BRISTOL METROPOLITAN PLANNING ORGANIZATION

BLUFF CITY, TENNESSEE
BRISTOL, TENNESSEE
BRISTOL, VIRGINIA
SULLIVAN COUNTY, TENNESSEE
WASHINGTON COUNTY, VIRGINIA
Bristol MPO Resolution 11-01

A Resolution Adopting the
Bristol Urban Area Long-Range Transportation Plan Year 2035

WHEREAS, the U. S. Department of Transportation requires each MPO to have a current long-range transportation plan that addresses all modes of transportation in the urban area, and

WHEREAS, the long-range transportation plan must have a planning horizon of at least 20 years and provide the basis for future transportation planning decisions for the urban area.

WHEREAS, the various state, local, and regional agencies involved with multimodal transportation planning for the Bristol Tennessee-Virginia Urbanized Area have cooperatively developed the Bristol Urban Area Long-Range Transportation Plan Year 2035, and

WHEREAS, Bristol Urban Area Long-Range Transportation Plan Year 2035 was developed in accordance to the requirements of 23 CFR, Part 23.

NOW, THEREFORE, BE IT RESOLVED by the Executive Board of the Bristol Metropolitan Planning Organization as follows:

That the Bristol Urban Area Metropolitan Planning Organization does hereby approve the Bristol Urban Area Long-Range Transportation Plan Year 2035.

Jeffrey J. Broughton
Chairman, Executive Board
February 1, 2011
Date

Secretary
** This page intentionally left blank **
TABLE OF CONTENTS

CHAPTER 1: Introduction ............................................................................................................ 1-1

CHAPTER 2: Goals and Objectives ............................................................................................ 2-1

CHAPTER 3: Travel Demand Modeling Process and Data Sources ........................................... 3-1

CHAPTER 4: Demographic and Socio Economic Data ............................................................. 4-1

  Part A: Regional Overview .................................................................................................. 4-1

  Part B: Population and Employment .................................................................................. 4-5

CHAPTER 5: Operational Analysis and Congestion Management ............................................ 5-1

CHAPTER 6: Multi-Modal Transportation System ..................................................................... 6-1

  Part A: Streets and Highways Element ............................................................................... 6-1

  Part B: Public Transportation Element ............................................................................. 6-23

  Part C: Pedestrian and Bicycle Element ............................................................................ 6-31

  Part D: Goods Movement and Freight Element .................................................................. 6-38

CHAPTER 7: Safety and Security Planning .............................................................................. 7-1

  Part A: Safety Planning ....................................................................................................... 7-1

  Part B: Security Planning .................................................................................................... 7-10

CHAPTER 8: Financial Analysis ............................................................................................... 8-1

  Part A: Financial Resources .............................................................................................. 8-2

  Part B: Projected Revenue ................................................................................................. 8-7

  Part C: Financially Constrained Plan ............................................................................... 8-17

CHAPTER 9: Title VI and Environmental Justice ..................................................................... 9-1

CHAPTER 10: Environmental Mitigation .................................................................................. 10-1
APPENDICES

Appendix A: Major Trip Generators ................................................................. A-1
Appendix B: Federal and State Routes............................................................... B-1
Appendix C: Modeled Roadway List ................................................................. C-1
Appendix D: List of Highway Projects – Tennessee ........................................... D-1
Appendix E: List of Highway Projects – Virginia .............................................. E-1
Appendix F: List of Transit Projects ................................................................. F-1
Appendix G: List of Pedestrian and Bicycle Projects ...................................... G-1
Appendix H: Milepost Details for Selected Projects .......................................... H-1
Appendix I: List of Abbreviations ................................................................. I-1
Appendix J: Public Involvement ................................................................. J-1
Appendix K LRTP 2035 Project Map Insert

MAPS

Map 1-1: MPO Planning Boundary ............................................................... 1-3
Map 3-1 MPO Study Area ........................................................................... 3-3
Map 3-2: Transportation Analysis Zones .................................................... 3-6
Map 4-1: 2035 Projected Population by TAZ ............................................. 4-9
Map 4-2 2035 Projected Population Density by TAZ .................................. 4-10
Map 4-3: 2035 Projected Employment by TAZ ........................................... 4-14
Map 4-4 2035 Projected Employment Density by TAZ .............................. 4-15
Map 5-1: 2035 LOS Locator Map .................................................................. 5-6
Map 5-2: 2035 LOS – Northeastern Area .................................................. 5-7
Map 5-3: 2035 LOS – Central Area ............................................................... 5-8
Map 5-4: 2035 LOS – Northwestern Area .................................................. 5-9
Map 5-5: 2035 LOS – Southwestern Area .................................................. 5-10
Map 6-1: Interstate, Federal, and State Routes ............................................. 6-3
Map 6-2: Bristol Study Area Highway Network ........................................... 6-4
Map 6-3: Traffic Signal Locations ................................................................. 6-6
Map 6-4: 2010-2035 Transportation Plan Highway Projects ...................... 6-10
Map 6-5: Bristol Transit Routes ................................................................. 6-25
Map 6-6: Pedestrian Signals ................................................................. 6-34
Map 6-7: Bicycle and Pedestrian Routes .................................................... 6-37
Map 6-8: U.S. Freight Tonnage on Highway, Railroads, and Waterways .... 6-39
Map 6-9: Norfolk Southern Railway System .................................................. 6-42
Map 6-10: Rail Served Business Locations ............................................... 6-43
Map 6-11: Natural Gas Pipelines ............................................................... 6-45
Map 6-12: Norfolk Southern Crescent Corridor ........................................... 6-46
Map 7-1: Crash Monitoring Locations ....................................................... 7-5
Map 9-1: Minority Census Tracts ................................................................. 9-6
Map 9-2: Poverty Level Census Tracts .................................................................9-7
Map 10-1: Major Stream Network .................................................................10-3
Map 10-2: Federal Lands ..............................................................................10-5
Map 10-3: Bristol MPO Geography .........................................................10-6

Charts
Chart 4-1: Average Household Size .................................................................4-1
Chart 4-2: Average Vehicles per Household ......................................................4-2
Chart 4-3: Commute to Work by Mode of Transportation ..............................4-3
Chart 4-4: Travel Time to Work .....................................................................4-3
Chart 4-5: Year 2000 Percent Population by Jurisdiction ...............................4-6
Chart 4-6: Year 2035 Percent Population by Jurisdiction ...............................4-8
Chart 4-7: Year 2007 Percent Employment by Jurisdiction ............................4-12
Chart 4-8: Year 2035 Percent Employment by Jurisdiction ............................4-13
Chart 5-1: Reasons for Congestion ..................................................................5-1
Chart 6-1: Truck Shipments To, From, and Within Tennessee .......................6-40
Chart 6-2: Truck Shipments To, From, and Within Virginia .........................6-40
Chart 8-1: Percent of Annual Funding Sources ............................................8-1

Tables
Table 3-1: 2007 TAZ Statistics ......................................................................3-4
Table 4-1: County by County Commuter Flows ...........................................4-4
Table 4-2: Year 2000 Population and Dwelling Units ......................................4-6
Table 4-3: Year 2035 Population Estimate ....................................................4-8
Table 4-4: Year 2007 Employment ..................................................................4-11
Table 4-5: Year 2035 Employment ..................................................................4-13
Table 6-1: Project Selection Criteria ...............................................................6-9
Table 6-2: Transit Service Characteristics .....................................................6-23
Table 6-3: Bristol Tennessee Transit Capital Needs .........................................6-29
Table 6-4: Bristol Virginia Transit Capital Needs ..........................................6-29
Table 6-5: Weight of Freight Shipments by Transportation Mode ..................6-38
Table 7-1: Probable Hazard Risk and Vulnerability .......................................7-14
Table 8-1: Tennessee Projected Highway Revenue ........................................8-8
Table 8-2: Virginia Projected Highway Revenue ..........................................8-10
Table 8-3: Annual Operating and Maintenance Cost .....................................8-11
Table 8-4: Tennessee Projected Transit Operating Revenue ............................8-13
Table 8-5: Virginia Projected Transit Operating Revenue ..............................8-13
Table 8-6: Tennessee Projected Transit Capital Revenue ...............................8-14
Table 8-7: Virginia Projected Transit Capital Revenue ....................................8-15
Table 8-8: Tennessee Enhancement Grant Funding .......................................8-16
Table 8-9: Virginia Enhancement Grant Funding .........................................8-16
Table 8-10: Year 2010-2035 Operating and Maintenance Cost ....................8-18
Table 8-11: Year 2010-2035 Tennessee Highway Revenue vs. Cost .........................8-20
Table 8-12: Year 2010-2035 Virginia Highway Revenue vs. Cost ............................8-20
Table 8-13: Year 2010-2035 Tennessee Transit Operating Revenue vs. Cost ...........8-21
Table 8-14: Year 2010-2035 Tennessee Transit Capital Revenue vs. Cost............8-21
Table 8-15: Year 2010-2035 Virginia Transit Operating Revenue vs. Cost...........8-22
Table 8-16: Year 2010-2035 Virginia Transit Capital Revenue vs. Cost ...............8-22
Table 9-1: MPO Study Area Title VI Demographics..............................................9-2
Table 9-2: MPO Region Minority Population..................................................9-4
Table 9-3: MPO Region Poverty Status..............................................................9-5
Table 10-1: National Register of Historic Places.................................................10-4
Table 10-2: Federally Endangered Species.....................................................10-5
Table 10-3: Potential Environmental Mitigation Activities.................................10-8
Table 10-4 Greenhouse Gas Emissions by Economic Sector ............................10-9
Table 10-5 Greenhouse Gas Emissions by Passenger/Freight Transportation ....10-9
Table 10-6 Potential Climate Change Mitigation Strategies..............................10-10
CHAPTER 1: INTRODUCTION

The movement of people and goods is, to a great extent, regional. People often live in one locality and commute to another. Various businesses, medical, educational and other services are oriented towards meeting the needs of a metropolitan area market, which requires access and mobility at the regional level. As a result, the welfare of the social and economic environment is dependent on the speed and efficiency with which people can interact on a day-to-day basis. Development of a strategic transportation plan is a primary factor behind the success of planning for the movement of people and goods in the urban environment.

Basic mobility needs of the local population are satisfied through a network of roadways, transit routes, pedestrian and bicycle paths, paratransit services, and other systems that enhance the movement of people. In addition to ensuring the efficient movement of people throughout the region, it is equally important to provide for transportation choices for the movement of goods. The need for fast and efficient connectivity for goods movement must be met to ensure a strong and vibrant economy. The transportation plan must identify an integrated intermodal transportation system that facilitates the movement of both people and goods.

As traffic patterns shift because of changes in land use patterns, the original design of an established transportation network may become outdated. Analysis behind the transportation plan strives to identify those portions of the transportation network which are or will be overburdened by traffic conditions. The purpose of this study is to categorically quantify those developing weaknesses in the transportation system in order to formulate priorities for improvement.

This report has been prepared by the staff of the Bristol Metropolitan Planning Organization (MPO). The assistance of all participating jurisdictions and staff/resources from the State of Tennessee and Commonwealth of Virginia is gratefully acknowledged.

BRISTOL URBAN AREA LONG-RANGE TRANSPORTATION PLAN YEAR 2035

The Bristol Urban Area Long-Range Transportation Plan Year 2035 serves as the initial step and framework in developing a regionally based network of transportation facilities and services that meets the travel needs of the region in the most efficient and effective manner possible. For transportation projects to be eligible for federal funding, they must first appear in the long-range transportation plan. As required by federal law, the plan is updated on a regular cycle and includes a planning horizon of at least 20 years. This plan is a revised edition of the Bristol Urban Area Long-Range Transportation Plan Year 2030 (2006) and its update (2008) to confirm the validity and consistency with current and forecasted transportation and land use trends and to extend the plan’s horizon year.
The intent of the *Bristol Urban Area Long-Range Transportation Plan Year 2035* is to create the best possible plan of action to help maintain a functional transportation system for the Bristol urban area. This document provides an overview of the existing transportation system, including roadways; public transportation services; bicycle/pedestrian facilities; and freight movements, and evaluates future transportation improvements for the urbanized area. Additionally, federal law requires the preparation of a long-range transportation plan that is realistic, both from an implementation and a financial standpoint.

**WHAT IS AN MPO?**

Although we see ourselves as one region, politically we are broken into multiple jurisdictions (states, counties, cities), which are necessary for governance, taxation, and implementation of public services. The settlement of land around cities and into suburban environs, greatly enhanced by the freedom of the automobile, has developed into regional economies that span across governmental boundaries. The federal government recognized the concept of regional economies when they established, through the U.S. Census, designations for Urbanized Areas and Metropolitan Statistical Areas, generally defined as a population core with adjacent communities that have a high degree of economic and social integration.

The federal government also recognized that regional economies are dependent on the large-scale movement of people and goods over regional transportation networks; however, it is difficult to address regional transportation impacts and needs when you have multiple jurisdictions of political authority. Over the decades, the federal government has sought to address regional transportation by requiring states to establish Metropolitan Planning Organizations (MPO), composed of local elected officials and state representatives to review and approve transportation investments in urbanized areas.

Numerous federal highway acts have led to the development of MPOs. The highway acts of the 1940s and 1950s, which authorized the interstate system, were primarily funding legislation and did not focus on comprehensive planning or land use issues. It was not until the Highway Act of 1962, which made federal highway aid contingent on the establishment of a continuing, comprehensive, and cooperative transportation planning process know as the “3-C Process,” and the Highway Act of 1973 that dedicated a small portion of the Highway Trust Fund for Metropolitan Planning Organizations to be established in urbanized areas over 50,000 in population, that such regional transportation planning was widely applied.

**BRISTOL AREA MPO**

Following the 1980 Census of Population the U. S. Bureau of the Census designated Bristol, Tennessee/Virginia as an “Urbanized Area.” As a result, the area came under the provisions of the Federal Aid Highway Acts and the Urban Mass Transportation Acts, which require a "continuing, comprehensive, and cooperative 3-C" transportation planning process. Each successive Census redefines the urbanized area based on the changes in population
characteristics. The 2000 Bristol urban area consists of the Town of Bluff City, Tennessee; City of Bristol, Tennessee; the City of Bristol, Virginia (an independent city outside of the jurisdiction of any county); and certain surrounding areas of Sullivan County, Tennessee, and Washington County, Virginia, as delineated in the Bureau of the Census urbanized area designation. The Bristol urban area, as defined in the 2000 Census, and MPO study planning areas are shown on Map 1-1.

Map 1-1: MPO Study Area

The Bristol MPO was established in 1982 under agreement with the governors of the State of Tennessee and Commonwealth of Virginia, and the local governments within the urbanized area, based on the 1980 Census data. The Bristol MPO, in cooperation with the Tennessee and Virginia Departments of Transportation and local transit services, are responsible for carrying out the metropolitan planning process. The 2000 Census saw the urban area grow to the point that the Town of Bluff City was added to the Bristol MPO in addition to the two Bristols, two counties, and two states that made up the jurisdictions of the original organization.

The structure of the Bristol MPO consists of an Executive Board and a Technical Committee. The MPO is controlled by the Executive Board, which is composed of the principal elected officials of the member governmental jurisdictions and constitutes the
forum for transportation decision-making within the metropolitan area. The Technical Committee consists of administrative and technical personnel whose primary function is to formulate transportation plans and programs for the urbanized area, keep Executive Board members advised of all transportation planning activities, and recommend specific actions for Executive Board approval.

**REGULATORY REQUIREMENTS**

The Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU) legislation, as well as the previous federal transportation acts, outlines the transportation planning requirements for MPOs. The long-range transportation plan is directed to meet the goals, policies, and objectives of an efficient transportation system for the urbanized area and address a twenty-year minimum planning horizon. The plan must include the efficient movement of both goods and persons and consider all modes of transportation. In addition, the plan must project the transportation demand of persons and goods over the period of the plan, identify congestion management strategies, identify pedestrian walkway and bicycle facilities, and demonstrate the consistency of proposed transportation investments with existing and proposed funding sources that can reasonably be expected to be available for transportation uses.

Under the provisions of federal metropolitan planning regulations it is necessary for the transportation program to demonstrate conformity with the National Ambient Air Quality Standard (NAAQS) for transportation related pollutants. As of December 2010, the Bristol MPO study area is designated attainment under the Clean Air Act. As a result, conformity analysis is currently not required for the *Bristol Urban Area Long-Range Transportation Plan Year 2035*. However, consideration by the Environmental Protection Agency to lower the 8-hour ozone standard could potentially require future transportation plans developed by the MPO to demonstrate conformity with the Clean Air Act. MPO planning activities have taken the potential impacts of changing air quality standards into account as part of its efforts.

SAFETEA-LU lists eight planning elements to be considered by the MPO in developing transportation plans and programs. Each long-range transportation plan shall, at a minimum, address the following:

- Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency.
- Increase the safety of the transportation system for motorized and non-motorized users.
- Increase the security of the transportation system for motorized and non-motorized users.
- Increase the accessibility options available to people and freight.
- Protect and enhance the environment, promote energy conservation, improve quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns.
- Enhance the integration and connectivity of the transportation system, across and
between modes, for people and freight.

- Promote efficient system management and operation.
- Emphasize the preservation of the existing transportation system.

These eight planning factors are addressed in the goals and objectives of the *Bristol Urban Area Long-Range Transportation Plan Year 2035*.

**LONG-RANGE PLANNING UPDATES AND PUBLIC PARTICIPATION**

The long-range transportation plan must be updated on a regular cycle according to federal transportation planning regulations. At times it becomes necessary to amend the plan during the interim for unanticipated funding, project development, or program updates. Adoption of amendments to the plan will follow the MPO’s policy for public participation, which requires a 30-day public review period. All comments received either verbally or in writing are presented to the MPO Executive Board. The MPO staff will prepare a written response to the comments to be incorporated into the document, or suggest amendments to the draft document. After evaluation of comments received, the Executive Board may defer the adoption of the plan if there are significant unresolved issues. Public review and comment opportunities are provided when the Plan is originally adopted as well as for amendments, with the exception of projects deemed to be generally local in nature and scale of the project.

**TRANSPORTATION IMPROVEMENT PROGRAM**

The Transportation Improvement Program (TIP) is a four-year funding program that identifies which transportation projects will be implemented each year. The TIP must be financially constrained, which requires that each project have a secured source of funding. The Transportation Improvement Program must be consistent with *Bristol Urban Area Long-Range Transportation Plan Year 2035*, as well as the transportation plans of local governments. It is important to understand that transportation projects originate with the development of the long-range transportation plan and the TIP serves as a management tool to accomplish the objectives of the adopted long-range transportation plan.
CHAPTER 2: GOALS AND OBJECTIVES

The creation of goals and objectives in the development of a long-range transportation plan establishes the foundation for achieving the results most desired and needed. It is important for MPO member jurisdictions and communities to have a unified vision of the role that transportation will have in defining the quality of life for the community.

One of the first steps in the long-range planning process is to establish guiding principles. The following goals and objectives provide the foundation for the development of this long-range transportation plan. The goals and objectives were developed to meet the eight planning factors identified under SAFETEA-LU.

GOAL: SYSTEM EFFICIENCY AND MAINTENANCE
Develop and maintain a transportation system to move people and goods at the most effective level of public and private cost.

Objectives:
- Maintain the efficiency and effectiveness of the existing transportation system.
- Maximize the cost-effectiveness of transportation investments.
- Select and program projects based on identified need and effectiveness.

Planning Factors Addressed:
- Promote efficient system management and operation.
- Emphasize the preservation of the existing transportation system.

GOAL: ECONOMIC DEVELOPMENT
Provide transportation resources to support economic growth and strengthen the local economy.

Objectives:
- Enhance the transportation access to commercial and industrial areas.
- Increase the accessibility options for freight movement.
- Promote downtown revitalization and infill development.
- Provide employment centers with adequate access to labor through affordable, multi-modal transportation options.

Planning Factors Addressed:
- Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency.
- Increase the accessibility options available to people and freight.
- Promote consistency between transportation improvements and State and local planned growth and economic development patterns.
GOAL: ENVIRONMENTAL QUALITY AND LIVABLE COMMUNITIES
Develop a transportation system to preserve and enhance the natural environment and improve quality of life.

Objectives:
- Minimize adverse environmental impacts of the urban transportation system.
- Reduce vehicle emissions and promote activities that reduce greenhouse gases.
- Coordinate and improve the provision of transportation facilities with land development activities to promote livable communities.

Planning Factors Addressed:
- Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency.
- Protect and enhance the environment, promote energy conservation, and improve quality of life.

GOAL: MOBILITY
Develop a transportation system that provides an opportunity for a choice of mode for the movement of people and goods.

Objectives:
- Develop a transportation system that is accessible to all users.
- Encourage the development of bicycle facilities, sidewalks, and greenways.
- Enhance the connectivity of the transportation system.
- Maintain an efficient and cost effective public transportation system.

Planning Factors Addressed:
- Increase the accessibility options available to people and freight.
- Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight.

GOAL: USER SAFETY AND SECURITY
Develop a transportation system for the movement of people and goods, which is safe and provides security for users of any mode.

Objectives:
- Reduce transportation-related crashes, injuries, and fatalities.
- Minimize bicycle, pedestrian, rail, and motor vehicle conflicts.
- Promote safety in the design and construction of highways, bicycle/pedestrian links, and other modes.
- Work with state and local agencies to develop a transportation system that is secure for all users.
Planning Factors Addressed:

- Increase the safety of the transportation system for motorized and non-motorized users.
- Increase the security of the transportation system for motorized and non-motorized users.
BRISTOL URBAN AREA LONG-RANGE TRANSPORTATION PLAN
YEAR 2035

** This page intentionally left blank **
CHAPTER 3: TRAVEL DEMAND MODELING PROCESS AND DATA SOURCES

This section describes the transportation related data that was collected, assimilated, and analyzed in the development of the Bristol Urban Area Long-Range Transportation Plan Year 2035. The MPO has obtained data from various sources; collected some of its own; and assimilated them into this document to present the existing state of the regional transportation system as well as future traffic estimates utilizing a travel demand model.

The Bristol Urban Area Long-Range Transportation Plan 2035 was developed with consultation and input from the public, municipal officials, TDOT, VDOT, FHWA, FTA, and other transportation, economic development, environmental, and land use planning agencies throughout the MPO region. Numerous plans and studies were referenced prior to the development of this document to ensure coordination and to promote consistency between transportation improvements and State and local planned growth and economic development patterns, including:

- Vtrans2025 (Virginia multimodal transportation plan)
- Plan Go (Tennessee long-range multi-modal strategy)
- Tennessee 25-Year Long Range Transportation Plan
- TDOT Bicycle and Pedestrian Element
- Virginia 2025 State Highway Plan
- I-40/I-81 Corridor Feasibility Study (Tennessee)
- Tennessee Statewide Rail Plan
- Tennessee Transit Plan
- Virginia State Rail Plan
- Status of the TransDominion Express Passenger Rail Service
- I-81 Corridor Improvement Study Draft Purpose and Need
- Bristol Tennessee Land Use and Transportation Plan
- Bristol Tennessee Urban Growth Boundary Study
- Bristol Tennessee Bicycle and Pedestrian Plan
- Bristol Virginia Comprehensive Plan
- Washington County Virginia Comprehensive Plan
- SAGA Regional Greenways and Trails Plan
- Tennessee Bicycle and Pedestrian Plan
- Bristol Bicycle and Pedestrian Plan
- Bristol Urban Area Major Thoroughfare Plan 1985-2005
- Bristol Urban Area Long-Range Transportation Plan Year 2015
- 2025 Long Range Transportation Plan Update
- Bristol Urban Area Long-Range Transportation Plan Year 2030
- Bristol Urban Area Long-Range Transportation Plan Year 2030 Update
- Virginia Policy for Integrating Bicycle and Pedestrian Accommodations
- State of Tennessee Strategic Highway Safety Plan
- Commonwealth of Virginia Strategic Highway Safety Plan
- Bristol Regional ITS Architecture and Deployment Plan
- A Climate Change Action Plan (Virginia)
- Southern Regional Economic Assessment of Climate Policy Options and Review of Economic Studies of Climate Policy.
- Inventory of U.S. Greenhouse Gas Emissions and Sinks (Federal Highway Administration)
- Freight Facts and Figures 2009 (Federal Highway Administration)
TRAVEL DEMAND MODEL AND DEVELOPMENT

Travel demand models provide the capability of performing a traditional four-step transportation planning process that includes trip generation, trip distribution, mode split, and traffic assignment. The Bristol traffic model encompasses the MPO study area plus that portion of Sullivan County east of South Holston Lake. The model was validated and calibrated for 2007 traffic volumes and land use conditions and was then updated to the year 2010 to represent the current transportation network. The model could then be utilized to develop future year traffic models and volume estimates. The following section provides an overview of the modeling process.

The Modeling Process. Roadway data (such as road segment length, capacity, number of lanes, travel times, and free-flow speeds) are used to create a mathematical representation of the regional transportation system. For a smaller network such as Bristol, the level of detail can be focused to include minor arterials, collectors, some local streets, and even one private roadway that is heavily used by public traffic. All roadways functionally classified as collectors or above are represented in the Bristol network; however, it is impractical to model every roadway.

The bounds of the Bristol study area was developed using several criteria. The basic “rule of thumb” for development of a study area boundary is that area which can be expected to become urbanized over the life of the plan. The Bristol study area encompasses that area, and more; topography plays a large role in the development of boundaries. For instance, one could argue that it is not practical to expect the Hickory Tree area of southeastern Sullivan County to become urbanized in the foreseeable future. However, because of the presence of Holston Mountain and South Holston Lake, nearly all trips in and out of the Hickory Tree area must pass through the Bristol study area. Instead of representing the Hickory Tree area as a series of external nodes, it was decided to go ahead and include the entire area of Hickory Tree up to Holston Mountain in the modeled network. Map 3-1 illustrates the network map for this area.

By the same token, the 2007 network contains a number of external stations along the northern periphery for very low volume roadways (such as Abrams Falls Road, Musick Drive, and Buffalo Pond Road). The northern edge of the Bristol network is up against Dickey Mountain and Walker Mountain in Washington County; the southern sides of those mountains contain a series of hollows for which trips in and out have no choice but to enter the Bristol study area. Leaving these roadways out of the model would under-represent the traffic volumes along the northern edges of the network, as there is no other way to faithfully represent those trips and their termini.

---

1 Since the traveling public uses this private roadway, to leave it out of the travel demand model would not faithfully represent the actual trip paths in this part of the network and introduce errors on the adjacent public roadway links.
**Population and Employment.** Population and employment data are generated to determine the trips that are taken on the highway network. Data was already available for both the actual 2000 Census results and the forecasted 2030 populations from the *Bristol Urban Area Long-Range Transportation Plan Year 2030* (Note: 2010 Census data is not yet available for development of this document). The 2030 population forecasts were developed for that long-range plan through a top-down allocation process, following an analysis by the University of Tennessee to determine the overall population growth for the entire area. In this top-down allocation process, local planning staff from the various jurisdictions allocated the population growth to various areas based on such factors as land availability (i.e., not in floodplains, steep slopes, or heavy rock areas), planned utility extensions, soil conditions, and other local knowledge. Using these two points (2000 Census population and 2030 population forecast), populations were projected on a straight-line growth rate for the other forecast years (2007 and 2035).

The employment data was purchased from InfoUSA for the 2030 long-range plan. For the 2035 long-range plan, 2007 data was acquired from the same source. For 2035, employment was calculated using a parallel process to that used for population, with employment data for 2000 and 2030 as a base to develop annual growth rates by employment type, and then those growth rates were applied to the 2007 employment to determine the 2035 employment. In this manner, the population and employment data would represent the same time period. The employment data included location, number of employees by class, and type of employee (agricultural/mining, manufacturing, retail, service, office, and governmental, based on SIC and NAICS codes).

**Traffic Analysis Zones.** The study area is broken down into Traffic Analysis Zones, or TAZs. Each TAZ should represent a relatively homogenous area from a land-use standpoint without being so small as to be overly detailed. For instance, a single TAZ can be predominantly residential, but still have small sections of retail areas within it. The Bristol study area has 137 TAZs, of which 87 are in Tennessee and 50 are in Virginia. Map 3-2 shows the distribution of TAZs in the Bristol Study Area. TAZs are bounded by physical features, such as roadways, railroads, water courses, and ridge tops, as well as political features such as the state line and county boundaries. Employment and population locations are geographically defined as being within a specific TAZ. While the TAZs are in and of themselves relatively homogenous, there are vast differences between them, as listed in Table 3-1 and shown on Map 3-2.

From the 2030 to the 2035 networks, there were only two changes in the TAZs, both in Sullivan County. First, the TAZ closest to Tri-Cities Airport in the Bristol model was eliminated, and this area transferred to the Kingsport MPO study area. This is because part of this TAZ ended up being included in the Kingsport Urbanized Area. Secondly,

---

2 The data did not include the exact number of employees per location. Instead, it aggregated the number of employees into broad categories (1 to 5 employees, 6 to 20 employees, etc.). By assigning the average number of employees in the group (such as assigning three employees to every location that had 1 to 5 employees) to each location, the error in employee assignment should average out. A list of large employers appears in Appendix A.
although not technically part of the MPO planning boundary, that portion of Sullivan County east of South Holston Lake is added to the model network as a single, large TAZ for potential air quality modeling purposes subsequent to this plan.

Table 3-1: 2007 TAZ Statistics
(letters correspond to red TAZ labels shown on Map 3-2)

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Largest TAZ in area (overall model area)</td>
<td>58.90 square miles (Holston Mountain in Sullivan County)</td>
</tr>
<tr>
<td>B</td>
<td>Largest TAZ in area (study area)</td>
<td>10.21 square miles (Rocky Springs area of Sullivan County)</td>
</tr>
<tr>
<td>C</td>
<td>Smallest TAZ in area (overall model area and in study area)</td>
<td>0.06 square miles (west of downtown Bristol, Virginia, at old Southern Railway yard)</td>
</tr>
<tr>
<td>D</td>
<td>Largest TAZ in dwelling units (overall model area and in study area)</td>
<td>1,410 dwelling units (northeastern Bristol, Virginia, north of Kings Mill Pike and east of Bonham Road)</td>
</tr>
<tr>
<td>E</td>
<td>Smallest TAZ in dwelling units (overall model area and study area)</td>
<td>Two industrial-area TAZs have no dwelling units</td>
</tr>
<tr>
<td>F</td>
<td>Highest Population Density TAZ (overall model area and study area)</td>
<td>10,087 persons per square mile (just northeast of downtown Bristol, Virginia)</td>
</tr>
<tr>
<td>G</td>
<td>Lowest Population Density TAZ (overall model area and study area)</td>
<td>12.2 persons per square mile (northwest of Exit 74 in Bristol, Tennessee)</td>
</tr>
<tr>
<td>H</td>
<td>Highest Employment TAZ (overall model area and study area)</td>
<td>3,348 employees (hospital/Exit 74 area of Bristol, Tennessee)</td>
</tr>
<tr>
<td>J</td>
<td>Lowest Employment TAZ (overall model area and study area)</td>
<td>2 employees (Lime Hill area of Washington County)</td>
</tr>
<tr>
<td>K</td>
<td>Highest Employment Density TAZ (overall model area and study area)</td>
<td>17,242 employees per square mile (northern 5th Street area of Bristol, Tennessee)</td>
</tr>
<tr>
<td>A</td>
<td>Lowest Employment Density TAZ (overall model area)</td>
<td>1.03 employees per square mile (Holston Mountain in Sullivan County)</td>
</tr>
<tr>
<td>J</td>
<td>Lowest Employment Density TAZ (study area)</td>
<td>1.19 employees per square mile (Lime Hill area of Washington County)</td>
</tr>
</tbody>
</table>

Trip Generation. The raw demographic data has to be converted into trips as part of the trip generation step of the four-step modeling process. In trip generation, the number of persons and employees are input into equations to predict the number of vehicle trips that would be produced or attracted to each traffic zone. Those equations developed, for each TAZ, the number of trips produced (outgoing) or attracted (incoming) for several different trip types:

- Home-based work trips
- Home-based shopping trips
- Home-based social-recreational trips
- Home-based other trips
BRISTOL STUDY AREA
TRAFFIC ANALYSIS ZONES
(TAZs)

Colors represent spatial distribution and size of TAZs and do not represent any independent variable.

