPT. *However the funding estimates shown here are not guaranteed.*

In preparing the financial plan the MPO made the following assumptions:

1. That we should account for inflation;
2. That nominal funding would match the projections provided by VDOT and BDRPT.

Figure 89 shows the nominal funding stream the MPO expects to receive to 2045.

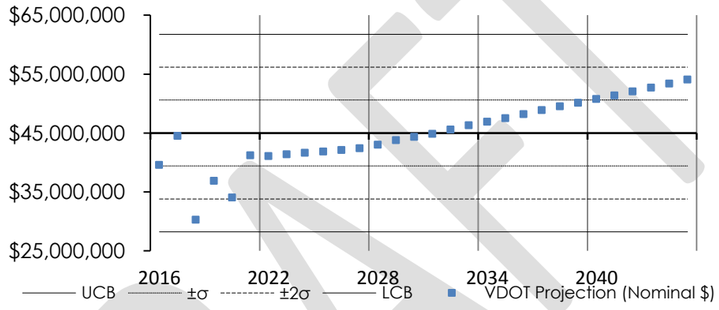


Figure 89: VDOT Estimate of Nominal Dollars to 2045

Figure 90 shows the effect of inflation to 2040. The dashed line shows the revenue projection prepared by VDOT. The solid line shows the likely effect of inflation on revenues over the same period. Assuming the revenue projections are accurate the actual purchasing power will be 74% of the same money today.

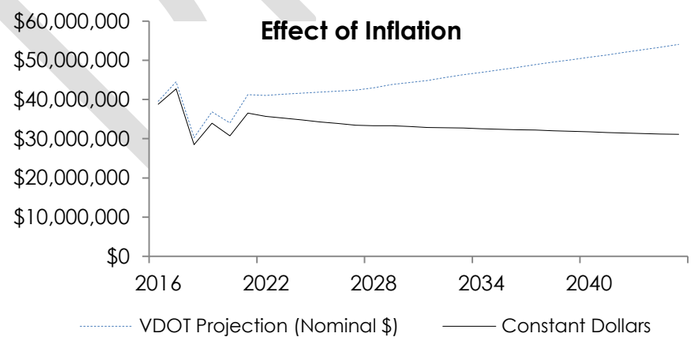


Figure 90: The Effect of Inflation on Revenue Estimates to 2045

Finally, Figure 91 shows the inflation adjusted funding stream along with an estimate of likely variability of funding based on historic data.

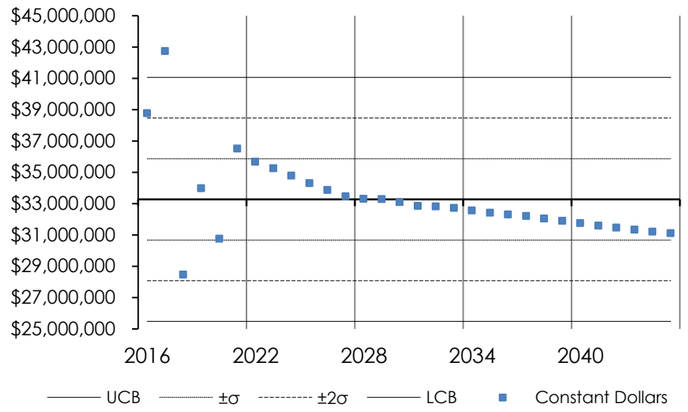


Figure 91: Estimate of Constant Dollars Available to 2045

Table 16 is a summary of the financial projection divided into four categories based upon restrictions in VDOT's financial projections. The full financial projections are included in Appendix G. O&M includes three funding categories used to maintain and operate the roadway system. These categories are Local Maintenance Funds, State Maintenance Funds and State of Good Repair funds. Unrestricted funds include any funding that can be used for construction of new roads, used for environmental projects, non-highway projects, or transit. Other funds cover administering the program.

Table 16: Funding Projection by Six Year Period

	TIP: 2017-2022	Period 2: 2023 - 2028	Period 3: 2029-2034	Period 4: 2034 - 2040
O&M	$ 143,867,252	$ 154,023,141	$ 151,876,112	$151,320,154
Unrestricted	$ 8,362,959	$ 45,126,379	$ 39,483,322	$ 35,136,065
Other	$ 5,823,161	$ 5,755,897	$ 5,897,786	$ 6,081,129
Transit	$ 27,368,000	$ 23,181,000	$ 19,634,000	$ 16,630,000
Total	$ 185,421,368	$228,086,417	$ 216,891,220	$209,167,348

Table 17: Prioritized Project List

TOTAL SCORE	JURISDICTION	PROJECT DESCRIPTION	TYPE	FACILITY NAME	FROM	TO	LENGTH	EXIS COND :LANE	EXISTING TRAFFIC/PASS VOL	EXISTING V/C	FUTURE TRAFFIC/PASS VOL	FUTURE V/C	ESTIMATE	COST/USER
139	CF	RECONSTRUCT BRANDERS BRIDGE ROAD FROM LONG CREEK LANE TO TOOLEY DRIVE AS A TWO-LANE ROAD WITH SHOULDERS AND DITCHES.	RECONSTRUCTION	BRANDERS BRIDGE ROAD	LONG CREEK LANE	TOOLEY DRIVE	1.3	TWO-LANE ROAD	2,400	0.09	3200	0.12	$15,500,000	$ 6,458
133	CF	REALIGN BESSIE LANE/EAST RIVER ROAD INTERSECTION WITH GRANGER STREET AND RECONSTRUCT THE ENTIRE LENGTH OF BESSSIE LANE FROM EAST RIVER ROAD/GRANGER STREET TO THE TERMINI.	ACCESS MANAGEMENT IMPROVEMENTS	BESSIE LANE/EAST RIVER ROAD	GRANGER STREET	BESSIE LANE/EAST RIVER ROAD	0.1	TWO-LANE ROAD	660	0.2	870	0.25	$1,072,500	$ 1,625
132	CF	CONSTRUCT A NEW 2-LANE ROAD (2.3 MILES) FROM HARROWGATE ROAD TO ROUTE 1).	NEW CONSTRUCT	HARROWGATE ROAD	NORTH-SOUTH ARTERIA	(WEST OF BRANDERS BRIDGE ROAD	2.3	TWO-LANE ROAD	N/A	N/A	N/A	N/A	$84,000,000 ($30,000,000 to come from local or private sources)	N/A
132	CF	LAKEVIEW ROAD/BRANDERS BRIDGE ROAD INTERSECTION IMPROVEMENT	INTERSECTION IMPROVEMENT	LAKEVIEW ROAD	BRANDERS BRIDGE ROAD	LAKEVIEW ROAD	0.4	TWO-LANE ROAD	8,000	0.11	10,600	0.21	$3,500,000	$ 438
129	CF	WOODPECKER ROAD/SANDY FORD ROAD INTERSECTION IMPROVEMENT	INTERSECTION IMPROVEMENT	WOODPECKER ROAD	WOODPECKER ROAD	SANDY FORD ROAD	0.3	TWO-LANE ROAD	6,500	0.1	8,600	0.11	$3,000,000	$ 462
127	CF	RECONSTRUCT WOODPECKER ROAD FROM JOHN WINSTON JONES PKWY. TO SANDY FORD ROAD AS A TWO-LANE ROAD WITH SHOULDERS AND DITCHES.	RECONSTRUCTION	WOODPECKER ROAD	JOHN WINSTON JONES PKWY	SANDY FORD ROAD	1.1	TWO-LANE ROAD	6,000	0.16	8,000	0.28	$13,534,400	$ 2,256

TOTAL SCORE	JURISDICTION	PROJECT DESCRIPTION	TYPE	FACILITY NAME	FROM	TO	LENGTH	EXIS COND :LANE	EXISTING TRAFFIC/PASS VOL	EXISTING V/C	FUTURE TRAFFIC/PASS VOL	FUTURE V/C	ESTIMATE	COST/USER
127	CF	RECONSTRUCT MATOACA ROAD FROM WEST OF WOODPECKER ROAD TO HICKORY ROAD AS A TWO-LANE ROAD WITH SHOULDERS AND DITCHES.	RECONSTRUCTION	MATOACA ROAD	WOODPECKER ROAD	HICTORY ROAD	1	TWO-LANE ROAD	6,000	0.26	8,000	0.35	$14,300,000	$ 2,383
127	CF	RECONSTRUCT CHESTERFIELD AVENUE FROM MAIN STREET TO JAMES STREET TO PROVIDE A SEPARATE 8'-WIDE TWO-WAY BICYCLE TRACK ON THE NORTH SIDE.	RECONSTRUCTION	CHESTERFIELD AVE	MAIN STREET	JAMES STREET	0.5	TWO-LANE ROAD	7,000	0.33	9,200	0.37	$15,000,000	$ 2,143
127	CF	WIDEN N. ENON CHURCH ROAD FROM ROUTE 10 TO BERMUDA HUNDRED ROAD (0.7 MILE) FROM TWO LANES TO FOUR LANES.	WIDENING	ENON CHURCH ROAD	ROUTE 10	BERMUDA HUNDRED ROAD	0.7	TWO-LANE ROAD	6,600	0.85	9,000	0.85	$5,600,000	$ 848
126	CF	RECONSTRUCT BRANDERS BRIDGE ROAD FROM NORTH OF WHITEHOUSE ROAD TO LONG CREEK LANE AS A TWO-LANE ROAD WITH SHOULDERS AND DITCHES.	RECONSTRUCTION	BRANDERS BRIDGE ROAD	WHITEHOUSE ROAD	LONG CREEK LANE	0.7	TWO-LANE ROAD	2,400	0.09	3,200	0.1	$9,400,000	$ 3,917
125	CF	CONSTRUCT NEW STATION AND PLATFORM TO ACCOMMODATE FUTURE TRACK EXPANSION, IMPROVE PARKING AND ON-SITE CIRCULATION, PROVIDE PEDESTRIAN AND BICYCLE FACILITIES ON-SITE.	RAIL	ETTRICK STATION	N/A	N/A	N/A	N/A	30,000	N/A	98,000	N/A	$9,000,000	$ 300

TOTAL SCORE	JURISDICTION	PROJECT DESCRIPTION	TYPE	FACILITY NAME	FROM	TO	LENGTH	EXIS COND :LANE	EXISTING TRAFFIC/PASS VOL	EXISTING V/C	FUTURE TRAFFIC/PASS VOL	FUTURE V/C	ESTIMATE	COST/USER
116	CF	CONSTRUCT SIDEWALK ALONG NORTH STREET AND WILLIAMS STREET TO IMPROVE PEDESTRIAN ACCESS TO THE TRAIN STATION.	SIDEWALKS	NORTH STREET	NORTH STREET	WILLIAMS STREET	0.2	TWO-LANE ROAD	60	N/A	63	N/A	$780,000	$ 13,000
115	CF	WIDEN ROUTE 10 FROM I-295 TO BURGESS ROAD (1 MILE) FROM FOUR LANES TO SIX LANES.	WIDENING	RT. 10	I-295	BURGRESS ROAD	1	FOUR-LANE ROAD	28,000	0.31	35,000	0.4	$19,542,600	$ 698
114	CF	WIDEN ROUTE 10 FROM BURGESS ROAD TO POINT OF ROCKS ROAD (1.2 MILES) FROM FOUR LANES TO SIX LANES.	WIDENING	RT. 10	BURGRESS ROAD	POINT OF ROCKS ROAD	1.2	FOUR-LANE ROAD	24,000	0.59	32,000	0.68	$25,014,528	$ 1,042
145	CF	WIDEN ROUTE 10 FROM POINT OF ROCKS ROAD TO THE HOPEWELL CITY LIMITS (1 MILE) FROM FOUR LANES TO SIX LANES.	WIDENING	RT. 10	POINT OF ROCKS ROAD	HOPEWELL CL	1	FOUR-LANE ROAD	21,000	0.59	28,000	0.61	$10,250,000	$ 488
134	CF	CONSTRUCT SIDEWALK ALONG SOUTH (ETTRICK) STREET AND JAMES STREET TO IMPROVE PEDESTRIAN ACCESS TO THE TRAIN STATION.	SIDEWALKS	SOUTH STREET (ETTRICK)	SOUTH STREET	JAMES STREET	0.2	TWO-LANE ROAD	130	N/A	135	N/A	$875,000	$ 6,731
133	CF	WIDEN WOODS EDGE ROAD FROM KAIROS ROAD TO INDIAN HILL ROAD (0.6 MILE) FROM TWO LANES TO FOUR LANES.	WIDENING	WOODS EDGE ROAD	KAIROS ROAD	INDIAN HILL ROAD	0.6	TWO-LANE ROAD	15,000	0.51	20,000	0.64	$5,600,000	$ 373
122	CF	CONSTRUCT SIDEWALK ALONG THE WEST SIDE OF ROUTE 1 FROM WHERE IT CURRENTLY ENDS AT WHITEPINE ROAD TO MILHORN STREET TO IMPROVE PEDESTRIAN ALONG THE CORRIDOR.	SIDEWALKS	RT. 1	WHITEPINE ROAD	MILHORN STREE	1.5	FOUR-LANE ROAD	19,500	0.33	25,000	0.4	$3,200,000	$ 164

TOTAL SCORE	JURISDICTION	PROJECT DESCRIP-TION	TYPE	FACILITY NAME	FROM	TO	LENGTH	EXIS COND :LANE	EXISTING TRAFFIC/PASS VOL	EXISTING V/C	FUTURE TRAF-FIC/PASS VOL	FUTURE V/C	ESTIMATE	COST/USER
130	CF	CONSTRUCTION OF 5'-WIDE CONCRETE SIDEWALK ALONG THE EAST SIDE OF HARROWGATE ROAD, FROM HARROW DRIVE TO NORTH STREET; CONSTRUC-TION OF 5' WIDE CONCRETE SIDEWALK ALONG THE WEST SIDE OF HARROWGATE ROAD, FROM COU-GAR TRAIL TO DOG-WOOD AVENUE; AND PEDESTRIAN IM-PROVEMENTS TO THE SOUTH SIDE OF COU-GAR TRAIL FROM CARVER MIDDLE SCHOOL TO HAR-ROWGATE ROAD.	SIDEWALKS	HARROWGATE ROAD	HARROW DRIVE	NORTH STREET	0.45	TWO-LANE ROAD	10,000	0.35	13,000	0.4	$647,220	$ 65
120	CF	CONSTRUCT SIDE-WALK ALONG NORTH SIDE OF EAST RIVER ROAD FROM DUPUY AVENUE TO CHESTER-FIELD AVENUE TO IM-PROVE PEDESTRIAN ACCESS TO VSU, THE TRAIN STATION AND CHESTERFIELD AVE-NUE.	SIDEWALKS	EAST RIVER ROAD	DUPUY AVENUE	CHESTERFIELD AVENUE	0.7	FOUR-LANE ROAD	18,000	0.52	24,000	0.6	$780,000	$ 43
134	CH	IMPROVEMENTS TO THE RAMP/INTERCHANGE AREA AT I-95 AND SOUTHPARK BOULE-VARD (EX. 53)	RECONSTRUCTION	I-95	I-95 (RAMP/INTERCHANGE)	SOUTHPARK BOULEVARD	N/A	FOUR-LANE ROAD	87,901	0.87	126,057	0.96	$32,480,000	$ 370
134	CH	RECONSTRUCT LAKE-VIEW AVE FROM VANCE AVE WEST TO CITY LIMITS	RECONSTRUCTION	LAKEVIEW AVE	VANCE AVE	WCL	0.63	TWO-LANE ROAD	7,319	0.58	8,608	0.68	$4,247,100	$ 580
134	CH	RECONSTRUCT INTER-SECTION AT TEMPLE AVE (RT. 144) AND BOULEVARD (RT. 1/301).	RECONSTRUCTION	TEMPLE AVE (RT. 144)	TEMPLE AVE (RT. 144)	BOULEVARD (RT. 1/301)	N/A	FOUR-LANE ROAD	27,045	0.69	39,164	0.99	$6,525,000	$ 241