1 TAZ transferred to Kingsport after 2030 long-range plan update
2 TAZ added to Bristol network for air quality analysis
3 South Holston Lake

Letters refer to TAZs referenced in Table 3-1
Non-home based trips (trips within a series of trips that do not start or end at home, such as going to a restaurant for lunch from work)
- Truck trips (to calculate trips for freight movement instead of people movement)
- Internal/external trips (trips that pass over the cordon line defining the edges of the study area)

The trip productions and attractions thus calculated are loaded onto the mathematical model network at those points in the network where such trips would enter or exit one of the modeled roadways.

Trip Distribution. The next step in the four-step process is trip distribution. In trip distribution, it is known, for example, that so many trips are produced as home-to-work trips in a certain TAZ. Trip distribution will determine how many of those outgoing trips are attracted to each of all the TAZs. In the Bristol model, a gravity model was used. For example, if a trip produced in a TAZ can go to either of two other TAZs, and one of those two TAZs is twice as far away as the other, then trips are four times more likely to go to the nearer TAZ than they are to the further TAZ. The end result of trip distribution is a trip table, by trip purpose, that identifies how many trips are going between each pair of TAZs for each trip purpose. For the 137-zone Bristol network, each of the trip purposes will have a 137 by 137 matrix listing the number of trips between each pair of TAZs. Trips are also calculated for trips that stay within a particular TAZ and thus do not enter the major thoroughfare network.

Mode Choice: The third step in the four-step process is mode split, or mode choice. In mode choice, the trips between each TAZ pair is examined to determine how many will travel by car, by public transit, by vanpool, by walking, etc. For mathematical simplicity, the Bristol model postulates that all trips will be by vehicle and not by public transit or other modes. This results in a conservative error of overestimating the number of trips using the highways. However, the number of trips utilizing transit or other modes in the Bristol area is small enough that any such error will not be great.

Traffic Assignment. Finally, traffic assignment loads the trip tables onto the appropriate highway to produce traffic volumes for each roadway segment. Highway assignment in the Bristol model uses two different approaches. For truck trips, an all-or-nothing assignment is used, loading the network with these trips first only on those links that are coded as truck routes. For all of trips, the model utilizes a mathematical equilibrium process to simulate congestion effects on the roadway system that is loaded onto the network after the truck trips have been assigned. Output from the highway assignment is a network file that includes the assigned roadway volumes for each roadway segment.

Model Calibration and Future Year Model Development. The network is then calibrated using the 2007 data. That is, if the employment, population, and network information for the year 2007 is inputted into the mathematical model, then the answer should be close to the 2007 traffic counts measured in the field. The network and its data are then adjusted in a calibration process to match the 2007 traffic counts as closely as possible. An exact fit is never possible for several reasons: (a) since every street is not
modeled, those trips that use nonmodelled roadways are assigned to other, modeled roadways; (b) the model postulates that all motorists will behave the same way; and (c) the model assumes that every motorist has an omnipotent knowledge of the network and real-time congestion levels throughout the system. A purely mathematical process will not account for a trip route choice because a motorist wants to avoid a steep grade on a snowy day, or takes a new route because they are tired of the old one, or any of a thousand other reasons other than pure optimization of travel.

Once the model is calibrated, it represents predicted travel demand for the year 2007. The next step is to update the network from 2007 to the current calendar year of 2010 to account for modifications made in the roadway network since 2007. Included as well are projects that may not be completed, but are committed to construction, either because construction is actually underway or that the financial commitment is in place. This combination results in a network referred to as the “existing + committed” (or “E+C” for short) network.

For the selected target year (in this case, the year 2035), the predicted population and employment data for the TAZs must be generated. Once these are generated, they are loaded onto the 2010 E+C network. The end result of this process should be the predicted traffic volumes on each roadway segment of the network in the year 2035 if no additional projects are built. This is referred to as the 2035 “no build” network. This network will illustrate those links that have volume/capacity ratios in the ranges of interest, showing locations where volume is nearing or greater than capacity and thus congestion may result if remedial action is not taken. Those needs then contribute in analyzing proposed projects for the study period.

Projects may also be selected for other reasons besides inadequate volume/capacity ratios. Projects may also be selected to alleviate safety issues; to help develop multi-lane roadway networks within a jurisdiction; to add capacity for proposed economic development; for better operations of intersections; or for combinations of these and other factors.

**Accounting for Truck and Rail Movements in the Bristol Travel Demand Model.**

Because of the importance of freight in the Bristol study area as elsewhere, the travel demand model featured a revamping of the freight component from previous models. Mainline railroad operations have a considerable impact on road travel in the Bristol study area. For rail movements, all mainline surface crossings are mathematically represented in the network of roadways by reducing the capacity of those roadways. Capacity is not reduced on modeled roadways to account for the spur crossings.

Where appropriate (because of weight restrictions, size restrictions, or local ordinances), links in the network are coded as a truck route or a no-truck route. For truck routes, as mentioned above, capacities are further reduced on links with mainline railroad crossings to account for the additional induced delays. Truck trips are generated separately from the demographic data (broken down further into single-unit [light] and combination-unit [heavy] trucks) and assigned to the network first with an all-or-nothing assignment. Only
after the trucks are assigned to the network are the passenger vehicles assigned to the network with an equilibrium assignment, using the capacity left over after the truck assignment.

**References.** The model used in this process for this document was developed using TransCAD, a software package developed by Caliper Corporation. The Bristol TransCAD model was developed by the Memphis office of Kimley-Horn and Associates consultant firm, utilizing network and demographic data supplied by the MPO. Future demographic data was developed by the MPO and Kimley-Horn, based on past work developed by the University of Tennessee in conjunction with the local jurisdictions to determine growth of population and employment and where that growth can be predicted to occur.
CHAPTER 4: DEMOGRAPHIC AND SOCIO-ECONOMIC DATA

PART A: REGIONAL OVERVIEW

The demand for transportation within the region is directly related to the demographic, economic, and land use characteristics of the area. Population, households, and employment patterns help to characterize an area – be it urban, suburban, or rural. Because the transportation network influences to varying degrees where people live and work, the evaluation of demographic, socio-economic, and commuting characteristics is important in developing the long-range transportation plan. Population and employment growth increases the demand for transportation as well as decisions on land use and zoning at the city and county level.

Data for the Bristol Urban Area was gathered from the 2000 U.S. Census and the 2000 Census Transportation Planning Package (Note: data from the 2010 Census is not yet available for development of this document). Since a majority of data is configured by county, the evaluation of some general demographic and transportation trends includes all of Sullivan County, Tennessee, and Washington County, Virginia. The population and employment data discussed later in this chapter are specific to the MPO study area.

**Households.** The number of persons per household is an important factor in determining trip rates for an area. The average number of persons per household has decreased in the MPO study area from 2.47 in 1990 to 2.30 in 2000. Although these figures are lower than the state averages, they do correspond to the national trend towards smaller household sizes. Average household size is identified in Chart 4-1.

**Chart 4-1: Average Household Size**

![Chart 4-1: Average Household Size](Image)

Source: U.S. Census Bureau, Census 2000
**Vehicles Available.** While the average household size in the Bristol region has decreased, the number of vehicles has increased. Since 1990, the number of households with two or more vehicles has encountered the greatest percentage increase for the Bristol region. The number of vehicles available per household for the Bristol region is higher than the statewide averages for Tennessee and Virginia. Average vehicles per household are identified in Chart 4-2.

![Chart 4-2](chart.png)

Source: U.S. Census Bureau, Census 2000

**Commuting to Work.** Travel characteristics of all transportation modes play an important role in determining future transportation needs. The automobile is the predominate choice of transportation within the Bristol region, with 86 percent of workers commuting to work in a single-occupant vehicle. In 2000, public transportation represented less than 0.5 percent of the work trips; however, regional transit service is limited in the Bristol region outside the municipal limits of Bristol, Tennessee and Bristol, Virginia. Chart 4-3 illustrates the regional commute to work by transportation mode.

Throughout the Bristol region commuting times have also increased, although they still remain less that the state averages. For the Bristol region, this is consistent with the national trend of suburban growth and the availability of the automobile. Chart 4-4 illustrates the regional travel time to work for the Bristol region.

The counties in and surrounding the Bristol area function coherently as a single economic region. Residents from one county often commute to another county for work. Some of the larger county-to-county commuting patterns within the Bristol region are between Washington County, Tennessee, and Sullivan County, Tennessee. Table 4-1 provides county-to-county commuter flows for the Tri-Cities Region.
Chart 4-3
Bristol Region Commute to Work by Mode of Transportation (2000)

Source: U.S. Census Bureau, Census 2000

Chart 4-4
Bristol Region Travel Time to Work (Minutes)

Source: U.S. Census Bureau, Census 2000
Table 4-1
Tri-Cities Region County-by-County Commuter Flows (2000)

<table>
<thead>
<tr>
<th>County of Work</th>
<th>Carter Co. TN</th>
<th>Hawkins Co. TN</th>
<th>Sullivan Co. TN</th>
<th>Unicoi Co. TN</th>
<th>Washington Co. TN</th>
<th>Bristol City VA</th>
<th>Scott Co. VA</th>
<th>Washington Co. VA</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carter Co. TN</td>
<td>10,899</td>
<td>24</td>
<td>1,860</td>
<td>414</td>
<td>9,688</td>
<td>74</td>
<td>-</td>
<td>49</td>
<td>2,035</td>
<td>25,043</td>
</tr>
<tr>
<td>Hawkins Co. TN</td>
<td>39</td>
<td>11,434</td>
<td>5,953</td>
<td>8</td>
<td>741</td>
<td>35</td>
<td>7</td>
<td>3,771</td>
<td>22,167</td>
<td></td>
</tr>
<tr>
<td>Sullivan Co. TN</td>
<td>921</td>
<td>1,494</td>
<td>48,100</td>
<td>83</td>
<td>7,171</td>
<td>4,233</td>
<td>458</td>
<td>2,530</td>
<td>2,111</td>
<td>67,101</td>
</tr>
<tr>
<td>Unicoi Co. TN</td>
<td>244</td>
<td>14</td>
<td>370</td>
<td>4,042</td>
<td>2,320</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>472</td>
<td>7,472</td>
</tr>
<tr>
<td>Washington Co. TN</td>
<td>1,217</td>
<td>174</td>
<td>7,211</td>
<td>993</td>
<td>37,567</td>
<td>301</td>
<td>29</td>
<td>238</td>
<td>3,129</td>
<td>50,659</td>
</tr>
<tr>
<td>Bristol City VA</td>
<td>51</td>
<td>9</td>
<td>2,045</td>
<td>9</td>
<td>216</td>
<td>3,230</td>
<td>-</td>
<td>1,204</td>
<td>198</td>
<td>6,962</td>
</tr>
<tr>
<td>Scott Co. VA</td>
<td>-</td>
<td>314</td>
<td>3,625</td>
<td>11</td>
<td>352</td>
<td>71</td>
<td>3,578</td>
<td>168</td>
<td>935</td>
<td>9,054</td>
</tr>
<tr>
<td>Washington Co. VA</td>
<td>47</td>
<td>2</td>
<td>2,471</td>
<td>-</td>
<td>240</td>
<td>3,589</td>
<td>40</td>
<td>13,844</td>
<td>3,262</td>
<td>23,495</td>
</tr>
</tbody>
</table>

Source: Census Transportation Planning Package 2000
PART B: POPULATION AND EMPLOYMENT

The population and employment forecasts for this edition of the long-range plan are based, in part, on trends and principles established for the *Bristol Urban Area Major Thoroughfare Plan Year 2030*.

Analysis and forecasts for population and employment data is specific to the MPO study area. To better interpret the study area, the population and employment data are analyzed by transportation analysis zones (TAZs). TAZs are generally defined as areas of homogeneous activity, and are typically bounded by barriers to travel or changes in land use. TAZs serve as the geographic unit for socioeconomic data used in the travel demand model to project future trips. To project future travel demand, population and employment within the MPO study area are estimated for the target year 2035. Future population and employment projection rates and trends were developed by the University of Tennessee. The travel demand model was discussed in greater detail in the previous chapter.

As part of the development of the long-range transportation plan, each of the MPO jurisdictions’ comprehensive plans were reviewed in an effort to make the plan consistent with adopted goals and objectives, land use, and economic growth plans proposed by local jurisdictions.

**POPULATION**

The primary source of population and household data is the U.S. Census Bureau. The population of any study area is generally a reflection of the complexity of its economic and social structure. The 2000 Census was the source of the aggregate base year household and population data upon which population projections were previously established for the horizon year 2030 of the long-range transportation plan. Base year population and dwelling units are provided in Table 4-2.

A note needs to be made when comparing 2000 base year data from this long-range plan and the previous editions. One TAZ in Sullivan County near Tri-Cities Regional Airport that appeared in the previous long-range plan has been deleted, and one TAZ east of South Holston Lake was added. The TAZ east of South Holston Lake is so sparsely populated, however, that no population growth was postulated for that area to 2030 or 2035, and so the trends developed for the Sullivan County portion of the study area are still valid despite the change in geography.
Table 4-2
MPO Study Area Population and Dwelling Units in 2000

<table>
<thead>
<tr>
<th>Area</th>
<th>2000 Population</th>
<th>2000 Dwelling Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sullivan County, Tennessee (part) (includes Bristol and Bluff City)</td>
<td>63,365</td>
<td>28,135</td>
</tr>
<tr>
<td>Tennessee Subtotal</td>
<td>63,365</td>
<td>28,135</td>
</tr>
<tr>
<td>Bristol, Virginia</td>
<td>17,367</td>
<td>8,449</td>
</tr>
<tr>
<td>Washington County, Virginia (part)</td>
<td>11,469</td>
<td>4,976</td>
</tr>
<tr>
<td>Virginia Subtotal</td>
<td>28,836</td>
<td>13,425</td>
</tr>
<tr>
<td>Total MPO Study Area</td>
<td>92,201</td>
<td>41,560</td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau, Census 2000

The Tennessee portion of the MPO study area represents approximately 69 percent of the 2000 population, which includes Bristol, Bluff City, the unincorporated community of Blountville, and the eastern part of Sullivan County. The Virginia portion of the MPO study area includes the City of Bristol, Virginia and the southwestern part of Washington County and contains approximately 31 percent of the population of the study area between them. Chart 4-5 illustrates the percent of year 2000 population by MPO jurisdiction.

Chart 4-5: Year 2000 Percent of Population by Jurisdiction
**Methodology.** The 2035 projections are based on previously developed 2030 projections, extrapolated out to 2035. In some cases, the 2035 projections are also altered from the 2030 projections to account for differences observed in residential construction since those projections were made.

The overall study area population was previously projected to increase approximately five percent between 2000 and 2030 based on normal growth trends. Projections were obtained from secondary sources, which served as control totals for the study area. These included Woods and Poole Economics, University of Virginia Cooper Center, University of Tennessee Center for Business and Economic Research, and local resources. While some forecasts were prepared exclusively for Bristol, Tennessee, Bluff City, Tennessee, and Bristol, Virginia, the other estimates were prepared for Sullivan County, Tennessee, and Washington County, Virginia, which have extensive areas outside the study area. To estimate the partial counties, the portions of Sullivan County and Washington County assigned to the MPO study area were assumed to be the same proportion in 2030 as the base year 2000 population.

Once an overall total population for the target year was determined by jurisdiction, this was broken up further to allocate those populations to each of the TAZs. This was accomplished by first assigning the 137 TAZs into seventeen “super regions,” with six of those “super regions” in Virginia and the balance in Tennessee. Based on the local land use and comprehensive plans of the various jurisdictions, as well as local knowledge of such issues as slopes, utility availability, and floodplains, a certain proportion of the additional population was allocated to each of the “super regions.” Then, in turn, the additional population for each “super region” was further allocated to each TAZ.

Once the 2000 and 2030 populations for each TAZ were established, on the assumption of straight-line growth, populations per TAZ for 2007 and 2035 were developed by interpolation and extrapolation, respectively.

**Population Estimates.** Ultimately an aggressive growth scenario was developed for the MPO study area and utilized for the travel demand model to develop 2030 population estimates. Such a scenario accounts for demographic influencing factors as proactive local governmental initiatives to foster growth, as well as accounting for the changes in household size and vehicle availability indicated by the trends that have become evident. This scenario also assumed the development of a new sewage treatment facility in Washington County, Virginia, that would support substantial population growth in the unincorporated areas of the county. Additional discussions concerning the economic development potential of Bristol, Tennessee, suggested a more aggressive population growth. In addition, the original 2030 study postulated no population growth for Bristol, Virginia; this was revised slightly to continue the trend evidenced by actual residential construction in Bristol, Virginia, observed up to 2007. Based on both of the revised Bristol, estimates with the alternatives to Washington County, Virginia, an aggressive population estimate was developed, which represented a projected increase of approximately five percent between 2007 and 2035 and represented on Table 4-3.
Chart 4-6 illustrates the projected year 2035 percent of population by MPO jurisdiction. Maps 4-1 and 4-2 illustrate the 2035 population and 2035 population density by TAZ.

Table 4-3
MPO Study Area Population Estimates for Year 2007 and 2035

<table>
<thead>
<tr>
<th>Area</th>
<th>2007 Population</th>
<th>2035 Population</th>
<th>Population Change</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sullivan County, Tennessee (part)</td>
<td>63,808</td>
<td>68,077</td>
<td>4,269</td>
<td>6.7%</td>
</tr>
<tr>
<td>(includes Bristol and Bluff City)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tennessee Subtotal</td>
<td>63,808</td>
<td>68,077</td>
<td>4,269</td>
<td>6.7%</td>
</tr>
<tr>
<td>Bristol, Virginia</td>
<td>17,451</td>
<td>17,708</td>
<td>257</td>
<td>1.5%</td>
</tr>
<tr>
<td>Washington County, Virginia (part)</td>
<td>11,672</td>
<td>12,105</td>
<td>433</td>
<td>3.7%</td>
</tr>
<tr>
<td>Virginia Subtotal</td>
<td>29,123</td>
<td>29,813</td>
<td>690</td>
<td>2.4%</td>
</tr>
<tr>
<td>Total MPO Study Area</td>
<td>92,931</td>
<td>97,890</td>
<td>4,959</td>
<td>5.3%</td>
</tr>
</tbody>
</table>

Source: University of Tennessee

Chart 4-6
Year 2035 Percent of Population by Jurisdiction
2035 POPULATION PROJECTIONS BY TAZ

Each color represents 20% of the TAZs.
2035 POPULATION DENSITY PROJECTIONS BY TAZ

Each color represents 20 percent of the TAZs.
EMPLOYMENT

Employment growth in the study area has generally followed regional and state patterns and the cyclical nature of the national economy. Throughout the nation, a shift in the employment base has occurred. The service industry is replacing traditional industries such as manufacturing and wholesale trade. The Bristol region is no exception. No longer does the Central Business District serve as the region’s primary employment center. Instead, the percentage of employment is expanding away from the central business district, where land is more abundant and less expensive. Year 2007 employment data for the MPO study area were purchased from InfoUSA, which provides employment records for employers by SIC/NAICS code and address. Table 4-4 provides the base year 2007 employment for the MPO study area.

Another change in this long-range plan from previous editions is a change in employment categories from two (basic and service) to six (agricultural/mining, manufacturing, retail, office, service, and governmental) to allow for more sophisticated trip generation equations to be used.

Chart 4-7, provides the year 2007 total employment by jurisdiction. In addition, Appendix A contains a list of major employers in the Bristol study area in single locations for the year 2007 (major employers that have employees scattered throughout several locations may not appear on this list).

<table>
<thead>
<tr>
<th></th>
<th>AGRI</th>
<th>MNFG</th>
<th>RETAIL</th>
<th>OFFICE</th>
<th>SERV</th>
<th>GOV’T</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sullivan Co (part)</td>
<td>2,085</td>
<td>7,789</td>
<td>4,633</td>
<td>2,952</td>
<td>8,813</td>
<td>1,824</td>
<td>28,096</td>
</tr>
<tr>
<td>Tennessee subtotal</td>
<td>2,085</td>
<td>7,789</td>
<td>4,633</td>
<td>2,952</td>
<td>8,813</td>
<td>1,824</td>
<td>28,096</td>
</tr>
<tr>
<td>City of Bristol, VA</td>
<td>580</td>
<td>3,883</td>
<td>4,575</td>
<td>2,477</td>
<td>2,036</td>
<td>1,068</td>
<td>15,619</td>
</tr>
<tr>
<td>Washington Co (part)</td>
<td>197</td>
<td>2,205</td>
<td>374</td>
<td>273</td>
<td>568</td>
<td>271</td>
<td>3,888</td>
</tr>
<tr>
<td>Virginia subtotal</td>
<td>777</td>
<td>6,088</td>
<td>4,949</td>
<td>2,750</td>
<td>2,604</td>
<td>1,339</td>
<td>18,507</td>
</tr>
<tr>
<td>MPO study area total</td>
<td>2,862</td>
<td>13,877</td>
<td>9,582</td>
<td>5,702</td>
<td>11,417</td>
<td>3,163</td>
<td>46,603</td>
</tr>
</tbody>
</table>

Source: InfoUSA
Methodology. An initial estimate by the University of Tennessee of 2030 employment was based on a constant ratio of jobs to population for the MPO study area. This initial estimate was modified when it was determined that the growth rates for population and employment did not converge. Additional analysis on growth of the available labor force by jurisdiction to fill those employment needs resulted in the final modified employment values used for the target year to account for the aging population of the region. The distribution of jobs by sector was based on estimates provided by Woods and Poole Economics. In addition to the ambient employment growth, economic development initiatives by local jurisdictions were included in the employment forecasts that promote economic activity beyond the ambient population growth. Specific initiatives include reutilization of the former Raytheon industrial plant and construction of the Bristol Business Park and Partnership Park II in Tennessee, and additional development near Exit 7 of Interstate 81 in Virginia.

The University of Tennessee determined the original overall growth in employment for the entire study area by jurisdiction by employment type for the target year based on the above updated data. Once the overall employment for the target year was determined by jurisdiction, this was broken up further to allocate those employees to each of the TAZs. This was accomplished by first assigning the 137 TAZs into seventeen “super regions,” with six of those “super regions” in Virginia and the balance in Tennessee. Based on the local land use and comprehensive plans of the various jurisdictions, as well as local knowledge of such issues as slopes, zoning, utility availability, and floodplains, a certain proportion of the additional employees were allocated to each of the “super regions.” Then, in turn, the additional employees for each “super region” were further allocated to each TAZ. Thus, the impact of various types of employment growth is reflected into the travel patterns developed in the traffic model.
Employment Estimates. The employment estimates for 2035 are based on previous work to develop estimates for 2030 employment in the previous long-range plan. Once the 2030 employment projections were determined by TAZ in the previous long-range plan, the annual growth rates by TAZ by employment category was applied to the 2007 employment levels to determine the 2035 employment projects. Table 4-5 indicates the projected employment, based on the calculations described above, for the target year of 2035.

Table 4-5
Projected Year 2035 MPO Study Area Employment

<table>
<thead>
<tr>
<th></th>
<th>AGRI</th>
<th>MNFG</th>
<th>RETAIL</th>
<th>OFFICE</th>
<th>SERV</th>
<th>GOV’T</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sullivan Co (part)</td>
<td>2,556</td>
<td>8,806</td>
<td>5,445</td>
<td>3,331</td>
<td>10,366</td>
<td>2,066</td>
<td>32,570</td>
</tr>
<tr>
<td>Tennessee subtotal</td>
<td>2,556</td>
<td>8,806</td>
<td>5,445</td>
<td>3,331</td>
<td>10,366</td>
<td>2,066</td>
<td>32,570</td>
</tr>
<tr>
<td>City of Bristol, VA</td>
<td>787</td>
<td>4,486</td>
<td>6,536</td>
<td>3,064</td>
<td>2,387</td>
<td>1,099</td>
<td>18,359</td>
</tr>
<tr>
<td>Washington Co (part)</td>
<td>299</td>
<td>2,308</td>
<td>386</td>
<td>300</td>
<td>608</td>
<td>279</td>
<td>4,180</td>
</tr>
<tr>
<td>Virginia subtotal</td>
<td>1,086</td>
<td>6,794</td>
<td>6,922</td>
<td>3,364</td>
<td>2,995</td>
<td>1,378</td>
<td>22,539</td>
</tr>
<tr>
<td>MPO study area total</td>
<td>3,642</td>
<td>15,600</td>
<td>12,367</td>
<td>6,695</td>
<td>13,361</td>
<td>3,444</td>
<td>55,109</td>
</tr>
</tbody>
</table>

Chart 4-8 illustrates the estimated year 2035 percent of employment by jurisdiction. Maps 4-3 and 4-4 show the projected 2035 employment by TAZ.

Chart 4-8
Year 2035 Percent of Total Employment by Jurisdiction
BRISTOL URBAN AREA LONG-RANGE TRANSPORTATION PLAN
YEAR 2035

** This page intentionally left blank **
CHAPTER 5: OPERATIONAL ANALYSIS AND CONGESTION MANAGEMENT

Based on national trends, congestion studies show that over half of traffic delay is non-recurring, meaning it is caused by various types of incidents such as crashes, disabled vehicles, work zones, poor weather, and special events (see Chart 5-1). Better management of work zones, better incident response and better traveler information can significantly reduce this type of congestion. The remaining portion is recurring congestion, delay that occurs in the same place at the same time of day. Some of this congestion is caused by poor traffic signal timing, which can be reduced through better use of technology. Solving recurring capacity-related congestion requires strategies to maximize the capacity of the infrastructure already in place or investing in additional lanes to increase capacity.

Chart 5-1
Reasons for Congestion

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidents</td>
<td>25%</td>
</tr>
<tr>
<td>Weather</td>
<td>15%</td>
</tr>
<tr>
<td>Work Zones</td>
<td>10%</td>
</tr>
<tr>
<td>Poor Signal Timing</td>
<td>5%</td>
</tr>
<tr>
<td>Other Non-Recurring</td>
<td>5%</td>
</tr>
<tr>
<td>Recurring Congestion</td>
<td>40%</td>
</tr>
<tr>
<td>Other</td>
<td>5%</td>
</tr>
</tbody>
</table>

Source: FHWA

One of the primary purposes of long-range planning is to determine at which locations additional road capacity will be required in the future so that facilities can be constructed in time to manage that predicted travel demand. For the Bristol study area, this was done by utilizing the consultant firm of Kimley-Horn and Associates to develop and operate a mathematical model of the Bristol network utilizing the TransCAD software developed by the Caliper Corporation. A year 2007 model was developed, utilizing year 2007 population, employment, and traffic count data that could be used for calibration purposes. Once the 2007 network was calibrated, it was converted to a 2010 “existing + committed” network to update the network to projects completed or committed in by December 2010. Population and employment data predicted for the target year 2035 is then loaded onto that network and run to serve as the year 2035 “no build” scenario to determine what traffic volumes could be predicted if no further projects were built.
As shown on the accompanying maps (Map 5-1 through Map 5-5), there are several areas that were identified as having volume/capacity (V/C) problems. These maps indicate the predicted ratio of volume to capacity in the year 2035 if no further projects were constructed after those completed or committed in 2010. The various roadway segments illustrate the predicted volume/capacity ratios in four groups, defined by their Levels of Service (LOS) as a measure of their volume/capacity ratios:

- LOS F (highest level of congestion)
- LOS E
- LOS D
- LOS C, B, and A (LOS A is the lowest level of congestion)

The vast majority of roadway links fell into the last category. Those of special interest for this chapter are those with higher ratings. These roadway links are listed below. If consecutive links have the same high LOS rating, they are listed as a single long section, rather than as each individual link. In many cases, the high V/C ratio is because a traffic signal or stop sign reduces the capacity at the intersection at one or both ends of the roadway segment. In some cases, the level of detail for the TransCAD model is not sufficient to illustrate the full capacity of the different turn lanes available on a particular approach to an intersection, and so the high V/C rate does not necessarily indicate that additional lanes are needed. Examples of this phenomenon are the southbound Highway 11E off-ramp to Highway 394, where the downstream traffic signal does not serve the right-turn majority movement, which is actually controlled by a YIELD sign and so has less constriction on the capacity of the roadway. Another example is Exide Drive from Bethel Drive to Highway 11E/Volunteer Parkway, where a traffic signal at the downstream end restricts capacity rather than a lack of lanes for the entire segment.

For these analyses, the green time-to-cycle time ratio (G/C) of an approach to a traffic signal was calculated as the same ratio of approach volumes. In this manner, the traffic signal is postulated to be optimized, so that real-time efforts to optimize traffic signals would already be accounted for in the model. In the same vein, an approach controlled by a YIELD sign was assigned a G/C ratio of 0.8, while a STOP-controlled approach was assigned a G/C ratio of 0.6. Finally, for links that crossed mainline railroad tracks, an additional capacity reduction was included to account for periods when the roadway is effectively out of service while trains pass.

These roadway segments are illustrated on the following maps.