TOTAL SCORE	JURISDICTION	PROJECT DESCRIPTION	TYPE	FACILITY NAME	FROM	TO	LENGTH	EXIS COND :LANE	EXISTING TRAFFIC/PASS VOL	EXISTING V/C	FUTURE TRAFFIC/PASS VOL	FUTURE V/C	ESTIMATE	COST/USER
133	CH	CONSTRUCT TWO NEW TRAVEL LANES (ONE EASTBOUND – ONE WESTBOUND) ON TEMPLE AVE FROM I-95 EAST TO CITY LIMITS	NEW CONTRUCTION	TEMPLE AVE	I-95	ECL	1.15		32,617	0.8	47,234	1.15	$13,475,700	$ 413
126	CH	RECONSTRUCT BOULEVARD (RT. 1) FROM JAMES AVE NORTH TO CITY LIMITS	RECONSTRUCTION	RT.1 (BOULEVARD)	JAMES AVE	NCL	1.95	FOUR-LANE ROAD	24,138	0.63	28,385	0.8	$54,098,625	$ 2,241
123	CH	RECONSTRUCT BRANDERS BRIDGE ROAD FROM BOULEVARD WEST TO CITY LIMITS	RECONSTRUCTION	BRANDERS BRIDGE ROAD	RT. 1 (BOULEVARD)	WCL	0.27	TWO-LANE ROAD	5,770	0.35	7,237	0.43	$1,496,000	$ 259
122	CH	RECONSTRUCT CONDUIT AVE FROM TEMPLE AVE TO LYNCHBURG AVE	RECONSTRUCTION	CONDUIT AVE	TEMPLE AVE	LYNCHBURG	0.7	TWO-LANE ROAD	19,144	0.55	22,549	0.55	$1,496,000	$ 78
119	CH	RECONSTRUCT HAMILTON AVE FROM TEMPLE AVE TO BOULEVARD	RECONSTRUCTION	HAMILTON AVE	TEMPLE AVE	BOULEVARD	1.23	TWO-LANE ROAD	2162	0.12	3842	0.22	$4,104,000	$ 1,898
132	DIN	REALIGN (IMPROVE ROAD GEOMETRY) DUNCAN ROAD (ROUTE 670) APPROXIMATELY 1 AND 1/2 MILES SOUTH OF THE RT. 1/DUNCAN RD. INTERSECTION	REALIGNMENT	DUNCAN RD(RT. 670)	DUNCAN RD(RT. 670)	RT. 1/ DUNCAN RD INTERSECTION	1.5	TWO-LANE ROAD	954	0.04	1908	0.08	$1,363,600	$ 1,429
126	DIN	REALIGN (IMPROVE INTERSECTION GEOMETRY) INTERSECTION OF NAMOZINE ROAD (ROUTE 708) AND RIVER RD. (RT. 601)	REALIGNMENT	NAMOZINE ROAD (ROUTE 708)	NAMOZINE ROAD (ROUTE 708)	RIVER RD. (RT. 601)	N/A	TWO-LANE ROAD	2,188	0.08	3830	0.15	$1,826,250	$ 835
122	DIN	WIDENING RT. 1 (BOYDTON PLANK RD.) FROM I-85 EXIT 63B NORTH/NORTHEAST TO THE PETERSBURG CITY LIMITS.	WIDENING	RT. 1 (BOYDTON PLANK RD)	I-85 EXIT 63B NORTH/NORTHEAST	PETERSBURG CL	4	FOUR-LANE ROAD	14,464	0.4	19,586	0.54	$8,622,080	$ 596
118	HW	I-295 ACCESS RAMPS W/SOUND BARRIERS	NEW CONTRUCTION	I-295	RIVER ROAD	NCL	N/A	FOUR-LANE ROAD	35,592	0.34	47,819	0.49	$45,370,500	$ 1,275

TOTAL SCORE	JURISDICTION	PROJECT DESCRIPTION	TYPE	FACILITY NAME	FROM	TO	LENGTH	EXIS COND :LANE	EXISTING TRAFFIC/PASS VOL	EXISTING V/C	FUTURE TRAFFIC/PASS VOL	FUTURE V/C	ESTIMATE	COST/USER
136	PG	WIDEN I-95 FROM THE PETERSBURG SCL TO THE SOUTHERN MPO BOUNDARY	WIDENING	I-95	PETERSBURG SCL	SOUTHERN MPO BOUNDARY	N/A	FOUR-LANE ROAD	30,903	0.29	38,831	0.36	$81,251,560	$ 2,629
121	PG	WIDEN I-295 FROM THE I-95 / I-295 INTERCHANGE IN PRINCE GEORGE TO THE HOPEWELL SCL	WIDENING	I-295	I-95/I-295 IN PG	HOPEWELL SCL	N/A	FOUR-LANE ROAD	32,592	0.34	47,819	0.49	$175,206,720	$ 5,376
140	PG	U.S. ROUTE 460 CORRIDOR IMPROVEMENT PROJECT (RECONSTRUCTION 4 LANES)	RECONSTRUCTION	US-460	RT. 630 (BULL HILL RD)	PG SOUTHERN MPO BOUNDARY	7.2	FOUR-LANE ROAD	14,695	0.18	20,127	0.25	$68,640,000	$ 4,671
126	PG	INTERSECTION IMPROVEMENT AT RT. 106 AND RT. 630 (COURTHOUSE RD. AND BULL HILL RD.	INTERSECTION IMPROVEMENT	US-460	INTERSECTION RT.106 & RT. 630 COURTHOUSE RD. & BULL HILL RD.	N/A	N/A	FOUR-LANE ROAD	8,510	0.28	13,625	0.45	$1,402,560	$ 165
120	PG	INTERSECTION IMPROVEMENT AT COURTHOUSE ROAD AND BAXTER ROAD, ADDING SIGNALIZATION	INTERSECTION IMPROVEMENT	COURTHOUSE RD	COURTHOUSE RD	BAXTER RD	N/A	TWO-LANE ROAD	8,510	0.32	11,975	0.4	$675,000	$ 79
134	TCAMPO	TCAMP: US-460/I-85/I-95 INTERCHANGE (2015 SMART SCALE/BH2 PROJECT)	NEW CONTRUCTION	US-460/I-85/I-95 INTERCHANG	CRATER RD	WANGER RD.	3	TWO-LANE ROAD	60,000	0.6	70,000	0.7	$17,224,517	287.075283

Section 7 – Appendices

Appendix A: Comment Log

This comment log provides a summary of comments received by the MPO during development of the TIP.

Source	Summary of Comment	MPO Response
US ARMY CORPS OF ENGINEERS NORFOLK DISTRICT FORT NORFOLK 803 FRONT STREET NORFOLK VA 23510-1011 In a letter dated April 3, 2017 – by Alice Allen-Grimes	The discussion of avoidance in Table 12 should specifically include choosing another alignment. The discussion of minimization in Table 12 should specifically be expanded with specific examples. Figure 65 is difficult to read and should include wetlands and streams.	Table 12 has been revised as suggested. Figure 65 has been revised to show wetlands from the National Wetlands Inventory Maps and the resolution has been improved.
Friends of the Lower Appomattox River	Thanks for sharing the draft Transportation Plan. See thoughts below. - Wendy • Page 21 - first sentence under "Bicycle and Pedestrian" heading - Would change the language from "provides users with access at either end of a trip or recreational opportunities" to something like "provides opportunity for alternative modes of transportation and/or recreation." When you read the information in the tables that follow, they certainly talk about bike/walk as a means of transportation • The maps are difficult to read, but it seems like the Appomattox River Trail (ART) could be added as an overlay - and the map on page 25 seems to have some of it mapped • Seems appropriate to mention ART in this section as a bike/ped facility that will span the region. Could even link the concept of a separated trail system to some of the pedestrian fatality data cited later in the document.	
Chesterfield County (Ms. Barb Smith via email) May 2, 2017	David – I am sorry to have to make this request, but we need to add another project to the MTP. It's an extension to a project listed in the draft MTP on page 72. Here is the description: East-West Freeway; Construct a new 2-lane road (1.2 miles) from Harrowgate Road to Route 1; The estimate for this 1.2 mile road is $30 M . See attached sketch. Obviously, we do not know the funding source for this project, but we would like to include it under "Private-Local". Please let me know the schedule for getting this project added and don't hesitate to contact me if you have any questions or need additional information. Barb	The MPO staff discussed the project with Ms. Smith and determined that the project description was in error. We are correcting the description and adding a note to the cost estimate noting that
City of Petersburg (Interim City Man-	Mr. Berry noted that there were no projects specific to Petersburg in the Draft MTP	City of Petersburg staff did not request any projects. There

ager Jack Berry) May 11th 2017 at the MPO Policy Committee Meeting		are projects that are within Petersburg (I-95 Interchange) and the MPO is willing to amend the MTP to include Petersburg's priorities.

Appendix B: Copies of Media Advertising & Social Media Posts

TCMPO Facebook Page

Screenshot of Facebook Page(s) to be added in the final document

TCMPO Website

Screenshot of Facebook Page(s) to be added in the final document

Hopewell News

Image of Add to be added in the final document

Progress Index

Image of Add to be added in the final document

Richmond Times Dispatch

Image of Add to be added in the final document

Ridefinders Facebook Page

Image of Add to be added in the final document

Urban Weekly

Image of Add to be added in the final document

Appendix C: Correlation Plots of Fatal Accidents by Jurisdiction

Tri-Cities MPO	*Total Fatal-ities*	*Alcohol-Impaired Driv-ing (BAC=.08+) Fatalities*	*Single Vehicle*	*Large Truck*	*Speeding*	*Rollover*	*Roadway Departure*	*Intersection Related*	*Passenger Car*	*Light Truck*	*Motorcyclist*	*Pedestrian*	*Bicyclist*
Total Fatalities	1.00												
Alcohol-Impaired Driving (BAC=.08+) Fatalities	0.64	1.00											
Single Vehicle	**0.88**	0.63	1.00										
Large Truck	0.09	0.20	0.55	1.00									
Speeding	0.31	0.01	0.09	0.13	1.00								
Rollover	**0.82**	0.35	0.62	0.02	0.79	1.00							
Roadway Departure	**0.99**	0.72	**0.91**	0.17	0.30	**0.80**	1.00						
Intersection Related	0.04	0.63	0.11	0.27	0.47	0.36	0.02	1.00					
Passenger Car	0.36	**0.95**	0.36	0.11	0.13	0.09	0.45	**0.81**	1.00				
Light Truck	**0.99**	0.71	**0.86**	0.06	0.24	0.77	0.99	0.09	0.46	1.00			
Motorcyclist	0.69	0.06	0.57	0.09	0.65	**~~0.86~~**	0.63	0.73	0.36	0.59	1.00		
Pedestrian	0.37	0.90	0.32	0.04	0.32	0.01	0.44	0.90	0.96	0.48	0.42	1.00	
Bicyclist	0.00	0.39	0.13	0.05	**~~0.91~~**	0.56	0.03	0.72	0.48	0.09	0.60	0.67	1.00

Chesterfield County	*Total Fatali-ties**	*Alcohol-Impaired Driv-ing (BAC=.08+) Fatalities*	*Single Vehicle*	*Large Truck*	*Speeding*	*Rollover*	*Roadway Departure*	*Intersection Related*	*Passenger Car*	*Light Truck*	*Motorcyclist*	*Pedestrian*	*Bicyclist*
Total Fatalities*	1.00												
Alcohol-Impaired Driving (BAC=.08+) Fatalities	0.62	1.00											
Single Vehicle	**0.98**	0.66	1.00										
Large Truck	**0.84**	0.10	0.80	1.00									
Speeding	0.64	0.25	0.53	0.53	1.00								
Rollover	0.66	0.65	0.54	0.32	0.66	1.00							
Roadway Departure	**0.98**	0.55	**0.96**	**0.88**	0.51	0.60	1.00						
Intersection Related	0.04	0.54	0.11	0.37	0.31	0.15	0.14	1.00					
Passenger Car	0.46	**0.81**	0.53	0.00	0.44	0.40	0.30	0.90	1.00				
Light Truck	0.67	0.69	0.66	0.44	0.02	0.62	0.75	0.24	0.15	1.00			
Motorcyclist	0.61	0.07	0.46	0.73	**0.88**	0.55	0.56	0.17	0.00	0.07	1.00		
Pedestrian	0.07	**0.82**	0.14	0.45	0.21	0.37	0.02	0.55	0.61	0.47	0.54	1.00	
Bicyclist	0.09	0.48	0.10	0.33	0.64	0.31	0.05	0.32	0.37	0.28	**0.83**	0.68	1.00

Colonial Heights	*Total Fatalities*	*Alcohol-Impaired Driving (BAC=.08+) Fatalities*	*Single Vehicle*	*Large Truck*	*Speeding*	*Rollover*	*Roadway Departure*	*Intersection Related*	*Passenger Car*	*Light Truck*	*Motorcyclist*	*Pedestrian*	*Bicyclist*
Total Fatalities*	1.00												
Alcohol-Impaired Driving (BAC=.08+) Fatalities	1.00	1.00											
Single Vehicle	1.00	1.00	1.00										
Large Truck	1.00	1.00	1.00	1.00									
Speeding	1.00	1.00	1.00	1.00	1.00								
Rollover	NA	NA	NA	NA	NA	1.00							
Roadway Departure	1.00	1.00	1.00	1.00	1.00	NA	1.00						
Intersection Related	1.00	1.00	1.00	1.00	1.00	NA	1.00	1.00					
Passenger Car	1.00	1.00	1.00	1.00	1.00	NA	1.00	1.00	1.00				
Light Truck	1.00	1.00	1.00	1.00	1.00	NA	1.00	1.00	1.00	1.00			
Motorcyclist	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.00		
Pedestrian	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.00	
Bicyclist	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.00

The data for Colonial Heights does not support any conclusions because of the small number of fatalities in the data.

Dinwiddie County	*Total Fatalities*	*Alcohol-Impaired Driving (BAC=.08+) Fatalities*	*Single Vehicle*	*Large Truck*	*Speeding*	*Rollover*	*Roadway Departure*	*Intersection Related*	*Passenger Car*	*Light Truck*	*Motorcyclist*	*Pedestrian*	*Bicyclist*
Total Fatalities	1.00												
Alcohol-Impaired Driving (BAC=.08+) Fatalities	0.58	1.00											
Single Vehicle	**0.99**	0.66	1.00										
Large Truck	**0.97**	0.76	**0.99**	1.00									
Speeding	**0.84**	**0.93**	**0.89**	0.94	1.00								
Rollover	**0.96**	0.33	0.92	0.87	0.65	1.00							
Roadway Departure	**0.84**	**0.93**	**0.89**	**0.94**	**1.00**	0.65	1.00						
Intersection Related	NA	NA	NA	NA	NA	NA	NA	1.00					
Passenger Car	**0.88**	**0.89**	**0.93**	**0.97**	1.00	0.72	**1.00**	NA	1.00				
Light Truck	**0.96**	0.33	**0.92**	**0.87**	0.65	**1.00**	0.65	NA	0.72	1.00			
Motorcyclist	0.69	0.19	0.61	0.50	0.19	**0.87**	0.19	NA	0.28	**0.87**	1.00		
Pedestrian	0.69	0.19	0.61	0.50	0.19	**0.87**	0.19	NA	0.28	**0.87**	1.00	1.00	
Bicyclist	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.00

Hopewell	*Total Fatalities**	*Alcohol-Impaired Driving (BAC=.08+) Fatalities*	*Single Vehicle*	*Large Truck*	*Speeding*	*Rollover*	*Roadway Departure*	*Intersection Related*	*Passenger Car*	*Light Truck*	*Motorcyclist*	*Pedestrian*	*Bicyclist*
Total Fatalities*	1.00												
Alcohol-Impaired Driving (BAC=.08+) Fatalities	0.17	1.00											
Single Vehicle	0.17	1.00	1.00										
Large Truck	NA	NA	NA	1.00									
Speeding	0.61	0.61	0.61	NA	1.00								
Rollover	NA	NA	NA	NA	NA	1.00							
Roadway Departure	0.67	0.17	0.17	NA	0.41	NA	1.00						
Intersection Related	0.61	0.41	0.41	NA	0.25	NA	0.41	1.00					
Passenger Car	**0.92**	0.10	0.10	NA	0.25	NA	0.61	**0.88**	1.00				
Light Truck	0.67	0.17	0.17	NA	0.41	NA	1.00	0.41	0.61	1.00			
Motorcyclist	0.41	0.41	0.41	NA	0.25	NA	0.41	0.25	0.38	0.41	1.00		
Pedestrian	0.61	0.61	0.61	NA	1.00	NA	0.41	0.25	0.25	0.41	0.25	1.00	
Bicyclist	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.00

Petersburg	*Total Fatalities**	*Alcohol-Impaired Driving (BAC=.08+) Fatalities*	*Single Vehicle*	*Large Truck*	*Speeding*	*Rollover*	*Roadway Departure*	*Intersection Related*	*Passenger Car*	*Light Truck*	*Motorcyclist*	*Pedestrian*	*Bicyclist*
Total Fatalities*	1.00												
Alcohol-Impaired Driving (BAC=.08+) Fatalities	**0.98**	1.00											
Single Vehicle	**0.98**	0.93	1.00										
Large Truck	0.23	0.34	0.08	1.00									
Speeding	0.62	0.56	0.74	0.41	1.00								
Rollover	0.74	0.63	0.83	0.46	0.75	1.00							
Roadway Departure	**0.89**	**0.81**	**0.96**	0.22	**0.84**	**0.94**	1.00						
Intersection Related	**0.85**	**0.91**	0.74	0.61	0.17	0.37	0.54	1.00					
Passenger Car	**0.93**	**0.91**	**0.94**	0.07	0.72	**0.87**	**0.94**	0.72	1.00				
Light Truck	0.09	0.14	0.18	0.61	0.67	0.37	0.36	0.17	0.39	1.00			
Motorcyclist	0.62	0.56	0.74	0.41	**1.00**	0.75	0.84	0.17	0.72	0.67	1.00		
Pedestrian	0.23	0.34	0.08	**1.00**	0.41	0.46	0.22	0.61	0.07	0.61	0.41	1.00	
Bicyclist	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.00

`Prince George County	*Total Fatalities*	*Alcohol-Impaired Driving (BAC=.08+) Fatalities*	*Single Vehicle*	*Large Truck*	*Speeding*	*Rollover*	*Roadway Departure*	*Intersection Related*	*Passenger Car*	*Light Truck*	*Motorcyclist*	*Pedestrian*	*Bicyclist*
Total Fatalities*	1.00												
Alcohol-Impaired Driving (BAC=.08+) Fatalities	0.87	1.00											
Single Vehicle	**0.97**	0.76	1.00										
Large Truck	0.75	0.42	0.76	1.00									
Speeding	0.49	0.61	0.52	0.07	1.00								
Rollover	0.33	0.05	0.46	0.30	0.02	1.00							
Roadway Departure	0.78	**0.80**	0.76	0.21	0.67	0.46	1.00						
Intersection Related	0.74	0.69	0.72	0.69	0.51	0.23	0.30	1.00					
Passenger Car	0.58	0.73	0.56	0.15	**0.91**	0.30	0.53	0.78	1.00				
Light Truck	0.57	0.57	0.48	0.24	0.03	0.52	0.75	0.09	0.07	1.00			
Motorcyclist	0.49	0.29	0.52	0.78	0.13	0.20	0.11	**0.88**	0.44	0.34	1.00		
Pedestrian	0.76	0.68	0.70	0.42	0.18	0.59	**0.85**	0.13	0.10	**0.96**	0.13	1.00	
Bicyclist	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.00

Appendix D: Analysis Security Incidents

The Federal Bureau of Investigation defines terrorism *as the unlawful threat of or use of force of violence against people or property with the intention of coercing society or government* (Terrorism). To help assess the threat to transportation from terrorism the MPO analyzed terrorist incidents in the United States that occurred between 1982 and 2014 (Global Terrorism Database). Figures 92, 93 and 94 present that information graphically.

Terrorist incidents have occurred in almost every state; however, most terrorist incidents, in the United States, happen in more populous areas. Almost 1/3 of terrorist incidents in the United States happen in California, Puerto Rico or New York.

Considering transportation system security in the context of intentional incident was added to the transportation portfolio after 2001. Based upon events of the last decade it seems prudent for the MPO to evaluate the risk of a terror attack upon the transportation planning system in the Tri-Cities area to assess the level of effort needed to provide security for transportation system users and to determine its proper role in security.

Figure 38 shows where, in the United States, terrorist incidents are most likely. The blue bars show the number of incidents in each state. Virginia is highlighted in dark blue to show how it compares with the rest of the United States.

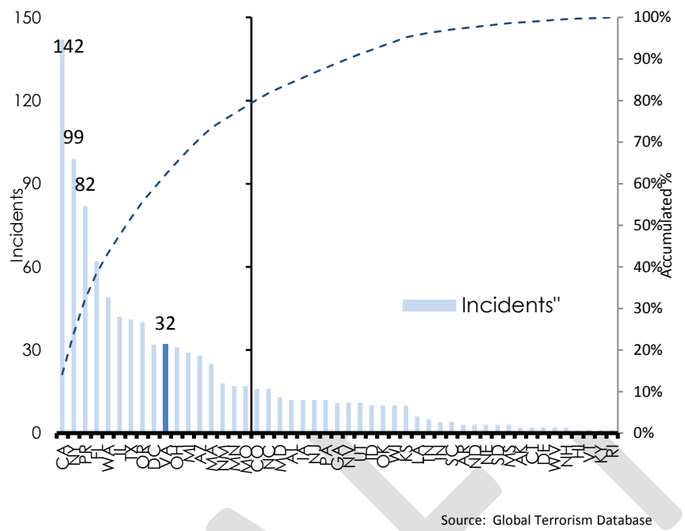


Figure 92: Terrorist Incidents by State

Terrorists choose targets using five general criteria (Terrorism):

- Minimal danger to themselves;
- Ease of access;
- Visibility (*e.g.,* international airports, landmarks, large cities, or major special events);
- Avoiding detection before the attack; and
- Easy escape from the site.

However, many targets meet these criteria. Figure 39 looks at the U.S. targets of terrorists. *Despite high profile incidents outside the U.S., only five of the 1000 incidents recorded since 1982 have been directed at transportation targets.* However, 51 of the 1000 incidents have targeted military facilities and Fort Lee, home of the US Army Logistics Command, is in the Tri-Cities MPO's service area.

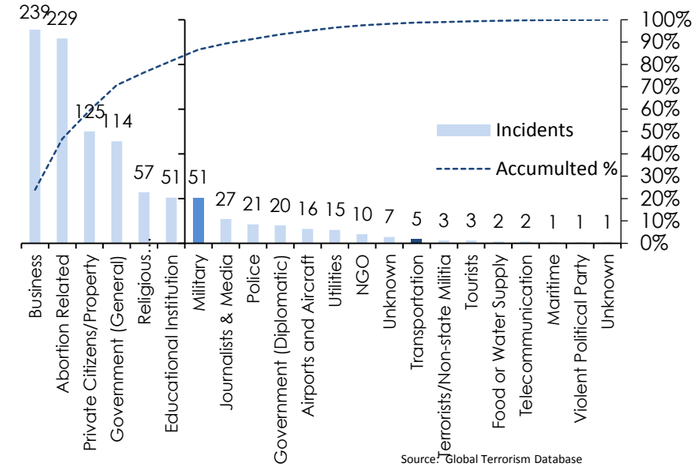


Figure 93: Terrorist Incidents by Target Type

Figure 40 shows the types of terrorist incidents that have occurred in the U.S. Over eighty percent of the attacks in the U.S have been attacks on facilities.

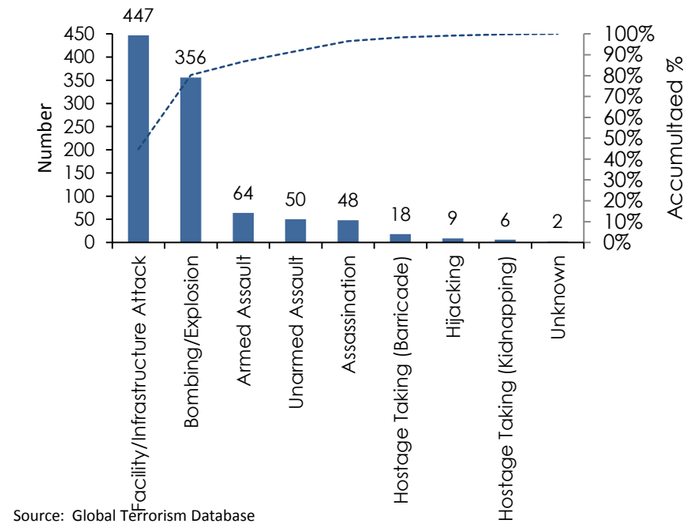


Figure 94: Terrorist Incident by Type

Appendix E: Human Services Transportation Providers

Table 18: Human Services Transportation Providers

Service Area	Agency/ Provider	Client Type	# of Vehicles	Trip Characteristics (Times, Fees, etc.)	# of Trips	Wheelchair Accessible	Contact Information
As arranged	Senior Bridge	Provides escort and errand services in association with their home health care services		Rides arranged on a per case basis; contact provider for more information.			Phone: (804) 282-0753 Website: www.matureoptions.com
Chesterfield County. *Trips outside Chesterfield County will be available for medical purposes only; with the exception of or passengers living in Southeastern Chesterfield County where limited transportation is available along a designated route in Colonial Heights.*	Access Chesterfield	Available to people with disabilities, people age 60+, or households living at 200% of federal poverty level. Must be a resident of Chesterfield and registered for the service.	15 Vehicles	Monday – Friday 5:30am to 7:30pm and Saturday 5:30am to 5:30pm. $30 for five vouchers; voucher good for one way trip.	50,000 annually	Yes	Phone: (804) 279-8489 (registration) (804) 955-4172 (ride requests) Website: www.chesterfield.gov/accesschesterfield
Chesterfield County	Chesterfield Community Services Board (CSB)	Members of CSB programs	30 Vehicles	Service is associated with CSB services. Transportation includes trips for employment, day services, mental health services and substance abuse programs.	77,000 in FY14	Yes	Phone: (804) 748-1227 Website: www.chesterfield.gov/csb
Chesterfield, Goochland, Hanover, Henrico, Richmond, Petersburg area	Acti-Kare in Home Care			Monday – Sunday 6:00am to 9:00pm. $16 to $18 per hour.			Phone: (804) 264-2829 Website: www.actikarerichmondva.com
Chesterfield, Henrico, Richmond; *additional fees apply in Powhatan, Goochland and Hanover*	Alliance Specialty Transport			Transportation provided 24/7. Office hours are Monday – Friday 9:00am to 5:00pm.		Yes	Phone: (804) 225-8599 Website: Alliancespecialtytransport.com
Chesterfield, Henrico and Richmond	American Cancer Society (Road to Recovery)	Transportation to and from cancer treatment for those without rides.		Monday – Friday 8:00am to 5:00pm. Rides are free.			Phone: (804) 527-3700 Website: www.cancer.org
Chesterfield, Henrico, Richmond	Mobility Transportation, LLC	General public		Monday – Friday 6:00am to 6:00pm and Saturday 6:00am to 1:00pm.		Yes	Phone: (804) 687-6590 Website: www.mobility-transportation.com
Chesterfield, Glen Allen, Hanover, Henrico, Mechanicsville, Midlothian, Richmond	Home Helpers	General public; intended for seniors and lower income persons		Provide trips for grocery shopping, prescription pick-up, errand services and doctor visits.			Phone: (804) 864-4258 Website: Homecarerichmond.com
Colonial Heights, Hopewell, Petersburg	Petersburg Area Transit	General public	14 Buses 6 Demand Response Vehicles	Monday – Thursday 5:45am to 7:00pm, Friday 5:45am to 8:00pm and Saturday 6:45am to 8:00pm fixed route and demand response service.	664,701 in FY12	Yes	Phone: (804) 733-2450 Website: www.petersburg-va.org/transit/
Colonial Heights, Hopewell, Petersburg; *service in other areas may be provided upon request*	Pink Transportation			Service provided 24 hours a day, 7 days a week.			Phone: (804) 894-8646 Website: www.pink804.com

Service Area	Agency/ Provider	Client Type	# of Vehicles	Trip Characteristics (Times, Fees, etc.)	# of Trips	Wheelchair Accessible	Contact Information
Goochland, Hanover and Powhatan	Capital Area Partnership Uplifting People (CAP-UP)	Intended for Seniors	8 Vehicles		7,716 in FY10		Phone: (804) 598-3351
New Kent and Charles City Counties to Richmond	Bay Transit	General public	48 Vehicles (35 are wheelchair accessible)	Call Monday – Friday 6:00am to 6:00pm to schedule a ride. $2.00 per trip; $12.00 for booklet of 10 trips.	11,453 in FY13	Yes	Phone: (804) 966-8743 Website: www.baytransit.org
Goochland	Goochland Free Clinic and Family Services	Must be at or below the 200% of the federal poverty level; eligibility screening required	3 Vehicles	Monday 12:00pm to 3:00pm in Richmond; Tuesday – Thursday 9:00am to 3:00pm in Goochland; and Friday 9:00am to 12:00pm in Richmond. Fare free if eligible.	3,246 in FY13		Phone: (804) 556-6260 Website: Goochlandfreeclinicandfamilyservices.org
Greater Richmond area	Comfort Keepers	Disabled adults, seniors aging in place and persons recovering from surgery.		Provides transportation incidental to other care services.	24,781 in FY13		Phone: (804) 750-1123 Website: www.comfortkeepers.com
Greater Richmond area	Greater Richmond ARC	People with developmental disabled and their families	9 Vehicles	Provides transportation for ARC services. Contact provider for more information.	82,873 in FY13	Yes	Phone: (804) 358-1874 Website: www.richmondarc.org
Greater Richmond area	Heart Havens, Inc.	Persons with intellectual disabilities hat are enrolled in the program	2 Vehicles	Trips are available by appointment for community outings, medical appointments and shopping.			Phone: (804) 237-6097 Website: www.hearthavens.org
Richmond, Goochland and Petersburg	Brooks LLC			Monday – Friday 7:00am to 7:00pm, Saturday 7:00am to 5:00pm and Sunday by appointment only.			Phone: (804) 276-3401
Richmond and surrounding areas	Bowman Transportation Service			Office Hours Monday – Friday 8:00am to 5:00pm.		Yes	Phone: (804) 745-0046 Website: www.ridewithlarry.com
Richmond and surrounding areas	Dependacare Transportation	General public		Provide pre-scheduled and same day appointments for door-to-door, curb-to-curb, or door-through-door service.		Yes	Phone: (804) 745-1818 Website: www.dependacareva.com
Petersburg, Colonial Heights, Dinwiddie, Greensville, Hopewell, Prince George, Surry, Sussex	Crater District AAA	General public, elderly, disabled and Medicare	22 Vehicles	Monday – Friday 8:00am to 4:30pm. Volunteer based; must schedule ride at least 48 business hours before appointment.		Yes	Phone: (804) 732-7020 Website: www.cdaaa.org
	Flagship Transportation			Monday – Friday 6:00am to 6:00pm and Saturday 6:00am to 2:00pm.			Phone: (434)265-6781 Website: www.flagshiptransport.com
Richmond, Chesterfield, Hanover, Henrico	Greater Richmond Transit Company (GRTC)	General public	135 Vehicles	Fixed route service available daily from 5:00am to 1:00am. Fare is $1.50, $0.75 reduced fare is available for those aged 65+, certain disabilities and CARE	8,845,810 in FY13	Yes	Phone: (804) 358-4782 Website: www.ridegrtc.com
Richmond, Henrico and portions of Chesterfield	GRTC's CARE	ADA paratransit eligibility process is required.	70 Vehicles	Richmond: 4:30am to 12:30am and Henrico: 6:00am to 11:00pm. Specialized transportation fare is $3.00.	345,358 in FY13	Yes	Phone: (804) 782-2273 Website: www.ridegrtc.com