**Washington County, Virginia**

- **LOS F**
  - Interstate 81 northbound, north end of three-lane section to Exit 13 gore
  - Interstate 81 northbound, Exit 13 on-ramp to cordon line north
  - Interstate 81 southbound, cordon line north to Exit 13 off-ramp
  - Interstate 81 southbound, Exit 13 merge point to north end of three-lane section
LOS E
Interstate 81 southbound, Exit 13 gore to Exit 13 merge
Interstate 81 northbound, Exit 13 gore to Exit 13 merge
Junction Drive, Old Jonesboro Road to Kings Mill Pike
Lee Highway, cordon line north to Astor Road
Lee Highway, Halls Bottom Road to Industrial Park Road
Spring Creek Road, Lee Highway to Exit 13 north ramps

LOS D
Interstate 81 southbound, Exit 1 merge to state line
Interstate 81 northbound, state line to Exit 1 gore
Lee Highway, Astor Road to Halls Bottom Road
Lee Highway, Majestic Drive to Industrial Park Road
Lee Highway, Ole Dominion Road to Bristol corporate limits

Bristol, Virginia
LOS F
Exit 5 northbound off-ramp to Lee Highway
Exit 7 northbound off-ramp to Old Airport Road
Exit 7 southbound off-ramp to Old Airport Road
Island Road, Lee Highway to curve north of Lee Highway
Lee Highway, Clear Creek Road/Old Airport Road to Mt. Vernon Drive/Resting Tree Drive
Lee Highway, Bonham Road to shopping center entrance east of Bonham Road
Old Airport Road, Bonham Road ( southern intersection) to Kings Mill Pike

LOS E
Clear Creek Road, Lee Highway to shopping center entrance north of Lee Highway
Commonwealth Avenue, Sycamore Street to Euclid Avenue
Exit 5 southbound off-ramp to Lee Highway
Lee Highway, Bonham Road to Alexis Drive
Lee Highway, Wendover Road to East Valley Drive/West Valley Drive
Old Airport Road, Exit 7 north ramps to Exit 7 south ramps
Vance Street, Randolph Street to Euclid Avenue
West Mary Street, Goodson Street to Martin Luther King, Jr. Boulevard

LOS D
Bonham Road, Lee Highway to Linden Drive
Commonwealth Avenue, Sycamore Street to Cumberland Street
Euclid Avenue, Bob Morrison Boulevard to Commonwealth Avenue
Interstate 81 southbound, end of three-lane section to Exit 7 gore
Interstate 81 southbound, Exit 7 merge to Exit 3 gore
Interstate 81 northbound, Exit 3 merge to Exit 7 gore
Interstate 81 northbound, Exit 7 merge to end of three-lane section
Kings Mill Pike, Bristol corporate limits to Old Airport Road
Lee Highway, East Valley Drive/West Valley Drive to Euclid Avenue
Old Airport Road, Lee Highway to Exit 7 north ramps
Old Abingdon Highway, Lee Highway to Beaverview Drive
State Street, Martin Luther King, Jr. Boulevard to Goodson Street/Pennsylvania Avenue
West State Street, Bob Morrison Boulevard to Douglas Street/13th Street

Bristol, Tennessee (corporate limits as of January 1, 2010)

❖ **LOS F**
Exide Drive, Bethel Drive to Highway 11E/Volunteer Parkway
Highway 11E southbound off-ramp to Highway 394
Highway 11E northbound off-ramp to Highway 394
Volunteer Parkway, Shelby Street to State Street/West State Street

❖ **LOS E**
Medical Park Boulevard, hospital entrance to Meadow View Road
Weaver Pike, College Avenue to Edgemont Avenue

❖ **LOS D**
Anderson Street, 11th Street to Volunteer Parkway
Highway 11E, Hendrickson Lane Private Drive to Highway 394 ramps
Highway 394, Blountville Boulevard to Feathers Chapel Road (western intersection)
Interstate 81 southbound, state line to Exit 74B gore
Interstate 81 southbound, Exit 74A merge to Exit 74A gore (under bridges)
Interstate 81 northbound, Exit 74A merge to state line
Pennsylvania Avenue, State Street/East State Street to Ash Street
State Street, Martin Luther King, Jr. Boulevard to Pennsylvania Avenue/Goodson Street
Volunteer Parkway Shelby Street to Broad Street/Anderson Street
Weaver Pike, Volunteer Parkway to Edgemont Avenue
Weaver Pike, Cedar Valley Road to Industrial Drive
West State Street, Bob Morrison Boulevard to 13th Street/Douglas Street

Bluff City, Tennessee (corporate limits as of January 1, 2010)

❖ **LOS F**
no sections identified

❖ **LOS E**
Highway 390, Holston Drive to Egypt Road/Silver Grove Road

❖ **LOS D**
Bluff City, Highway, Fleming Drive to Holston Drive
Bluff City Highway, Highway 19E to Elizabethton Highway
Highway 11E, Highway 19E to Egypt Road
Unincorporated Sullivan County, Tennessee (corporate limits as of January 1, 2010)

❖ **LOS F**
Highway 126, Highway 75 to Highway 394  
Highway 126, Carden Hollow Road to Carlton Road  
Highway 394, Highway 126 to Franklin Drive  
Interstate 81 northbound, cordon line west to Exit 69 off-ramp  
Interstate 81 southbound, Exit 69 on-ramp to cordon line west

❖ **LOS E**
Highway 126, Carlton Road to Walnut Hill Road  
Interstate 81 northbound, Exit 69 merge to Walnut Hill Road bridges  
Interstate 81 southbound, Walnut Hill Road bridges to Exit 69 gore

❖ **LOS D**
Big Hollow Road, Knob Hill Drive to Highway 394  
Exit 69 northbound off-ramp to Highway 394  
Highway 11E, Allison Road/Piney Flats Road to Industrial Park Road  
Highway 75, Muddy Creek Road (northern intersection) to Highway 126  
Highway 126, Blountville Boulevard/Blountville Bypass to Fain Road  
Highway 126, Walnut Hill Road to Rock Lane  
Highway 394, Exit 69 south ramps to Highway 126  
Interstate 81 southbound, Exit 69 gore to Exit 69 merge  
Interstate 81 northbound, Exit 69 gore to Exit 69 merge

It is important to note that the travel demand model is only one tool that can be used to determine deficient roadways. One drawback of the model is that it can only measure effects of major improvement projects such as additional lanes or new roadways whereas smaller capacity improvements such as additional turn lanes at an intersection may not typically show much effect in the model. Congestion can also be a function of delay. In the Bristol transportation network, delay over a roadway segment is a function of delay at the intersections along the way, in addition to delay generated by congestion on the roadway itself away from intersections because of insufficient capacity. In those cases, congestion at intersections is best identified by analysis on a more detailed level than TransCAD.
Map 5-1
CONGESTION MANAGEMENT STRATEGIES

When projects are selected for a long-range transportation plan, this listing of locations with higher V/C ratios is only one potential source for projects. Projects for such a document can also be developed to alleviate safety issues, develop a network of multi-lane roadways throughout a jurisdiction or region, or to add additional capacity for economic development and adjacent commercial/industrial activity. Thus, not every road project candidate will be on a location with high V/C ratios, nor will every roadway with a predicted future high V/C ratio appear on the project list. Those locations with high V/C ratios resulting from lack of lane capacity, rather than capacity constraints induced only by traffic control devices, become candidates for future projects under the system efficiency criterion. The relative need for projects under this criterion, when compared to project candidates selected under other criteria, is part of the balance required for development of a long-range transportation plan. Such long-range transportation projects selected with congestion issues in mind are shown in Appendix D as meeting the “system efficiency” criterion.

The operating deficiencies listed above that are related to a high V/C ratio can be targeted with the following strategies discussed below. Certain strategies that deal with land use policies and growth management can be effective in managing congestion although they are somewhat beyond the control of the MPO since land use decisions are made by local jurisdictions. Also, utility providers can exert a great amount of influence on growth patterns depending on where sewer, water, and overhead lines are extended.

- Appropriate timing of traffic signals can decrease congestion, improve air quality, and reduce fuel consumption. To respond to changes in traffic demand, retiming of traffic signals should occur regularly. Those traffic signals that operate independently can sometimes work more efficiently with only minor investments in equipment and labor. Agencies can enhance efficiency of traffic signals by coordinating or interconnection of certain closely spaced traffic signals so they share a common time reference.

- Transportation systems management and operations strategies must be used to maximize the capacity of the existing infrastructure already in place. More efficient operation of the highway network can be a successful approach to addressing congestion. These strategies can include the addition and/or modification of turn lanes and traffic control devices.

- The number and design of access points can be a major factor in the operations of a roadway. Where access must be provided, access points should be spaced sufficiently apart in order for traffic control devices and turn lanes to operate effectively.
Crashes and other non-recurring incidents can cause significant delays, especially if lanes are completely blocked. Incident management allows the roadway’s available capacity to be restored by removing incidents as quickly as possible.

Operational improvement projects as well as new construction projects are identified in the Bristol Urban Area Long Range Transportation Plan 2035 to address the problems associated with high LOS ratings as listed above. These include the following projects:

- Bonham Road widening (Bristol, Virginia)
- Blountville Highway/Highway 126/Highway 75 widening (Bristol, Tennessee/Sullivan County)
- Clear Creek Road/Old Airport Road intersection and bridge modifications (Bristol, Virginia)
- Cross-Bristol Thoroughfare alteration of existing roadways and new roadway construction, especially the US 421 corridor east of the railroad (Bristol, Tennessee)
- Exit 69 northbound off-ramp widening (Sullivan County)
- Highway 357 construction (Sullivan County)
- Interstate 81 enhancements (Washington County)
- Kings Mill Pike widening (Bristol, Virginia)
- Lee Highway widening and traffic signal projects, multiple sections (Bristol, Virginia/Washington County)
- Medical Park Boulevard widening and extension to Highway 126 (Bristol, Tennessee)
- Old Airport Road widening (Bristol, Virginia)
- Old Abingdon Highway narrow railroad underpass modification (Bristol, Virginia)
- West State Street lane reconfigurations along state line (Bristol, Tennessee/Bristol, Virginia)

**Intelligent Transportation Systems.** The implementation of Intelligent Transportation Systems (ITS) can be a strategic element in reducing congestion and incident management. ITS deployment refers to the use of advanced technologies to enhancement management and operation of transportation facilities. ITS program areas include many elements, some of which include surveillance equipment to monitor roadways for congestion and incidents; variable message signs that display traffic information to motorists, vehicle detection devices that report traffic counts, speed, and travel time, and motorist service patrols that respond to incidents in a timely manner.

A multi-jurisdictional task force developed and approved the Bristol Regional ITS Architecture and Deployment Plan in June 2008. This ITS plan covers all of Washington County, Virginia, Bristol, Virginia; and that portion of Sullivan County within the Bristol MPO study area (but not the area east of South Holston Lake). The jurisdictions within the Bristol MPO study area are stakeholders in this ITS plan, the bounds of which were designed to complement the operational ITS characteristics of both TDOT and VDOT’s pre-existing ITS operations. This ITS plan provides the guideline and structure for the
implementation and operation of ITS technology within the MPO study area, and defines the transportation needs, ITS solutions, agencies to be involved, and projects to be deployed.

This document supports the expansion of Interstate motorist service patrols into the Tri-Cities, including the Bristol area. Such expansion of service has been endorsed by the various communities in the Tri-Cities area.

**Special Events.** One of the common features of community special events is the traffic congestion that is often caused by the double impact of additional traffic generated by the special event, and loss of roadway capacity to accommodate the traffic needs and parking demand of the special event. In the Bristol study area, there are many special events; some are annual, while others recur on a different schedule or are one-time events. The most prominent of these events are the annual Rhythm and Roots Reunion music festival in downtown Bristol and the semi-annual visits by NASCAR to Bristol Motor Speedway.

For special events in downtown Bristol, congestion impacts the roadways to a localized level in the downtown Bristol area, characterized by the closure of State Street and adjacent side streets downtown. The impacts on other nearby roadways because of added traffic demand and additional areas used for parking are the primary congestion issues for downtown events.

For the NASCAR visits to Bristol Motor Speedway, the impacts to the roadway and transit systems are much larger. The Multi-Agency Command Center (MACC) activated for Race Weekends, as well as the VDOT Bristol District temporary race traffic command center and the permanent regional Traffic Operations Centers (TOCs) in Knoxville and Roanoke, serve to operate the roadway systems impacted by race traffic. During Race Weekend periods, traffic volumes on roadways utilized for race traffic can reach up to 700,000 vehicles. This results in some short-term congestion issues as well as temporary countermeasures to accommodate the flows, which include, but are not limited to, the following techniques:

- Manual coordination of traffic signals through multiple jurisdictions
- Contraflow lanes (lane direction reassignment)
- Temporary median opening closures to eliminate left turns, U-turns, and remove intersection conflict points
- Interstate lane closures for merging traffic control
- Interchange ramp closure and left-turn prohibitions
- Special event-related messages on variable message boards, both overhead permanent and trailer-mounted temporary units
- Additional transit operations, both public and private

Until the reconstruction of Highway 11E adjacent to Bristol Motor Speedway as a multifaceted enhancement project (discussed in the pedestrian section of this document) that was completed in 2008, no public roadway projects had been constructed with the primary purpose of alleviating problems associated with race traffic. Nonetheless, since
traffic generated for such events at Bristol Motor Speedway are not everyday flows, the traffic analysis behind the development of the high-LOS locations did not include traffic generated by such events.
CHAPTER 6: MULTI-MODAL TRANSPORTATION SYSTEM

The Bristol regional study area lies astride the Tennessee/Virginia state line on both sides of one of the United States’ major roadways, Interstate 81. It is located near the headwaters of the Tennessee River system, above the head of navigation of that waterway. As such, it is not accessible to waterborne transportation systems. Both Bristols and Sullivan County, along with several other jurisdictions, are part owners of the Tri-Cities Regional Airport, located just outside of the study area to the southwest in a centrally located site between the urbanized areas of Bristol, Kingsport, and Johnson City. The study area is also located astride a major natural gas pipeline that runs from Texas to Pennsylvania roughly parallel to Interstate 81, and one of the major Class I railroad main lines (Norfolk Southern Railway) in the United States. Transit and paratransit services are provided by several public agencies in the Bristol area. There is also a system of greenways and bicycle/pedestrian routes in the Bristol area, providing the study area with a variety of mode choices for some trips.

This chapter will discuss the existing transportation system for the various modes as well as specific projects proposed, in various timeframes, within the Bristol planning area boundary.

PART A: STREETS AND HIGHWAYS ELEMENT

EXISTING CONDITIONS

Like all urbanized areas in the United States, the roadway system in the Bristol area follows a hierarchy of functionality, based on an inverse relationship between accessibility and through traffic flow. At the top of the hierarchy are Interstate roadways, of which there are two in the Bristol area (Interstate 81 as a through route and Interstate 381 in Bristol, Virginia, as a spur route). Two more Interstate through routes intersect Interstate 81 west (Interstate 26) and east (Interstate 77) of the Bristol study area. Arterials primarily move through traffic, with limited or no access available to adjacent pieces of property. Below arterials are collector roadways, which serve an intermediate function of collecting trips to and from the arterials and distributing them among the local streets. At the bottom of the public roadway hierarchy are the local streets, whose primary purpose are to allow access to adjacent properties and upon which through traffic is discouraged. As one moves up the hierarchy from local to collector to arterial to Interstate, speeds generally increase and access to adjacent properties decrease.

There are different classification systems for the roadways in the Bristol study area for different purposes. The federal and state governments classify and identify certain roadways as Interstate routes, Federal (or U.S.) routes, and state routes. In Virginia, since there are no county roads per se, there is also a breakdown of state routes into primary (route numbers less than 600) and secondary (route numbers 600 and above) routes. The Bristol MPO maintains a functional classification system for the purposes of identifying
eligibility for funding for different purposes and from different sources. Local planning commissions, on the other hand, also maintain classification systems as a requirement to determine the need for future right-of-way reservation as land is developed, often in conjunction with local land use or comprehensive plans. It is not unheard of for a roadway to be classified in one class under one system and another class for another system.

Map 6-1 illustrates the Interstate, Federal, and (primary) state routes in the Bristol study area in 2010. A list of Interstate, Federal, and (primary) state routes is provided in Appendix B. It is worth noting on the Tennessee side of the study area that all federal routes are also assigned a concurrent state route number, but the converse is not necessarily true. In several cases, older alignments of federal routes live on as state routes after the federal route was realigned; State Route 126 (as a former US 11W) and State Route 435 (as a former US 421) are cases in point. It is also interesting to note that some of the westbound lanes of Tennessee State Route 1 actually lie in Bristol, Virginia. All of federal and state routes are modeled in the Bristol network.

All of the federal routes and state routes are available to both cars and trucks, except for the portion of US 11/19 along eastern Euclid Avenue in Bristol, Virginia, upon which trucks are not permitted. The Truck US 11/19 route in Bristol, Virginia, allows for trucks to continue along US 11 and 19 without traveling on this portion of Euclid Avenue.

As with most communities, the roadway network for both Bristols continued to grow as the cities grew. Part of that growth is the replacement of formerly major routes with upgraded (and in some cases realigned) facilities, and the older routes move down the hierarchy of streets. The best example of this is Interstate 81, which superceded the former major north/south routes in Bristol (US 11, US 11E, and US 11W); they, in turn, superceded Island Road—the first major wagon road in the State of Tennessee.

Other roadways were initially constructed as industrial access routes. Examples of this phenomenon are Exide Drive, Raytheon Road, and Industrial Drive on the Tennessee side. In Virginia, Linden Drive was built as a facilitator for commercial development, as was the realignment of Clear Creek Road just north of Lee Highway.

The Bristol 2010 roadway network is illustrated on Map 6-2 and a list of thoroughfares for the *Bristol Urban Area Long Range Transportation Plan Year 2035* is provided in Appendix C. The 2010 network contains just over 1,000 lane-miles of roadway.

**Traffic Signals.** As of December 2010, there are a total of 104 traffic signals in the Bristol study area. Of these, 47 are operated by the City of Bristol, Tennessee (through Bristol Tennessee Essential Services), 36 (with two more under construction) by the City of Bristol, Virginia (through Bristol Virginia Utilities), twelve by the Virginia Department of Transportation (at Exits 5 and 7 and along Lee Highway in Washington County), four by Bluff City, and five by Sullivan County.
BRISTOL STUDY AREA LONG-RANGE TRANSPORTATION PLAN
2010 NETWORK MAP

Map 6-2
Of these 104 traffic signals, there are eleven systems comprised of 32 traffic signals of either physically interconnected or time-based coordinated traffic signals, as listed below. All of the traffic signals in place have at least two of their approaches on roadways modeled in the long-range transportation plan network, except for the traffic signal at East Mary Street and Norfolk Avenue in Bristol, Virginia.

Traffic signal locations within the study area are identified on Map 6-3.

**Coordinated Traffic Signals**

**Bristol, Virginia**
- Commonwealth Avenue (at Keys Street, Spurgeon Lane, and Glenway Avenue)
- Gate City Highway (at Osborne Street, Catherine Street, and Midway Street)
- Lee Highway (at Bonham Road, Lee Highway shopping center entrance, Clear Creek Road/Old Airport Road, and Clear Creek Road shopping center entrance)

**Bristol, Tennessee**
- Northern Volunteer Parkway (at Broad Street/Anderson Street, Anderson Street [southern intersection], Windsor Avenue, and Hill Street/Holston Avenue)
- Central Volunteer Parkway (at Godsey Road [northern intersection] and Kennedy Road)
- West State Street (at Carson Lane, Euclid Avenue/Gate City Highway, and 24th Street)
- Highway 394 (at Blountville Boulevard and Feathers Chapel Road [western intersection])
- Highway 394 (at Highway 11E western ramps, Highway 11E eastern ramps, and Highway 390)

**Sullivan County**
- Highway 394 in Blountville (at Highway 126 and Franklin Drive)

**Washington County (by Virginia Department of Transportation)**
- Lee Highway (at Exit 5 northbound off-ramp, Exit 5 southbound off-ramp, Old Abingdon Highway, and Island Road [the latter being operated by the City of Bristol, Virginia but coordinated with VDOT’s Exit 5 traffic signals])
- Old Airport Road (at Exit 7 northbound and southbound off-ramps)

The two Bristols long ago developed a protocol for the operation of traffic signals along the West State Street/State Street/East State Street corridor that spans across the state line. The two cities agreed that each city will operate certain signalized intersections in their entirety, so that Bristol, Virginia, is maintaining traffic signal equipment at a particular intersection on both sides of the state line, and likewise for Bristol, Tennessee, at other locations. Although this agreement functions well for the provision of municipal services and maintenance, this has been an issue along the state line corridor to interconnect signals powered by different utility systems.
The cross street list below illustrates which city operates which traffic signal along this corridor (listed west to east).

- Euclid Avenue/Gate City Highway (*Tennessee*)
- 24th Street (*Tennessee*)
- Peters Street/17th Street (*Virginia*)
- Douglas Street/13th Street (*Virginia*)
- Bob Morrison Boulevard (*Virginia*)
- Commonwealth Avenue/Volunteer Parkway (*Virginia*)
- Piedmont Avenue/7th Street (*Virginia*)
- 6th Street/Moore Street (*Tennessee*)
- Martin Luther King, Jr. Boulevard (*Tennessee*)
- Pennsylvania Avenue/Goodson Street (*Tennessee*)

Different jurisdictions have, in the recent past, followed a program of examining their traffic signals to determine if any of them can be removed. Since 1985, Bristol, Virginia, has removed six traffic signals from service (two temporarily); Bristol, Tennessee, has removed eight traffic signals from service, and the Town of Bluff City has removed one, for a total of thirteen traffic signals permanently removed from service.

**Interstate 81 Corridor Improvement Studies.** For several years, the Virginia Department of Transportation has been studying improvements along the I-81 corridor in Virginia to address existing and future transportation deficiencies on the interstate facility. The Tier 1 Environmental Impact Statement was completed in 2005, which identified current and future transportation problems and evaluated dozens of possible solutions involving road improvements, rail improvements, truck separation, tolling and many combinations. The Commonwealth Transportation Board (CTB) has approved the immediate need for safety and operational improvements along I-81, apart from possible long-term expansion. VDOT has been in the process of implementing short-term spot safety improvements including building dedicated truck climbing lanes and extending ramps at interchanges. Currently, no major initiatives are programmed for the I-81 corridor.

Both the Tennessee Department of Transportation and Virginia Department of Rail and Public Transportation have conducted multi-state freight rail studies to help determine the level of rail improvements that would be needed to divert a maximum amount of truck traffic from I-81. No decisions have been made on specific improvements as of this writing.

The Tennessee Department of Transportation completed the *I-40/I-81 Corridor Feasibility Study* for Tennessee in 2008. The interstate corridor from Bristol to Memphis was identified in the statewide planning effort for the *Tennessee 25-Year Long Range Transportation Plan* as a strategic transportation corridor and several projects along the corridor are included in the 10-Year Plan as a high priority. The study identified improvement solutions to a variety of transportation issues and compiled a list of recommended projects that can be considered by TDOT for funding. Projects encompass capacity, roadway operations and maintenance, safety, freight movement, inter-modal...
connections, and economic access opportunities along the interstate corridor. For the MPO study area, one such project is programmed: the widening of the northbound Exit 69 off-ramp to Highway 394.

PROGRAMMED AND PLANNED PROJECTS

The projects proposed for the *Bristol Urban Area Long Range Transportation Plan 2035* are from a variety of sources and address a variety of needs, from roadways with inadequate volume/capacity ratios to local governmental visions of roadway networks to consultant studies looking at the interaction of land use and transportation to safety and maintenance issues. Some of these projects are “carry-overs” from previous long-range plans. Some projects in previous long-range plans have not been carried forward, as the needs for those projects have been alleviated by other transportation network modifications or changes in land use. Proposed projects are illustrated on Map 6-4, followed by detailed project descriptions.

**Project Selection.** It is important to understand that transportation projects originate with the development of the long range transportation plan and the Transportation Improvement Program serves as a management tool to accomplish the objectives of the adopted *Bristol Urban Area Long Range Transportation Plan Year 2035*. Projects that are identified in the current three-year Transportation Improvement Program have priority. The long-range transportation plan sets selection criteria for transportation projects to be included into the plan by evaluating projects based on whether they meet the goals and objectives of the plan. Those goals and objectives include system efficiency, economic development, environment, mobility, security, and safety (see Appendix D to view how each project compared to these goals).

In addition to these goals, local priorities for projects are also based on future land use and comprehensive plan implications and network connectivity. Project priorities are established by local governmental jurisdictions in cooperation with the two Departments of Transportation and the MPO. The MPO is responsible for evaluating proposed projects for inclusion in the long-range transportation plan. The MPO Technical Staff makes a recommendation to the MPO Executive Board, which approves projects to be placed into the plan. When projects are moved into the Transportation Improvement Program, they come from the long-range plan and go through additional selection criteria.

**Financial Constraint.** Federal planning regulations require the *Bristol Urban Area Long Range Transportation Plan 2035* to be fiscally constrained. The fiscal constraint requirement is intended to ensure that metropolitan long-range transportation plans reflect realistic assumptions about future revenues, rather than merely being lists that include many more projects than could realistically be completed with available revenues. Unfortunately, all project needs identified in the *Bristol Urban Area Long-Range Transportation Plan 2035* cannot be funded based on the current revenue projections,
Table 6-1: Selection Criteria

<table>
<thead>
<tr>
<th>System Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improves Traffic Operations</td>
</tr>
<tr>
<td>Improves Access to Major Highways</td>
</tr>
<tr>
<td>Improves Freight Movement</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Economic Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improves Access to Commercial and Industrial Areas</td>
</tr>
<tr>
<td>Increases Accessibility Options for Freight</td>
</tr>
<tr>
<td>Promotes Revitalization and Infill Development</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contributes to Maintaining or Improving Air Quality</td>
</tr>
<tr>
<td>Reduces Greenhouse Gas Emissions</td>
</tr>
<tr>
<td>Improves Quality of Life/Promotes Livable Communities</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternate Transportation Mode</td>
</tr>
<tr>
<td>Access Management</td>
</tr>
<tr>
<td>Transit Capital Project</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>User Safety and Security</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addresses Safety/Functional Issues</td>
</tr>
<tr>
<td>Improves Security of the Transportation System</td>
</tr>
</tbody>
</table>

which are discussed in Chapter 8. As a result, the plan includes “regional projects,” which are regional in nature and require separate state-level funding above and beyond the typical annual allocations; and “illustrative projects”, which would be included in the adopted transportation plan if reasonable additional resources beyond those identified in the financial plan were available. Although regional and illustrative projects are not part of the fiscally constrained transportation plan, _per se_, the inclusion of a listing of such projects presents an opportunity for the MPO to identify additional projects for future consideration in the event that additional future funding sources were identified. Appendices D (Tennessee) and E (Virginia) identify additional details for these projects. For several of the “spot location” projects, Appendix H provides additional details as well.

**TENNESSEE ROADWAY PROJECTS: 2010-2020**

*Project T1-1: Interstate 81 Exit 69 Northbound Off-Ramp Widening (Sullivan County).* This project would widen the northbound Exit 69 off-ramp to Highway 394 from one lane to two lanes. This is especially important for vehicles traveling to Bristol Motor Speedway for NASCAR events, as this route is one of the primary routes for Tennessee traffic outside of the Tri-Cities to reach BMS. Analysis indicates that this project is needed for everyday flows outside of race traffic to alleviate congestion created by the future growth of traffic volumes.
**Project T1-2: East Cedar Street** (Bristol). To enhance East Cedar Street’s operation as a gateway to King College, this plan proposes improvements to East Cedar Street between 5th Street and King College Road. This will include the realignment of East Cedar Street between Georgia Avenue and Halverstadt Drive (an entrance roadway into the King College campus) to alleviate several sharp curves, and the modification of the intersection at Virginia Avenue (US 421-SR 34 LM 13.44±) with the installation of turn lanes, increased turning radii, and a modernized traffic signal. It is also proposed to install a northbound right-turn lane on 5th Street at East Cedar Street, increase the turning radii and modernize the traffic signal at this intersection as well. Sections of East Cedar Street east of Virginia Avenue are proposed to be reconstructed as a two-lane boulevard. In addition, the at-grade railroad crossing signal on East Cedar Street is proposed to be interconnected with the traffic signal at 5th Street and East Cedar Street. As a project of discontinuous segments, they can be phased in different combinations as operational and fiscal considerations require.

**Project T1-3: Highway 11E (US 11E/19/19W-SR 34 at SR 34 LM 5.20±) and Highway 19E (US 19E-SR 37 at LM 3.44±) Interchange Construction (Bluff City/Sullivan County).** This project calls for the replacement of the three-legged signalized intersection of Highway 11E and Highway 19E in Bluff City with a four-approach diamond interchange (the realigned Whitehead Road would form the fourth approach) to address operational and crash concerns at this intersection.

**TENNESSEE ROADWAY PROJECTS: 2021-2035**

**Project T2-1: Cross-Bristol Thoroughfare, eastern portion** (Bristol). This plan proposes the construction of a multi-lane cross-Bristol thoroughfare from Highway 421 just north of Highway 394 in southeastern Bristol to the intersection of West State Street and Medical Park Boulevard in northwestern Bristol. The opening of the Anderson Street bridge over the Norfolk Southern Railway in 2008 completes the center portion of such a thoroughfare, connecting Volunteer Parkway (SR 34 LM 16.81±/SR 1 LM 25.21±) to Pennsylvania Avenue (SR 34 LM 17.50±) with a multi-lane facility. The next section would be the eastern part from the end of the four-lane portion of Highway 421 just north of Highway 394 to the eastern end of the Anderson Street bridge at Pennsylvania Avenue. Such a thoroughfare could include the following phased components:

a. Widening of Highway 421 and Virginia Avenue northward from the end of the current four-lane roadway (US 421-SR 34 LM 19.92±), just north of its signalized intersection with Bristol Caverns Highway/Highway 394. This would take the form of a three-lane roadway cross-section with bicycle lanes.

b. A realignment of the “shift” that now transfers the state route from Virginia Avenue to Pennsylvania Avenue via Maple Street and two 90°
turns. This would involve a relocation of US 421 north of Lakeview Street (US 421-SR 34 LM 18.61±) along a new alignment that would tie into East Cedar Street at Pennsylvania Avenue. Design of such a roadway would have to account for the East Cedar Street railroad crossing as integral part of the design, with a possible new traffic signal at Pennsylvania Avenue and East Cedar Street. Another alternative “shift” location is in the vicinity of Chesnut Street so as to avoid interaction with the East Cedar Street railroad crossing. By keeping the “shift” south of Maple Street, this eliminates impacts on adjacent properties in the recently-designated Fairmount Historic District north of Maple Street. This could also be a three-lane cross-section with bicycle lanes.

c. Widening of Pennsylvania Avenue from the “shift” to Anderson Street (US 421-SR 34 LM 17.50±) to a three-lane section with bicycle lanes.

d. Relocate both the Highway 421 left-turn lanes at the Bristol Caverns Highway/Highway 394 intersection (US 421-SR 34 LM 20.04±; SR 394 LM 15.60±; SR 435 LM 0.00) to an offset configuration for improved sight distance and modify the traffic signal accordingly.

The Tennessee Department of Transportation recently completed a Transportation Planning Report (TPR) for this portion of the US 421 corridor, which identified several alternatives for lane configurations and the location of the “shift” to transfer between Pennsylvania Avenue and Virginia Avenue.