Service Area	Agency/ Provider	Client Type	# of Vehicles	Trip Characteristics (Times, Fees, etc.)	# of Trips	Wheelchair Accessible	Contact Information
Richmond area	Home Instead Senior Care	Home Instead provides transportation incidental to their companionship services		As scheduled; there is a three hour minimum per visit and we prefer at least a 24 hour notice. Provide service for a single event or regular schedule seven days a week.			Phone: (804) 527-1100 Website: www.homeinstead.com
Within six miles of clinic locations	Jen Care	Healthcare delivery system for seniors eligible for Medicare		Trips are designated for clinic patients.			Phone: (804) 344-9848 Website: www.jencaremed.com
South-central Hanover County (zip codes: 23111, 23116 and a portion of 23059	Mechanicsville Churches Emergency Function Senior Rides	Seniors		Rides arranged on a per case basis; contracts with transit agencies and taxicab companies. Contact provider for more information.			Phone: (804) 334-6590 Website: www.mcef.co
Richmond area	New Freedom Transportation, LLC	General Public, Medicaid	7 Fifteen Passenger Vans 7 Minivans	Rides arranged on a per case basis; contact provider for more information.			Phone: (804) 288-1248 Website: www.newfreedomtransportation.com
Richmond area	Save Our Seniors			Rides arranged on a per case basis; contact provider for more information.			Phone: (804) 559-4480
Chesterfield, Henrico and Richmond	Presbyterian Homes and Family Services and the Family Alliance/Ways to Work	This program is geared towards families in helping them retain employment	1 Vehicle	The Ways to Work Program has approved 103 families with small-interest loans to meet their transportation needs. Contact provider for more information.			Phone: (804) 888-8226 Website: www.phfs.org www.waystowork.org
Richmond (Shelia Lane Wal-Mart; service from Hillside Court, Fay Tower, Creighton Court, Fairfield, Mosby, Whitcomb, and Fulton)	RVA Shoppers' Shuttle			Operates on the second and ninth day of each month and the third Saturday of each month. Bus schedules are online. Fare free.		No	Phone: (804) 646-7985 Website: Richmondvacitynews.blogspot.com /2012/02/rva-shoppers-shuttle-schedule.html
Charles City, Chesterfield, Goochland, Hanover, Henrico, New Kent, Powhatan and Richmond	Senior Connections	General public, elderly and disabled		Contact provider for more information.		Yes	Phone: (804) 343-3000 Website: www.seniorconnections-va.org
Charles City Chesterfield, Colonial Heights, Goochland, Hanover, Henrico, Hopewell, New Kent, Petersburg, Powhatan and Richmond,	VIP & Associates			Monday – Friday 8:00am to 4:00pm.		Yes	Phone: (804) 329-2500
Chester, Chesterfield, Colonial Heights, Dinwiddie, Hopewell, Midlothian, Prince George, South Richmond	Shepherd's Center of Chesterfield	Must be over 50 years of age without serious cognitive impairment		Office hours are Monday – Friday 9:00am to 1:00pm. Fare free, donations accepted.		No	Phone: (804) 706-6689 Website: www.shepctrchesterfield.org
Greater Richmond and Petersburg areas	Senior Express Enterprise			Monday – Friday 7:00am to 6:00pm.			Phone: (804) 402-6457

Service Area	Agency/ Provider	Client Type	# of Vehicles	Trip Characteristics (Times, Fees, etc.)	# of Trips	Wheelchair Accessible	Contact Information
Greater Richmond and Petersburg areas including Hanover, Williamsburg, Louisa and Powhatan	St. Joseph's Villa	Children and families with special needs	6 Vehicles	Transportation is provided as needed to participants in St. Joseph's programs. Contact the provider for more information.		Yes	Phone: (804) 553-3200 Website: www.neverstopbelieving.org
Richmond, eastern Henrico	Seniors Helping Seniors			Rides arranged on a per case basis; contact provider for more information.			Phone: (804) 553-0526 Website: www.seniorshelpingseniors.com/RVA
Goochland, Hanover, Henrico, Louisa and Richmond	Tendercare Transport			Monday – Friday 8:00am to 5:00pm.		Yes	Phone: (804) 288-8763 Website: www.tendercareofva.com
Petersburg	We Care Transportation			Rides arranged on a per case basis; contact provider for more information.			Phone: (804) 7333-2450
Powhatan, Colonial Heights, Hopewell, Petersburg, Chesterfield, Hanover, Henrico, Richmond and Goochland	Van Go			Monday – Friday 5:30am to 8:30pm; service available 24 hours a day with advance notice.		Yes	Phone: (804) 261-7388 Website: www.vangorichmond.com
Richmond area based ; *will provide transport to anywhere in Virginia and some out of state trips*	TNT Transportation Services	Non-Emergency Medical Transportation	11 Vehicles	Available 24/7. Fees based per trip. Authorized for intrastate and interstate transportation.	300 per month	Yes	Phone: (804) 270-3258 Website: www.tntvans.com
Richmond, Hanover and Henrico	Sunrise Transportation			Monday – Friday 7:00am to 7:00pm.			Phone: (804)559-6083
Statewide	Logisticare – Virginia Non-Emergency Medical Transportation System	Medicaid recipients only	None	Can be contacted 24 hours a day to arrange transportation. Fares are arranged through Medicaid.	800,000 registered members	Yes	Phone: (866) 810-8305 Website: www.logisticare.com
Western Richmond, western Henrico, northern Chesterfield; additional fee for pickup in other areas.	Angels for Hire/Angel Ride			Monday – Friday 8:30am to 6:00pm.		Yes	Phone: (804) 423-9200 Website: www.angelride.net
Zip codes: 23059, 23060, 23113, 23114, 23219, 23220, 23221, 23222, 23224, 23225, 23226, 23227, 23228, 23229, 23230, 23233, 23235, 23236, 23238, 23294	Shepherd's Center of Richmond	Must be over 60 years of age without serious cognitive impairment		Transportation is provided for medical appointments and grocery shopping. Office hours are Monday – Friday 8:30am to 4:30pmFare free.		No	Phone: (804) 355-7282 Website: www.tscor.wordpress.com
	CareMore	Must be an Anthem Blue Cross Blue Shield Medicare patient to use services		Service is associated with individual facilities.			Phone: (855) 242-9606 Website: www.caremore.com
	Capital Area Health Network (CAHN)	Members of the CAHN		Transportation services are associated with CAHN medical services.			Phone: (804) 253-1969 Website: Cahealthnet.com

Appendix F: Interagency Contact List

Table 19: Agency Contacts

Agency	Contact Name	Address	Telephone	Fax	Email
U.S. Department of Agriculture	Janice Stroud-Bickes, Acting State Director	1606 Santa Rosa Road, Suite 209 Richmond, VA 23229-5014	804-287-1615	804-287-1718	janiceStroud-Bickes@va.usda.gov
U.S. Army Corps of Engineers Office	Alice Allen-Grimes	Regulatory Branch Corps of Engineers 803 Front St. Norfolk, VA 23510	757-201-7219		Alice.W.Allen-Grimes@usace.army.mil]
U.S. EPA Region 3	Cecil A. Rodrigues	1650 Arch Street (3APOO) Philadelphia, PA 19103-2029	215-814-2900		R3_RA@epa.gov
U.S. Fish and Wildlife Service	Cindy Schulz, Field Supervisor	Virginia Field Office 6669 Short Lane Gloucester, VA 23061	804-824-2426	804-654-1842	cindy_schulz@fws.gov
U.S. Geological Survey	George E. Harlow Jr., Associate Director	Virginia -West Virginia Water Science Center 1730 East Parham Road Richmond, VA 23228	804-261-2631	804-261-2657	geharlow@usgs.gov
Virginia Department of Conservation and Recreation	Tom Smith, Director	Natural Heritage Central Office Main Street Centre 600 East Main Street 1657 Richmond, VA 23219	804-786-45574	804-225-3447	Tom.Smith@dcr.virginia.gov
Virginia Department of Environmental Quality	Michael Murphy, Regional Director	Piedmont Regional Office 4949-A Cox Road Glen Allen, VA 23060	804-527-5020	804-527-5106	Michael.Murphy@deq.virginia.gov
Virginia Department of Environmental Quality	Michael Dowd, Air Quality Division Director	629 East Main Street Richmond, VA 23219	804-698-4424		Michael.Dowd@deq.virginia.gov
Virginia Department of Forestry	Bettina K. Ring, State Forester	Fontaine Research Park 900 Natural Resources Drive Suite 800 Charlottesville, VA 22903	434-220-9047	434-296-2369	BETTINA.RING@DOF.VIRGINIA.GOV
Virginia Department of Game and Inland Fisheries	Robert “Bob” W. Duncan Executive Director	Director’s Office Virginia Department of Game and Inland Fisheries P.O. Box 90778 Henrico, VA 23228	804-367-9231		BOB.DUNCAN@DGIF.VIRGINIA.GOV

Appendix G: Available Funds for the Transportation Plan in Constant Dollars

Table 20: Available Funding for the Years 2017 through 2022 (Constant Dollars)

Period 1: 2017-2022	Year						Grand Total
	2017	2018	2019	2020	2021	2022	
Maintenance							
Maintenance-Localities	$ 3,975,069	$3,961,269	$,952,056	$,947,388	$,947,237	$3,947,722	$ 23,730,741
Maintenance-VDOT	$ 18,937,445	$18,874,862	$18,832,388	$18,810,276	$8,807,254	$18,807,527	$ 13,069,752
State of Good Repair	$ -	$ -	$ -	$ -	$3,584,380	$,482,379	$ 7,066,759
Maintenance Total	**$ 22,912,514**	**$ 2,836,131**	**$22,784,444**	**$,757,664**	**$26,338,871**	**$6,237,628**	**$143,867,252**
			None				
CMAQ	$ 996,841	$ 976,782	$ 957,287	$ 938,336	$ 919,909	$ 910,559	$ 5,699,714
CMAQ-Match	$ 249,210	$ 244,195	$ 239,322	$ 234,584	$ 229,977	$ 227,639	$ 1,424,927
District Grant Program	$ 616,688	$ 352,571	$ 313,151	$ 1,007,200	$ 805,574	$ 2,128,121	$ 7,223,305
High Priority Projects	$ 616,688	$ 352,571	$ 313,151	$ 1,007,200	$ 805,574	$ 2,128,121	$ 7,223,305
Other Discretionary Construc-tion	$ 3,919,883	$ 322,698	$ 6,040,925	$ 1,518,467	$ 160,233	$ 816,616	$ 22,778,822
RSTP	$ 1,844,419	$ 1,807,306	$ 1,771,234	$ 1,736,169	$ 702,075	$ 1,683,273	$ 10,544,476
RSTP-Match	$ 461,105	$ 451,827	$ 442,809	$ 434,042	$ 425,519	$ 420,818	$ 2,636,120
TAP	$ 145,583	$ 142,653	$ 139,806	$ 137,038	$ 134,347	$ 132,863	$ 832,290
None Total	**$18,850,417**	**$ 4,650,603**	**$ 10,217,685**	**$ 7,013,036**	**$ 9,183,208**	**$ 8,448,010**	**$ 58,362,959**
			Other				
Administrative	$ 966,927	$ 968,089	$ 969,858	$ 971,946	$ 973,481	$ 972,860	$ 5,823,161
Other Total	**$ 966,927**	**$ 968,089**	**$ 969,858**	**$ 971,946**	**$ 973,481**	**$ 972,860**	**$ 5,823,161**
			Transit				
5303	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5307	$ 807,000	$ 1,534,000	$ 1,480,000	$ 1,830,000	$ 1,603,000	$ 807,000	$ 7,254,000
5310	$ 202,000	$ 336,000	$ 200,000	$ 304,000	$ 272,000	$ 1,314,000	$ 1,314,000
5339	$ 141,000	$ 112,000	$ 142,000	$ 142,000	$ 112,000	$ 141,000	$ 790,000
Local Matching Funds	$ 3,400,000	$ 1,039,000	$ 998,000	$ 2,667,000	$ 1,019,000	$ 3,400,000	$ 9,123,000
State Matching Funds	$ 2,121,000	$ 945,000	$ 921,000	$ 2,128,000	$ 942,000	$ 2,121,000	$ 7,057,000
Fares	$ 395,000	$ 394,000	$ 394,000	$ 394,000	$ 394,000	$ 395,000	$ 1,971,000
Transit Total	**$ 7,066,000**	**$ 4,360,000**	**$ 4,135,000**	**$ 7,465,000**	**$ 4,342,000**	**$ 7,066,000**	**$ 27,368,000**
Grand Total	**$ 42,729,858**	**$ 28,454,823**	**$ 33,971,987**	**$ 0,742,646**	**$ 6,495,560**	**$ 35,658,498**	**$ 208,053,372**

Table 21: Available Funding for the Years 2023 through 2028 (Constant Dollars)

Period 2: 2023 - 2028	Year						
	2023	2024	2025	2026	2027	2028	Grand Total
Maintenance							
Maintenance-Localities	$ 3,948,837	$ 3,950,576	$,952,930	$3,955,896	$,959,465	$ 3,963,633	$ 23,731,337
Maintenance-VDOT	$ 18,810,941	$18,817,459	$18,827,048	$18,839,676	$18,855,313	$18,873,929	$113,024,366
State of Good Repair	$ 3,324,057	$ 3,131,827	$,939,277	$,757,717	$2,588,543	$ 2,526,017	$ 17,267,438
Maintenance Total	**$26,083,835**	**$25,899,862**	**$25,719,255**	**$25,553,289**	**$25,403,321**	**$ 25,363,579**	**$ 154,023,141**
			None				
CMAQ	$ 901,440	$ 892,545	$ 883,868	$ 875,403	$ 867,145	$ 859,086	$ 5,279,487
CMAQ-Match	$ 225,360	$ 223,136	$ 220,967	$ 218,851	$ 216,786	$ 214,771	$ 1,319,871
District Grant Program	$ 2,031,368	$ 1,913,895	$ 1,796,225	$ 1,685,271	$ 1,581,887	$ 1,543,677	$ 10,552,323
High Priority Projects	$ 2,031,368	$ 1,913,895	$ 1,796,225	$ 1,685,271	$ 1,581,887	$ 1,543,677	$ 10,552,323
Other Discretionary Construc-tion	$ 806,399	$ 796,444	$ 786,743	$ 777,288	$ 768,072	$ 759,088	$ 4,694,034
RSTP	$ 1,664,943	$ 1,633,028	$ 1,601,975	$ 1,571,753	$ 1,542,336	$ 1,513,697	$ 9,527,732
RSTP-Match	$ 416,236	$ 411,768	$ 407,412	$ 403,163	$ 399,020	$ 394,979	$ 2,432,578
TAP	$ 131,417	$ 130,006	$ 128,631	$ 127,290	$ 125,982	$ 124,705	$ 768,031
None Total	**$ 8,208,531**	**$ 7,914,717**	**$ 7,622,046**	**$ 7,344,290**	**$ 7,083,115**	**$ 6,953,680**	**$ 45,126,379**
			Other				
Administrative	$ 951,204	$ 954,197	$ 957,377	$ 960,749	$ 964,310	$ 968,060	$ 5,755,897
Other Total	**$ 951,204**	**$ 954,197**	**$ 957,377**	**$ 960,749**	**$ 964,310**	**$ 968,060**	**$ 5,755,897**
Transit							
5303	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5307	$ 785,000	$ 764,000	$ 743,000	$ 723,000	$ 703,000	$ 684,000	$ 4,402,000
5310	$ 1,278,000	$ 1,243,000	$ 1,209,000	$ 1,176,000	$ 1,144,000	$ 1,113,000	$ 7,163,000
5339	$ 137,000	$ 133,000	$ 1296,000	$ 125,000	$ 122,000	$ 119,000	$ 765,000
Local Matching Funds	$ 3,307,000	$ 3,217,000	$ 3,129,000	$ 3,304,000	$ 2,961,000	$ 2,208,000	$ 18,538,000
State Matching Funds	$ 2,063,000	$ 2,207,000	$ 1,195,000	$ 1,189,000	$ 1,184,000	$ 1,797,000	$ 9,635,000
Fares	$ 384,000	$ 374,000	$ 364,000 -	$ 354,000	$ 344,000	$ 335,000	$ 2,125,000
Transit Total	**$ 7,954,000**	**$ 7,938,000**	**$ 7,572,000**	**$ 6,871,000**	**$ 6,458,000**	**$ 6,256,000**	**$ 42,628,000**
Grand Total	**$ 35,243,570**	**$ 34,768,776**	**$ 4,298,678**	**$ 3,858,328**	**$ 3,450,746**	**$ 33,285,319**	**$ 204,905,417**

Table 22 Available Funding for the Years 2029 through 2034 (Constant Dollars)

Period 3: 2029-2034	Year						Grand Total
	2029	2030	2031	2032	2033	2034	
Maintenance							
Maintenance-Localities	$ 3,968,396	$ 3,973,747	$ 3,979,681	$ 3,986,195	$ 3,993,284	$ 4,000,944	$ 23,902,247
Maintenance-VDOT	$ 18,895,499	$ 18,919,994	$18,947,391	$18,977,667	$19,010,801	$ 19,046,771	$ 113,798,123
State of Good Repair	$ 2,531,907	$ 2,451,128	$ 2,349,500	$ 2,332,691	$ 2,291,417	$ 2,219,099	$ 14,175,742
Maintenance Total	**$ 25,395,802**	**$ 25,344,869**	**$25,276,572**	**$25,296,553**	**$25,295,502**	**$ 25,266,814**	**$ 151,876,112**
None							
CMAQ	$ 851,221	$ 843,545	$ 836,054	$ 828,741	$ 821,602	$ 814,632	$ 4,995,795
CMAQ-Match	$ 212,806	$ 210,887	$ 209,013	$ 207,185	$ 205,401	$ 203,658	$ 1,248,950
District Grant Program	$ 1,547,277	$ 1,497,912	$ 1,435,805	$ 1,425,533	$ 1,400,310	$ 1,356,116	$ 8,662,953
High Priority Projects	$ 1,547,277	$ 1,497,912	$ 1,435,805	$,425,533	$,400,310	$ 1,356,116	$ 8,662,953
Other Discretionary Construction	$ 750,329	$ 741,788	$ 733,458	$ 725,333	$ 717,407	$ 709,675	$ 4,377,990
RSTP	$ 1,485,810	$ 1,458,651	$ 1,432,195	$ 1,406,420	$ 1,381,305	$ 1,356,827	$ 8,521,208
RSTP-Match	$ 391,037	$ 387,190	$ 383,437	$ 379,775	$ 376,201	$ 372,712	$ 2,290,352
TAP	$ 123,460	$ 122,246	$ 121,061	$ 119,904	$ 118,776	$ 117,674	$ 723,121
None Total	**$ 6,909,217**	**$ 6,760,131**	**$,586,828**	**$ 518,424**	**$ 6,421,312**	**$ 6,287,410**	**$ 39,483,322**
Other							
Administrative	$ 972,001	$ 976,132	$ 980,453	$ 984,965	$ 989,669	$ 994,566	$ 5,897,786
Other Total	**$ 972,001**	**$ 976,132**	**$ 980,453**	**$ 984,965**	**$ 989,669**	**$ 994,566**	**$ 5,897,786**
Transit							
5303	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5307	$ 665,000	$ 647,000	$ 629,000	$ 612,000	$ 595,000	$ 579,000	$ 3,727,000
5310	$ 1,113,000	$ 1,083,000	$ 1,053,000	$ 1,024,000	$ 996,000	$ 969,000	$ 6,0685,000
5339	$ 116,000	$ 113,000	$ 110,000	$ 107,000	$ 104,000	$ 101,000	$ 651,000
Local Matching Funds	$ 2,801,000	$ 2,275,000	$ 2,651,000	$ 2,257,000	$ 2,509,000	$ 2,441,000	$ 15,706,000
State Matching Funds	$ 1,748,000	$ 1,170,000	$ 1,654,000	$ 1,609,000	$ 1,565,000	$ 1,522,000	$ 9,979,800
Fares	$ 326,000	$ 317,000	$ 308,000	$ 300,000	$ 292,000	$ 284,000	$ 1,827,000
Transit Total	**$ 6,769,000**	**$ 5,605,000**	**$ 6,405,000**	**$ 5,909,000**	**$ 6,061,000**	**$ 5,896,000**	**$ 92,575,800**
Grand Total	**$ 40,046,020**	**$ 38,386,132**	**$39,248,853**	**$38,708,942**	**$ 38,767,483**	**$ 32,440,790**	**$ 289,833,020**

Table 23 Available Funding for the Years 2036 through 2040 (Constant Dollars)

Period 4: 2034 - 2040	Year						Grand Total
	2035	2036	2037	2038	2039	2040	
Maintenance							
Maintenance-Localities	$ 4,009,173	$ 4,017,965	$ 4,027,318	$ 4,037,229	$ 4,047,696	$ 4,058,716	$ 24,198,097
Maintenance-VDOT	$ 19,085,560	$ 19,127,150	$19,171,525	$ 9,218,669	$19,268,570	$ 19,321,215	$ 115,192,689
State of Good Repair	$ 2,147,221	$ 2,093,003	$ 2,040,839	$ 1,961,518	$ 1,881,359	$ 1,805,428	$ 11,929,368
Maintenance Total	**$ 25,241,954**	**$ 25,238,118**	**$25,239,682**	**$ 5,217,416**	**$25,197,625**	**$ 25,185,359**	**$ 151,320,154**
None							
CMAQ	$ 807,826	$ 801,181	$ 794,691	$ 788,353	$ 782,161	$ 776,114	$ 4,750,326
CMAQ-Match	$ 201,957	$ 200,295	$ 198,673	$ 197,088	$ 195,540	$ 194,029	$ 1,187,582
District Grant Program	$ 1,312,191	$ 1,279,058	$ 1,247,179	$ 1,198,706	$ 1,149,719	$ 1,103,317	$ 7,290,170
High Priority Projects	$ 1,312,191	$ 1,279,058	$ 1,247,179	$ 1,198,706	$ 1,149,719	$ 1,103,317	$ 7,290,170
Other Discretionary Construction	$ 702,130	$ 694,767	$ 687,581	$ 680,567	$ 673,719	$ 667,034	$ 4,105,798
RSTP	$ 1,332,966	$ 1,309,704	$ 1,287,020	$ 1,264,897	$ 1,243,317	$ 1,222,264	$ 7,660,168
RSTP-Match	$ 369,307	$ 365,983	$ 362,736	$ 359,567	$ 356,473	$ 353,450	$ 2,167,516
TAP	$ 116,599	$ 115,549	$ 114,524	$ 113,524	$ 112,547	$ 111,592	$ 684,335
None Total	**$ 6,155,167**	**$ 6,045,595**	**$ 5,939,583**	**$ 5,801,408**	**$ 5,663,195**	**$ 5,531,117**	**$ 35,136,065**
Other							
Administrative	$ 999,656	$ 1,004,941	$ 1,010,421	$ 1,016,097	$ 1,021,970	$ 1,028,044	$ 6,081,129
Other Total	**$ 999,656**	**$ 1,004,941**	**$ 1,010,421**	**$ 1,016,097**	**$ 1,021,970**	**$ 1,028,044**	**$ 6,081,129**
Transit							
5303	$ -	$ -	$ -	$ -	$ -	$ -	$ -
5307	$ 563,000	$ 548,000	$ 533,000	$ 518,000	$ 504,000	$ 490,000	$ 3,156,000
5310	$ 917,000	$ 892,000	$ 868,000	$ 844,000	$ 821,000	$ 799,000	$ 5,141,000
5339	$ 98,000	$ 95,000	$ 92,000	$ 89,000	$ 87,000	$ 85,000	$ 546,000
Local Matching Funds	$ 2,374,000	$ 2,309,000	$ 2,246,000	$ 2,185,000	$ 2,125,000	$ 2,067,000	$ 13,306,000
State Matching Funds	$ 1,480,000	$ 1,440,000	$ 1,401,000	$ 1,363,000	$ 1,326000	$ 1,290,000	$ 8,300,000
Fares	$ 276,000	$ 268,000	$ 261,000	$ 254,000	$ 247,000	$ 240,000	$ 1,546,000
Transit Total	**$ 5,708,000**	**$5,552,000**	**$ 5,401,000**	**5,253,000**	**$ 5,110,000**	**$ 4,971,000**	**$ 31,995,000**
Grand Total	**$ 38,104,777**	**$ 37,840,654**	**$37,590,686**	**$37,287,921**	**$36,999,790**	**$ 36,715,520**	**$ 224,532,348**

Appendix H: Level of Service

The Highway Capacity Manual defines six levels of service using the letters A through F. LOS A represents the best operating conditions and LOS F the worst. Level of Service is a qualitative measure of operating conditions how they are perceived. Factors such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety are used to describe level-of-service. LOS of C or better is considered desirable. LOS of E or F is undesirable. Levels-of-service are described in Table 25.

Table 24: Level of Service Definition

	Description	Multi-Lane (VPH/lane)	Signals (Delay/Vehicle)	Roundabout(Delay/Vehicle)
LOS A	*(Free flow)* Vehicles can maneuver freely in the traffic stream. Minor accidents or breakdowns are easily absorbed.	600	<10	<10
LOS B	*(Reasonably free flow)* The ability to maneuver is slightly restricted. Minor accidents or breakdowns are easily absorbed.	960	10-20	10-15
LOS C	*(Stable flow)* Traffic flows are approaching the range in which increases in traffic deterioration in service. Freedom to maneuver is restricted. Minor accidents are still absorbed, but the deterioration in service will be substantial with queues forming behind blockages. Drivers experience a noticeable tension.	1440	21-35	16-25
LOS D	*(High density, stable flow)* Small increases in traffic cause substantial deterioration in service. Freedom to maneuver is severely limited and drivers experience drastically reduced physical and psychological comfort levels. Minor incidents can create substantial delays because the traffic stream has little space to absorb disruptions.	1825	36-55	26-35
LOS E	*(Unstable operations)* Few gaps exist in the traffic stream. Any disruption causes following vehicles to slow or stop. Incidents cause substantial delay. Maneuverability is extremely limited. Physical and psychological comfort is low.	2200	56-80	36-50
LOS F	*(Forced/breakdown flow)* Such conditions generally exist for a number of reasons such as traffic accidents, recurring points of congestion, or peak hour conditions which exceed the current design of the facility. LOS F is used to identify that point where the facility has reached maximum capacity and a complete breakdown of service occurs.	NA	>80	>50

Appendix I Richmond/Tri-Cities Travel Demand Model Development

The Richmond/Tri-Cities Forecasting (RTC) Model is an advanced practice four-step forecasting model supporting air quality analysis and project planning in the Richmond/Petersburg Metropolitan Area. It utilizes Citilabs' CUBE Catalog modeling platform. The model includes trip generation, trip distribution, mode split, and traffic assignment. Its outputs forecast traffic volumes and congested travel speeds on roads. These results can be used to:

- Analyzing regional transportation scenarios in the planning process;
- Determine future transportation infrastructure needs;
- Analyzing the regional effects of different groups of transportation projects to aid project selection;
- Forecast future traffic congestion the CMP network analysis;
- Validating or checking other CMP data sources; and
- Analyzing driver route choices to better inform the CMP.

In April 2012, the updated RTC model was in the final stages of development. The model has been calibrated and validated to the standards defined in the VTM policies and procedures manual.

The new model updates the base year of traffic analysis data 2008 and the horizon to 2040. It also includes these changes from the earlier model:

- The highway network has been enhanced and provides more detailed streets and alignments. The freeway interchanges are micro-coded in the network (*i.e.,* coded more closely to the way they actually exist on the ground).
- The transit networks and their processes were converted to the CUBE Public Transport (PT) module. The networks were updated to represent 2008 GRTC transit services.
- The model has been refined to conduct time-of-day modeling. The first three steps in the model (trip generation, trip distribution and mode choice) are stratified for the peak period and the off-peak period. The highway assignments are further stratified into four time periods – AM peak, Midday, PM peak and Night.
- The trip generation and trip distribution models were refined using the 2009 National Household Travel Survey (NHTS) Virginia Add-On. Key relationships such as trip rates by purpose, average trip lengths, and trip frequency distributions are derived from that survey.
- The mode choice model was developed using the data from the 2009 GRTC On-Board transit survey, the NHTS data (automobile occupancy) and model parameters from FTA "national experience". The mode choice model is executed using CUBE's XCHOICE module.
- The highway assignment procedures include a variety of enhancements. These include the use of Conical Volume-Delay functions built up on the VDF optimization research done by Virginia Modeling, Analysis and Simulation Center (VMASC) at Old Dominion University (Source: Evaluation of Volume-Delay Functions and Their Implementation in VDOT Travel Demand Models, May 2011), refinements to the speed-capacity tables and the use of enhanced toll procedures.

Appendix J: Summary of Simulations Data

The MPO has found it useful to project future demand for transportation using a simplified Monte Carlo Method. This offers the advantages of simplicity and the ability to give a range of possible outcome and their likelihood of happening. The tables in this appendix show the basic information used in the simulation (historic data, year on year growth, and sample standard deviation). They also show the range of potential demands for 2040 based upon 1,000 iterations of the simulation. These demands are rounded to the nearest 1000 vehicle miles of travel or 100 passengers.