**Project T2-2: Medical Park Boulevard Extension, West State Street to Highway 126 (Bristol).** Medical Park Boulevard exists as a four-lane roadway from West State Street to the main hospital entrance and as a two-lane roadway (with sufficient right-of-way for four lanes) from the main hospital entrance to Meadow View Road. The 2001 long-range transportation plan called for the widening of Medical Park Boulevard from the main hospital entrance to Meadow View Road from two to four lanes, and extension southward to Highway 126 as a four-lane facility as a means to improve connectivity with Blountville and with Bluff City, Piney Flats, and southern Bristol via Carden Hollow. In 2009, a joint committee consisting of officials from Bristol, Sullivan County, and the hospital worked together to study several alternative routes for the portion between Meadow View Road and Highway 126 (State Route 126). In the end, a route was selected that is reflected in the project map. Such a project would consist of three parts. Part (a) is the widening of Medical Park Boulevard from the main hospital entrance to Meadow View Road from two lanes to four lanes, and the lengthening of the westbound West State Street left-turn lane to Medical Park Boulevard (SR 1 at LM 21.58±). Part (b) is the upgrading of a portion of Meadow View Road (two lanes to four lanes, vertical alignment modifications) from Medical Park Boulevard to point east of the Collingwood subdivision near Kinkead Drive. Part (c) is the construction of a new four-lane facility east of the Collingwood subdivision connecting Meadow View Road near Kinkead Drive to the intersection of Highway 126 at Steele Creek Drive (SR 126 at LM 22.17±) and the installation of turn lanes at the latter intersection on the existing approaches as
appropriate. All three parts would also include accommodation of bicycle facilities along its length, as this is identified in the Bristol’s bicycle plan as a future bicycle route to connect the hospital to Steele Creek Park.

TENNESSEE ROADWAY PROJECTS: ILLUSTRATIVE

- **Project TIL-1: Carden Hollow Road** (Sullivan County). This plan proposes a modification of Carden Hollow Road in both directions from Highway 126. To the north, it is proposed to extend Carden Hollow Road northward from Highway 126 (SR 126 at LM 19.39±) to Island Road as a two-lane facility, utilizing the existing two-lane Massengill Road overpass over Interstate 81, and construction of a new interchange on Interstate 81 (Exit 72). To the south, it is proposed to improve the alignment and add turn lanes at Carden Hollow Road and Highway 126, and at Carden Hollow Road and Bethel Drive. Again, the discontinuous nature of this project easily lends itself to implementation by phase.

- **Project TIL-2: Cross-Bristol Thoroughfare, western portion** (Bristol). This plan proposes the construction of a multi-lane cross-Bristol thoroughfare from Highway 421 just north of Highway 394 in southeastern Bristol to the intersection of West State Street and Medical Park Boulevard in northwestern Bristol. This project consists of the western portion, connecting Volunteer Parkway (US 11E-19/SR 34) to the extension of Medical Park Boulevard at Highway 126 (SR 126). Such a thoroughfare could include the following components:
  
a. West of Volunteer Parkway, the route would use a multi-lane Windsor Avenue route from Volunteer Parkway (SR 34 LM 16.63±) to its intersection with Anderson Street.
  
b. A widened Anderson Street facility from Windsor Avenue to a point where the roadway would shift north to Broad Street near Flint Street.
  
c. A widened Broad Street/Steele Creek Drive from near Flint Street to Highway 126 (SR 126 LM 22.17±).

North of Highway 126, the extended and widened portions of Medical Park Boulevard and Meadow View Road described as another project would serve as the western end of the Cross-Bristol Thoroughfare, ending at West State Street and Medical Park Boulevard (SR 1 LM 21.58±).

- **Project TIL-3: Edgemont Avenue/Bluff City Highway, Queen Street to Volunteer Parkway** (Bristol). This plan identifies the continuation to the previous project of converting Martin Luther King Jr. Boulevard and Edgemont Avenue from a two-lane boulevard with on-street parking to a four-lane boulevard without on-street parking, from the end of the last project in the early 1990s at Queen Street southward to Bluff City Highway. It also calls for the widening of Bluff City Highway from Edgemont Avenue to Volunteer Parkway (SR 34 LM 13.60±) to a three-lane facility with improved shoulders and intersection modifications.

---

1 This project will require an Interchange Justification Study.
(realignments) at Southside Avenue and Lavinder Lane. Logical break points for phasing include the Bluff City Highway intersections at Edgemont Avenue, Lavinder Lane, and Raytheon Road/Craig Drive.

- **Project TIL-4: King College Road** *(Bristol).* The plan identifies spot modifications along King College Road to add turn lanes at Old Jonesboro Road, Holston View School, Trammel Road, and East Cedar Street. Included as well are safety widening of the Sinking Creek bridge and two culverts that carry King College Road over tributaries of Sinking Creek (one west of Kingsbridge and one south of Reserve Boulevard). Like Old Jonesboro Road, another facet of this project would be shoulder widening of King College Road from Tadlock Road to Trammel Road to accommodate an extension of the bicycle route system to eastern Bristol. Like other projects described above, the discontinuous nature of this project lends itself to different combinations of phasing for operational and fiscal considerations.

- **Project TIL-5: Meadow View Road** *(Bristol).* Vertical and horizontal alignment modifications of Meadow View Road between Medical Park Boulevard (at its new eastern intersection) and Highway 126 (SR 126 at LM 22.52±) are proposed to improve sight distance and vehicle operations. The portion from Medical Park Boulevard to a point east of the Collingwood subdivision would also function as an extension of Medical Park Boulevard discussed as a separate project elsewhere in this list. This also includes the construction of a new four-lane connector between Meadow View Road and West State Street (in the vicinity of SR 1 LM 22.40±) east of Watson’s Ridge near the natural gas pumping station.

- **Project TIL-6: Old Jonesboro Road** *(Bristol/Sullivan County).* The project calls for geometric modifications at specific locations along Old Jonesboro Road from Bristol Caverns Highway (SR 435) to Kilcoote Way. Vertical modifications also desired at the Carolina Avenue intersection. The addition of left-turn lanes are proposed at Trammel Road, Paperville Road, King College Road, Valley Pike Road, Carolina Avenue, and Bristol Caverns Highway. The section between Valley Pike Road and Carolina Avenue needs widening to provide additional two-lane width, and modifications to intersections to promote Old Jonesboro Road as the through movement. Like the median modification projects described above, the isolated discontinuous nature of this project lends itself to being broken into various sections. A separate facet of the project is shoulder widening in Bristol between Trammel Road and Kilcoote Way for the accommodation of bicycle lanes in accordance with existing bicycle route plans. Modifications at King College Road, Trammel Road, part of the Paperville Road area, and the shoulder widening facet are currently within the corporate limits of Bristol.

- **Project TIL-7: Volunteer Parkway/Highway 11E Median Modifications** *(US 11E-19/State Route 34, between LM 6.12± and 15.84± in Bristol).* This project involves installation of left turn lanes at selected median opening locations along Volunteer Parkway and Highway 11E from West Cedar Street to River Road.
Not every median along this portion of Volunteer Parkway/Highway 11E is included in this project; some median openings already have left-turn lanes, while others have little or no demand for left turns or U-turns because of the relationship between the median opening locations, driveway locations, topography, the proximity of Beaver Creek, and adjacent land uses. This project also includes modifications of side street approaches with median modifications at Avoca Road/Phillipswood Drive, Blue Bonnet Drive/Main Street, and consolidation of median openings north and south of Hilltop Street into a single median opening at Hilltop Street. Because this is a project consisting of work at a series of isolated locations, rather than a continuous work zone, this project lends itself to being broken into myriad combinations of small sections for dealing with fiscal and operational constraints.

**Project TIL-8: Weaver Pike.** Volunteer Parkway to Partnership Park Road (State Route 358 between LM 6.28± and LM 9.45± in Bristol). This plan promotes a more limited approach to the wide-sweeping five-lane realigned roadway called for in previous long-range transportation plans. Instead, this plan calls for limited modifications at spot locations. These spot modifications include intersection modifications at Volunteer Parkway, Stonecroft Road/Stine Street, 5th Street, Cedar Valley Road, Industrial Drive, Bellebrook Road/Industrial Boulevard, and Partnership Park Road in the form of adding left-turn lanes with curvature realignments and earthwork as required for proper intersection operation and sight distance. At the Volunteer Parkway intersection, this could include additional left-turn and right-turn lanes, which in turn could require the widening of the Beaver Creek bridge, for enhanced intersectional operations. At the Vance Tank Road intersection, the proximity of the Weaver Pike railroad overpass precludes the installation of left-turn lanes on Weaver Pike and sight distance without replacement of the railroad bridge. Instead, it is proposed to relocate the Vance Tank Road intersection approximately 400 feet north of the railroad bridge and reconstruct it with left-turn lanes. This project also calls for the addition of shoulders from the Bellebrook Road/Industrial Boulevard intersection to Industrial Drive for bicycle lanes. Finally, this project would include modification of certain bridges (over Cedar Creek, Hogtown Creek, and Beeler Branch) for proper bridge and rail approach treatments. Like other projects described above, the discontinuous nature of this project lends itself to different combinations of phasing for operational and fiscal considerations.

**Project TIL-9: West State Street/Highway 11W Median Modifications (US 11W/State Route I, between LM 20.87± and 23.69± in Bristol).** This project involves the installation (or lengthening at Medical Park Boulevard) of left turn lanes at selected median opening locations on West State Street from Sycamore Street to Interstate 81, and on Highway 11W at its intersection with Holiday Drive/Island Road. As along Volunteer Parkway and Highway 11E, not every median opening requires modification as part of this project. Because this is a project consisting of work at a series of isolated locations, rather than a
continuous work zone, this project lends itself to being broken into myriad combinations of small sections for dealing with fiscal and operational constraints.

- **Project TIL-10: West State Street and Memorial Drive/K-Mart Drive Intersection Modifications** (US 11W/State Route 1 at SR 1 LM 23.62± in Bristol). This project calls for the reconstruction of this signalized intersection to allow northbound K-Mart Drive left turns and through movements, with traffic signal upgrades as appropriate.

### TENNESSEE ROADWAY PROJECTS: REGIONAL

- **Project TR-1: Blountville Highway/Highway 126. Neal Drive to Highway 75 (SR 126 from LM 15.4± to LM 23.0±); Highway 75. Highway 126 to western cordon line (SR 75 from LM 6.7± to LM 9.2±) (Bristol/Sullivan County).** This project involves the widening of this corridor from the current end of multi-lane roadway on Blountville Highway at Neal Drive (just southwest of its intersection with West State Street), to the intersection of Highway 126 and Highway 75 in Blountville, and then along Highway 75 to the western cordon line near Adams Chapel Road. This project would then extend beyond the Bristol study area into the Kingsport and Johnson City study areas, eventually linking up with the multi-lane portion of Highway 75 at its intersection with State Route 36 in Washington County. This would also involve the widening of several bridges along the route as well as reconfiguration of major intersections in Blountville. It should also include a reconfiguration of the intersections at Walnut Hill Road and Paramount Drive from two three-leg intersections separated by a narrow bridge to a single four-leg intersection. Analysis indicates that widening of Highway 75 is required even if SR 357 is constructed. Logical break points for widening of this roadway into phases for construction along Highway 126 include Collingwood Drive (SR 26 LM 12.77±); Walnut Hill Road (SR 125 LM 20.62±), Carden Hollow Road (SR 126 LM 19.44±), Bethel Drive (SR 126 LM 18.22±), Blountville Boulevard/Blountville Bypass (SR 126 LM 16.30±), Highway 394 (SR 126 LM 15.84±), and Highway 75 (SR 126 LM 15.40±, SR 75 LM 9.1±). Along Highway 75, logical break points for widening phases include Highway 126 (SR 126 LM 15.40±, SR 75 LM 9.1±), Muddy Creek Road [northern intersection] (SR 75 LM 7.8±), and the Booher Creek bridge at the cordon line separating the Bristol and Kingsport study areas (SR 75 LM 6.7±).

- **Project TR-2: State Route 357 Extension Eastward from Tri-Cities Airport to Highway 11E (US 11E/19/19W-SR 34 at SR 34 LM 5.20±). (Bluff City/Sullivan County).** This project involves the extension of SR 357 eastward from Tri-Cities Airport (the western terminus of this project is in the Kingsport MPO study area) to the intersection of Highway 11E and Highway 19E in Bluff City (proposed for modification to an interchange as discussed above).

This project utilized the Context Sensitive Solution (CSS) program for project development, which involved a citizen/official committee to distill a “best-fit”
route selection short list. As of this writing, TDOT has approved the interchange construction at Highway 11E and Highway 19E as part of this process, but has not made a decision on the balance of the alignment or project implementation.

**VIRGINIA ROADWAY PROJECTS: 2010-2020**

- **Project V1-1: Lee Highway, Alexis Drive to Ole Dominion Road; Clear Creek Road/Old Airport Road, north and south of Lee Highway and Interstate 81 (Bristol/Washington County).** This project would take the series of isolated traffic signals along Lee Highway (US 11-19) from Alexis Drive in Bristol to Ole Dominion Road in Washington County, and the traffic signals at Clear Creek Road and the shopping center entrance as well as the two traffic signals at Old Airport Road and the Exit 7 interchange, and connect them into a single coordinated traffic signal system. As of December 2010, there are currently ten traffic signals in this area in Bristol and three in Washington County.

- **Project V1-2: Old Airport Road, Lee Highway to Stagecoach Road; Interstate 81 Ramps at Exit 7 (Bristol).** This project would consist of the following components to help alleviate congestion in this area that has developed as a result of recent commercial growth in the area:
  
  a. Widen Old Airport Road from Lee Highway to the southbound Exit 7 ramp intersection to allow for a future physical median as a separate project; in addition, widen the Old Airport Road bridge over Beaver Creek to add a southbound right-turn lane from Linden Drive to the southbound Interstate 81 on-ramp. This would allow the existing southbound right-turn lane to be converted into a through lane. The Linden Drive intersection would be reconfigured to physically block left turns from eastbound Linden Drive to northbound Old Airport Road.
  
  b. Add roadway width to accommodate an additional lane on Old Airport Road under the Interstate 81 overpass between the two ramp intersections, so that there are two northbound through lanes, two southbound through lanes, and a left-turn lane in each direction for the entire length between the two ramp intersections.
  
  c. Add a right-turn lane on northbound Old Airport Road at the northbound Interstate 81 on-ramp intersection, lengthening the culvert north of Stagecoach Road as appropriate.
  
  d. Add a second left-turn lane on the northbound Interstate 81 off-ramp.
  
  e. Revise the traffic signals to accommodate the new traffic configurations.

- **Project V1-3: Providence Road Relocation (Route 611) (Washington County).** Relocation of a portion of Providence Road from Lee Highway to a point south of Repass Street is proposed in order to make room for an extension of a runway at Virginia Highlands Airport, which is located immediately east of Providence Road. This relocation would remove the portion connecting to Lee Highway.
adjacent to Exit 13, and move the roadway to connect to Lee Highway at Westinghouse Road.

- **Project V1-4: Spring Creek Road** (Route 611) from Lee Highway (US 11-19) to Old Jonesboro Road (Route 647) (Washington County). This project would replace the existing two-lane facility with its weight-posted narrow bridge over Spring Creek and replace it with a new two-lane facility with an improved alignment, widening shoulders and a new bridge.

**Virginia Roadway Projects: 2021-2035**

- **Project V2-1: Lee Highway, Kerin Drive to North Corporate Limits** (US 11-19, Bristol/Washington County). This project would extend the multi-lane portions of Lee Highway from near Kerin Drive to the northern corporate limits north of Clear Creek Road/Old Airport Road. This project involves widening of this roadway to four through lanes with additional lanes at intersections, as appropriate; some short sections may have to be accommodated with a center two-way left-turn lane cross-section. This would also include reconfiguration of the signalized intersections; and the design would need to incorporate future needs of Project V1L-6, as appropriate, that is discussed elsewhere in this document. This project could also include an extension of Bonham Road and/or Travelite Drive northward (while remaining south of the railroad tracks) to connect to the large shopping center area east of the Walnut Hill Cemetery near its northern edge. Bridge work (replacement and/or widening) integral to this project include the Lee Highway bridge over Goose Creek and the Bonham Road bridge over Beaver Creek that is immediately adjacent to Lee Highway; the latter bridge should be widened to at least six lanes for proper intersectional operation. For project phasing, a logical break point is the existing four-lane divided short section beneath the Norfolk Southern Railway overpass east of Alexis Drive.

**Virginia Roadway Projects: Illustrative**

- **Project VIL-1: Bonham Road**, Old Airport Road to Lee Highway (US 11-19) (Bristol). This plan proposes the widening of Bonham Road between Lee Highway and Interstate 81 from its current three-lane configuration to five lanes (including the widening/replacement of the bridge over Beaver Creek at Lee Highway, which will require six lanes, minimum, to accommodate the operational needs of this intersection). It also calls for replacing the two-lane roadway between Interstate 81 and the northern intersection with Old Airport Road with a four-lane facility and turn lanes as appropriate. Thus, Interstate 81 is a logical break point to divide this project into phases.

- **Project VIL-2: East Valley Drive**, Lee Highway (US 11-19) to Kings Mill Pike (Bristol). This project involves widening of East Valley Drive from Lee Highway (US 11-19) to Kings Mill Pike from its current two lanes to four lanes, which would also include replacement of the underheight railroad overpass that currently
impacts truck traffic to nearby industrial and commercial sites, as well as widening the bridge over Beaver Creek. For a multi-phase project, the logical break point would be the Old Abingdon Highway/Texas Avenue intersection.

- **Project VIL-3: Kings Mill Pike, East Valley Drive to Bristol Eastern Corporate Limits (Bristol).** The widening and horizontal alignment modifications of Kings Mill Pike from East Valley Drive to the eastern corporate limits of Bristol is proposed as a four- or five-lane section, varying as appropriate by location, to enhance the recent widening of Kings Mill Pike at its signalized intersection with Old Airport Road/Pendergrass Road. The Old Airport Road/Pendergrass Road intersection is also a logical break point for splitting this project into multiple phases.

- **Project VIL-4: Kings Mill Pike/Old Jonesboro Road (Route 647), Bristol Corporate Limits to cordon line east (Washington County).** This project involves widening the roadway (while remaining a two-lane facility) with horizontal and vertical curve modifications, bridge upgrades, and left-turn lane installations at Sinking Springs Road (Route 648), Junction Drive (Route 649), High Point Road (Route 649), Mock Knob Road (Route 666), Halls Bottom Road (Route 808), and Spring Creek Road (Route 611). For multiple phases, any of these proposed left-turn lane installation locations could serve as a break point.

- **Project VIL-5: Lee Highway (US 11-19), Euclid Avenue (US 11-19) to Overhill Road/Wendover Road (Bristol).** This project includes widening of this portion of Lee Highway to five lanes, including intersection improvements, as an extension of the existing five-lane portion north of Overhill Road/Wendover Drive. This could be done as a two-phase project split at the East Valley Drive/West Valley Drive intersection.

- **Project VIL-6: Lee Highway, Linden Drive, and Old Airport Road Roadway Reconfiguration (Bristol).** This project is a continuation of the Old Airport Road project discussed in the 2010-2020 section above. In this project, a median is installed on Old Airport Road between Interstate 81 at Exit 7 and Lee Highway to prevent left turns. This, in turn, requires a new connection for traffic from Interstate 81 to Linden Drive via Lee Highway west of the Clear Creek Road/Old Airport Road intersection, and alternative access treatments for the various adjacent businesses that are oriented towards passing traffic in general and Interstate 81 traffic in particular.

- **Project VIL-7: Old Abingdon Highway Underpass Widening (Bristol).** The Norfolk Southern Railway bridge over Old Abingdon Highway currently has a side-to-side clearance of 20 feet zero inches, but its curving northern approach requires that this section operate as a one-lane underpass, with traffic in both directions yielding to oncoming traffic already passing through. This creates several issues, not the least of which is its use as the truck route serving two large industrial plants and a landfill just south of this facility (neither of which can be
served from the other direction by large trucks, because the East Valley Drive underpass has insufficient vertical clearance for standard tractor-trailers). This project would widen the Old Abingdon Highway underpass to allow tractor-trailers to pass freely without the one-lane operation constriction. This could take the form of either lengthening the existing railroad bridge, or diverting the southbound Old Abingdon Highway lane to pass under the railroad at its bridge over Beaver Creek just south of the existing Old Abingdon Highway structure.

- **Project VIL-8: Old Airport Road, Kings Mill Pike to Bonham Road, southern intersection (Bristol).** This project is a logical extension of the widening of Old Airport Road north of this location that is already complete; this project would replace the existing two-lane section with a roadway with four through lanes (and either turn lanes as appropriate at intersections or a center two-way left-turn lane). In combination with the Kings Mill Pike, East Valley Drive, and southwestern Lee Highway projects, this would create a multi-lane “ring road” facility in northeastern Bristol.

**VIRGINIA ROADWAY PROJECTS: REGIONAL**

- **Project VR-1: Gate City Highway (US 58/US 421) Modifications, western cordon line to Exit 1 (Washington County).** The replacement of the existing US 58 roadway between Weber City (in Scott County, Virginia, in the Kingsport study area) and Exit 1 with a multi-lane facility is proposed as part of the larger statewide initiative to provide a multi-lane continuous US 58 facility from Cumberland Gap to the Atlantic Ocean. The portion in the Bristol study area would extend from the Scott County line to the Miller Hill Road intersection immediately north of the recently reconstructed Exit 1 interchange of Interstate 81. A major challenge for this new roadway design is the crossing of Walker Mountain between the Reedy Creek Road (Route 633) and Rich Valley Road (Route 700) intersections. Logical break points for phasing the work would be near the two Reedy Creek Road intersections (Route 633) and at Rich Valley Road (Route 700).

- **Project VR-2: Interstate 81 Exit 11 and Connector to the Bristol-Washington County Industrial Park (Washington County).** The construction of a new interchange (Exit 11) of Interstate 81 and a new four-lane connector roadway between it and the Bristol-Washington County Industrial Park is proposed. This could also serve in the future as the western leg of a proposed Abingdon bypass between Interstate 81 and Porterfield Highway heading towards Russell County. Such a roadway would include an intersection, perhaps signalized, at Lee Highway (US 11-19) just north of Interstate 81.

- **Project VR-3: Interstate 81 Modifications from LM 8.3± to cordon line east (Washington County).** This project would involve modifications to Interstate 81 from the northern end of the current six-lane section at LM 8.3± to the eastern cordon line just east of Exit 13 and beyond in accordance with findings from
studies undertaken and decisions made by the legislature of the Commonwealth of Virginia.

- **Project VR-4: Lee Highway**, Bristol North Corporate Limits to Majestic Drive (F-310) (US 11-19) (Washington County). This project includes widening of Lee Highway from the Bristol corporate limits north of the Clear Creek Road/Old Airport Road intersection to Majestic Drive in Washington County to a four-lane divided highway cross-section, with additional lanes as required at selected intersections and bicycle facilities.

- **Project VR-5: Lee Highway** (US 11-19), Majestic Drive (F-310) to cordon line east (Washington County). This project would continue the widening of Lee Highway to a four-lane cross-section with turn lanes at intersections and bicycle facilities from Majestic Drive (the access roadway at Exit 10) to the eastern cordon line just east of Spring Creek Road (Route 611, the access roadway to Exit 13). Depending on the timing of the projects, design of this project should also accommodate the future Exit 11 project described above.

**TENNESSEE-VIRGINIA ROADWAY PROJECTS: 2010-2020**

- **Project S1-1: West State Street** (TN SR 1), 24th Street (Tennessee State Route 1 LM 24.06±) to Volunteer Parkway (Tennessee State Route 1 LM 25.10±)/Commonwealth Avenue (US 11E-19/Virginia State Route 381) (Bristol, Tennessee and Bristol, Virginia). This project proposes removal of some on-street parking on this portion of West State Street to allow for the operation of a three-lane undivided facility without the construction of additional pavement width. This roadway could also be configured to only allow additional left-turn lanes at the intersections as circumstances permit. The installation of dual left-turn lanes from northbound Volunteer Parkway (US 11E/19-SR 1 at Tennessee State Route 1 LM 25.17±) to westbound West State Street (Tennessee SR 1) is also proposed, but can be installed as a separate project to also include lane configuration modifications on the approaches of this intersection for operational efficiency. Should the latter be installed first, it is proposed that it be accompanied by a two-lane westbound configuration of West State Street all the way to Bob Morrison Boulevard (Tennessee State Route 1 at LM 25.00±) to allow the second westbound through lane to be configured as a right-turn lane drop.

**TENNESSEE-VIRGINIA ROADWAY PROJECTS: REGIONAL**

- **Project SR-1: “Bristol Beltway”** (Sullivan County/Washington County) Since the 1960s, various alignments have been proposed for extending Tennessee State Route 394, popularly known as the “Bristol Beltway,” eastward into Virginia to intersect with Interstate 81 northeast of Exit 7. As time goes on and the urbanized area continues to expand, proposed alignments have moved further and further from the central city area. This plan identifies that goal with three projects that provide improvements to existing roadways.


c. Widening of Green Spring Road in Washington County, Virginia (Virginia State Route 75) from the Virginia/Tennessee state line to northern cordon line of the study area near the Spring Creek bridge (about one mile north of the state line); the route would ultimately extend to Interstate Exit 17 in Abingdon outside of the Bristol study area.

This proposed project would utilize the existing four-lane portion of Highway 421 between the two Bristol Caverns Highway intersections (US 421/SR 34 from SR LM 20.04± to LM 24.69±) to function as part of the “Bristol Beltway,” which extends on Highway 394 (Tennessee State Route 394) westward from Highway 421 back to Interstate 81 at Tennessee Exit 69.
PART B: PUBLIC TRANSPORTATION ELEMENT

EXISTING CONDITIONS

As the years pass the need for transit services will continue. The elderly, children, people with disabilities, and the economically disadvantaged should not be confined without mobility options. The majority of public transportation riders in the Bristol region are transit dependent, and without that source of transportation they would be without access to essential services or potential employment.

There are multiple agencies providing public transportation in the Bristol study area. These include the Bristol Virginia and Bristol Tennessee Transit systems, which serve the urban areas, and the rural First Tennessee Human Resource Agency (FTHRA) and the District III Government Cooperative transportation providers. The two transit systems in urban area of Bristol operate on a fixed route, coordinated pulse system that meet at the Downtown Center on the Tennessee side of State Street in downtown Bristol. Both transit systems also provide point-to-point handicapped van service, as well as transportation services for the elderly and job access programs. During special events at Bristol Motor Speedway (BMS), BMS and a variety of private entities provide shuttle bus service in the BMS area. Shuttle bus service is also provided for special events at Viking Hall Civic Center in Bristol, Tennessee, and for special events in downtown Bristol. Table 6-2 shows annual service characteristics for Bristol Tennessee Transit and Bristol Virginia Transit (system wide – all modes combined).

<table>
<thead>
<tr>
<th>Service Characteristics</th>
<th>FY 2010 Bristol Tennessee Transit</th>
<th>FY 2010 Bristol Virginia Transit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ridership</td>
<td>80,238</td>
<td>77,318</td>
</tr>
<tr>
<td>Revenue-Hours</td>
<td>16,839</td>
<td>9,929</td>
</tr>
<tr>
<td>Revenue-Miles</td>
<td>199,503</td>
<td>130,624</td>
</tr>
</tbody>
</table>

Fixed-Route Services. The Bristol Urban Area continues to grow and change while the Bristol Tennessee Transit (BTT) and Bristol Virginia Transit (BVT) bus routes have been changing to match that growth and change. Much of the growth in Tennessee is westward in the Highway 11W and Highway 394 areas and southward along Highway 11E, while much of the Virginia growth has been northeastward along Lee Highway and the I-81 Exit 7 area. Much of this growth has occurred beyond the areas served by transit. When new developments were constructed, both transit systems have extended
service outward from the central business district to serve those needs when feasible. Fixed-route services outside of the Bristol corporate limits are nonexistent except for a small section of commercial development in Washington County in the Exit 7 area. Both BTT and BVT need to investigate the potential for system growth to reach new outlying trip generators. Map 6-5 illustrates Bristol Tennessee Transit and Bristol Virginia Transit service routes.

The cities of Bristol, Tennessee, and Bristol, Virginia, comprise a single small metropolitan area, but each entity has its own government and separate transit system. However, the two transit systems are integrated and operate on a pulse system from the downtown transfer center in the 800 block of State Street. Both Bristol Tennessee Transit and Bristol Virginia Transit operate a system of three fixed routes each, which provides service to commercial and residential areas as well as medical/hospital campuses and educational institutions. Transit service is offered on weekdays from 6:15 a.m. to 6:15 p.m. Basic adult fare for bus service is $0.60. A reduced fare of $0.30 is offered to persons with disabilities, senior citizens, and persons with a Medicare card during off-peak hours of service (10:15 a.m. to 2:15 p.m.). Transfers are $0.10 and children under six years of age ride free.

Recent capital facilities completed include transit maintenance facilities in both Tennessee and Virginia, as well as the reconstruction and modification of the Downtown Center, which serves not only as the central loci of the pulse transit system but also as the Farmer’s Market of four jurisdictions and the scene of downtown concerts and other cultural events.

**Paratransit Services.** Most of the paratransit passengers within the Bristol Urban Area are senior citizens, disabled persons, or individuals with no other transportation alternatives. This service is absolutely essential for access to health care, nutrition sites, grocery shopping, and basic community services for persons who cannot access traditional fixed-route transit.

The First Tennessee Human Resource Agency (FTHRA) in Sullivan County and the District III Cooperative Government in Washington County receive federal transit funding assistance for transportation outside of urbanized areas. These agencies provide public transportation for multi-county regions in northeast Tennessee and southwest Virginia. While these services focus on residents that have no other source of transportation for medical and essential errands, their services are available to the general public. The rural transit providers are facing new problems and opportunities as travel needs in the rural areas become more diffuse. Improvements in health care and other community services for senior citizens, the disabled and the general public are generating new travel needs for the people who rely on rural transit for their basic mobility needs.
Individual medical or social service providers throughout the urban area contribute a valuable transportation service to persons who are unable to drive. These services are generally set up to serve the individuals’ need, but have limitations on who qualifies for such services. The Federal Transit Administration provides these nonprofit corporations and associations with capital assistance for the specific purpose of assisting them with providing transportation services meeting the special needs of elderly persons and persons with disabilities for whom typical mass transportation services are unavailable, insufficient, or inappropriate.

Both Bristol Tennessee Transit and Bristol Virginia Transit are required by Federal law to provide paratransit service to those persons who are eligible as defined by the Americans with Disabilities Act of 1990 (ADA). Public entities providing fixed-route systems must provide paratransit or other special service to individuals with disabilities that are comparable to the level of service provided to persons without disabilities who use the fixed-route systems. ADA service is available during the same operating hours as fixed-route service. Because Sullivan and Washington Counties do not provide fixed-route transit service, they do not fall under the comparable paratransit provisions of ADA. Both BTT and BVT are in full compliance with the service criteria established by ADA.

Despite a variety of alternative transportation options available in the Bristol urban area, their remains unfulfilled needs, gaps in services, and lack of coordination of services which are discussed later in this chapter under Programmed and Planned Projects. The area has been reactionary instead of proactive towards alternative forms of transportation, but transit must also be a product which people will desire to use. Through the education of the general public and government officials, the acceptance of transit and its importance to the community can occur.

New Freedom Program. Neither Bristol Tennessee Transit nor Bristol Virginia transit are recipients of grant funding under the New Freedom Program. New Freedom funds are available to provide additional assistance to persons with disabilities beyond those required by the Americas with Disabilities Act (ADA).

Job Access and Reverse Commute Program. Neither Bristol Tennessee Transit nor Bristol Virginia transit are recipients of grant funding under the Federal Job Access and Reverse Commute Program. Job Access funds are intended to fill transportation gaps to make job access, childcare services, and educational training more accessible to welfare recipients and low-income individuals.

Bristol Tennessee Transit provides a similar service to the Jobs Access Program to fill transportation gaps to make job access, childcare services, and educational training more accessible. The additional service for Bristol Tennessee Transit involves the operation of demand-response vans to expand public transportation services during hours when regular bus service is not available, primarily early morning and late afternoon hours, and
Saturdays. This program has been a cooperative effort with local human service agencies as well as the rural provider First Tennessee Human Resource Agency to provide connectivity for urban and rural trips. This service is provided from 5:30 a.m. to 8:30 p.m. on weekdays and 5:30 a.m. to 8:30 p.m. on Saturdays.

**Passenger Rail Service.** There is currently no passenger railroad service in the Bristol study area, apart from an occasional excursion train, usually in the autumn of the year. Currently, the closest Amtrak service is available in Hinton, West Virginia, approximately 130 miles northeast of Bristol.

Since 1996, the Commonwealth of Virginia has been in the process of evaluating options and funding proposals for the TransDominion Express, which would provide passenger rail service between Bristol and twin destinations of Washington, D.C., and Richmond. In 2009, the Virginia Department of Rail and Public Transportation opened one daily passenger rail service trip from Lynchburg to the Northeast Corridor as the first phase of the TransDominion Express. If ridership and revenue goals are met, VDRPT will advance additional phases including potential expansions to Bristol. Although many impediments remain, including funding, the Department of Rail and Public Transportation and Norfolk Southern are looking for a responsible way to move this proposed service forward to implementation.

The Tennessee Statewide Rail Plan also included the evaluation and cost effectiveness of passenger rail service throughout the State. The passenger rail corridors studied include Memphis to Nashville, Nashville to Knoxville, Nashville to Chattanooga, Knoxville to Chattanooga, and Knoxville to Bristol. The Chattanooga-Knoxville-Bristol corridor was identified as one of the four most promising corridors for development of intercity passenger rail service due to the existing rail infrastructure and the opportunity to connect with the proposed TransDominion Express. A new passenger rail service can only be instituted if there is demonstrable ridership to financially support system operations and to justify the infrastructure and rolling stock that would be required. Based on the study, implementation of passenger rail service to Bristol does not appear economically viable at this time due to the low benefit-to-cost ratio. However, the feasibility of the Chattanooga-Knoxville-Bristol corridor is highly dependent upon securing agreements with Virginia and the establishment of an all-Tennessee freight rail linkage. It is important to note that investment in passenger rail can only be justified if freight movements are the primary purpose for the rail infrastructure enhancements.

**Private Bus Lines.** With the acquisition of Trailways, Greyhound Bus became the only provider of intercity bus service in the Bristol study area, providing bus connections to Johnson City, Kingsport, Abingdon, and points beyond. The Greyhound bus station is located on Shelby Street in Bristol, Tennessee, just a few feet from the Downtown Center transit center described above. Other private firms in the area provide charter bus services.
**Taxicab Services.** Several private firms provide taxicab and delivery service throughout the study area from their bases in Bristol.

**Programmed and Planned Projects**

It is anticipated that the cost of providing transit services will continue to grow. The major potentials for cost increases for operations and maintenance in the foreseeable future are due to national trend issues, such as insurance and fuel costs. Transit projects identified in the *Bristol Urban Area Long-Range Transportation Plan Year 2035* represent Bristol Tennessee Transit and Bristol Virginia Transit maintaining the existing system with no major service additions. As a result, it is anticipated that capital expenditures in the near future will be for the replacement of rolling stock on a typical vehicle replacement cycle. Bristol Tennessee Transit operates a fleet of four buses for fixed-route service of which three are required for peak service. The fleet consists of standard 19-to 24-passenger vehicles. The BTT paratransit service is provided with a fleet of four vans of which two are required for peak service. In addition, Bristol Tennessee Senior Center provides additional transportation services for senior citizens. Bristol Virginia Transit operates a fleet of four fixed-route buses, of which three are required for peak service. BVT paratransit services are provided utilizing one mini-bus.

Due to the existing level of service remaining consistent, it is anticipated that capital projects will primarily be required for replacement of vehicles, which are programmed using a normal vehicle replacement cycle of 4-5 years for vans and 7-10 years for buses. Although no major new facilities are identified for the life of this plan, it can be expected that some maintenance of existing facilities (both the Virginia and Tennessee transit garages, and the Downtown Center complex at the transfer station pulse point) would be required in the outlying years and have been programmed for both BVT and BTT. The number of vehicles and estimated costs needed to provide the current level of service are shown in Table 6-3 for Bristol Tennessee Transit and Table 6-4 for Bristol Virginia Transit to continue providing the current level of service. In addition, associated capital maintenance items and rehabilitation of above-referenced facilities are identified in those tables. Costs are based on current procurement standards with a four percent inflation rate projected for future expenditures.

On various levels, investigations should be made to expand or realign service for either fixed-route or paratransit service, or both. There exists a potential for extension of service to outlying trip generators such as the Department of Human Services facilities on Feathers Chapel Road, the Exide Battery plant on Exide Drive, and Partnership Park industrial development between Highway 394 and Vance Tank Road. Bristol Tennessee Transit currently provides demand-response service to the Department of Human Services and the Sullivan County Health Department; however, this service is limited and based on an as needed basis. The implications of extended transit service requires further consideration beyond the scope of this document because of the individual issues raised for each service expansion. Such issues include service demand only at shift-change times for basic industries; the need to develop strategies for outlying service expansion or realignment while maintaining system-wide pulse scheduling (perhaps through alternate-
pulse service); and location of some trip generators outside of the jurisdictions that help to fund the service. The decision to modify either fixed-route or paratransit service to serve currently unserved trip generators will ultimately be made by the local jurisdiction providing the service. Since specific recommendations for transit service changes are not determined costs for those service changes have not been identified in this plan, but could be included as feasibility studies are developed and implemented.

Table 6-3: Bristol Tennessee Transit
Vehicle and Capital Needs 2010-2035

<table>
<thead>
<tr>
<th>Capital Item</th>
<th>2010-2020</th>
<th>2021-2035</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Cost</td>
<td>Number</td>
</tr>
<tr>
<td>Buses</td>
<td>5</td>
<td>$779,752</td>
<td>6</td>
</tr>
<tr>
<td>Lift Vans</td>
<td>8</td>
<td>$300,982</td>
<td>12</td>
</tr>
<tr>
<td>Support Vehicles</td>
<td>4</td>
<td>$101,588</td>
<td>6</td>
</tr>
<tr>
<td>Associated Capital Items and Facility Maintenance</td>
<td>n/a</td>
<td>$249,727</td>
<td>n/a</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>$1,432,049</td>
<td></td>
</tr>
</tbody>
</table>

Table 6-4: Bristol Virginia Transit
Vehicle and Capital Needs 2010-2035

<table>
<thead>
<tr>
<th>Capital Item</th>
<th>2010-2020</th>
<th>2021-2035</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Cost</td>
<td>Number</td>
</tr>
<tr>
<td>Buses</td>
<td>7</td>
<td>$362,337</td>
<td>10</td>
</tr>
<tr>
<td>Lift Vans</td>
<td>2</td>
<td>$73,373</td>
<td>3</td>
</tr>
<tr>
<td>Support Vehicles</td>
<td>2</td>
<td>$48,544</td>
<td>3</td>
</tr>
<tr>
<td>Associated Capital Items and Facility Maintenance</td>
<td>n/a</td>
<td>$124,863</td>
<td>n/a</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>$609,117</td>
<td></td>
</tr>
</tbody>
</table>
Tables 8-14 through 8-17 illustrate the operating and capital costs vs. revenue for both BTT and BVT as well as the transit funding sources. Appendix F identifies the financially constrained transit projects for the *Bristol Urban Area Long Range Transportation Plan Year 2035*.

Future planning strategies for public transportation should include the role of transit in the concept of livable communities. Transit-oriented development provides mixed-use development within walking distance of public transportation and is a key element of livable and sustainable communities. Opportunities for transit to be incorporated in transportation and land use planning will provide local agencies additional tools to improve access to housing, jobs, commercial, and social activities. The integration of other transit planning methods, such as mixed-use, open-space, and transit-oriented developments, are all strategies for public transportation to assist in reducing sprawl, reduce automobile travel, and to help create healthier communities.
While we may think of trails and greenways as paths we find in parks, the growing trend in communities around the country is the use of trails as transportation. Typically paved or graveled and designed for both bicycles and pedestrians, urban trails are considered a form of alternative transportation. Creating a regional pedestrian/bicycle system can supplement the typical transportation system when residential areas are connected to major trip generators. These types of linkages can reduce vehicle trips, improve air quality, and provide mobility options.

A major obstacle to bicycle and pedestrian transportation is current land use and development patterns. Major roads usually do not have facilities adequate for bicycle use and destinations in commercial developments are often separated from neighborhoods by long distances. Even where residential development is adjacent to activity centers, the lack of connectivity can make that area inaccessible and encourage driving.

**Pedestrian/Bicycle Policy and Planning.** Based on the Federal Highway Administration’s policy statement that calls for bicycle and pedestrian facilities on all new roadways, both the Tennessee and Virginia Departments have developed policies for integrating bicycle and pedestrian accommodations. The state policy documents provide procedures for incorporating bicycle and pedestrian accommodations in the construction, reconstruction, operation and maintenance of the state’s transportation network. An accommodation is defined as any facility, design feature, operations change, or maintenance activity that improves the environment in which bicyclists and pedestrians travel. Examples of such accommodations include the provisions of bicycle lanes, sidewalks, signage, and the addition of paved shoulders. Exceptions to the policies include facilities where bicyclists and pedestrians are prohibited by law, where cost for bicycle facilities is greater than 20% of the project costs, or where there is a demonstrated lack of need due to low population density.

After the development of the 2001 long-range transportation plan, the Southern Appalachian Greenways Alliance (SAGA) was created, which includes the Bristol MPO study area. SAGA is a regional coalition to advocate, develop and sustain a creative and comprehensive system of trails and greenways linking communities. SAGA has developed a plan of action, which identifies opportunities for connecting existing and planned greenways and trails and provides an inventory of existing and proposed trails. Although the plan is policy-based and does not provide specific project recommendations, significant corridors are identified in the SAGA Plan.

The City of Bristol, Tennessee has developed the *Bicycle and Pedestrian Plan* to identify a potential network of facilities within the community. The primary focus of the plan was to establish a comprehensive city-wide network of routes that would connect various land uses and landmarks of interests. A hierarchy of proposed bicycle routes was identified in the *Bicycle and Pedestrian Plan* based on project costs and implementation schedule.
The Overmountain Victory National Historic Trail Master Plan for Sullivan County proposes development of 22 miles of trail within the county as part of the National Trails system administered by the National Park Service. To be certified, the trail location must be within one-half mile of either side of the actual historic route of the Overmountain Victory Trail.

Objectives of local MPO jurisdictions comprehensive plans should be followed as much as possible as many call for improved pedestrian facilities. Although local community plans address needs for bicycle and pedestrian facilities, currently no local subdivision regulations require the development of pedestrian facilities for new residential or commercial construction.

**EXISTING CONDITIONS**

**Sidewalks.** All three of the incorporated cities in the Bristol study area (both Bristols and Bluff City) contain sidewalks in parts of the central cities, as well as in the unincorporated community of Blountville. For the most part, sidewalks are confined to the central business district, older residential districts, and near schools.

In Bristol, Virginia, sidewalks exist along major arterials such as State Street, Cumberland Street, Piedmont Avenue, Euclid Avenue and Gate City Highway. Sidewalks can also be found in older areas of the city such as the Virginia Intermont College campus, Moore Street, Lee Street and other areas of central and west Bristol. The newest areas of Bristol, Virginia, in the northeastern part of the city have very few sidewalks.

Bristol, Virginia, performs regular inspections of its sidewalks in order to keep them in good condition. Both the Public Works and Engineering divisions perform these inspections and determine which sidewalks need refurbishing or replacement. Local funding for the maintenance of sidewalks is sparse so the city depends on Federal Community Development Block Grant for partial funding for sidewalk reconstruction.

In Bristol, Tennessee, sidewalks exist along major arterials such as State Street, West State Street, Anderson Street, Martin Luther King Jr. Boulevard and Broad Street. Sidewalks can also be found in older areas of the city such as Holston Avenue and the Fairmount area of central Bristol. The newer areas in eastern and southern Bristol have very few sidewalks. The city allocates funds each fiscal year to replace sidewalks in poor condition.

Bluff City and Blountville have sidewalks in their older areas only. A section of sidewalks within Bluff City, from the suspension bridge over the South Holston River to the Bluff City Middle School, has been certified by the National Park Service as part of the Overmountain Victory National Historic Trail.
**Pedestrian Signals.** As of December 2010, Bristol, Virginia has two signalized intersections equipped with pedestrian signal displays, while Bristol, Tennessee has twelve such traffic signals in place. Engineering is complete for two more traffic signals in Bristol, Virginia, and one more traffic signal in Bristol, Tennessee, to be so equipped. These traffic signals are clustered in the downtown area; along the Volunteer Parkway/Commonwealth Avenue corridor in both Bristols; and the Vance Middle School/Tennessee High School area in Bristol, Tennessee. The two newest pedestrian traffic signals (at State Street and Martin Luther King, Jr. Boulevard and at Commonwealth Avenue and Euclid Avenue) feature LEDs and countdown displays to meet the latest MUTCD standards. Other locations are planned to be upgraded to meet those standards. The Commonwealth Avenue and Euclid Avenue traffic signal is also the only traffic signal in Bristol equipped for visually impaired pedestrians. Map 6-6 illustrates the location of pedestrian signals.

**Bicycle Routes and Greenways.** There are several dedicated bicycle/walking trails in the Bristol study area. The first ones in place were within the Sugar Hollow and Steele Creek Parks in Virginia and Tennessee, respectively. In recent years, the City of Bristol, Tennessee has installed the Wes Davis Greenway between Anderson Street and Melrose Street along the ex-Virginia and Southwestern Railway right-of-way, and the Mark Vance Memorial Greenway bicycle/walking trail connecting the Wes Davis Greenway and downtown to Steele Creek Park in western Bristol. In 2009, Bristol, Tennessee adopted the **Bristol Bicycle and Pedestrian Plan** and began the installation of bicycle route signage for those proposed routes for which no additional pavement construction was necessary. Bristol, Virginia has several blocks of an urban trail in downtown along Beaver Creek, which is the first phase of a citywide trail system designated in the City’s comprehensive plan. Bristol, Virginia, has been in the process of developing a 14-mile segment of the Mendota Trail, which follows an old railway from Bristol to Scott County, Virginia.

The State of Tennessee has designated several bicycle routes along major roadways, but these take the form of signage and pavement markings along routes rather than separate facilities. TDOT has recently begun marking bicycle lanes along US 11W as resurfacing takes place, but this process has not yet extended into the Bristol study area (the bicycle lane markings start just west of SR 394, just outside of the Bristol study area boundary). US 11E and US 19E are also designated as part of the statewide bicycle route system. Map 6-6 illustrates these routes.

**Programmed and Planned Projects**

As the Bristol MPO experiences growth in population, vehicles, roads, and pedestrian facilities cannot be ignored. Increasing the number of roads and vehicles makes it vital that there exist a safe and effective system of sidewalks and community trails on which pedestrians can travel. Good pedestrian facilities encourage pedestrian travel and can provide safe and convenient routes to bus stops and schools.
Both Bristol, Virginia, and Bristol, Tennessee, plan to continue their current program of sidewalk repair, sidewalk reconstruction and expansion, and upgrades to pedestrian traffic signal displays. New roads should be constructed with adequate pedestrian facilities and proposed development plans should be reviewed to encourage sidewalks and pedestrian facilities. Landscaping standards should be consistent with local government policies and adequate sight distance should be maintained for pedestrian safety. All sidewalks must comply with federal, state and local laws concerning accessibility by persons with a disability. In addition to sidewalk maintenance, local community trails should receive routine maintenance to keep them clear and safe for pedestrian use.

One of the goals of the MPO is promote livable communities to improve the quality of life in the Bristol urban area by providing safe pedestrian and bicycling facilities as alternative forms of transportation. This will benefit our communities, commerce, tourism and the general public by promoting physical fitness and energy conservation. To assist in achieving this goal, the MPO supports the Southern Appalachian Greenway Alliance’s efforts to be proactive in the development of greenways and trails. The MPO also encourages the incorporation of pedestrian and bicycle facilities accommodations during reconstruction and/or new construction, based on current state policy.

As a follow-up to the last long-range transportation plan, several pedestrian projects have recently been completed in the Bristol area. These include the pedestrian improvements along Highway 11E adjacent Bristol Motor Speedway; the Solar Hill Historic District sidewalk reconstruction in Bristol, Virginia; and the recent pedestrian improvements installed in Bristol, Virginia funded by VDOT grants (pedestrian signals at State Street and Martin Luther King, Jr. Boulevard and at Commonwealth Avenue and Euclid Avenue; sidewalk and crosswalk installation throughout the downtown area).

The following pedestrian projects are currently (December 2010) in the planning/design phase:

- **Bristol, Tennessee, Highway 11E Pedestrian Improvements.** This project will extend the sidewalk system in the vicinity of Bristol Motor Speedway north of Exide Drive.
- **Bristol, Virginia, Pedestrian Improvements.** This project will provide pedestrian traffic signal pushbuttons and displays, and sidewalk construction at various locations within the City. Targeted improvement areas include State Street at its intersections with Commonwealth Avenue/Volunteer Parkway, Piedmont Avenue/7th Street, and the Norfolk Southern Railway, and sidewalk work on Linden Drive.
- **Bristol, Tennessee, Safe Routes to School.** This project was initiated as part of the Safe Routes to School grant program funded by SAFETEA-LU. The project will focus on the Fairmount residential neighborhood and provide construction/reconstruction of sidewalks, including handicap ramps, to encourage and promote walking and bicycling to the Fairmount Elementary School.
Appendix G identifies the currently funded pedestrian and bicycle projects for the *Bristol Urban Area Long Range Transportation Plan Year 2035*.

The following projects to improve bicycling and pedestrian conditions have been envisioned but are not yet funded.

- A proposed network of bicycle/pedestrian routes, as shown on the map, for the City of Bristol, Virginia. This would include sections along the railroad, connections to Sugar Hollow Park and the industrial areas in northeastern Bristol and the downtown area, and connections to the Bristol, Tennessee bicycle/pedestrian network discussed below.
- Proposed additional bicycle/pedestrian routes to enhance the existing network of such routes in Bristol, Tennessee. Such extensions of the system include routes eastward to connect to Holston View School and the Bristol Country Club, a route near the regional medical center at Exit 74, and routes in southern Bristol in the industrial areas. Several of these routes will not be constructed until shoulder widening takes place on several selected thoroughfares.
- In Bluff City, Tennessee, a pedestrian enhancement grant is proposed to provide a greenway connection between the downtown park and the recently completed pedestrian suspension bridge over Boone Lake.
- The Heritage Trail is proposed for Blountville, Tennessee’s Historic District, which will link community points of interest with an urban trail replicating the original cobblestone sidewalks along the Great Stage Road (Highway 126).
- Part of the four-state Overmountain Victory National Historic Trail passes through Bluff City, eastern Sullivan County just east of the current Bristol corporate limits, and the Holston Valley area of Washington County to its northern terminus in Abingdon. A motor tour route is currently signed, but out of roadway necessity sometimes wanders away from the actual Overmountain Trail. As designated by the National Park Service, one of the goals is to see the construction of the trail along its original historic path as shown on Map 6-6.
- In Sullivan County, Tennessee, the Patriots Trail is proposed as a branch of the Overmountain Victory National Historic Trail within Sullivan County. The project begins at the Holston River in Bluff City, follows a route along part of Pleasant Grove Road, and ends at Sullivan East High School.

Map 6-7 illustrates the general location of existing and proposed pedestrian and bicycle routes for the MPO study area, including the Overmountain Victory National Historic Trail and Patriots Trail.
PART D: GOODS MOVEMENT AND FREIGHT ELEMENT

The economy has always played a key role in determining the growth of the freight industry. As the demand for goods and services increases, the need for transporting these goods to customers increases. Today the continuing trend of companies minimizing inventories and providing just-in-time shipping has changed the dynamics of freight transportation. Freight can be move from origin to destination by various modes; however, trucking has the greatest range of accessibility since they can operate on most roads. Even when freight arrives by other modes, distribution to its final destination is usually by truck over the surface transportation system. Shipping freight by rail becomes feasible if there is a large quantity of the same commodity destined from a common location, the commodity is being shipped over a distance greater that 500 miles, or if the size or weight of the commodity exceeds the limitations of trucking. Shipping freight by air is expensive and is typically only done when the commodity has a high value or requires next-day delivery over a long distance.

The 2009 Freight Fact and Figures indicate the U.S. transportation system moved 53 million tons of freight each day in 2002. The Freight Analysis Framework estimates the tonnage will increase to 102 million tons per day by 2035.

<table>
<thead>
<tr>
<th>Transportation Mode</th>
<th>2002 Tons</th>
<th>2002 Percent</th>
<th>2008* Tons</th>
<th>2008* Percent</th>
<th>2035 Tons</th>
<th>2035 Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck</td>
<td>11,539</td>
<td>59.7</td>
<td>13,243</td>
<td>61.6</td>
<td>22,813</td>
<td>61.3</td>
</tr>
<tr>
<td>Rail</td>
<td>1,879</td>
<td>9.7</td>
<td>2,007</td>
<td>9.4</td>
<td>3,525</td>
<td>9.5</td>
</tr>
<tr>
<td>Water</td>
<td>701</td>
<td>3.6</td>
<td>632</td>
<td>2.9</td>
<td>1,041</td>
<td>2.8</td>
</tr>
<tr>
<td>Air, Air &amp; Truck</td>
<td>11</td>
<td>0.1</td>
<td>13</td>
<td>0.1</td>
<td>61</td>
<td>0.2</td>
</tr>
<tr>
<td>Intermodal</td>
<td>1,292</td>
<td>6.7</td>
<td>1,661</td>
<td>7.7</td>
<td>2,598</td>
<td>7.0</td>
</tr>
<tr>
<td>Pipeline &amp; Unknown</td>
<td>3,905</td>
<td>20.2</td>
<td>3,940</td>
<td>18.3</td>
<td>7,172</td>
<td>19.2</td>
</tr>
<tr>
<td>Total</td>
<td>19,327</td>
<td>100.0</td>
<td>21,496</td>
<td>100.0</td>
<td>37,210</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Freight Facts and Figures 2009, FHWA
* The 2008 data are provisional estimates

EXISTING CONDITIONS

Trucking. The Freight Analysis Framework (FAF) estimates that trucks carried about 60 percent of the total tonnage in 2002 for U.S. commodity shipments. Based on the FAF report, trucks transported approximately 379 million tons of goods in Tennessee and 380 million tons in Virginia (tonnage represents to, from, and within state shipments). In 2035, trucking is estimated to carry 853 million tons in Tennessee and 683 million tons in Virginia. The following graphics illustrate the 2002 and 2035 truck shipments to, from, and within Tennessee and Virginia.
Much of the freight moving by truck uses the Interstate System. For the Bristol study area, Interstate 81 is a major corridor for the movement of goods within the region and passing through to other markets. Both Tennessee and Virginia report that approximately 60 percent of the truck traffic on the I-81 corridor is traveling through the state to other states. On Interstate 81, at most times of the day, about every third vehicle is a truck, which is about double what the road was designed for. The high degree of dependence on trucks has given rise to several concerns, including road capacity, safety, accelerated damage to the highway system, air quality, noise and the overall impact of truck traffic on the community.
Chart 6-1
Truck Shipments To, From, and Within Tennessee
2002-2035

Chart 6-2
Truck Shipments To, From, and Within Virginia
2002-2035
**Rail.** In 2002, the FAF report estimated 54 million tons of freight was moved by rail in Tennessee. In Virginia, rail shipments represented 74 million tons. In 2035, freight tonnage by rail is estimated to increase to 113 million tons in Tennessee and 83 million tons in Virginia.

The Bristol study area is crossed from southwest to northeast by one Class I railroad, the Norfolk Southern Railway (Map 6-9). Historically, the predecessor railroads of Norfolk Southern Railway served to help spur development in the area; the railroad first reached Bristol in 1856. The mainline of the railroad was in place before the Civil War, serving as part of the few east/west railroad links of the Confederacy, and was in and of itself a wartime target for military raids. In more recent history, this mainline served as one of the few railroads running inland from the Port of Norfolk of sufficient height to allow for double-stack container trains; such trains ran from Norfolk to Knoxville, where they split into Atlanta-bound and Chicago-bound trains and vice versa. 2010 saw the completion of the Heartland Corridor by Norfolk Southern, which included modifications to bridges, tunnels, and structures to allow double-stack and oversize railroad rolling stock to pass between Norfolk and the Ohio-Chicago areas without passing through Knoxville. This corridor will undoubtedly play a major role in the shifting of rail freight routes in the United States.

As for railroad industrial spurs, there are several located in the Bristol study area, some of which cross roadways on surface crossings (Industrial Park Road, Moore Street, Martin Luther King Jr. Boulevard, Commonwealth Avenue, Spurgeon Lane, Euclid Avenue, Keys Street) and on a bridge (Piedmont Avenue). A new spur line is proposed in 2010 to cross Vance Tank Road west of Raytheon Road as part of an industrial redevelopment project. Railroad spur train traffic is infrequent enough that capacity on the modeled roadways in the network is not modeled. Industries served by railroad spur service include a snack foods plant, an asphalt plant, and an agricultural products outlet in Bristol, Virginia; a natural gas tank farm and several plastics facilities in Bristol, Tennessee; and several industries in the Tri-County Industrial Park in Piney Flats. Spurs have been abandoned in the recent past that formerly served two lumber suppliers, two woodworking plants, an oil recycling plant, a food distribution plant, a hardware wholesaler, a fertilizer plant, a defense plant, and a tannery.

Map 6-10 identifies railroad served business locations in the Bristol study area.
Mainline railroad operations have a considerable impact on road travel in the Bristol study area. In both Virginia and Tennessee, the main line crosses study roadways on surface crossings and on or under bridges, as listed below. Those bridge locations marked with an asterisk (*) represent modeled locations in which the railroad bridge over the railroad is weight-posted (West Mary Street); the passage underneath the railroad is either too narrow (Providence Road, Old Abingdon Highway) or too low (East Valley Drive, Columbia Avenue, Piedmont Avenue) to allow for the passage of trucks; or are too narrow to accommodate turn lanes at immediately adjacent intersections (Weaver Pike) and thus inhibit the flow of freight. Several of the projects proposed in this document address these bridge issues.

**Virginia Bridged Crossings, Mainline (listed north to south):**
- Providence Road, Washington County *
- Lee Highway, Bristol
- Interstate 81, Bristol
- Old Abingdon Highway, Bristol *
- East Valley Drive, Bristol *
- Columbia Avenue, Bristol *
- West Mary Street, Bristol *
Virginia Bridged Crossings, Spur (listed west to east):

- Piedmont Avenue, Bristol *

Tennessee Bridged Crossings, Mainline (listed north to south):

- Ash Street, Bristol
- Anderson Street, Bristol
- Weaver Pike, Bristol *
- Highway 394, Bristol
- Silver Grove Road, Sullivan County
- Highway 19E, Bluff City

Air. There are no airports within the Bristol study area. However, there are two airports just outside of the Bristol study area. As previously described, Tri-Cities Regional Airport is a jointly operated facility just outside of the Bristol study area to the southwest, which provides commercial airliner service to a variety of cities, including Nashville, Charlotte, Atlanta, Detroit, Cincinnati, and Chicago at various times. Tri-Cities Regional Airport is also a Port of Entry for a foreign free trade zone with its air cargo facility.

Just outside of the Bristol study area to the northeast is Virginia Highlands Airport, a general aviation facility located north of Lee Highway just east of Exit 13. Potential expansion of this airport may extend its facilities into the Bristol study area in the near future; such a runway expansion is the driving force behind the relocation of Providence Road (Route 611) in Washington County.

Waterways. The Bristol study area lies above the head of navigation of the Holston River system, which is a tributary of the Tennessee River system. Prior to the conversion of the Holston River system to a series of reservoirs by the Tennessee Valley Authority, the head of navigation on the South Holston River was at Kingsport; commercial navigation above that point was not possible because of rapids in the river. The waterways of the region provided limited travel potential and some travel obstacles in the past, requiring bridges over them and one ford important in the settlement history of the area (Choates Ford in modern-day Bluff City, located just downstream of the Norfolk Southern Railway bridge over the South Holston River). Choates Ford was further inundated by the formation of Boone Lake on the South Holston River. Depending upon where one enters the water system, the TVA dams at Boone, Fort Patrick Henry, and Cherokee lie between the entry point and the head of navigation.

Pipeline. Outside of short industrial on-site usage, the only major pipeline in the Bristol study area is a natural gas pipeline running approximately parallel to Interstate 81, with a pumping station inside the study area (off of Meadow View Road), running between Texas and Pennsylvania. Pumping stations on this line are some miles apart, with the nearest pumping stations outside of the study area near Morristown, Tennessee, and Marion, Virginia. This pipeline recently has been renewed, since the original pipeline dates from World War II and was nearing the end of its original service life.
Map 6-11 identifies the pipelines in the Bristol MPO Region operated by East Tennessee Natural Gas, a division of Spectra Energy (Duke Energy).

![Map 6-11: Natural Gas Pipelines in the MPO Region](image)

**PROGRAMMED AND PLANNED PROJECTS**

Goods movement is recognized as a critical element in the transportation planning process, yet few localities have attempted to associate goods movement with economic development. Most improvements to correct existing network deficiencies are related to a desire to reduce impediments to passenger travel and any reciprocal benefits to local industries was secondary. Recently, governments are realizing that location decisions are increasingly based on the availability of an efficient and dependable transportation network.

Operational improvement projects as well as new construction projects are identified in the *Bristol Urban Area Long Range Transportation Plan Year 2035* that will address freight movements primarily by improving turning movements and access improvements for trucking, but also the problems associated with several capacity issues on local roadways. With only a few exceptions on no-truck routes (Old Jonesboro Road in Tennessee, King College Road, eastern East Cedar Street, and southern Carden Hollow Road), freight movements will benefit from the projects proposed in this document.