Simulation Information for Interstate VMT

Year	Interstate VMT	Year over Year change		2040 VMT (1000 Iterations)
2004	3,403,363		Maximum of Simulation	5,456,000
2005	3,492,956	2.6%	95th Percentile	5,456,000
2006	3,577,625	2.4%	75th Percentile	5,108,000
2007	3,600,653	0.6%	50th Percentile	4,788,000
2008	3,512,754	-2.5%	25th Percentile	4,481,000
2009	3,549,258	1.0%	5th Percentile	4,224,000
2010	3,552,309	0.1%	Minimum of Simulation	3,403,000
2011	3,474,359	-2.2%		
2012	3,493,419	0.5%		
2013	3,543,864	1.4%		
2014	3,604,497	1.7%		
2015	3,746,854	3.8%		
Average (Historic Data)	3,566,366	1.0%		
Sample Standard Deviation (Historic Data)	±57,172	±2.0%		

Simulation Information for Primary VMT

Year	Primary VMT	Year over Year change		2040 VMT (1000 Iterations)
2004	5,546,848		Maximum of Simulation	5,995,000
2005	5,640,297	-1%	95th Percentile	9,380,000
2006	5,776,072	5%	75th Percentile	8,575,000
2007	5,911,348	1%	50th Percentile	8,575,000
2008	5,893,150	4%	25th Percentile	7,002,000
2009	5,834,153	0%	5th Percentile	6,478,000
2010	5,914,159	0%	Minimum of Simulation	3,380,000
2011	5,820,009	-2%		
2012	5,742,462	1%		
2013	5,528,697	-2%		
2014	5,721,242	2%		
2015	6,109,028	5%		
Average (Historic Data)	5,809,964	1.0%		
Sample Standard Deviation (Historic Data)	± 130,990	±3.0%		

Simulation Information for Secondary VMT

Year	Secondary VMT	Year over Year Change		2040 VMT (1000 Iterations)
2004	3,397,166		Maximum of Simulation	19,884,000
2005	3,379,638	1.3%	95th Percentile	19,383,000
2006	3,564,356	3.1%	75th Percentile	18,803,000
2007	3,582,696	1.3%	50th Percentile	17,569,000
2008	3,746,562	0.4%	25th Percentile	16,400,000
2009	3,740,526	-0.2%	5th Percentile	13,771,000
2010	3,750,058	0.7%	Minimum of Simulation	12,347,000
2011	3,673,039	-1.9%		
2012	3,702,315	-0.2%		
2013	3,620,994	-1.9%		
2014	3,707,651	2.6%		
Average (Historic Data)		1.0%		
Sample Standard Deviation (Historic Data)	±126,658	±2.0%		

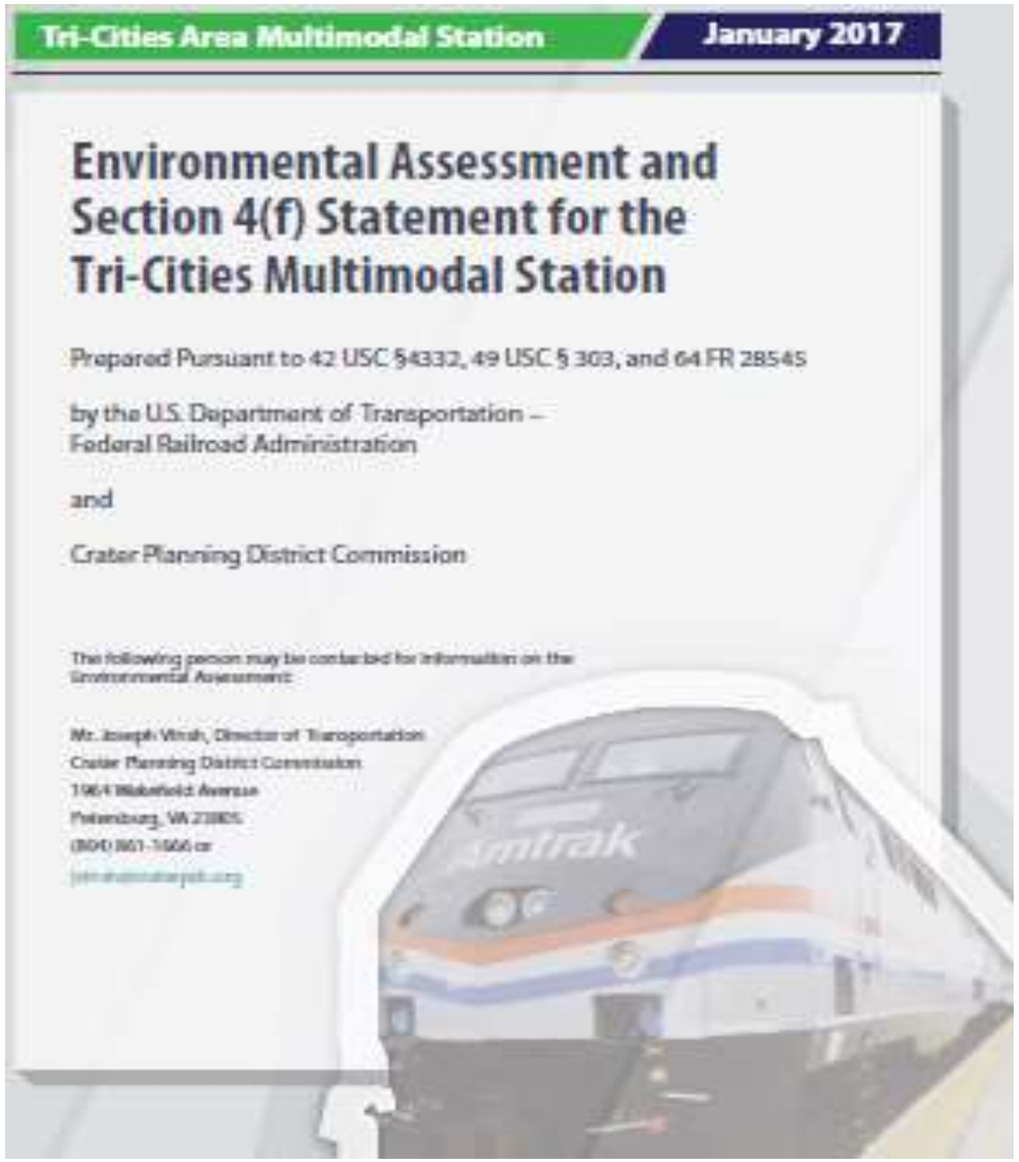
Simulation Information for System VMT				
Year	**System VMT**	**Year over Year Change**		**2040 VMT (1000 Iterations)**
2004	12,347,377		Maximum of Simulation	19,884,000
2005	12,512,891	1.3%	95th Percentile	19,383,000
2006	12,918,053	3.1%	75th Percentile	18,803,000
2007	13,094,697	1.3%	50th Percentile	17,569,000
2008	13,152,465	0.4%	25th Percentile	16,440,000
2009	13,123,938	-0.2%	5th Percentile	13,771,000
2010	13,216,526	0.7%	Minimum of Simulation	12,347,000
2011	12,967,407	-1.9%		
2012	12,938,196	-0.2%		
2013	12,693,555	-1.9%		
2014	3,033,390	2.6%		
Average (Historic Data)	13,106333	1.0%		
Sample Standard Deviation (Historic Data)	±265,105	±2.0%		

Simulation Information for Fixed Route Ridership				
Year	**Ridership**	**Year over Year Change**		**2040 Ridership (1000 Iterations)**
2003	475,672	-2.66%	Maximum of Simulation	998,500
2004	463,023	0.38%	95th Percentile	954,900
2005	464,797	5.72%	75th Percentile	757,200
2006	491,404	13.65%	50th Percentile	644,900
2007	558,481	5.98%	25th Percentile	544,000
2008	591,887	2.89%	5th Percentile	575,000
2009	609,022	-5.56%	Minimum of Simulation	252,000
2010	575,162	1.82%		
2011	585,641	12.04%		
2012	656,155	-11.73%		
2013	579,156	-28.12%		
2014	416,269	-2.58%		
2015	405,520	-2.66%		
Average (Historic Data)	528,630	-0.68%/Year		
Sample Standard Deviation (Historic Data)	±79,549	±11.2%		

Simulation Information for Demand Response Ridership				
Year	**Ridership**	**Year over Year Change**		**2040 Ridership (1000 Iterations)**
2003	17,875		Maximum of Simulation	17,900
2004	7,660	-57.15%	95th Percentile	9,700
2005	8,003	4.48%	75th Percentile	1400
2006	8,968	12.06%	50th Percentile	600
2007	8,150	-9.12%	25th Percentile	200
2008	10,849	33.12%	5th Percentile	100
2009	10,186	-6.11%	Minimum of Simulation	0
2010	9,740	-4.38%		
2011	8,009	-17.77%		
2012	8,546	6.70%		
2013	6,675	-21.89%		
2014	6,266	-6.13%		
Average (Historic Data)	9,244	-6.0%		
Sample Standard Deviation (Historic Data)	±2,901	±22.0%		

Simulation Information for Rail Ridership				
Year	**Ridership**	**Year over Year Change**		**2040 Ridership (1000 Iterations)**
2008	20,909		Maximum of Simulation	67,000
2009	29,558	41.4%	95th Percentile	59,000
2010	22,148	-25.1%	75th Percentile	28,800
2011	22,065	-0.4%	50th Percentile	16,000
2012	21,787	-1.3%	25th Percentile	9,000
2013	27,909	28.1%	5th Percentile	4,200
2014	29,286	4.9%	Minimum of Simulation	4,000
2015	29,780	1.7%		
Average (Historic Data)	9,244	7.1.0%		
Sample Standard Deviation (Historic Data)	±2,901	±20.0%		

Appendix K: Executive Summary of the Environmental Assessment and Section 4(f) Tri-Cities Multimodal Station



Tri-Cities Area Multimodal Station
Chesterfield, Colonial Heights, and Petersburg, Virginia

Submitted Pursuant to 42 USC §4332, 49 USC § 303, and 64 FR 28545

by the
U.S. Department of Transportation
Federal Railroad Administration and
The Crater Planning District Commission

Cooperating Agencies:
Federal Transit Administration and Federal Highway Administration

March 10, 2017
Date of Approval
For Federal Railroad Administration

February 24, 2017
Date of Approval
For Crater Planning District Commission

PROJECT BACKGROUND AND EXECUTIVE SUMMARY

This is the Environmental Assessment (EA) for the proposed Tri-Cities Area Multimodal Station (Project).

This summary is intended to assist readers in answering these and other important questions:

- What is the Tri-Cities Area Multimodal Station Project?
- What is an EA?
- What goes into an EA?
- How is an EA prepared? Who prepares it?
- What were the steps in the environmental review of the Tri-Cities Area Multimodal Station project?
- What are some areas of controversy related to the Tri-Cities Area Multimodal Station project?
- What are some of the environmental effects related to the Tri-Cities Area Multimodal Station project?

Some of the highlights of this EA are discussed below.

WHAT IS THE TRI-CITIES AREA MULTIMODAL STATION PROJECT?

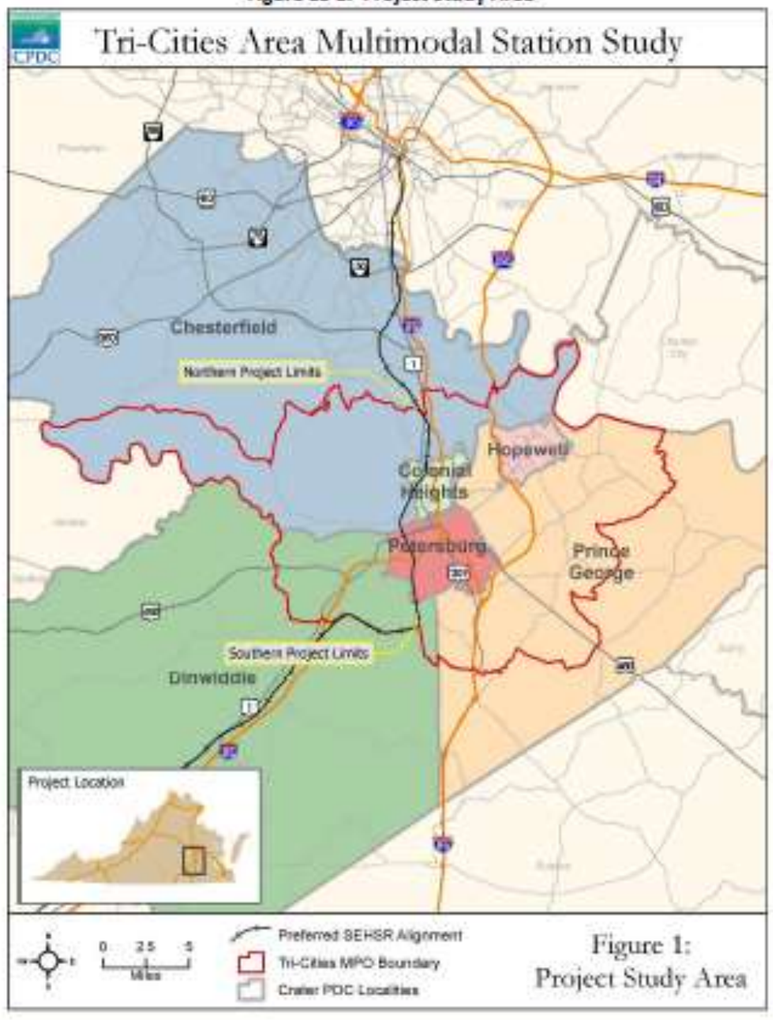
The Project involves the construction of a new multimodal station in the Tri-Cities area of Virginia, which includes the Cities of Petersburg, Colonial Heights and Hopewell (Tri-Cities). The proposed station will serve existing and future Amtrak regional and long distance trains, which operate at conventional speeds[1] through the Tri-Cities area, and will also support the introduction of higher speed rail[2] service along the Southeast High Speed Rail (SEHSR) Corridor. The SEHSR Corridor extends from the Northeast Corridor (NEC) and Washington, DC through Richmond and the Tri-Cities area, then branching onto two routes extending eastward to Norfolk, VA and westward to Raleigh and Charlotte, NC. Previous SEHSR[3] studies did not evaluate potential environmental impacts of new stations as part of its documentation, including the Tri-Cities area, leaving that analysis to be conducted in conjunction with local jurisdictions such as the Crater Planning District Commission (CPDC), the agency sponsoring this evaluation.

Figure ES 1 shows the Study Area for this Project and includes all localities within Tri-Cities area.

[1] Not in excess of 80 mph for passenger trains on Class 4 track – 49 CFR 213.9.
[2] Maximum authorized speed of 110 mph – SEHSR Tier II FEIS (2015)
[3] Tier-I EIS, Southeast High Speed Rail Project, Washington D.C. to Charlotte NC, 2002.
Tier-I EIS, Richmond to Hampton Roads Passenger Rail Project, 2012.
Tier-II EIS, Southeast High Speed Rail, Richmond, VA to Raleigh, NC (2015)

The purpose of the Project is to construct the Tri-Cities Area Multimodal Station for current intercity passenger rail service through Petersburg, including the relatively new conventional service to Norfolk, and prepare for the future introduction of higher speed rail service on the SEHSR corridor to Norfolk and North Carolina.

Figure ES 1: Project Study Area



WHAT IS AN ENVIRONMENTAL ASSESSMENT (EA)?

The National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. § 4321, et seq.) requires federal agencies to facilitates public disclosure and establishes policies to study the reasonable range of alternatives and assess environmental impacts of proposed projects.

A NEPA document must be prepared by a federal agency for any major federal action that could potentially affect the quality of the natural and built environment. The appropriate type of NEPA document that a federal agency must prepare for a given project (either a Categorical Exclusion, an EA, or an Environmental Impact Statement (EIS)) is determined by the agency through a thorough review of the proposed project. A "major federal action" might include an agency proposal to approve or implement a project or program, or when an agency provides funding for a project. The term "environment" refers to the natural and physical setting, including resources like animals, plants, buildings, and landscapes, and the relationship of people with that natural and physical setting. When the significance of impacts of an action is uncertain, an EA is prepared to assist in making this determination. If the EA finds that the Project will result in significant, unmitigatable impacts, the preparation of an EIS will be required. If no significant impacts are associated with the action after completing the EA, a finding of no significant impact (FONSI) may be prepared.

An "environmental effect" is any change to the environment resulting from the proposed activity. Environmental effects can be both positive (beneficial) or negative (adverse). An EA typically includes measures to mitigate potential adverse effects.

WHAT GOES INTO AN EA?

NEPA assumes that any proposed goal can be achieved through different means. To this end, NEPA requires that an EA evaluate the environmental effects of a "reasonable range" of project alternatives. NEPA defines a "reasonable alternative" as an option that would feasibly achieve the objectives of a particular proposed action.

NEPA does not require any specific number of alternatives. Instead, the number and type of reasonable alternatives depends on the specific nature of the Project. The reasonable range of alternatives is determined after careful consideration of a number of factors which may include technical and environmental criteria.

Practicality is another consideration in determining whether an alternative is "reasonable"–NEPA allows cost, engineering feasibility, and other factors to be considered.

NEPA does require that an environmental document explicitly note two specific alternatives:

- No Build or No Action Alternative
- Agency Preferred Alternative

Each of the alternatives is discussed in more detail below. Under NEPA, the No Build or No Action Alternative (which will be referred to as the No Build Alternative in this EA) details the environmental effects that would result if no action were taken. In this case, no new multimodal station would be constructed.

The term "Agency Preferred Alternative" refers to the option/alternative that the lead and cooperating agencies believe would best fulfill each agency's statutory mission and responsibilities, in consideration with economic, environmental, and technical factors.

WHAT IS THE PROCESS FOR PREPARING THE EA?

NEPA and the Council on Environmental Quality's (CEQ) implementing regulations[4] define the general framework for preparing an EA. Each federal agency may also have its own, more specific guidelines for implementing NEPA that will influence the contents of an environmental document. For example, the Federal Railroad Administration (FRA) uses its Procedures for Considering Environmental Impacts to supplement the CEQ regulations.[5]

Scoping

The scoping process refers to the early and open process for identifying significant issues related to a proposed action. As part of the scoping process, public agencies and the public are invited to participate and provide comment. Public scoping meetings are held to give agencies and the public a chance to submit comments, discuss the proposed alternatives, and talk about the NEPA guidelines and EA process with project team members. A public workshop was held to initiate this EA process and to help scope out concerns on December 11, 2014. Scoping packages were also distributed to agencies and identified stakeholders at that time. An additional public workshop was held on September 16, 2015 to receive input on project alternatives under consideration.

Appendix K-5 of this EA contains summary reports of the public workshops held.

Environmental Assessment (EA)

The purpose of this EA is to disclose all of the environmental effects associated with the alternatives, whether they are adverse or beneficial and allow for the public to review and comment on the document. The lead agency, FRA, publishes the document and informs citizens and stakeholders of its availability through a variety of means. The EA is used to determine the next step in the NEPA process – either the preparation of an EIS or a FONSI as noted above. If no significant impacts are associated with the action after completing the EA, a FONSI may be prepared and would represent the final step in this process.

Who prepares an EA?

NEPA establishes a framework whereby federal, state, local and tribal agencies as well as the public can have important roles in project development and the environmental review process. FRA is the Lead Agency preparing this EA for the Project. FRA has the authority to regulate the safety of railroads and manages financial assistance programs for rail capital investments. FRA is also the lead agency for the Tier-II EIS for the SEHSR Richmond, VA to Raleigh, NC project, which encompasses the railroad corridor adjacent to the Project and will provide service to the station. FRA has also been identified as the lead agency because it is

[4] See Section 1.5 for applicable regulations and permits

[5] See 64 Fed. Reg. 28545.

anticipated that they could provide funding assistance for station construction. Overall management for the EA was provided by the CPDC, who is FRA's state partner on the Project and was the sponsor for the environmental document. A Study Working Group (SWG) formed by CPDC, which is also described in the EA, consisting of local agencies and stakeholders, provided guidance for the EA process. These agencies reviewed the proposed project and environmental analyses and provided comments and input on the overall process.

For the NEPA process for this Project, FRA has worked with two Cooperating Agencies, the Federal Transit Administration (FTA) and the Federal Highway Administration (FHWA). The role of the Cooperating Agencies is to assist the Lead Agency during the scoping process and in developing information and preparing environmental analyses; the specific roles depend on the agency's expertise and relationship to the proposed action. Additional station funding may be available from FTA and FHWA, therefore this EA included their participation. While not considered formal Cooperating Agencies, the Virginia Department of Rail and Public Transportation (DRPT) and the Virginia Department of Transportation (VDOT) also worked closely with FRA throughout the EA process. Chapter 4.0, Coordination and Consultation, of this EA lists all of the agencies that were consulted in the development of these documents.

Figure ES 2 illustrates the Tri-Cities Area Multimodal Station EA process.

Figure ES 2: Environmental Assessment Process

WHAT IS THE PURPOSE OF THE TRI-CITIES AREA MULTIMODAL STATION PROJECT?

One of the most important aspects of NEPA is the requirement to define the "purpose and need" of a project. In other words– what is the objective of the Project? What need will it fulfill?

The purpose of this Project is to construct a multimodal station for current intercity passenger rail service through Petersburg, including the relatively new conventional service to Norfolk, and to prepare for the future introduction of high speed rail service on the SEHSR corridor to Norfolk and North Carolina. While the existing Petersburg Station in Ettrick supports current Amtrak passenger rail service, additional investment is required to attract and accommodate increased ridership, improve accessibility to the local and regional transportation network, improve ADA accessibility, and provide capacity to support future high speed rail service.

The secondary purposes of this Project are to:

- Construct a station in a location that supports the SEHSR goal of diverting trips from air and highway within the travel corridor to passenger rail use, thus reducing the growth rate of congestion on I-95; and
- Construct a station in a location that serves long-distance, regional, business and leisure travelers within and beyond Virginia, including Amtrak's Northeast Corridor (NEC), extending from Washington, DC, to Boston, MA, as well as points south (the SEHSR Tier-II EIS serves as the key link for these travelers to the busy Northeast) and east to the Norfolk and Hampton Roads area.

This EA includes a comparative analysis of potential station locations that would best serve the Tri-Cities area passenger rail market.

The Purpose and Need for the Project are summarized in Chapter 1 of this EA.

WHAT ALTERNATIVES WERE CONSIDERED IN THIS EA?

This EA identifies and evaluates a number of potential station locations relative to the purpose and need requirements supporting the regional SEHSR Corridor as well as the local transportation network in the Tri-Cities. The Tri-Cities MPO (CPDC) and their appointed SWG, in conjunction with input from FRA, were instrumental in the selection and application of the criteria and measures of effectiveness used to evaluate existing and proposed station location alternatives for this study. This work is consistent with the recommendations of the SEHSR Tier-II EIS as mentioned previously. Other than analyzing how potential stations would impact the overall transportation network, the SEHSR Tier-II EIS did not evaluate potential environmental impacts of new stations as part of its documentation, leaving that analysis to be conducted in conjunction with local jurisdictions.

The first step for alternatives evaluation was a preliminary screening evaluating the entire rail corridor within the Study Area. The preliminary screening identified all possible areas with the appropriate track geometry

and available land area to accommodate a rail platform and station. The preliminary screening was a two-step process, resulting in 13 preliminary station location concepts. The 13 concepts are discussed in more detail in Chapter 2 of this EA.

The assessment of 13 preliminary station concepts was an iterative screening process conducted in coordination with the Tri-Cities MPO's SWG. The screening process compared each of the station areas to the established measures of effectiveness that were developed in collaboration with the SWG and based on input received at a public workshop held December 11, 2014. The measures of effectiveness are organized into five different categories, with multiple measures in each category.

A summary of the measures is included below and the complete details of each measure are included in Appendix A.1:

- Design Considerations – platform accommodation, ADA compatibility, and freight integration
- Property Implementation – assessed value, access routes, and relocations
- Environmental Constraints – environmental justice and human/natural resources
- Proximity – distance to interstate, population and employment within 1 mile, and transit access
- Local Compatibility – compatibility with each locality's Comprehensive Plan and locality support

Based on these measures of effectiveness, each station concept was scored and ranked to understand its strengths and weaknesses. The results of the screening indicate that all station sites have advantages and disadvantages; some more so than others.

The five highest ranked preliminary station areas following an initial Screening #1 phase, which were highly conceptual in nature, are presented from north to south in the list below and shown in Chapter 2 of this EA.

- Walthall - the Walthall site in Chesterfield County is one of the farthest north of the 13 potential station sites. This site ranked fourth (tie) overall in the preliminary screening. The Walthall site has some strengths, including design considerations and a large open parcel. However, being so far north, the site is furthest from major population and employment centers[6], with limited supporting land uses surrounding the site. Multiple environmental and cultural resource constraints exist within the parcel, and stakeholders have raised serious security concerns due to the proximity to secured industrial uses.
- Branders Bridge NE – the Chesterfield County site at Branders Bridge ranked second because of its central location to the urban core and population, limited environmental constraints, and favorable design considerations. However, the site is largely in a residential area and the county's comprehensive plans do not incorporate a multimodal station at this location.

[6] Average distance to geographic center of each Tri-City, Fort Lee and VSU. All sites = 5.7mi; Walthall = 8.6mi.

uncovered archaeological remains of a mid-nineteenth-century outbuilding believed to be associated with a kitchen or dairy of a large farming operation active during the Antebellum, as well as Civil War and Reconstruction periods of the site. Given the historic significance of the site, the SWG agreed that shifting the Collier site southward, away from the newly discovered archaeological site, would serve as an appropriate avoidance measure. This shifted Collier site, referred to as Collier South was carried forward into the EA.

Of the five conceptual station sites evaluated in Screening #2, four concepts were carried forward for further evaluation in this EA to become the Build Alternatives: Boulevard (NW), Branders Bridge (NE), Ettrick, as well as the shifted location for Collier - Collier South. The No-Build Alternative (maintaining the existing Petersburg Amtrak Station in Ettrick with no improvements to the station) is also a baseline alternative against which the proposed station sites are compared, although it would not meet the purpose and need for this Project.

To test for site development suitability and environmental impacts at each of the four Build Alternatives, a common station concept was developed. Station size, determined by current utilization and anticipated ridership growth, calls for a Small/Medium Station. The typical station footprint is approximately 2.5 acres, although this can vary once design phase is conducted depending on unique site characteristics. Each Build Alternative station and configuration was influenced by topogeaphical constraints and site-specific conditions. Upon identification of a Preferred Build Alternative at the conclusion of this NEPA process, the station site design will be further refined during final design. The sites, as currently assessed, are conceptual in nature and subject to refinement.

At this conceptual stage of design, the typical station features for any of the four Build Alternatives include the following:

- Center platform, to be located between the eastern-most existing mainline track and the future SEHSR third track. The platform would be a minimum of 24 feet wide and extend up to 1,200 feet on tangent/level track. Depending on the site selected, either an overhead bridge or underpass would be constructed to provide access to the center platform.
- 3,600 square foot station building with a minimum of passenger waiting, restrooms, and vending amenities.
- Parking for 30-50 vehicles.
- Automobile access road, and in one case, a new bridge to nearest arterial road.

For each of the four Build Alternatives, the proposed facility was located to best fit the existing topographic conditions; minimize impacts to existing natural and cultural resources; minimize impacts to private property and structures; and minimize grading, related earthwork, and other ground-disturbing activities. If a station site required a new access road, such roads were kept to a minimum length, providing the clearest, most direct access to the site in light of natural and human resource constraints. Vehicular access to the station site that requires or increases travel through primarily residential or neighborhood streets was avoided where possible.

No-Build Alternative (Maintain Existing Ettrick Station)

The No-Build Alternative maintains the existing Petersburg Amtrak Station in Ettrick as it currently exists. Only routine maintenance would be provided at this station (Figure 6). While the No-Build Alternative does not disturb the Project site nor result in any immediate impacts, it would not address the Purpose and Need for the Project.

Boulevard Build Alternative

The central development focus of Colonial Heights is along US 1, known locally as the "Boulevard". The Boulevard Build Alternative is primarily on private property that was once a big-box retail store with a correspondingly large, paved parking area adjacent to Boulevard (US 1). Current use of the site includes a tape slitting operation (Superior Slitting), an equipment rental business (Rent-E-Quip), a carpet sales store (Carpet-N-Floors), and an automatic ice vending booth. As proposed, the platform, station, and parking area would be on the eastern side of the rail line, within the existing paved parking area. The SEHSR Tier-II EIS Preferred Alternative calls for a third track to be constructed on the eastern side of the rail line. A new platform would be provided between the current track and this newly constructed track, necessitating grade-separated pedestrian access. The mainline tracks are above grade at this location (approximately 12 feet to 15 feet), which necessitates retaining walls, as well as ADA ramps/elevator access to the platform from the passenger waiting area. The platform would be constructed within the existing railroad right-of-way, parallel to the existing track, with the new SEHSR track located on the opposite side of the platform for a center island design. Station access would be provided via Boulevard (US 1). See Table 6 in the main EA document for additional details of the station features at the Boulevard conceptual station site as well as the other sites.

Branders Bridge Build Alternative

Located in the Chesterfield County, the Branders Bridge Build Alternative site is on private property that is currently undeveloped. However, the property has been recently purchased and the property owner intends to construct an agri-business and home on the property. The exact location and extent of this development is not available at this time. As proposed, the station and parking area would be on the eastern side of the current rail line. The SEHSR Tier-II EIS Preferred Alternative calls for a third track to be constructed on the eastern side of the rail line. A new platform would be provided between the current track and this newly constructed track, necessitating grade-separated pedestrian access. The SEHSR Tier-II EIS Preferred Alternative also calls for the removal of the existing, at-grade rail crossing of Branders Bridge Road. This crossing would be replaced with a new Branders Bridge Road overpass. The new overpass would span the existing rail, center platform, and proposed new third track. Potential design considerations for a new overpass could include an additional pedestrian (elevator) access point down to the station platform at this location. A new access road to the station would be necessary to connect to the realigned Branders Bridge Road.

Ettrick Build Alternative

Located in Chesterfield County, the Ettrick conceptual station is approximately 220 feet north of the existing Ettrick station, along the eastern side of the rail line. The site is owned by CSXT. The SEHSR Tier-II EIS Preferred Alternative calls for a third track to be constructed to the east of the existing rail line. A new platform would be provided between the current track and this newly constructed track, necessitating grade-

separated pedestrian access. The existing Ettrick station could be replaced in its entirety or incorporated into a plan for adaptive re-use. Access to the station would continue to be via South Street to either James Street then East River Road or to Bessie Lane to Granger Street.

Collier South Build Alternative

Located in the City of Petersburg, the Collier South Build Alternative site, platform, parking lot, and access road are within property owned by the City of Petersburg (See Figure 8 in the EA). This station location must accommodate the switch point location to the Norfolk Connection Track, which provides a connection for passenger trains traveling to and from Norfolk. Ultimately, the optimal station location was chosen with two platforms that enable both Norfolk trains (side platform) and Amtrak long distance trains traveling along the eastern seaboard and SEHSR trains to North Carolina (center platform) to be served. Station locations farther north or south on this property would result in less optimal design/access, such as limited platform length or requirement for a platform on a curve, which does not conform to Amtrak's preferred station design guidelines.

The SEHSR Tier-II EIS Preferred Alternative calls for a third track to be constructed east of the existing rail line. A new platform would be provided between the current track and this newly constructed track, necessitating grade-separated pedestrian access. Given the platform design requirements, the station location requires an approximately 1,800-foot long access road to the south to connect to Route 604 (Halifax Road). To shift the access road to the north and connect to Defense Road would have adverse effects to multiple Civil War resources eligible for the National Register of Historic Places (NRHP): Defense Road, Dimmrock Line/Earthworks, and the Bridge over Defense Road. To avoid these potential Section 106 and Section 4(f) resources, the access road is located to the south and includes a grade separated crossing in order to access the station. A secondary access road from the east remains possible at this location, which would not provide primary access but would allow for additional entry for emergency or service vehicles.

More details about the screening process and the Build Alternatives are provided in Chapter 2 of this EA.

WHAT INPUT WAS RECEIVED DURING THE PROCESS ABOUT THE ALTERNATIVES?

Once the Build Alternatives were defined and preliminary concepts created, these were shared with the SWG and the public in a workshop held on September 16, 2015 in Ettrick. Input on preferences or any remaining concerns about the four Build Alternatives was solicited at that time and are discussed in Chapter 4 of this EA and included in Appendix K5.

At that workshop and during the 30 day comment period that followed, a total of thirty-five (35) comment sheets were received. Of those received during the comment period, thirteen (13) citizens stated their preference for the Ettrick Build Alternative location, eleven (11) preferred the Boulevard Build Alternative location, nine (9) preferred the Collier South Build Alternative, and two (2) did not state a preference. At the workshop, concerns about the Branders Bridge Build Alternative were discussed and it received no preferences. In identifying why citizens selected a preferred location, the two highest benefits cited for any location were consideration of vehicular access to the Build Alternative and consideration of future

development potential of the Build Alternative site and surrounding land uses. After the comment period was closed, seven (7) additional comments and notes of support were submitted stating a preference for the Ettrick Build Alternative.

Members of the SWG, which consists of stakeholders and localities within CPDC, were also asked to identify their preferences of any of the Build Alternatives under consideration. Responses are also included in Appendix K5. The Branders Bridge Build Alternative did not receive any support from the localities or stakeholders in the SWG. The Boulevard Build Alternative was identified as the preferred Build Alternative by Colonial Heights and Prince George County (who identified two preferred Build Alternatives). The Ettrick Build Alternative was identified by Chesterfield County as the preferred location. The Collier South Build Alternative was the preferred location by Dinwiddie County, Hopewell, City of Petersburg, the Petersburg Area Transit authority (PAT) and Prince George County. The resolutions that support these preferences were provided to the FRA, FHWA, and FTA as part of the process and are included in Appendix K5.

WHAT IS THE PREFERRED ALTERNATIVE AND WHY IS IT IMPORTANT?