**Crescent Corridor.** Norfolk Southern Railway, in a public-private partnership with multiple states (including Virginia and Tennessee), has formulated a rail improvement program for the 2,500 mile corridor from Memphis and New Orleans to New Jersey as shown on Map 6-12. These improvements include straightening curves, adding signals, building passing lanes and double tracks, and constructing and expanding intermodal terminals. Known as the “Crescent Corridor”, the freight improvements are intended to benefit both trucks and trains by investing in terminal and rail capacity enhancements for intermodal freight shipments. Infrastructure improvements are underway in Tennessee and Virginia; however, current projects are outside the MPO study area.
**I-81 Corridor Studies.** Motivated by rising projections of highway congestion and truck traffic exceeding what the highways were designed to handle, both Tennessee and Virginia have developed freight diversion studies to evaluate strategies that could be used to assess the potential for diversion of truck trips to rail along the Interstate 81 corridor. The premise underscoring rail system improvements was that they would lead to cargo movement diversions from truck to rail and consequently reduce congestion on the interstate system. The overall conclusion of both studies was that because most freight currently shipped by truck either begins or has a destination outside the state, the potential to diverting goods from truck to rail is limited unless corridor-wide multi-state coalitions are developed to partnership with the railroads, which produces a higher volume of traffic diversions.
CHAPTER 7: SAFETY AND SECURITY PLANNING

In previous federal transportation legislation, safety was often an inherent factor in engineering and design of infrastructure. Now, safety must be considered as a key goal in the development of metropolitan and statewide transportation plans and is explicitly included as a transportation planning factor. With the current federal transportation legislation, security is included as a separate goal which must be addressed in this document. Although the MPO is not directly involved in security or emergency planning, communication has been established with emergency management agencies, local law enforcement agencies, engineering officials, and emergency personnel on major transportation plans and projects with the intent of developing a transportation system that is secure as possible.

PART A: SAFETY PLANNING

Both Tennessee and Virginia have made efforts to increase safety statewide. Behavioral strategies such as seat belt laws, child restraint laws, laws governing the use of electronic devices by drivers, and DUI laws have been strengthened to improve safety on roadways. If the ultimate goal is to eliminate fatalities, injuries, and property damage, then obviously safety planning, cooperation, education, and research are essential on the federal, state, and local level.

Strategic Highway Safety Plan. Providing the most efficient and safest transportation facilities is of critical importance. The primary performance measures for transportation safety are reductions in the number of crashes that result in fatalities, injuries, property damage, and related economic losses. The State of Tennessee and Commonwealth of Virginia have both developed a Strategic Highway Safety Plan (SHSP) to define a system, organization, and process for achieving the highest level of highway safety. Although the emphasis areas of each state’s SHSP varies, both integrate the four-E approach of transportation safety; Engineering, Education, Enforcement, and Emergency response services.

Tennessee’s SHSP includes eight safety emphasis areas to achieve the goal of reducing fatality rates statewide.

1. Improve crash data;
2. Reduce lane departures;
3. Improve intersection safety;
4. Improve work zone safety;
5. Improve motor carrier safety;
6. Improve driver behavior;
7. Strengthen legislation; and
8. Enhance educational and awareness programs.
Similar in scope, Virginia’s SHSP addresses three primary emphasis areas to reduce the annual number of injuries and deaths due to motor vehicle crashes.

1. Human Factors
   a. Driver behavior
   b. Special users
   c. Pedestrian and bicyclist safety
2. Environmental Factors
   a. Intersection safety
   b. Roadway departures
   c. Work zone safety
   d. Pedestrian and bicycle safety
3. Fundamental Areas
   a. Traffic records
   b. Transportation safety planning

Implemental of these strategies for Tennessee and Virginia are under the auspices of each state’s Transportation Safety Committee and comprised of representatives from multiple disciplines, agencies, and organizations involved in highway safety.

Roadway Intersections. As with all transportation plans and operations, safety is a key component. Oftentimes, however, it is found that modifications to traffic control devices or roadway operations end up being a viewpoint of safety vs. efficiency. For instance, one potential solution for a traffic signal with significant left-turn collisions is to install a left-turn-on-green-arrow-only phase, or restrictive left-turn phase. While this may help alleviate left-turn collisions, the increase in cycle time and delay imposed by such an addition may be enough to drop the level of service for the intersection to an unacceptable level, which in turn would require additional remediation.

Historically, there have typically been five or less fatal collisions in the two Bristols combined per year. Several of these crashes have been incidents in which the driver died behind the wheel and the guideless vehicle then crashed. Some of these fatal incidents have also involved pedestrians struck by vehicles.

The role of the Bristol MPO in safety planning lies primarily with data collection and statistical analysis. Such data and analysis is made available to the various jurisdictions, which can themselves develop the appropriate countermeasures. In some instances, the desire to implement various countermeasures by the jurisdictions results in those jurisdictions working through the MPO process to program funds for countermeasure implementation.

There are six law enforcement agencies that provide law enforcement response to traffic crashes:
There are many locations at which more than one law enforcement agency can respond to a crash site. Therefore, in order to get a comprehensive picture of crash history at a location, the files of more than one agency are examined.

As of 2010, the Bristol MPO compiles crash statistics for a total of 599 intersections within the Bristol study area, broken down as follows:

- City of Bristol Virginia: 134 intersections
- City of Bristol Tennessee: 257 intersections
- Shared by both Bristols on state line: 12 intersections
- Town of Bluff City: 23 intersections
- Unincorporated eastern Sullivan County: 113 intersections
- Unincorporated southwestern Washington County: 60 intersections

This compilation effort includes an annual review of crash reports, development of collision diagrams of each location, updates of traffic volume data, and an analysis of rates and trends, as well as before-and-after statistical comparisons for changed conditions. Analysis of crashes goes back a maximum of ten years’ worth of data (or less if it is a newly added intersection or one in which the conditions have changed in that time period); however, in many locations, crash data has been compiled back to 1982 (in Tennessee) and 1988 (in Virginia). Reports are made available to both Bristols, Bluff City, and Sullivan County; some locations have used these reports to assist in police department accreditation. The MPO uses the traffic crash reports themselves and not computer searches or summaries to develop this data, in order to eliminate the multiple pitfalls extant in using summarized data.

While knowing the total number of crashes at any given location is a useful tool for safety planning, it does not provide the entire story. Three crashes per year at the intersection of two 20,000 vehicles-per-day arterials does not represent the same safety impacts as three crashes per year at the intersection of two 300 vehicles-per-day subdivision streets. To account for different types of roads and different traffic volumes, Critical Rate Factors (CRFs) are used. The CRF is a statistical measure of how many crashes are occurring at a given location at a given volume of traffic, compared to similar intersections across the State of Tennessee. For a given confidence level (the Bristol MPO uses a 95 percent confidence level), a CRF is calculated. Should the CRF value be less than one, it indicates that the number of crashes (but not necessarily the types of crashes) can be attributed to random chance at that confidence level. If the CRF is greater than one, it indicates that there is some factor, correctable or not, that is
influencing the number of crashes at this location. The influencing factor may be correctable only at a huge cost (i.e., changing the orientation of a roadway so that afternoon commuters are not driving into the setting sun or demolishing a large building blocking sight distance).

The Commonwealth of Virginia does not compile the appropriate statewide statistics to develop CRFs. Some crash data is available for the Bristol District (twelve counties of southwestern Virginia), but it was felt that this was not a suitable population of data, given that Bristol is the largest city in the largely rural Bristol District. For the City of Bristol, Virginia and Washington County, the crash rates are compiled as crashes per million entering vehicles. This gives an indication of high-crash locations when comparing one intersection against another, but does not indicate which of those locations are, by the number of crashes and traffic volumes present, being influenced by factors other than random chance.

The individual jurisdictions can then use this data to determine for themselves what resources, whether through state, federal, or local funding, require remedial action and in what priority. It also provides data for proposed TIP projects that can be used in the design stage for remedial action.

To qualify for MPO crash monitoring, an intersection has to meet one or more of the following criteria:

- Equipped with traffic signals
- Equipped with flashing beacons
- Equipped with multi-way STOP control
- Intersection of modeled roadways in the travel demand model network
- Locations of intersection modifications
- Locations impacted by major land use changes (i.e., opening or closing of nearby shopping centers or manufacturing facilities)
- Intersections that are the subject of study by the local jurisdiction

Map 7-1 illustrates those locations for which crash data was collected for the calendar year 2010.

**Roadway and Lane Departure Crashes.** Both TDOT and VDOT have identified roadway and lane departure crashes as a major concern in the State Highway Safety Plan. This is due to the severity of this type of crash and the high rate of fatalities and injuries when vehicles leave the appropriate travel lanes or the roadway. The MPO will continue to coordinate with TDOT and VDOT, as well as local jurisdictions, to monitor locations with significant crash histories or potential roadway departures and identify effective strategies to reduce unintentional roadway and lane departure crashes through safety audits and roadway assessments. Starting in 2008, the MPO has collected statistics on roadway and lane departure crashes (head-on collisions, sideswipes, run-off-the-road incidents, and hitting parked vehicles) as part of its annual data collection and analysis efforts.
Public Transportation. Local transit agencies have always placed an emphasis in providing a safe, secure, and reliable service for its passengers and employees. These efforts are continuing and are an integral part of providing public transit services.

Since the terrorist attacks of September 11, 2001, the Federal Transit Administration has placed greater emphasis on safety and security for public transportation providers. As a department of local government, both Bristol Tennessee Transit and Bristol Virginia Transit are integrated into each city’s Disaster Preparedness Plan and Hazard Mitigation Plan. While transit must be concerned about safety and security as it relates to the provision of providing service, locally transit also functions as a valuable resource to the community in providing rescue or evacuation services. Local transit providers have been active in participating in emergency preparedness efforts in the community.

At the basic level, local transit agencies train drivers and supervisors on safety and security issues, conduct background checks for new employees, update security features on new vehicles procurements, screen employees for drug use, and coordinate with local emergency management services. Public transit in the Bristol community is responsible for being able to respond rapidly and effectively to natural and human-caused threats and disasters and to support the needs of emergency and public safety agencies.

Railroad Grade Crossings. One of the critical issues associated with rail service are grade crossings. At-grade crossings are a source of concern for both railroad companies and local jurisdictions in that safety and maintenance issues continually need addressing. Maintaining adequate sight distance and safety devices such as signs, pavement markings, gates, bells, and warning lights at existing at-grade crossings are very important and costly. Grade separation is one potential solution for safety issues involving automobiles at rail crossings; however, it is often unclear as to whose responsibility it is to finance such capital-intensive improvements. In both Virginia and Tennessee, the main line crosses modeled roadways on surface crossings as listed below.

Virginia Surface Crossings, Mainline (listed north to south):
- Astor Road, Washington County
- Industrial Park Road, Washington County
- Bordwine Road, Washington County
- Clear Creek Road, Washington County
- State Street, Bristol

Virginia Surface Crossings, Spur (listed west to east):
- Keys Street, Bristol
- Spurgeon Lane, Bristol
- Euclid Avenue, Bristol
- Commonwealth Avenue, Bristol
- Moore Street, Bristol
- Martin Luther King, Jr. Boulevard, Bristol
Tennessee Surface Crossings, Mainline (listed north to south):

- State Street, Bristol
- East Cedar Street, Bristol
- Hazelwood Street, Bristol
- Industrial Drive, Bristol
- Broyles Lane, Sullivan County
- White Top Road, Sullivan County
- Pleasant Grove Road, Sullivan County
- Fleming Drive, Bluff City
- Mountain View Drive, Sullivan County
- Piney Flats Road, Sullivan County

All of the surface mainline crossings listed above are equipped with crossbucks, advance signage and pavement markings, lights, and bells as a minimum, except for Pleasant Grove Road, which does not have any lights or bells. Some of these mainline surface crossings are also equipped with gates. On the spur line, the modeled crossings at Keys Street, Spurgeon Lane, Moore Street, and Martin Luther King, Jr. Boulevard are equipped with warning signs and pavement markings only; the Euclid Avenue and Commonwealth Avenue crossings have additional devices.

In the recent past, there have been several railroad/public street surface crossings that have been the scene of train/vehicle collisions, or train/pedestrian collisions.

- East Cedar Street (Bristol, Tennessee)
- Hazelwood Street (Bristol, Tennessee)
- Gray Road (Sullivan County)
- Pleasant Grove Road (Sullivan County)
- Rutledge Road (Sullivan County)

The MPO provides administrative assistance to the local jurisdictions for the funding of railroad surface crossing projects. This includes such projects as the recent installation of concrete surfaces at the Euclid Avenue and Martin Luther King Jr. Boulevard railroad crossings, and rubber/asphalt crossing surfaces at the Commonwealth Avenue and the State Street railroad crossings; installation of lights and bells at the Commonwealth Avenue railroad crossing; and installation of gates at the East Cedar Street railroad crossing. The Anderson Street bridge opened to traffic in May 2008 had as a primary purpose the removal of from the State Street railroad crossing with the rerouting of US 421 over the new structure.

**Pedestrian/Bicycle Projects.** Safety is often a primary purpose for the development of pedestrian enhancement projects. As of this writing, there are several pedestrian enhancement projects in various stages of development.

In Bristol, Virginia, the pedestrian enhancement project for the replacement of sidewalks in the Solar Hill area was recently completed (in and around Sycamore Street northwest
of downtown). Other pedestrian enhancements in Bristol, Virginia, include upgrades of the traffic signal at Commonwealth Avenue and Euclid Avenue for visually challenged pedestrians; installation of pedestrian displays at State Street and Martin Luther King, Jr. Boulevard; and installation of sidewalks along high-traffic roadways. Design has been completed for additional locations, both signalized and unsignalized, but not constructed to date (2010) because of fiscal constraints.

In Bristol, Tennessee, a multi-million dollar pedestrian enhancement project (funded jointly by the City of Bristol, TDOT, and Bristol Motor Speedway) was recently completed to construct walkways and provide positive separation between vehicles and pedestrians along Highway 11E in the vicinity of Bristol Motor Speedway. For several days before and immediately after a NASCAR race, many of the 165,000+ fans access the speedway campus to their off-site parking areas, and their only way to walk was along medians and shoulders or in the travel lanes. Of particular concern was the pair of bridges on Highway 11E over Back Creek and the pair of bridges over Beaver Creek, which had no shoulders, forcing pedestrians to walk in the travel lanes. These bridges were reconstructed by TDOT to include pedestrian walkways and completed in 2008. The construction of separate walkways with controlled points of road crossing along Highway 11E from Exide Drive to White Top Road/Maplehurst Lane helped alleviate many of the pedestrian issues on the Highway 11E side of the BMS campus. This enhancement project also included converting the median from center surface drainage to a piped system with a raised median, the installation of offset left-turn lanes at selected locations, and landscaping to help control pedestrian movements. Extension of this system north of Exide Drive, and similar treatments along Highway 394 adjacent to Bristol Motor Speedway, has been discussed.

Other recent projects in Bristol, Tennessee, include the construction of the Mark Vance Memorial walking/bicycle trail between the Wes Davis Greenway and Steele Creek Park, as well as the Safe Routes to School pedestrian enhancement project in the area surrounding Fairmount Elementary School, east of the Pennsylvania Avenue portion of US 421. In Bluff City, a pedestrian enhancement grant is proposed to provide a connection between the downtown park on the south bank of Boone Lake and the recently completed pedestrian suspension bridge over the lake east of the park. Ultimately, this section would be incorporated into the National Park Service’s historic Overmountain Trail from Abingdon, Virginia, to King’s Mountain, South Carolina.

The City of Bristol, Tennessee, has recently adopted a bicycle route network and plan for the development of a citywide system connecting points of interest and the TDOT’s statewide bicycle network. The Wes Davis and Mark Vance Greenways have been incorporated into this system.

As discussed, several local pedestrian and bicycle improvements have occurred since the last long range transportation plan and greater awareness of these types of facilities has been incorporated into local jurisdictions planning processes. The design of pedestrian and bicycle facilities by local jurisdictions within the urban area have included concerns for safety, primarily the separation of pedestrian and vehicles. For pedestrian/bicycle
routes recently developed, design has included traffic calming techniques, especially at street intersections for motor vehicle awareness. Signalization projects are now incorporating pedestrian pushbuttons, where applicable; recent examples include the two traffic signals installed at the ends of the Anderson Street bridge, and along the State Street intersections at Martin Luther King, Jr. Boulevard and Pennsylvania Avenue/Goodson Street.

**LED Use in Traffic Signals.** Several jurisdictions in the Bristol study area, including Bristol, Tennessee; Bristol, Virginia; VDOT; and Sullivan County are in various stages in the process of converting existing incandescent traffic signals to LED displays. In all of these jurisdictions, as well as TDOT projects, new traffic signals are being installed with LED fixtures. LED fixtures can provide greater visibility of displays than incandescent fixtures, in addition to a reduction in energy consumption and costs; the MPO is tracking the conversion of these traffic signals to determine before-and-after impacts of these installations on the crash history of these locations.

**OBJECTIVES AND PROPOSED ACTIONS**

To reduce transportation related accidents, injuries, and fatalities across all modes and to promote safety in the design and construction of transportation facilities, user safety is one of the primary goals of the *Bristol Urban Area Long Range Transportation Plan 2035*. Based on importance and public concern for a safe transportation system, safety has become an evaluation criterion for the long range transportation plan and the Transportation Improvement Program project selection process.

Since the MPO is involved in a regional planning analysis, it is not practical to address all local safety issues. One of the most appropriate safety activities of the MPO is to advocate safety conscious design principles into roadway improvements. One of the single most important elements that can be addressed is access control. Access control consists primarily of limiting the number of driveways and conflict points on the roadway system and serves to both reduce the number of crashes as well as reduce congestion. The recent adoption of driveway spacing standards as part of an overlay zoning district along the unlimited access portion of Highway 394 in Bristol, Tennessee, is a case in point.

To be effective, safety-conscious planning must extend across all planning activities. For example, land use planning and decisions influence access management through the subdivision and site plan process. Safety planning requires multi-agency coordination and communication to develop policies and design practices to promote safety and security for all transportation modes. The safety and security objectives of the MPO include the following activities:

- Implementing design factors in new infrastructure that enhances the safety and extends the life of structures.
Improving the safety of the transportation system at modal transfer points, such as bikeways that share or cross roadways, intersections with crosswalks, and railroad crossings.

Improving the accessibility and safety of transit stops and transfer points.

**PART B: SECURITY PLANNING**

With the SAFETEA-LU legislation, security has been added as a separate goal which must be considered and addressed in the *Bristol Long Range Transportation Plan Year 2035*. Although the MPO is not directly involved in security or emergency planning, communication has been established with emergency management agencies, local law enforcement agencies, engineering officials, and emergency personnel on major transportation plans and projects with the intent of developing a transportation system that is secure as possible.

The Bristol MPO’s role for the region is primarily to support existing federal, state, and local agencies in their efforts to enhance the transportation system for the region. Given the strong influence of security, public safety, and emergency management agencies in dealing with security/disaster incidents, it is likely the most appropriate MPO activities would be promoting coordinated planning in anticipation of unexpected events or disasters. As a forum for cooperative decision making in the metropolitan area, and the responsibility for allocating financial resources for improving the performance of the transportation system, the MPO does have a function in security planning.

**MPO Roles Relating to Security.** Security/disaster planning is divided into several components that reflect the different elements in dealing with such events, e.g., prevention, incident response, monitoring, system recovery, investigation, and institutional learning. In each case, the MPO would likely focus on some aspect of the transportation system that is part of the larger regional response to security/disaster incidents.

Given the MPO’s responsibilities as a forum for cooperative decision-making, transportation funding, technical analysis and transportation planning, the actions that seem most appropriate for the MPO in the context of security planning are:

- Providing a forum for security/safety agencies to coordinate surveillance and prevention strategies;
- Management of data related to transportation facilities;
- Funding regional surveillance and detection systems;
- Funding recovery strategies;
- Funding new strategies, technologies, and projects that can help prevent events;
- Conducting vulnerability analyses on regional transportation facilities and services;

---

1 Source: Georgia Institute of Technology
Analyzing the transportation network for redundancies in moving large number of people and materials, and strategies for dealing with “choke” points;

Analyzing the transportation network for emergency route planning and strategic gaps in the network.

EXISTING CONDITIONS

Intelligent Transportation Systems. In many metropolitan areas, much of the Homeland Security and Emergency Preparedness activity revolves around the implementation of Intelligent Transportation Systems (ITS). This is in part a result of the similarities between the need for functions such as surveillance, intrusion detection, and communications required for security, and the applications required for operation and management of the transportation system. In addition, deployment of ITS technologies has an impact on the institutional relationships, both formal and informal, that are established with the region between agencies.

The implementation of ITS can be a strategic element in reducing congestion and incident management. ITS deployment refers to the use of advanced technologies to enhance management and operation of transportation facilities. ITS program areas include many elements, some of which include surveillance equipment to monitor roadways for congestion and incidents; variable message signs that display traffic information to motorists, vehicle detection devices that report traffic counts, speed, and travel time, and motorist service patrols that respond to incidents in a timely manner.

A multi-jurisdictional task force developed and approved the Bristol Regional ITS Architecture and Deployment Plan in June 2008. This ITS plan covers all of Washington County, Virginia, Bristol, Virginia; and that portion of Sullivan County within the Bristol MPO study area (but not the area east of South Holston Lake). The jurisdictions within the Bristol MPO study area are stakeholders in this ITS plan, the bounds of which were designed to complement the operational ITS characteristics of both TDOT and VDOT’s pre-existing ITS operations. This ITS plan provides the guideline and structure for the implementation and operation of ITS technology within the MPO study area, and defines the transportation needs, ITS solutions, agencies to be involved, and projects to be deployed.

This document supports the expansion of Interstate motorist service patrols into the Tri-Cities, including the Bristol area. Such expansion of service has been endorsed by the various communities in the Tri-Cities area.

ITS operations in the Bristol study area are currently confined to camera detection systems and variable message boards along Interstates 81 and 381, operated by both the Tennessee and Virginia Departments of Transportation, as well as additional temporary ITS cameras and variable message boards deployed by both Departments of Transportation; Bristol, Tennessee; and Sullivan County for certain special events at Bristol Motor Speedway.
**Evacuation Routes.** No designated evacuation routes throughout the Bristol study area are identified, such as those found in other locations for hurricanes, industrial or nuclear incidents, or other similar events. In the event of emergency evacuations such as for hazardous spills or natural disasters, local law enforcement will determine the best routes.

**Public Transportation.** The Federal Transit Administration has undertaken a series of programs to help local transit providers prepare against a variety of threats. Although the transit providers within the Bristol MPO represent small urban and rural systems, it is important for local agencies to integrate security in transit programs.

Currently, transit agencies with the region have not invested in significant capital improvements based on the level of security-related incidents, and potential threats do not warrant further expense in this area. This does not imply that security has not been addressed as local agencies continue to train drivers and supervisors on security issues, conduct background checks for new employees, update security features on new vehicle procurements, and coordinate with local emergency management services. The security functions must be supported by an effective capability for emergency response, both to support resolution of those incidents that occur on transit property and those events that affect the surrounding community service by the agency. As a division of local government, both Bristol Tennessee Transit and Bristol Virginia Transit are integrated into the two cities’ disaster preparedness and hazard mitigation plans.

Basic goals of transit agencies in regards to security include:

- Being prepared for security incidents;
- Being able to respond rapidly and effectively to natural and human-caused threats and disasters;
- Being able to appropriately support the needs of emergency management and public safety agencies; and,
- Being able to quickly and efficiently be restored to full capability.

While local transit agencies have embraced the need to update safety and security throughout their systems, there are relatively few funds to help pay for these programs.

**Trucking.** The Transportation Security Administration (TSA) administers the Hazmat Threat Assessment Program which obtains background and security checks on drivers of commercial vehicles transporting hazardous materials. The Federal Motor Carrier Safety Administration (FMCSA) is responsible for developing, maintaining, and enforcing Federal regulations that establish safe operating requirements for commercial vehicle drivers, carriers, vehicles and equipment. In addition, FMCSA is enforces the Hazardous Materials Regulations to reduce security risks that could potentially harm the public and environment. FMCSA has initiated several programs aimed at protecting against terrorists utilizing commercial trucks as targets or weapons. Their top priority is dealing with trucks that carry hazardous materials.
Currently, no routes within the MPO study area are restricted for hazardous material transportation with the exception of routes which are restricted to all commercial vehicles.

**Rail.** The Bristol MPO region is crossed by one Class I railroad, the Norfolk Southern Railway. Bristol Yard, on the Virginia side of the state line, serves as a crew change point for trains operating between Knoxville and Roanoke. Norfolk Southern Railway routinely monitors railroads for both safety and security purposes and maintains customized facility security systems, electronic surveillance, perimeter intrusion detection, and access control systems. These technology enhancements are centrally monitored at the railroad’s Police Communication Center in Roanoke, Virginia.

The TSA plays an important role in securing railroads and conducts inspections and investigations to prevent attacks. TSA deploys inspectors, Visual Intermodal Protection and Response teams, canine teams and provides grants to protect and support rail systems.

**Pipelines.** Outside of short industrial on-site usage, the only major pipeline in the Bristol study area is a natural gas pipeline running approximately parallel to Interstate 81, with a pumping station inside the study area off of Meadow View Road. East Tennessee Natural Gas, a division of Spectra Energy (Duke Energy), employs a number of techniques to ensure pipelines are safe. This includes technical equipment to monitor and control the flow through the use of sensors that can identify an incident in the event of an emergency as well as routine foot patrols and aerial patrols of pipeline rights-of-way are conducted. To address terrorism concerns, they have regular drills and a security response plan in place.

The federal Department of Transportation’s Office of Pipeline Safety (OPS) administers the national regulatory program to assure the safe transportation of natural gas, petroleum, and other hazardous materials by pipeline. OPS develops regulations and other approaches to risk management to assure safety in design, construction, testing, operation, maintenance, and emergency response of pipeline facilities.

**Emergency Management Plans.** Although the MPO study area encompasses two states, all of the MPO county-level jurisdictions have Emergency Operation Plans and/or equivalent mitigation plans that include measures for homeland security factors for this region. These documents identify various potential man-made and natural hazards that could occur in this region and identify agency responsibilities in the event of an incident. Locally, the MPO has attended meetings and provided input in the development of Hazard Mitigation Plans. Typically, the content of a Hazard Mitigation Plan provides a risk and vulnerability assessment and establishes mitigation strategies. Both the Tennessee and Virginia Departments of Transportation have developed Interstate 81 incident response plans, which defines alternate routes if sections of the interstate are closed.
Because the geographic area that the Bristol MPO encompasses is relatively small, probable hazard risks are consistent throughout the planning region. *Risks* define a known, identified hazard area within the region. *Vulnerability* establishes the impact of that hazard to the region and can be on quantified based on collected data such as the number of buildings that would be affected or location of critical community facilities (i.e., fire stations). The following table presents the probable risk and vulnerability for identified hazards with the region and was compiled from local Hazard Mitigation Plans.

### Table 7-1
**Summary of Probable Hazard Risk and Vulnerability**

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Risk</th>
<th>Vulnerability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dam Failure</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>Flooding Hazards</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Geological Hazards</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Infestations</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Severe Weather-Drought</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Severe Weather Hazards</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Manmade Hazards</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

**ISSUES**

With the exception of severe storms, flooding, and forest fires, hazardous materials incidents are perhaps the most likely to affect the Bristol study area. There are some industries within the Bristol region that use, produce, store, or distribute hazardous materials. According to the EPA’s Toxic Release Inventory, Exide Technologies, Seaman Corporation, Strongwell Corporation, and Bristol Compressors are some of the larger facilities within the study area that handle hazardous materials. Additionally, hazardous materials are transported down many roads within the region on a daily basis.

Hazardous materials incidents typically take two forms: fixed facility incidents and transportation incidents. Transportation incidents are substantially harder to prepare for because they can occur at any place, although the vast majority occurs on interstate highways or on major rail lines.

As previously referenced, flooding, forest fires, severe weather and manmade hazards have been identified in local Hazard Mitigation Plans as the most likely concerns within the region. Primary response to these events will be local police, fire, and emergency management personnel. In both Tennessee and Virginia, local jurisdictions have Emergency Disaster Preparedness Plans establishing agency responsibilities and response for various types of incidents.

**Bristol Motor Speedway.** Given the location of Bristol Motor Speedway and the large numbers of people in the area during race events, both Bristol, Tennessee, and Sullivan
County included the facility in their local Hazard Mitigation Plans. The vulnerability is directly related to the ability to evacuate people in the event of a disaster, whether weather-related or terrorism-related. BMS has an Emergency Operations Plan and the multiple law enforcement, fire, medical, and emergency management agencies on local, state, and federal levels coordinate closely during events. A Multi-Agency Command Center (MACC) is established for major events.

**OBJECTIVES AND PROPOSED ACTIONS**

Although the Bristol MPO will play a supporting role in the efforts to mitigate security risks, it will continue to communicate with appropriate agencies to assist in their transportation system needs and to engage emergency and law enforcement personnel in transportation planning activities. An objective of the MPO is to ensure that the transportation system is capable of handling a response to an emergency. This can be achieved by providing multiple alternative routes through road network connectivity in the case of highway closures, ensuring sufficient emergency personnel and equipment access along the transportation system, and utilizing ITS and other measures to effectively handle an evacuation.

In the development of the *Bristol Urban Area Long Range Transportation Plan 2035*, security projects are undifferentiated from other more traditional projects. For example, a highway improvement project may be classified primarily as reconstruction to a four-lane facility, but will also result in additional capacity for emergency evacuation. The security objectives of the MPO include the following activities:

- Maintenance of an Intelligent Transportation System Plan for implementing and operating ITS technologies.

- Support programs and agencies involved in incident management and emergency situations to ensure safe, secure operations of the transportation system for motorized and non-motorized users.

- Encourage and support disaster, emergency and incident response preparedness and recovery.
CHAPTER 8: FINANCIAL ANALYSIS

The Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEA-LU) legislation requires the preparation of a long-range transportation plan that is realistic, both from an implementation and a financial standpoint. The needs of highway users, transit users, pedestrians, and bicyclists, as well as all other modes of transportation will all need to be weighed against the other needs of the community. An adequate transportation infrastructure will allow the Bristol urban area to continue to grow as an economic center and enhance the quality of life for the community. The transportation plan is considered financially constrained when all the proposed project costs do not exceed projected revenues. Financially constraining the transportation plan provides a realistic account of what projects and programs can be accomplished.

Transportation projects are funded through many different sources. Most projects are funded with some combination of federal, state, and local funds. The greatest funding source for highway and road projects, as well as public transportation, is from the federal government. Chart 8-1 shows the average percent of annual dollars spent per year (2001-2010) by funding source within the Tennessee-Virginia MPO study area.

**Chart 8-1**
Percent of Annual Funding Sources (2001-2010)
in the Tennessee-Virginia MPO Area

![Chart showing funding sources]

Federal Highway 65%
State 19%
Local 9%
Federal Transit 7%
**PART A: FINANCIAL RESOURCES**

**STREETS AND HIGHWAYS**

*Federal Funding.* The Highway Trust Fund was established in 1956 by the Federal-Aid Highway Act and the Highway Revenue Act in order to create a financing mechanism for the interstate highway system. The largest funding source for street and highway projects is from the federal government. The funds come from motor fuel taxes and are administered by the Federal Highway Administration. The Highway Trust Fund is not a permanent fund and must be extended by legislation. SAFETEA-LU then authorizes spending under the Highway Trust Fund. A description of the major federal funding programs is outlined below.

National Highway System (NHS) projects can be funded only if they are on the National Highway System, which is established by Congress. Roadways eligible for this funding include rural and urban roads serving major population centers, international border crossings, intermodal transportation centers, and major travel destinations. It includes the Interstate System, other urban and rural principal arterials, highways that provide motor vehicle access between the NHS and major intermodal transportation facilities, the defense strategic highway network, and strategic highway network connectors. Funding distributed to each state is based on lane-miles of principal arterials (excluding Interstate), vehicle-miles traveled on those arterials, diesel fuel used on the State’s highways, and per capita principal arterial lane-miles. The highways in the Bristol Urban Area which are designated NHS routes include Interstate 81, Interstate 381, Commonwealth Avenue, Volunteer Parkway/Highway 11E, and Highway 11W west of Interstate 81.

The Interstate System/Interstate Maintenance (IM) program funds reconstruction, maintenance, and improvements to the National System of Interstate and Defense Highways. These funds provide for the ongoing work necessary to preserve and improve Interstate highways. The Tennessee and Virginia Departments of Transportation administer these programs. Funding is based on each state’s lane-miles of Interstate routes open to traffic, vehicle-miles traveled on those routes, and contributions to the Highway Trust Fund attributable to commercial vehicles.

The Surface Transportation Program (STP) provides a flexible funding program for planning, construction, reconstruction, and rehabilitation that may be used by states and localities for projects on any Federal-Aid Highway, including the NHS, and bridge projects on any public road. These funds can also be used for non-highway projects such as transit capital projects and public bus terminals and facilities. SAFETEA-LU expanded the STP eligibilities to include advanced truck stop electrification systems, high crash or high congestion intersections, environmental restoration and pollution abatement, control of noxious weeds, and the establishment of native species. STP funds are distributed to the states based on lane-miles of Federal-Aid highways, total vehicle-miles traveled on those highways, and contributions to the Highway Trust Fund. The Bristol Urban Area receives
an annual allocation, based on population, from both Tennessee and Virginia under this program from which to develop projects. The Tennessee and Virginia Departments of Transportation administer the remainder of each state's allocation of STP funds. In addition, states must set aside ten percent of their STP funds for transportation enhancement activities.

The Bridge Rehabilitation and Replacement Program provides funding for any bridge rehabilitation and replacement on public roads. Eligibility for funding is based on a rating of bridge condition by the Tennessee or Virginia DOT as a candidate for rehabilitation or replacement. Each State must spend at least 15% of its bridge apportionment for bridges on public roads that are not on Federal-Aid highways (off-system bridges).

The Highway Safety Improvement Program (HSIP) was established as a core program with the authorization of SAFETEA-LU. The program provides flexibility for states to target funds to their most critical safety needs. A portion of the program funding is set aside for the Railway-Highway Crossing program, with the remainder distributed by formula based on each state’s lane-miles, vehicle-miles traveled, and number of fatalities.

The American Recovery and Reinvestment Act (ARRA) provided an influx of new federal funding for transportation infrastructure. The goal of the ARRA, signed into law in February 2009, is to stimulate economic growth and new job creation. This funding has helped local jurisdictions and state agencies to accelerate existing projects and advance new projects to the implementation stage. Within the Bristol MPO planning area, the primary use of these funds has been traffic signal and resurfacing projects; however, eligible uses include all the programs identified under the Surface Transportation Program.

State Funding. In addition to the Federal Highway Trust Fund, the State of Tennessee and Commonwealth of Virginia provide funding to finance street and highway improvements.

The State of Tennessee has legislation that establishes funding for highways and public transportation through motor fuel taxes and vehicle registrations. A variety of programs exist, including allocations to cities and counties for maintenance and construction projects. A portion of the money is retained by TDOT for ongoing maintenance and operations, resurfacing, bridges, major reconstruction, new construction, right-of-way purchases, and to match federal funds. Many major highways are on both the state and federal highway system and may qualify for improvements under either funding source depending upon resource availability. In 1986, the Tennessee General Assembly developed and authorized the 1986 Roads Program, which identified specific projects in the legislation for improvement. These projects were funded via a special tax per gallon of gasoline and motor fuel. The construction of State Route 394 in Bristol, Tennessee, and Sullivan County was funded through the 1986 Roads Program.

The Commonwealth of Virginia legislation that establishes funding for highways and public transit programs is through a combination of sales and transportation-related taxes. In addition to the Commonwealth Transportation Fund, the General Assembly also authorizes
the issuance of revenue bonds for special transportation projects. The Virginia Transportation Act of 2000 (VTA) created the Priority Transportation Fund and permanently commits General Fund revenues to transportation, primarily dedicated to debt service on bonds.

**Local Funding.** At the local level, the two major sources of transportation revenues include the general fund and the issuance of bonds for major transportation improvements. The primary source of operation and maintenance funds for highways is the general fund of the local city or county. For utilization of general funds, transportation projects compete with all municipal or county services for limited funding availability. Bonds provide a longer-term payment period and a dedicated funding source for larger capital projects. Local jurisdictions also provide local funding to match federal or state funds for local transportation projects.

**PUBLIC TRANSPORTATION**

**Federal Funding.** The Federal Transit Administration (FTA) administers several programs providing services within the Bristol Urban Area. Each year Bristol Tennessee Transit and Bristol Virginia Transit are designated recipients of FTA Section 5307 Formula Program funding. This funding can be utilized for capital and/or operating assistance. For special projects, FTA Section 5309 funds are available for capital expenses, which is a discretionary funding program. Funding under this program is competitive and has historically been used to fund major capital projects such as bus purchases and capital facilities.

Job Access and Reverse Commute (JARC) Section 5316 provides formula grants to expand mass transportation services for welfare recipients and low-income individuals to and from work and to access suburban employment opportunities. Provisions of the JARC program require coordination between private, non-profit, and public transportation providers for funding eligibility. JARC funds are distributed to states based on formulae involving the number of eligible low-income and welfare recipients.

Section 5317, the New Freedom Program, was established under the SAFETEA-LU legislation to provide formula funding for new transportation services and public transportation alternatives beyond those required by the Americans with Disabilities Act (ADA) to assist persons with disabilities. These funds are available to transit systems and states based on a formula including the disabled population in the state. In addition, the New Freedom Program requires coordination of transportation services with other federal human service programs.

The American Recovery and Reinvestment Act (ARRA) provided an influx of new federal funding for public transportation infrastructure. The goal of the ARRA, signed into law in February 2009, was to stimulate economic growth and new job creation. The new funding has helped local jurisdictions to advance new projects and procurements to implementation.
For transit programs, ARRA funding is available for capital projects only. Within the Bristol MPO planning area, the primary use of these funds has been for rolling stock replacement.

Sullivan County, Tennessee, and Washington County, Virginia, both receive funding under the FTA Section 5311 Rural Program. The First Tennessee Human Resource Agency is the recipient of these funds for Sullivan County, Tennessee, and the District III Government Cooperative is the designated recipient for Washington County, Virginia. These agencies provide public transportation for multi-county regions in northeastern Tennessee and southwestern Virginia.

**State Funding.** The State of Tennessee and the Commonwealth of Virginia provide additional funds for capital and operating assistance programs that are partially funded by the Federal Transit Administration. For Tennessee, most funding levels are based on formulae that consider local population and numbers of transit trips provided. Virginia distributes funds from the Commonwealth Mass Transit Fund based on the proportion that local transit expenses bear on the total statewide transit expenditures.

**Local Funding.** The City of Bristol, Tennessee and the City of Bristol, Virginia provide matching funds for capital and operating programs that are partially funded by federal and state transit monies. This local funding comes from the General Fund. Fare-box revenue and advertising displays on vehicles also provide additional financial support for Bristol Tennessee Transit and Bristol Virginia Transit. The rural transportation agencies receive local funding support from the participating counties they serve.

**OTHER MODES**

The Federal Railroad Administration (FRA) administers the Railroad Rehabilitation and Investment Financing Program (RRIF) that offers various loan enhancements to public or private sponsors of intermodal and rail capital projects, including acquisition, development, improvement, or rehabilitation of intermodal or rail equipment and facilities. Because rail infrastructure is almost exclusively privately owned, railroads have traditionally been privately funded. Government programs do support some rail-related works such as grade crossings and railroad grade separations. In Tennessee, the TDOT track and bridge rehabilitation program provides funding for shortline railroads. The Local Freight Rail Assistance program provides financial support to states for the continuation of rail freight service on abandoned light-density lines.

The Transportation Enhancement set-aside under SAFETEA-LU and the previous federal highway acts are major sources source of funding for bicycle and pedestrian projects. Ten percent of the STP fund is set aside for bicycle and pedestrian projects, including greenways and pedestrian paths. Most the greenways and pedestrian/bicycle facilities within the MPO study area have been funded with the Transportation Enhancement program. The Virginia and Tennessee Departments of Transportation can expand construction projects to include sidewalks and increased shoulder widths for bicyclists. Incorporation of pedestrian and
bicycle design into new roadways and roadway enhancements minimize the cost of having to incorporate these into existing roads. In addition, local governments provide funding for sidewalk construction and maintenance on an annual basis utilizing general funds.

The SAFETEA-LU legislation also established the Safe Routes to School Program (SRTS) to enable and encourage primary and secondary schoolchildren to walk and bicycle to school. Infrastructure improvements as well as educational/behavioral projects are funded to provide a safe, appealing environment for walking and bicycling to school. The intent of this program is to support national health objectives by reducing traffic, fuel consumption, and air pollution in the vicinity of schools.

**POTENTIAL REVENUE SOURCES**

Identification and utilization of user fees to support the transportation system can help guarantee a steady flow of funding for transportation improvements. Many revenue sources are utilized throughout the country. These sources of funding can include toll facilities, local fuel taxes, local motor vehicle taxes, and road improvement districts. Although a number of options are available, it is extremely difficult from a political standpoint to implement new revenue sources; any revenue source is perceived as an increase in taxes. Public acceptance is important when instituting taxes and user charges and can influence the feasibility of potential revenue sources or strategies. Additionally, some revenue sources require authorizing legislation and may require extensive legal research and analysis.

A number of criteria should be considered when evaluating additional sources of transportation revenue. These include: (1) the amount of revenue that can be produced, (2) revenue stability and how the revenue stream is likely to change over time, (3) marketability and public acceptance, (4) equity in who is paying, (5) legality and regulatory requirements, and (6) administrative costs of revenue collecting and monitoring mechanisms.

This information provides a basis for future dialogue on financing transportation improvement projects and none of these options are being recommended at this time nor included in the financial forecast for the *Bristol Urban Area Long-Range Transportation Plan Year 2035*.

**PART B: PROJECTED REVENUE**

**STREETS AND HIGHWAYS**

In spite of the importance of better highway system management, new construction is inevitable in order to accommodate the economic growth for the urban area over the next twenty-five years. Highway needs ranging from new regional alternative routes to Interstate improvements to widening of existing arterial and collector systems are all transportation improvements which have been identified by area planners, engineers, and residents.
The Tennessee and Virginia Departments of Transportation serve as the pass-through agencies for the federal dollars that come to the Bristol urban area for roadway improvements. The major identified sources of federal funding include the SAFETEA-LU programs for the National Highway System and the Surface Transportation Program. The motor fuel tax is the single largest source of revenue for transportation spending; however, federal fuel-efficiency standards and tax rate based on a per-gallon charge rather than a price percentage charge will have a negative impact on the role of the gas tax as a revenue stream. When considering transportation system funding, the significance of these impacts are the revenue from a per-gallon gas tax will fall in comparison to traffic volumes. Greater fuel efficiency means that states will receive less revenue per vehicle-mile traveled.

A historical review of the federal, state, and local funding programmed through the Transportation Improvement Program, for a ten-year funding period, identifies approximately $19.3 million in federal, state, and local funds that have been utilized within the Tennessee portion of the MPO. The Virginia portion of the MPO has been allocated approximately $30.7 million in federal, state, and local funding since 2001; however, a large percentage of this funding was dedicated to deficit funding for the widening of Interstate 81 to six lanes. This is based on previous allocations in the VDOT Six-Year Plan and Transportation Improvement Program for Virginia.

**TENNESSEE PROJECTED REVENUE SOURCES**

**Methodology.** To project future revenue for the *Bristol Urban Area Long-Range Transportation Plan Year 2035* for Tennessee sources, an average funding per year was established based on historic funding levels. However, local STP funding was adjusted to reflect the current local allocations and required local match. In addition, the current balance of Tennessee local STP funds was included in the first horizon tier of 2010 to 2020.

Based on the requirements of SAFETEA-LU, metropolitan transportation plans must use an inflation rate to reflect “year of expenditure dollars.” For the *Bristol Urban Area Long-Range Transportation Plan Year 2035*, a three percent annual growth rate was utilized to project future revenues for Tennessee, which is based on the assumed inflation rate established for the *Tennessee Long-Range Transportation Plan*.

**Projected Revenue.** Utilizing this methodology, the MPO is estimated to receive approximately $63 million from Tennessee sources through the planning horizon year 2035. This estimate is based on a trend analysis of funding sources that are reasonably expected to be available and does not account for any new funding sources. However, the revenue projection does include additional state funding in Tennessee for the first horizon tier (2010 to 2020) committed for the US 11E and US 19E interchange project under development in 2010.

Table 8-1 identifies the projected revenues for the Tennessee portion of the MPO study area.
Table 8-1

Streets and Highways Projected Revenues from Tennessee Funding Sources

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>Previous Balance</th>
<th>Projected 2010-2020</th>
<th>Projected 2021-2035</th>
<th>Total 2010-2035</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHS/IM</td>
<td>$1,031,749</td>
<td>$2,367,002</td>
<td>$3,398,751</td>
<td></td>
</tr>
<tr>
<td>BR</td>
<td>$97,443</td>
<td>$212,461</td>
<td>$309,904</td>
<td></td>
</tr>
<tr>
<td>STP-State</td>
<td>$14,053,600</td>
<td>$11,199,440</td>
<td>$25,253,040</td>
<td></td>
</tr>
<tr>
<td>STP-Local</td>
<td>$2,774,456</td>
<td>$11,556,416</td>
<td>$19,631,105</td>
<td></td>
</tr>
<tr>
<td>HSIP-Safety</td>
<td>$110,535</td>
<td>$241,000</td>
<td>$351,535</td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>$3,556,000</td>
<td>$5,793,380</td>
<td>$9,349,380</td>
<td></td>
</tr>
<tr>
<td>Local</td>
<td>$2,018,672</td>
<td>$2,889,104</td>
<td>$4,907,776</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$2,774,456</td>
<td>$26,168,232</td>
<td>$34,258,803</td>
<td>$63,201,491</td>
</tr>
</tbody>
</table>

Notes: Local STP funding adjusted to reflect current annual allocation. Local funds reflect STP local match.

State funding for transportation projects will continue to be funded through transportation-related taxes such as motor fuel taxes, and, in some cases, revenue bonds. It should be noted that state funding is discretionary and based on priority projects endorsed and approved by the state legislature. At the local level, funding sources have included the general fund, which is primarily from property taxes, and the issuance of bonds for major transportation improvements. A review of Capital Improvement Program budgets for local governments did not identify any regionally significant projects utilizing local funds.

VIRGINIA PROJECTED REVENUE SOURCES

Methodology. To project future Virginia revenue for the Bristol Urban Area Long Range Transportation Plan Year 2035, revenue projections were provided by VDOT based on the Commonwealth’s 2010-2015 financial plans. VDOT predicts revenues from various sources are all expected to increase in actual dollars; however the need for transportation spending will also expand. Over the past few years, Virginia’s budget has been insufficient to meet the maintenance needs of transportation infrastructure. As a result, covering the cost of maintenance will leave less available revenue for capital projects to expand the transportation system’s capacity. As a result, Virginia has been forced to transfer money from its fund for new capacity to its fund for maintenance. It should be noted that the
Virginia Department of Transportation is required by appropriations legislation to prioritize maintenance needs over construction of new highway capacity. [Source: *Virginia’s Long-Range Multimodal Transportation Report 2007-2035.*]

This funding crossover from capital funding to maintenance funding has a significant impact on the future VDOT revenue projections for the MPO. Based on requirements of SAFETEA-LU, metropolitan transportation plans must use an inflation rate to reflect “year of expenditure dollars.” Although the future federal revenue growth is based on an estimated fuel consumption of 0.6%, the overall funding for all sources averages 2.6% annually through the year 2035. Future revenue projections include the assumption that the transfer from construction funds to maintenance funds will grow tremendously. As a result, VDOT does not recommend the MPO utilizing future revenue funding based on historical trends.

**Projected Revenue.** Utilizing the methodology provided by VDOT, the MPO is estimated to receive approximately $32.9 million from Virginia sources through the planning horizon year 2035. This estimate is based on Virginia’s analysis of funding sources that are reasonably expected to be available and does not account for any new funding sources.

Table 8-2 identifies the projected revenues for the Virginia portion of the MPO study area.

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>Previous Balance</th>
<th>Projected 2010-2020</th>
<th>Projected 2021-2035</th>
<th>Total 2010-2035</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHS/IM</td>
<td>$1,464,000</td>
<td>$3,883,569</td>
<td>$153,886</td>
<td>$5,501,455</td>
</tr>
<tr>
<td>BR</td>
<td>$0</td>
<td>$6,487,064</td>
<td>$2,668,657</td>
<td>$9,155,721</td>
</tr>
<tr>
<td>STP-State</td>
<td>$1,004,000</td>
<td>$1,831,571</td>
<td>$3,078,432</td>
<td>$5,914,003</td>
</tr>
<tr>
<td>STP-Local</td>
<td>$1,087,000</td>
<td>$230,814</td>
<td>$0</td>
<td>$1,317,814</td>
</tr>
<tr>
<td>HSIP- Safety</td>
<td>$900,000</td>
<td>$1,029,906</td>
<td>$1,428,422</td>
<td>$3,358,328</td>
</tr>
<tr>
<td>State</td>
<td>$620,000</td>
<td>$2,005,803</td>
<td>$810,323</td>
<td>$3,436,126</td>
</tr>
<tr>
<td>Local</td>
<td>$29,000</td>
<td>$1,400,845</td>
<td>$2,756,675</td>
<td>$4,186,520</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$5,104,000</strong></td>
<td><strong>$16,869,572</strong></td>
<td><strong>$10,896,395</strong></td>
<td><strong>$32,869,967</strong></td>
</tr>
</tbody>
</table>

**Note:** Previous Balance represents funds allocated to committed projects.

State funding for transportation projects will continue to be funded through transportation related taxes such as motor fuel taxes and in some cases revenue bonds. It should be noted that state funding is discretionary and based on priority projects endorsed and approved by
the Commonwealth Transportation Board. At the local level, funding sources have included the general fund, which is primarily from property taxes, and the issuance of bonds for major transportation improvements; however, no regionally significant projects utilizing local funds were identified for this plan.

**Operations and Maintenance**

In order to maximize the efficiency of the street and highway system, local governments must maintain and make modifications to the existing system. If new improvements or existing roadways are not maintained properly, then the transportation system is not functioning at its capacity and new investments are not fully realized. As previously discussed, maintenance costs are anticipated to continue to increase significantly over the life of this plan in both Tennessee and Virginia. In fact, Virginia anticipates maintenance costs could potentially consume Virginia’s entire transportation budget within the next 20 years.

In Washington County, Virginia, all public roads are maintained by the Virginia Department of Transportation. As an independent city, the City of Bristol, Virginia receives an allocation of maintenance funds from VDOT for City streets. In Tennessee, counties and municipalities receive an annual allocation of maintenance funds from the Tennessee Department of Transportation. For Tennessee counties to be eligible for state gas tax funds, they are required to annually allocate funds for road maintenance from local revenue sources in an amount not less than the average of the five preceding fiscal years.

Both the Tennessee and Virginia Departments of Transportation provided the MPO with revenue allocations for operations and maintenance. Likewise, both TDOT and VDOT anticipate maintenance costs to increase four percent annually and the federal share of maintenance funding minimized to the amount needed to support growth. The assumption is operations and maintenance revenues will continue to be available for the life of this plan as funding will be prioritized to maintain the existing infrastructure.

Table 8-3 displays the 2010 annual costs for maintenance and operations for the MPO study area. Table 8-10 indicates the projected operations and maintenance costs for the lifespan of this plan.
Table 8-3

2010 Annual Operating and Maintenance Costs

<table>
<thead>
<tr>
<th>Area</th>
<th>Current Annual Expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tennessee MPO Area</td>
<td>$11,700,000</td>
</tr>
<tr>
<td>Virginia MPO Area</td>
<td>$11,292,000</td>
</tr>
<tr>
<td>Total</td>
<td>$22,992,000</td>
</tr>
</tbody>
</table>

**PUBLIC TRANSPORTATION**

The cost of providing the current level of public transportation services is expected to rise at a moderate level over the period of this plan, based on inflation. Bristol Tennessee Transit and Bristol Virginia Transit have utilized federal and state operating assistance to support public transportation for the Bristol area, which have primarily been funds from the Federal Transit Administration 5307 Formula Program and state operating assistance program.

Federal assistance has been essential for small urban areas to provide public transportation. Public transportation in the Bristol urban area provides a needed service for those who are elderly, disabled, and those who have no other means of transportation to work, medical care, or basic services. The demand for rural and ADA paratransit transportation services will continue to increase as changing demographics and lifestyles have produced increased demands for these services.

Funding for these services is supported by the Federal Transit Administration, the State of Tennessee, and the Commonwealth of Virginia as well as local funds. Revenue projections for transit formula funds were based on historic levels of allocations. A relatively steady allocation of future funds is anticipated and local funds to match federal and state dollars is assumed to continue over the life of this plan. A ten-year trend analysis of transit funding identifies approximately $4.8 million of federal and state operating and capital funds have been allocated to Bristol Virginia Transit for the past decade. Bristol Tennessee Transit has been allocated approximately $6.3 million of federal and state operating and capital funds. Capital assistance has primarily been allocated based on replacement cycles for transit fleets, with the exception of the construction of the downtown transfer facility in 2004.

The American Recovery and Reinvestment Act (ARRA), signed into law in 2009, provided an influx of new federal funding for public transportation infrastructure. Both Bristol Tennessee Transit and Bristol Virginia Transit were allocated ARRA funds. The additional new funding has helped advance local capital projects and procurements to implementation; however, this is not a reoccurring source of transit funding. For the Bristol transit systems, the primary use of these funds has been for rolling stock replacement.
The Federal Transit Administration and state governments will continue to be the major funding source for public transportation in the Bristol urban area. At the federal level, the Federal Transit Administration is the primary source for transit funding. There are four funding programs that are available to transit operations in the Bristol study area. Section 5307 Formula Capital and Operating Grant programs make funds available to all urbanized areas to finance transit capital and operating expenses. Section 5309 Discretionary Grant funding provides capital assistance to transit projects for major bus-related construction projects or equipment acquisition. The Section 5310 program allows the purchase of transit capital equipment and contracted services for private and non-private corporations and associations providing mass transportation services for the elderly and disabled. The Section 5311 Program is for the purchase of capital and operating expenses for transit services in rural areas. SAFETEA-LU established the New Freedom Program funding program to assist persons with disabilities and continued the funding for local transit systems to utilize Section 5316 for Job Access transportation. As long as these funding sources are available for operating and capital projects, the current level of service can be maintained for local communities.

The State of Tennessee has significantly increased its contribution to transit systems statewide for the last several years, although allocations from TDOT are not a dedicated funding source. Virginia provides state funding through the Commonwealth Mass Transit Fund.

Transit Operating Funds. Projections in transit operating and maintenance funds for Bristol Tennessee Transit and Bristol Virginia Transit represent maintenance of the existing system with no service additions. Salaries and fringe benefits are, and will continue, to be the greatest burden on the BTT and BVT operating budgets. There are no problem areas anticipated locally with regard to changes in labor cost or maintenance expenses. The only major cost increases would be those associated with nation economic trends, such as increases in fuel and insurance costs. Based on modest population and employment projects for the Bristol Urban Area Long-Range Transportation Plan Year 2035, ridership and farebox revenues will continue to remain consistent with current trends. The demand for paratransit services will provide the most pressure on operating budgets in outlying years servicing an increasing elderly population within the region.

Utilizing a ten-year historical review of local transit budgets, an average per year was established for federal, state, and local operating assistance for Bristol Tennessee Transit and Bristol Virginia Transit. The base year funding was projected through the life of the plan utilizing a three percent annual growth rate for transit revenue. Table 8-4 and Table 8-5 provide estimated operating revenues for Bristol Tennessee Transit and Bristol Virginia Transit.
Table 8-4
Bristol Tennessee Transit Projected Operating Revenues

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>Projected 2010-2020</th>
<th>Projected 2021-2035</th>
<th>Total 2010-2035</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal (FTA)</td>
<td>$2,685,322</td>
<td>$5,854,969</td>
<td>$8,540,291</td>
</tr>
<tr>
<td>State</td>
<td>$1,231,495</td>
<td>$2,685,104</td>
<td>$3,916,599</td>
</tr>
<tr>
<td>Local</td>
<td>$1,167,608</td>
<td>$2,545,805</td>
<td>$3,713,413</td>
</tr>
<tr>
<td>Farebox</td>
<td>$254,808</td>
<td>$555,572</td>
<td>$810,380</td>
</tr>
<tr>
<td>Total</td>
<td>$5,339,233</td>
<td>$11,641,450</td>
<td>$16,980,683</td>
</tr>
</tbody>
</table>

Table 8-5
Bristol Virginia Transit Projected Operating Revenues

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>Projected 2010-2020</th>
<th>Projected 2021-2035</th>
<th>Total 2010-2035</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal (FTA)</td>
<td>$1,712,497</td>
<td>$3,733,861</td>
<td>$5,446,358</td>
</tr>
<tr>
<td>State</td>
<td>$962,565</td>
<td>$2,098,737</td>
<td>$3,061,302</td>
</tr>
<tr>
<td>Local</td>
<td>$1,909,745</td>
<td>$4,163,931</td>
<td>$6,073,676</td>
</tr>
<tr>
<td>Farebox</td>
<td>$300,927</td>
<td>$656,129</td>
<td>$957,056</td>
</tr>
<tr>
<td>Total</td>
<td>$4,885,734</td>
<td>$10,652,658</td>
<td>$15,538,392</td>
</tr>
</tbody>
</table>

Transit Capital Funds. Due to completion of relatively new transit facilities, Bristol Tennessee Transit and Bristol Virginia Transit do not foresee the development of any major capital projects during the projected period of this financial forecast. For the existing level of service to remain consistent, it is anticipated that capital funds will primarily be required for replacement vehicles, which are budgeted using a normal vehicle replacement cycle of four to five years for vans and support vehicles, and seven to ten years for buses. Vehicle replacement will continue be funded with federal and state capital funds including local dollars.

For financial forecast purposes, a review of the last ten years of capital funding was utilized to establish a trend in capital expenditures and funding resources. As with the operating assistance, the average annual capital funding was projected to the year 2035 utilizing a three percent annual growth rate. Although no major facilities are programmed for the life of this
plan, it can be expected that some rehabilitation of facilities would be required in the outlying years. Because construction and rehabilitation does not occur on an annual basis, no average cost per year was established and projected on an annual basis. It is anticipated that this non-reoccurring capital expense would continue to be funded at the previous revenue level with a three percent inflation rate for Bristol Tennessee Transit. For Bristol Virginia Transit, facility rehabilitation funds are based on the current revenues identified by the Virginia Department of Rail and Public Transportation.

Annual capital revenues for Bristol Tennessee Transit are identified in Table 8-6. This estimate represents reoccurring revenue associated with vehicle replacement, associated maintenance costs, etc., as well as capital revenues projected for facilities.

### Table 8-6
**Bristol Tennessee Transit Capital Revenues 2010-2035**

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>Projected 2010-2020</th>
<th>Projected 2021-2035</th>
<th>Total 2010-2035</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal (FTA)</td>
<td>$1,263,698</td>
<td>$2,755,316</td>
<td>$4,019,014</td>
</tr>
<tr>
<td>State</td>
<td>$486,985</td>
<td>$1,061,804</td>
<td>$1,548,789</td>
</tr>
<tr>
<td>Local</td>
<td>$220,565</td>
<td>$840,911</td>
<td>$1,061,476</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$1,971,248</strong></td>
<td><strong>$4,658,031</strong></td>
<td><strong>$6,629,279</strong></td>
</tr>
</tbody>
</table>

Annual capital revenues for Bristol Virginia Transit are identified in Table 8-7 and represent reoccurring capital revenue associated with vehicle replacement, associated maintenance costs, etc., as well as the capital revenues projected for facilities. In addition, Bristol Virginia Transit has historically received flexed STP funds allocated by the DRPT.
Table 8-7
Bristol Virginia Transit Capital Revenues 2010-2035

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>Projected 2010-2020</th>
<th>Projected 2021-2035</th>
<th>Total 2010-2035</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal (FTA)</td>
<td>$234,665</td>
<td>$511,661</td>
<td>$746,326</td>
</tr>
<tr>
<td>Federal (STP)</td>
<td>$224,692</td>
<td>$489,918</td>
<td>$714,610</td>
</tr>
<tr>
<td>State</td>
<td>$42,932</td>
<td>$96,600</td>
<td>$139,532</td>
</tr>
<tr>
<td>Local</td>
<td>$164,564</td>
<td>$358,808</td>
<td>$523,372</td>
</tr>
<tr>
<td>Total</td>
<td>$666,853</td>
<td>$1,456,987</td>
<td>$2,123,840</td>
</tr>
</tbody>
</table>

OTHER MODES

Bicycle and pedestrian facilities have been primarily funded with Transportation Enhancement funds, which provide 80 percent federal funding and require a 20 percent local match. Although Enhancement funding is competitive and not guaranteed annually, the MPO has consistently received funds through this program and expects to continue to receive Enhancement funding. The base year for this funding source was assumed to be the average of the last ten years of grant awards and projected at a three percent inflation rate for Tennessee and 2.6 percent for Virginia. Although the projected Enhancement funding is based on grant awards for the urban area, it should be noted that the MPO programs enhancement funds as “grouped” or “bucket” projects, which allows flexibility in securing project authorizations and obligations without specific project data included in the Transportation Improvement Program.

It is important to note that highway revenue (Surface Transportation Program) is not specific only to highway related projects and can also be utilized for many types of projects including bicycle facilities, sidewalks, and greenways.

Other available funds for enhancements include the Safe Routes to School Program and Roadscapes funding for highway beautification. Although these funds have been limited in the urban area, the opportunity for successful grant awards for local jurisdictions during the life of this plan is realistic to assume.