The Preferred Alternative is the Project alternative that best meets the purpose and need of the Project and is favored by the agencies for approval and future construction. The Preferred Alternative is the alternative which FRA and the Cooperating Agencies, FHWA and FTA, believe would most closely align with their statutory mission and responsibilities, giving consideration to economic, environmental, technical and other factors. As the Lead Federal Agency, FRA is responsible for considering the input from Cooperating Agencies with regard to the selection of the Preferred Alternative. FRA and the Cooperating Agencies have considered the range of alternatives presented in this EA when selecting the Preferred Alternative as well as the input provided throughout the study process. FRA has identified the Boulevard Build Alternative as the Preferred Alternative for the Project for the following reasons:

- The Boulevard site is the most accessible and visible under consideration, as it is located approximately one mile (1.1 miles) from I-95 on a major arterial that provides convenient access to population centers in the region. Furthermore:
    - The site is less than a three minute travel time to I-95. Access to Interstates is a key consideration for Amtrak and inter-regional train service patronage, including potential feeder bus service, such as Amtrak's Thruway connection service[6].
    - Access from I-95 to the proposed site is provided along existing major arterials, Temple Avenue and Boulevard (US 1).
    - Improvements to Temple Avenue access at I-95 are currently under construction by VDOT.

[6] https://www.amtrak.com/thruway-connecting-services-multiply-your-travel-destinations

- The Boulevard site is close to the existing population / activity centers, including Fort Lee, VSU, downtown Petersburg and downtown Colonial Heights.
- Existing transit routes provide access to the site along Boulevard (US 1).
- The site is consistent from a land use perspective as it is proposed in an existing mixed /use and commercial corridor.
- The station could utilize existing parking that is directly accessible from Boulevard (US 1), requiring no new access routes or improvement to routes that provide access to the station.
- The Boulevard Build Alternative is the station site with the highest WalkScore®, a widely used measure of walkability in the station area that looks at the presence of sidewalks, land use and the overall pedestrian environment and measures how amenable it is to walking. The site is located within a "somewhat walkable" environment – the only station site to receive that category of rating.
- The Boulevard Build Alternative has been endorsed by the locality, the City of Colonial Heights.

  No environmental constraints exist that would preclude implementation of the station in this location.

WHAT ARE SOME OF THE POTENTIAL ENVIRONMENTAL IMPACTS RELATED TO THE TRI-CITIES AREA MULTIMODAL STATION PROJECT?

This EA provides an evaluation of the environmental effects associated with the Build Alternatives. The Build Alternatives would have both negative (adverse) and positive (beneficial) impacts on the environment. Mitigation measures are provided to reduce or eliminate adverse environmental effects, where needed. The potential effects, both beneficial and adverse, of the Build Alternatives are summarized below. Table 1 summarizes the comparable effects of the Build Alternatives. Chapter 4 of this EA includes detailed evaluations for each of the Build Alternatives.

Table ES-1: Summary of Impacts

Category	Impacts by Build Alternative				
	No-Build (Existing Ettrick Station)	Boulevard	Branders Bridge	Ettrick (New Station)	Collier South
Total Area of Station Footprint (acres)	N/A	2.67	2.57	2.34	4.30
Current Station Parcel Ownership	CSXT*	Private Property	Private Property	CSXT*	City of Petersburg
New Station Access Road (square feet)	N/A	0	14,326	5,056	61,817
Cost (Platform, Station, Parking, Access Road, Bridge, Parcel ($ Millions -2015 Dollars))	N/A	$9 – 12 M	$9 - $11 M	$7 - $9 M	$14 – $17 M
Violations of National Ambient Air Quality Standards (NAAQS)	None	None	None	None	None
Sensitive Noise Receptors Impacted	N/A	Category 3 (Institutional Land Uses): 1 Moderate Impact	Category 2 (Residential Land Uses): 1 Moderate Impact	None	None
Vibration	None	None	None	None	None
Water Quality	None	Minimal	Minimal	Minimal	Minimal
Wetlands (acres)	0	0	0	0	0
Streams (linear feet)	0	0	0	0	0
Threatened & Endangered Species	0	0	Potential: Northern Long-eared Bat** *Federal Threatened*	0	0

Category	Impacts by Build Alternative				
	No-Build (Existing Ettrick Station)	Boulevard	Branders Bridge	Ettrick (New Station)	Collier South
Critical Habitat	None	None	None	None	None
Floodplains (acres)	0	0.3	0	0	0
Visual Resources	N/A	Visually Compatible	Limited Impact	Visually Compatible	Limited Impact
Land Use & Zoning Consistency	Consistent	Consistent	Inconsistent	Consistent	Consistent
Farmland Impacts (acres)	N/A	N/A	N/A	N/A	1.7 acres Prime Farmland NRCS Rating = 141 out of 260 Points
Relocations: Home, Business, Farm, Non-Profit	0	Requires private property. Existing businesses may remain at same location, but, due to center platform track configurations, one business relocation is possible (adjacent to bridge).	Requires private property, but no relocations	0	0
Environmental Justice (EJ) Concerns	EJ Communities Present No disproportionately high and adverse impacts anticipated	EJ Communities Present No disproportionately high and adverse impacts anticipated	No EJ Communities	EJ Communities Present No disproportionately high and adverse impacts anticipated	EJ Communities Present No disproportionately high and adverse impacts anticipated
Public Health Concerns	Minimal	Minimal	Minimal	Minimal	Minimal
Public Safety Concerns	Minimal	Potential Improvement	Potential Improvement	Potential Improvement	Potential Improvement
Contaminated / Hazardous Waste Sites	0	0	0	0	0

Category	Impacts by Build Alternative				
	No-Build (Existing Ettrick Station)	Boulevard	Branders Bridge	Ettrick (New Station)	Collier South
Parks & Recreation Areas	0	0	0	0	0
# Cultural Resource Properties Affected (NRHP Listed or Eligible) ***	0	No Adverse Effect on 2 Properties	No Adverse Effect on 1 Property	No Adverse Effect on 1 Property	No Adverse Effect on 3 Properties
Section 4(f) Property Used ***	0	0	0	0	3 *de minimis* uses
Secondary & Cumulative Development Potential	Higher Potential	Higher Potential	Minimal Potential	Higher Potential	Moderate Potential

Source: Michael Baker International, 2015.

* CSXT is a private entity, but as a transportation services provider it traditionally works in conjunction with passenger rail services in its corridors. In this instance, the building and facilities are the responsibility of Amtrak but land is owned by CSXT.

**Northern Long-eared Bat: The U.S. Fish and Wildlife Service has indicated that station construction at the Branders Bridge site may effect this federally threatened species. Avoidance of impacts to this species is achieved by implementing time-of-year (TOY) restrictions for no tree clearing from April 15 – September 15 of any year at this site.

*** In a February 17, 2016 letter to FRA, SHPO stated concurrence with FRA's determination of effects was premature given that the Project is at the conceptual stage. SHPO asked to see more detailed plans for the preferred alternative, along with written comments from consulting parties [namely, the National Park Service], before providing formal comments on project effects. Because this is a conceptual-level EA, FRA is not conducting detailed engineering design on any alternative until a Preferred Alternative is identified. Therefore, the Section 106 process will not be completed until after the release of the EA and the selection of the Preferred Alternative. Following the selection, FRA will again seek SHPO's concurrence on determinations of effect and incorporate the results in the subsequent FONSI. While a formal determination of effect from SHPO is on hold until more detailed design information is available, SHPO stated that, based on the conceptual-level of information available, the potential for adverse effects appears minimal at each of the four station sites (Appendix H, DHR letter dated February 17, 2016). In addition, if necessary, the next step in the Section 4(f) process is for FRA to provide SHPO, in writing, its intent to make a de minimis impact finding. However, because SHPO is not providing a formal determination of effect until more detailed engineering design is available, FRA is unable to complete the Section 4(f) coordination requirements with SHPO. As with completion of the Section 106 process, the Section 4(f) process will be finalized following FRA's selection of a Preferred Alternative, subsequent coordination with SHPO, and documentation of these efforts and results in the FONSI. For more details on the Section 106 and Section 4(f) procedures, see Section 3.23 and 3.24 of this EA.

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Appendix M: Glossary of Terms

Acronym	Definition
AADT	Average Annual Daily Traffic
AC	Advanced construction funding (fund type TBD)
ADA	The Americans with Disabilities Act
ARRA	The American Recovery and Reinvestment Act (Economic Stimulus Act) Signed on February 17, 2009.
BOM	State bond match
BR	Bridge funds (BR/BROS)
BROS	Off-system bridge
BST	State bonds
BTS	Bureau of Transportation Statistics
BTU	The British thermal unit (Btu or BTU) is a traditional unit of work equal to about 1055 joules. It is the amount of work needed to raise the temperature of one pound of water by one degree Fahrenheit.
CAFE	Corporate Average Fuel Economy Standards
CCALS	Commonwealth Center for Logistics Systems
CENTERLINE MILE(S)	A centerline mile is a measure of the total length (in miles) of highway facility in-place or proposed, as measured along the highway centerline
CLASS I RAILROAD	A railroad with annual operating revenue greater than $250,000,000
CLASS II RAILROAD	A railroad with revenues between those of a Class I and a Class III Railroad.
CLASS III RAILROAD	A railroad with annual operating revenue less than $20,000,000
CM	CMAQ funds
CM AC CONVERSION	CMAQ planned to be converted
CMAQ	Congestion Mitigation Air Quality
CMP	Congestion Management Process
CSX	CSX Transportation a Class I Railroad serving the Tri-Cities Area
CTB	Commonwealth Transportation Board
DEMO	Demonstration Project Funds
DRPT	The Virginia Department of Rail and Public Transportation
DU	Dwelling Unit
EB	Equity Bonus (Minimum Guarantee) Funds
EJ	Environmental Justice as described in Executive Order 12898 and federal guidance derived from that executive order
EN	Enhancement
EQMG	Equity Bonus (Minimum Guarantee)
EV	Electric Vehicle
FAF	Freight Analysis Framework
FALL LINE	The edge of the Piedmont/Coastal Plain, where various rivers cross from hard bedrock to soft sediments, is marked by a line of rapids and waterfalls called the Fall Line. John Smith was the first European to report on this natural feature. In April, 1607, Captain Christopher Newport and John Smith led an expedition upstream from the site just chosen for Jamestown, until rapids at the current location of Richmond blocked further exploration by ship.
FARE	The money a passenger on public transportation has to pay
FARE BOX	The revenue derived from passenger fares
FEMA	Federal Emergency Management Administration
FHWA	Federal Highway Administration
FRA	Federal Rail Administration
FSM	GARVEE Soft Match
FTA	Federal Transit Administration
FY	Fiscal Year
GARVEE	Grant Anticipation Revenue Vehicle – Bonds secured by the expected federal transportation funds in future years.
GRV	GARVEE Bonds
GTRC	Greater Richmond Transit System
HABITAT BUFFER	

Acronym	Definition
HPD	High Priority Demo funds
HSIP	Highway Safety Improvement Program
IM	Interstate Maintenance
IM AC CONVERSION	Interstate Maintenance planned to be converted
INT	Interest Income
ISTEA	The Intermodal Surface Transportation Efficiency Act of 1991. The Federal Transportation Authorization Bill signed on December 18, 1991.
ITS	Intelligent Transportation Systems-Transportation Management System and Technologies intended to improve the performance of the transportation system.
JLUS	Joint Land Use Study
LANE MILE(S)	Lane-mile is a measure of the total length of traveled pavement surface. Lane-miles is the centerline length (in miles) multiplied by the number of lanes.
LCB	Lower Control Bound – In statistical process control the upper control bound represents a highest level of variance from the average that is expected. 99% of measured values should be below the UCB. (See UCB)
LEP	Limited English Proficiency
LOAD FACTOR	The number of passengers divided by the number of seats
LOC	Local funds
LOM	Local match
LOS	Level of Service: A qualitative measure of service
LRP	Long Range Plan
LTO	Landing/Take Off Operations
MAP 21	Moving Ahead for Progress in the j21st Century. The Federal Transportation Authorization Bill signed on June 29, 2012
MG/EB AC CONVERSION	Equity Bonus (Minimum Guarantee) planned to be converted
MGEB	Equity Bonus (Minimum Guarantee)
MIX	Mix of federal (STP/MG/BR/BROS) and state funds
MM	Mile Marker
NEPA	The National Environmental Policy Act of 1970.
NH	National Highway funds
NH AC CONVERSION	National Highway planned to be converted
NHPP	The NHPP provides support for the condition and performance of the National Highway System (NHS), for the construction of new facilities on the NHS, and to ensure that investments of Federal-aid funds in highway construction are directed to support progress toward the achievement of performance targets established in a State's asset management plan for the NHS.
NHS	The National Highway System
NOVA	Northern Virginia
NO_X	Oxides of Nitrogen – a chemical compound that contributes to the formation of ground level ozone. NO_X is usually a product of high temperature high pressure combustion (for example jet engines or diesel engines)
OC	Open Container
OPR	Operating Revenue
OTHER	Other funds (state, local, etc.)
PE	Preliminary Engineering - Preliminary engineering is the location, design, and related work needed to advance a project to physical construction. Preliminary engineering includes preliminary and final design; both defined in 23 CFR 636.103, and other project-related work leading to physical construction. This includes costs to perform studies needed to address requirements of the National Environmental Policy Act (NEPA) and other environmental laws. It may include advertising and other pre-award work such as bid analysis, although it is also acceptable to include this work as construction engineering costs.
PPT	TIFIA (Public/Private Partnership)
RSTP	The portion of STP funds allocated to urban areas over 200,000 in population See STP
RSTP AC CONVERSION	Regional STP planned to be converted
RTE.	Route
SAFETEA-LU	Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users: The Federal Transportation Authorization Bill Signed into law on August 10, 2005. In some contexts it indicates Congressionally earmarked funding.
SEHSR	Southeast High Speed Rail
SRS	Safe Routes to School funds
STF	State funds

Acronym	Definition
STM	State match
STP	The Surface Transportation Program (STP) provides flexible funding that may be used by States and localities for projects to preserve and improve the conditions and performance on any Federal-aid highway, bridge and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects, including intercity bus terminals.
STP AC CONVERSION	STP planned to be converted
STP/EN	Enhancement funds
STP/HES	Highway Safety funds
STP/RR	Rail Safety funds
STP/SRS	Safe Routes to School funds
TBD	Fund source to be determined
TEA 21	Transportation Equity Act for the 21st Century the Federal Transportation Authorization Bill Enacted on June 9, 1998.
TEU	Twenty Foot Equivalent Unit (the basic measure of shipping containers) is an inexact unit of cargo capacity describing the capacity of container ships and container terminals. It is based on the volume of a 20-foot-long (6.1 m) intermodal container, a standard-sized metal box which can be easily transferred between different modes of transportation, such as ships, trains and trucks. The container is defined by its length though the height can be between 4 feet 3 inches (1.30 m) and 9 feet 6 inches (2.90 m), with the most common height being 8 feet 6 inches (2.59 m). By volume a TEU is approximately 1,360 cubic feet or 39 cubic meters.
TIP	Transportation Improvement Program
TITLE VI	Title VI of the Civil Rights Act of 1964
TOL	Tolls
TOLL	Tolls
TON	Long – 2240 pounds Metric or tonne- 1000 kilograms/2204 pounds Short – 2000 pounds By volume approximately 60 cubic feet
TRAN	DRPT Equity Bonus
TSM	Transportation Systems Management
TTI	Texas Transportation Institute
UCB	Upper Control Bound – In statistical process control the upper control bound represents a highest level of variance from the average that is expected. 99% of measured values should be below the UCB. (See LCB)
VDOT	The Virginia Department of Transportation
VDRPT	See DRPT
VMT	Vehicle Miles of Travel (1 car driving 1 mile is 1 VMT. 20 cars driving 10 miles each is 200 VMT.
VOC	Volatile Organic Compound – a chemical compound that contributes to the formation of ground level ozone. These may be naturally occurring or the result of industrial processes.
VPA	Virginia Ports Authority