Tables 8-8 and 8-9 provide the projected funding for other transportation modes in Tennessee and Virginia, respectively.
### Table 8-8
#### Tennessee Grant Funding for Other Modes

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>Projected 2010-2020</th>
<th>Projected 2021-2035</th>
<th>Total 2010-2035</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhancement/SRTS</td>
<td>$377,976</td>
<td>$824,110</td>
<td>$1,202,086</td>
</tr>
<tr>
<td>Local</td>
<td>$94,494</td>
<td>$206,028</td>
<td>$300,522</td>
</tr>
<tr>
<td>Total</td>
<td>$472,470</td>
<td>$1,030,138</td>
<td>$1,502,608</td>
</tr>
</tbody>
</table>

### Table 8-9
#### Virginia Grant Funding for Other Modes

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>Projected 2010-2020</th>
<th>Projected 2021-2035</th>
<th>Total 2010-2035</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhancement/SRTS</td>
<td>$448,419</td>
<td>$930,246</td>
<td>$1,378,665</td>
</tr>
<tr>
<td>Local</td>
<td>$112,105</td>
<td>$323,561</td>
<td>$344,666</td>
</tr>
<tr>
<td>Total</td>
<td>$560,524</td>
<td>$1,162,807</td>
<td>$1,723,331</td>
</tr>
</tbody>
</table>

---

**PART C: FINANCIALLY CONSTRAINED PLAN**

Federal legislation requires that long-range transportation plans include a financial analysis that demonstrates how the plan can be implemented and identifies funding reasonably expected to be available. As previously discussed in this document, there are a variety of funding sources available for transportation improvements in the Bristol urban area. The largest source of funding comes from federal and state resources over which the MPO does not have direct control. The smaller of the federal funding sources such as the Local Surface Transportation Program can be determined directly by the MPO. Typically, local funds are used to meet match requirements for federal and state funding sources. Regional projects identified in this plan represent projects beyond the scope of funding available to the MPO or local jurisdictions and would require a specific appropriation of state revenue for implementation.

A revenue forecast is required to establish a fiscally constrained long-range transportation plan. Utilizing past funding trends, as well as current programmed allocations and Departments of Transportation forecasts, funding projections have been estimated for the lifetime of the *Bristol Urban Area Long-Range Transportation Plan Year 2035*. Revenues are then compared to the costs to demonstrate the plan is financially constrained. While this
analysis uses specific cost and revenue information, it provides only a planning level analysis. That analysis is subject to the following limitations:

- The financial projections are for a period of more than twenty years, during which time significant changes in travel behavior, local economies, and federal funding priorities are possible.
- Projections of federal funding involve uncertainty due to changes in federal transportation policy, budget and deficit reduction plans, and because many funds are administered on a statewide basis.
- Cost estimates are general and based on a simplified methodology and may change upon the completion of specific design plans for construction.

**Project Cost.** As with revenue projections, SAFETEA-LU requires the metropolitan long-range transportation plan to utilize an inflation rate to project future cost for the “year of expenditure.” Based on joint FTA/FHWA guidance on fiscal constraint, the Bristol Urban Area Long-Range Transportation Plan Year 2035 utilized the recommended four percent annual inflation rate for construction costs for 2007 and beyond. This inflation rate was applied to highway as well as transit capital improvements. Transit operating expenditures were assumed to parallel available revenue as local agencies have more control to maintain cost. However, unanticipated program cost increases in the outlying years of this plan may require the redistribution of transit capital funds to operating assistance.

**STREETS AND HIGHWAYS**

In order to establish a financially constrained plan, highway projects costs are identified in Appendices D and E. Existing planning studies, Transportation Planning Reports, and local jurisdiction engineering estimates were utilized to determine project costs. Each project cost was projected using a future value with an inflation rate of four percent. The amount of years the future value was inflated to was the middle point of the horizon year. It is assumed that half of the projects will be funded before the middle of the network year and half will be funded after the middle of the network year. For example, it is assumed that for the horizon years 2010-2020, half of the projects will be funded before year 2010 and half after year 2015. Therefore, all project costs programmed for 2010-2020 were inflated to the year 2015.

**Operations and Maintenance.** Costs associated with operations and maintenance were derived from annual costs provided by the Tennessee and Virginia Departments of Transportation. For both Tennessee and Virginia, costs were inflated four percent annually to determine an annual operation and maintenance cost for outlying years in the plan. It is assumed that the same level of service will be maintained per year by each jurisdiction/agency in the future years. For the life of this plan, it is anticipated funds will be allocated to maintain the existing infrastructure prior to new capital investments. As a result, the assumption regarding operations and maintenance revenues is that sufficient funds will continue to be available.
The cost for operations and maintenance are provided in Table 8-10 with a cumulative total for the plan horizon year of 2035.

**Table 8-10**  
Operating and Maintenance Cost 2010-2035

<table>
<thead>
<tr>
<th>Area</th>
<th>0 &amp; M Cost 2010-2020</th>
<th>O &amp; M Cost 2021-2035</th>
<th>Cumulative Total 2010-2035</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tennessee MPO Area</td>
<td>$146,090,311</td>
<td>$360,657,100</td>
<td>$506,747,411</td>
</tr>
<tr>
<td>Virginia MPO Area</td>
<td>$150,841,228</td>
<td>$313,897,452</td>
<td>$464,738,680</td>
</tr>
<tr>
<td>Total</td>
<td>$296,931,539</td>
<td>$674,554,552</td>
<td>$971,486,091</td>
</tr>
</tbody>
</table>

**Highway Construction.** As previously discussed, this financially constrained plan does not include illustrative or regional projects. The following tables display all projected revenues and expenditures and demonstrates that the long-range transportation plan is financially constrained for highway construction as well as operations and maintenance. Table 8-11 represents the Tennessee portion of the MPO study area and Table 8-12 represents the same for Virginia.

**PUBLIC TRANSPORTATION**

Funding needs and estimated costs for public transportation were identified in Chapter 6 and are shown in Appendix F. Table 8-13 displays all projected revenues and operating expenditures for Bristol Tennessee Transit. Table 8-14 provides its capital costs vs. revenue. Table 8-15 displays all projected revenues and operating expenditures for Bristol Virginia Transit. Table 8-16 provides its capital costs vs. revenue. The tables exhibit that the plan is financially constrained for transit operating and capital projects.

**OTHER MODES**

Bicycle and pedestrian facilities have traditionally been funded locally with Transportation Enhancement funds. Projects funded with these funds are programmed on an annual basis and are not programmed in the MPO Transportation Improvement Program as a “grouping fund.” Because this funding is discretionary on an annual basis, specific projects are not identified for funding in this financially constrained plan; however, Transportation Enhancement and related enhancement funding programs should continue to be available to MPO jurisdictions for project development as identified in Tables 8-8 and 8-9.
Transportation Enhancement projects, as well as other discretionary grant programs, are chosen at a statewide level by the MPO endorsing applications from its jurisdictions. The MPO encourages local jurisdictions to fund sidewalks, greenways, and other transportation modes as discussed in this plan. Appendix G identifies the currently funded pedestrian and bicycle projects for the *Bristol Urban Area Long Range Transportation Plan Year 2035.*
### Table 8-11: Tennessee Streets and Highways Revenue vs. Cost

<table>
<thead>
<tr>
<th>Funding Program</th>
<th>2010-2020</th>
<th>2021-2035</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Revenue</td>
<td>Cost</td>
<td>Balance</td>
</tr>
<tr>
<td>NHS/IM</td>
<td>$1,031,749</td>
<td>$383,000</td>
<td>$648,749</td>
</tr>
<tr>
<td>BR</td>
<td>$97,443</td>
<td>$-</td>
<td>$97,443</td>
</tr>
<tr>
<td>STP-State</td>
<td>$14,053,600</td>
<td>$14,053,600</td>
<td>$-</td>
</tr>
<tr>
<td>STP-Local</td>
<td>$8,074,689</td>
<td>$4,525,600</td>
<td>$3,549,089</td>
</tr>
<tr>
<td>HSIP-Safety</td>
<td>$110,535</td>
<td>$-</td>
<td>$110,535</td>
</tr>
<tr>
<td>State</td>
<td>$3,556,000</td>
<td>$3,556,000</td>
<td>$-</td>
</tr>
<tr>
<td>Local</td>
<td>$2,018,672</td>
<td>$1,131,460</td>
<td>$887,212</td>
</tr>
<tr>
<td>Project Total</td>
<td>$28,942,688</td>
<td>$23,649,600</td>
<td>$5,293,088</td>
</tr>
<tr>
<td>Operations &amp; Maintenance</td>
<td>$146,090,311</td>
<td>$146,090,311</td>
<td>$-</td>
</tr>
<tr>
<td>Total with O &amp; M</td>
<td>$175,032,999</td>
<td>$169,739,911</td>
<td>$5,293,088</td>
</tr>
</tbody>
</table>

### Table 8-12: Virginia Streets and Highways Revenue vs. Costs

<table>
<thead>
<tr>
<th>Funding Program</th>
<th>2010-2020</th>
<th>2021-2035</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Revenue</td>
<td>Cost</td>
<td>Balance</td>
</tr>
<tr>
<td>NHS/IM</td>
<td>$5,347,569</td>
<td>$1,714,000</td>
<td>$3,633,569</td>
</tr>
<tr>
<td>BR</td>
<td>$6,487,064</td>
<td>$3,988,397</td>
<td>$2,498,667</td>
</tr>
<tr>
<td>STP-State</td>
<td>$2,835,571</td>
<td>$2,835,571</td>
<td>$-</td>
</tr>
<tr>
<td>STP-Local</td>
<td>$1,317,814</td>
<td>$1,317,814</td>
<td>$-</td>
</tr>
<tr>
<td>HSIP-Safety</td>
<td>$1,929,906</td>
<td>$1,929,906</td>
<td>$-</td>
</tr>
<tr>
<td>State</td>
<td>$2,625,803</td>
<td>$2,625,803</td>
<td>$-</td>
</tr>
<tr>
<td>Local</td>
<td>$1,429,845</td>
<td>$202,000</td>
<td>$1,227,845</td>
</tr>
<tr>
<td>Project Total</td>
<td>$21,973,572</td>
<td>$14,613,491</td>
<td>$7,360,081</td>
</tr>
<tr>
<td>Operations &amp; Maintenance</td>
<td>$150,841,228</td>
<td>$150,841,228</td>
<td>$-</td>
</tr>
<tr>
<td>Total with O &amp; M</td>
<td>$172,814,800</td>
<td>$165,454,719</td>
<td>$7,360,081</td>
</tr>
</tbody>
</table>
### Table 8-13: Bristol Tennessee Transit Operating Costs vs. Revenue

<table>
<thead>
<tr>
<th>Funding Program</th>
<th>2010-2020</th>
<th>2021-2035</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Revenue</td>
<td>Cost</td>
<td>Balance</td>
</tr>
<tr>
<td>FTA Section 5307</td>
<td>$2,685,322</td>
<td>$2,685,322</td>
<td>$-</td>
</tr>
<tr>
<td>State</td>
<td>$1,231,495</td>
<td>$1,231,495</td>
<td>$-</td>
</tr>
<tr>
<td>Local</td>
<td>$1,167,608</td>
<td>$1,167,608</td>
<td>$-</td>
</tr>
<tr>
<td>Farebox</td>
<td>$254,808</td>
<td>$254,808</td>
<td>$-</td>
</tr>
<tr>
<td>Project Total</td>
<td>$5,339,233</td>
<td>$5,339,233</td>
<td>$-</td>
</tr>
</tbody>
</table>

### Table 8-14: Bristol Tennessee Transit Capital Costs vs. Revenue

<table>
<thead>
<tr>
<th>Funding Program</th>
<th>2010-2020</th>
<th>2021-2035</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Revenue</td>
<td>Cost</td>
<td>Balance</td>
</tr>
<tr>
<td>FTA Section 5307</td>
<td>$1,263,698</td>
<td>$1,145,639</td>
<td>$118,059</td>
</tr>
<tr>
<td>State</td>
<td>$486,985</td>
<td>$143,205</td>
<td>$343,780</td>
</tr>
<tr>
<td>Local</td>
<td>$220,565</td>
<td>$143,205</td>
<td>$77,360</td>
</tr>
<tr>
<td>Project Total</td>
<td>$1,971,248</td>
<td>$1,432,049</td>
<td>$539,199</td>
</tr>
</tbody>
</table>
### Table 8-15: Bristol Virginia Transit Operating Costs vs. Revenue

<table>
<thead>
<tr>
<th>Funding Program</th>
<th>2010-2020</th>
<th></th>
<th></th>
<th>2021-2035</th>
<th></th>
<th></th>
<th>2010-2035</th>
<th></th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Revenue</td>
<td>Cost</td>
<td>Balance</td>
<td>Revenue</td>
<td>Cost</td>
<td>Balance</td>
<td>Revenue</td>
<td>Cost</td>
<td>Balance</td>
<td>Revenue</td>
<td>Cost</td>
</tr>
<tr>
<td>FTA Section 5307</td>
<td>$1,712,497</td>
<td>$1,712,497</td>
<td>-</td>
<td>$3,733,861</td>
<td>$3,733,861</td>
<td>-</td>
<td>$5,446,358</td>
<td>$5,446,358</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>$962,565</td>
<td>$962,565</td>
<td>-</td>
<td>$2,098,737</td>
<td>$2,098,737</td>
<td>-</td>
<td>$3,061,302</td>
<td>$3,061,302</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local</td>
<td>$1,909,745</td>
<td>$1,909,745</td>
<td>-</td>
<td>$4,163,931</td>
<td>$4,163,931</td>
<td>-</td>
<td>$6,073,676</td>
<td>$6,073,676</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farebox</td>
<td>$300,927</td>
<td>$300,927</td>
<td>-</td>
<td>$656,129</td>
<td>$656,129</td>
<td>-</td>
<td>$957,056</td>
<td>$957,056</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Total</td>
<td>$4,885,734</td>
<td>$4,885,734</td>
<td>-</td>
<td>$10,652,658</td>
<td>$10,652,658</td>
<td>-</td>
<td>$15,538,392</td>
<td>$15,538,392</td>
<td>-</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 8-16: Bristol Virginia Transit Capital Costs vs. Revenue

<table>
<thead>
<tr>
<th>Funding Program</th>
<th>2010-2020</th>
<th></th>
<th></th>
<th>2021-2035</th>
<th></th>
<th></th>
<th>2010-2035</th>
<th></th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Revenue</td>
<td>Cost</td>
<td>Balance</td>
<td>Revenue</td>
<td>Cost</td>
<td>Balance</td>
<td>Revenue</td>
<td>Cost</td>
<td>Balance</td>
<td>Revenue</td>
<td>Cost</td>
</tr>
<tr>
<td>FTA Section 5307</td>
<td>$234,665</td>
<td>$213,191</td>
<td>$21,474</td>
<td>$511,661</td>
<td>$504,242</td>
<td>$7,419</td>
<td>$746,326</td>
<td>$717,433</td>
<td>$28,893</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal-STP</td>
<td>$224,692</td>
<td>$207,100</td>
<td>$17,592</td>
<td>$489,918</td>
<td>$489,835</td>
<td>$83</td>
<td>$714,610</td>
<td>$696,935</td>
<td>$17,675</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>$42,932</td>
<td>$36,547</td>
<td>$6,385</td>
<td>$96,600</td>
<td>$96,600</td>
<td>-</td>
<td>$139,532</td>
<td>$133,147</td>
<td>$6,385</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local</td>
<td>$164,564</td>
<td>$152,279</td>
<td>$12,285</td>
<td>$358,808</td>
<td>$350,014</td>
<td>$8,794</td>
<td>$523,372</td>
<td>$502,293</td>
<td>$21,079</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Total</td>
<td>$666,853</td>
<td>$609,117</td>
<td>$57,736</td>
<td>$1,456,987</td>
<td>$1,440,091</td>
<td>$16,296</td>
<td>$2,123,840</td>
<td>$2,049,808</td>
<td>$74,032</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER 9: TITLE VI AND ENVIRONMENTAL JUSTICE ASSESSMENT

Title VI of the Civil Rights Act of 1964 states that “No person in the United State shall, on the ground of race, color, or national origin be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.” In 1994, President Clinton Issued Executive Order 12898 which states that “Each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.”

As part of the transportation planning process, the Bristol MPO must address Title VI and environmental justice to minimize disproportionately adverse effects on minority populations and low-income groups in the development and implementation of transportation projects.

BACKGROUND

The first step in analyzing Title VI and environmental justice issues is to identify the population areas of traditionally under-represented groups, specifically low-income and minority populations. To make this determination, calculations of minority and low-income population proportions at a Census Tract level were made, based on 2000 Census data. It should be noted the 2010 Census is currently not available for this assessment. As a result, a re-evaluation of Title VI data will be required after the 2010 Census information is published.

For the purposes of Title VI Assessment, the MPO region was evaluated. The MPO region for the purposes of this analysis was defined as including all census tracts that are either entirely or partially within the MPO study area; thus, it is larger than the MPO study area to account for census tracts that are only partially in the MPO study area. Minorities consist of 3.5 percent of the total population of the MPO region. Utilizing a threshold-type of analysis, any census tract whose percentage is greater than the MPO area average is designated a Title VI minority census tract. Since the MPO regional long-range plan includes partial counties and is bi-state, utilizing state or county level averages to determine threshold levels would not accurately reflect the protected population groups within the study area.

The MPO recognizes that Title VI opportunities and concerns can exist outside of these defined areas and the definition of a Title VI minority census tract is for MPO analysis only. Assessing data for project level purposes requires using smaller scale spatial data where a high degree of demographic resolution is needed.

Although the Hispanic population in the MPO area is not significantly high, representing less than one percent of the MPO population, monitoring the growth of the Hispanic population will be necessary based on national and state growth trends, which indicate a rising Hispanic population. In the event that the Hispanic population, as well as other ethnic groups, reaches five percent, the MPO will need to comply with Executive Order
13166, which requires “improved access to services for persons with Limited English Proficiency” (LEP).

Persons below poverty level represent 13.2 percent of the population for the MPO region. This is consistent with the State of Tennessee, but slightly higher than the average for Virginia, as shown in Table 9-1. Historically, the Bristol region has averaged between 12 and 16 percent of the population classified as being in poverty.

### Table 9-1
**MPO Study Area Demographics**

<table>
<thead>
<tr>
<th>MPO Region and State</th>
<th>Percent Minority</th>
<th>Percent Hispanic</th>
<th>Percent Below Poverty Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bluff City, Tennessee</td>
<td>1.50%</td>
<td>0.70%</td>
<td>14.70%</td>
</tr>
<tr>
<td>Bristol, Tennessee</td>
<td>4.80%</td>
<td>0.70%</td>
<td>15.00%</td>
</tr>
<tr>
<td>Bristol, Virginia</td>
<td>7.50%</td>
<td>1.00%</td>
<td>16.20%</td>
</tr>
<tr>
<td>Sullivan County, Tennessee (part)</td>
<td>1.70%</td>
<td>0.50%</td>
<td>12.50%</td>
</tr>
<tr>
<td>Washington County, Virginia (part)</td>
<td>1.50%</td>
<td>0.50%</td>
<td>10.00%</td>
</tr>
<tr>
<td>MPO Study Area - Total</td>
<td>3.50%</td>
<td>0.60%</td>
<td>13.20%</td>
</tr>
<tr>
<td>Tennessee (statewide)</td>
<td>19.80%</td>
<td>2.20%</td>
<td>13.50%</td>
</tr>
<tr>
<td>Virginia (statewide)</td>
<td>27.70%</td>
<td>4.70%</td>
<td>9.60%</td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau, Census 2000

**ANALYSIS**

Concentrations of minority and low-income populations are defined by this analysis to be census tracts with percentages greater than the regional average. Using the threshold level of 3.5 percent minority population for the total MPO region, if a census tract has greater than the established threshold value, then the level of concern can be assumed to be higher than in areas where the value is lower than the threshold. It is important to understand that all census tracts include members of protected populations and this technique is being utilized for categorizing census tracts based on the proportion of protected populations they contain. Of the twenty census tracts that are partially or entirely within the MPO study area, eight are designated as minority tracts. Three of these census tracts are in the urban area of Bristol, Virginia; four are located in the urban area of Bristol, Tennessee; and one in Sullivan County which is only partially in the MPO study area.
Utilizing the same methodology, 13.2 percent of the population in the MPO region had income below poverty level based on the U.S. Census data for 2000. Of the twenty census tracts that are partially or entirely within the planning area, nine census tracts have a higher level of environmental justice concern. These tracts generally correspond with the minority census tracts with the exception of one Tennessee census tract, which has a low minority population but a higher level of concern for the poverty population.

Table 9-2 and Table 9-3 provide data for minority and poverty status within the MPO region based on census tracts. Map 9-1 and Map 9-2 illustrate a spatial analysis of the minority and low-income census tracts.

**Allocation of Funds to Geographic Areas**

An analysis was performed in conjunction with the spatial analysis identifying traditionally disadvantaged groups to determine what level of investment these areas would receive in terms of transportation spending as part of the *Bristol Urban Area Long-Range Transportation Plan 2035*. Approximately $78 million in highway projects are programmed throughout the study area in the plan. Of these, approximately $23 million are totally or partially in Title VI areas. This represents 31 percent of the total dollars to be invested in highway projects. The projects proposed in this plan (not including illustrative and regional projects for which funding has not been identified for implementation) within minority and/or low-income areas are as follows:

- West State Street, 24th Street to Volunteer Parkway/Commonwealth Avenue (Bristol, Virginia, and Bristol, Tennessee)
- East Cedar Street, Pennsylvania Avenue to King College Road (Bristol, Tennessee)
- Cross-Bristol Thoroughfare, eastern portion (US 421/SR 34), Anderson Street to Highway 394 (Bristol, Tennessee)

In addition to the three projects listed above, the Medical Park Boulevard project in Bristol, Tennessee, has its far eastern terminus in a census tract of interest from both a minority and low-income aspect. However, since it appears that less than 200 feet of a 1.4-mile project is within that census tract, this project is considered to be outside of the census tracts of interest for this allocation analysis.

Additionally, both Bristol Tennessee Transit and Bristol Virginia Transit serve in minority and low income defined areas within the urban area. This plan identifies $39 million programmed for transit operating and capital expenditures which benefits traditionally disadvantaged groups.
Table 9-2: Bristol MPO Region Minority Population

<table>
<thead>
<tr>
<th>Census Tract</th>
<th>Total</th>
<th>White</th>
<th>Minority</th>
<th>Relative Level of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tract 101</td>
<td>6,283</td>
<td>6,180</td>
<td>103</td>
<td>1.6% Lower</td>
</tr>
<tr>
<td>Tract 102</td>
<td>5,066</td>
<td>5,001</td>
<td>65</td>
<td>1.3% Lower</td>
</tr>
<tr>
<td>Tract 201</td>
<td>3,985</td>
<td>3,795</td>
<td>190</td>
<td>4.8% Higher</td>
</tr>
<tr>
<td>Tract 202</td>
<td>5,147</td>
<td>4,556</td>
<td>591</td>
<td>11.5% Higher</td>
</tr>
<tr>
<td>Tract 203</td>
<td>3,077</td>
<td>2,711</td>
<td>366</td>
<td>11.9% Higher</td>
</tr>
<tr>
<td>Tract 204</td>
<td>5,158</td>
<td>5,010</td>
<td>148</td>
<td>2.9% Lower</td>
</tr>
<tr>
<td>Tract 424</td>
<td>3,291</td>
<td>3,243</td>
<td>48</td>
<td>1.5% Lower</td>
</tr>
<tr>
<td>Tract 425</td>
<td>3,234</td>
<td>3,184</td>
<td>50</td>
<td>1.5% Lower</td>
</tr>
<tr>
<td>Tract 426</td>
<td>4,266</td>
<td>4,130</td>
<td>136</td>
<td>3.1% Lower</td>
</tr>
<tr>
<td>Tract 427.01</td>
<td>5,059</td>
<td>4,762</td>
<td>297</td>
<td>5.9% Higher</td>
</tr>
<tr>
<td>Tract 427.02</td>
<td>2,044</td>
<td>2,023</td>
<td>21</td>
<td>1.0% Lower</td>
</tr>
<tr>
<td>Tract 428.01</td>
<td>2,645</td>
<td>2,508</td>
<td>137</td>
<td>5.2% Higher</td>
</tr>
<tr>
<td>Tract 428.02</td>
<td>5,014</td>
<td>4,613</td>
<td>401</td>
<td>8.0% Higher</td>
</tr>
<tr>
<td>Tract 429</td>
<td>3,409</td>
<td>3,270</td>
<td>139</td>
<td>4.1% Higher</td>
</tr>
<tr>
<td>Tract 430</td>
<td>4,591</td>
<td>4,490</td>
<td>101</td>
<td>2.2% Lower</td>
</tr>
<tr>
<td>Tract 431</td>
<td>3,147</td>
<td>2,979</td>
<td>168</td>
<td>5.3% Higher</td>
</tr>
<tr>
<td>Tract 432</td>
<td>8,767</td>
<td>8,657</td>
<td>110</td>
<td>1.2% Lower</td>
</tr>
<tr>
<td>Tract 433</td>
<td>10,496</td>
<td>10,354</td>
<td>142</td>
<td>1.3% Lower</td>
</tr>
<tr>
<td>Tract 434</td>
<td>9,683</td>
<td>9,526</td>
<td>157</td>
<td>1.6% Lower</td>
</tr>
<tr>
<td>Tract 435</td>
<td>3,533</td>
<td>3,495</td>
<td>38</td>
<td>1.0% Lower</td>
</tr>
<tr>
<td>Total</td>
<td>97,895</td>
<td>94,487</td>
<td>3,408</td>
<td>3.5% n/a</td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau, Census 2000
## Table 9-3: Bristol MPO Region Poverty Status

<table>
<thead>
<tr>
<th>Census Tract</th>
<th>Population for whom poverty status is determined: Total</th>
<th>Income in 1999 below poverty level</th>
<th>Income in 1999 at or above poverty level</th>
<th>Relative Level of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tract 101</td>
<td>6,274</td>
<td>592</td>
<td>5,682</td>
<td>90.6% Lower</td>
</tr>
<tr>
<td>Tract 102</td>
<td>5,066</td>
<td>543</td>
<td>4,523</td>
<td>89.3% Lower</td>
</tr>
<tr>
<td>Tract 201</td>
<td>3,827</td>
<td>583</td>
<td>3,244</td>
<td>84.8% Higher</td>
</tr>
<tr>
<td>Tract 202</td>
<td>4,691</td>
<td>1,039</td>
<td>3,652</td>
<td>77.9% Higher</td>
</tr>
<tr>
<td>Tract 203</td>
<td>3,050</td>
<td>645</td>
<td>2,405</td>
<td>78.9% Higher</td>
</tr>
<tr>
<td>Tract 204</td>
<td>5,147</td>
<td>448</td>
<td>4,699</td>
<td>91.3% Lower</td>
</tr>
<tr>
<td>Tract 424</td>
<td>3,269</td>
<td>527</td>
<td>2,742</td>
<td>84.0% Higher</td>
</tr>
<tr>
<td>Tract 425</td>
<td>3,223</td>
<td>320</td>
<td>2,903</td>
<td>90.1% Lower</td>
</tr>
<tr>
<td>Tract 426</td>
<td>4,260</td>
<td>426</td>
<td>3,834</td>
<td>90.0% Lower</td>
</tr>
<tr>
<td>Tract 427.01</td>
<td>4,949</td>
<td>1,071</td>
<td>3,878</td>
<td>78.4% Higher</td>
</tr>
<tr>
<td>Tract 427.02</td>
<td>2,042</td>
<td>244</td>
<td>1,798</td>
<td>88.1% Lower</td>
</tr>
<tr>
<td>Tract 428.01</td>
<td>2,639</td>
<td>436</td>
<td>2,203</td>
<td>83.5% Higher</td>
</tr>
<tr>
<td>Tract 428.02</td>
<td>4,625</td>
<td>910</td>
<td>3,715</td>
<td>80.3% Higher</td>
</tr>
<tr>
<td>Tract 429</td>
<td>3,409</td>
<td>146</td>
<td>3,263</td>
<td>95.7% Lower</td>
</tr>
<tr>
<td>Tract 430</td>
<td>4,359</td>
<td>884</td>
<td>3,475</td>
<td>79.7% Higher</td>
</tr>
<tr>
<td>Tract 431</td>
<td>3,125</td>
<td>664</td>
<td>2,461</td>
<td>78.8% Higher</td>
</tr>
<tr>
<td>Tract 432</td>
<td>8,738</td>
<td>847</td>
<td>7,891</td>
<td>90.3% Lower</td>
</tr>
<tr>
<td>Tract 433</td>
<td>10,476</td>
<td>1,236</td>
<td>9,240</td>
<td>88.2% Lower</td>
</tr>
<tr>
<td>Tract 434</td>
<td>9,227</td>
<td>887</td>
<td>8,340</td>
<td>90.4% Lower</td>
</tr>
<tr>
<td>Tract 435</td>
<td>3,360</td>
<td>217</td>
<td>3,143</td>
<td>93.5% Lower</td>
</tr>
<tr>
<td>Total</td>
<td>95,756</td>
<td>12,665</td>
<td>83,091</td>
<td>86.8% n/a</td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau, Census 2000
** This page intentionally left blank **
CHAPTER 10: ENVIRONMENTAL MITIGATION

The Bristol Long Range Transportation Plan 2035 identifies and recommends a capital investment strategy to meet the existing and future transportation needs for the region. The considerations and recommendations made during the planning process are preliminary in nature and detailed environmental analysis conducted through the National Environmental Policy Act (NEPA) process does not apply to long range transportation plans. While detailed environmental analysis is not required, the SAFETEA-LU legislation requires the Bristol MPO to consult with Federal and State environmental and natural resource agencies to develop a general discussion on possible environmental mitigation activities that should be incorporated and considered in the development of the transportation plan.

Since the transportation planning activities of the MPO are regional in scope, environmental mitigation activities identified in the long range transportation plan do not focus on each individual project but offers a summary of the environmentally sensitive areas to be aware of region-wide and potential mitigation strategies that should be considered to reduce the impact of projects. Detailed environmental analysis of individual transportation projects occurs later in the project development process as the improvement approaches the preliminary engineering phase. At this phase, project features may be narrowed and refined, and the environmental impacts and mitigation strategies can be appropriately ascertained.

Climate change is rising in importance as a multi-faceted policy concern all over the world. Although there is no federal mandate to consider climate change in transportation planning, revisions to legislation have further incorporated energy and environmental considerations which offers opportunity for MPOs to integrate climate change consideration within the planning process. With the anticipation that future legislation will explicitly mention climate change and greenhouses gas emissions, alternatives for integrating climate change into the transportation planning process are discussed in this chapter.

ENVIRONMENTAL CONSULTATION PROCESS

The Bristol MPO utilized an environmental consultation process recommended by the Tennessee Department of Transportation and Virginia Department of Transportation and identified in the MPO’s Public Participation Plan to coordinate with agencies regarding land use management, natural resources, environmental protection, conservation, and historic preservation. To access potential environmental impacts and develop possible environmental mitigation activities, the following processes were incorporated in the development of the Bristol Long Range Transportation Plan 2035.

- The MPO compiled an inventory of environmentally sensitive areas identified from available conservation plans and maps of natural and historic resources.
Proposed transportation improvements were compared to available natural and historic references to assess potential environmental impacts and identify potential mitigation areas or activities.

The MPO provided affected agencies opportunities to review and comment on identification of sensitive areas and draft potential mitigation activities.

As part of the final document, the MPO will incorporate a summary analysis and report on the disposition of comments, enhancements, or modifications identified by affected agencies.

**Environmentally Sensitive Areas**

The Bristol Region consists of numerous environmentally sensitive areas, many too small or too numerous to map at a regional level and can only be accurately identified through a project-level analysis. When a project is ready to move from the long-range transportation plan into the engineering and design phases, a comprehensive analysis will be needed to determine the type and location of environmentally sensitive areas. The following discussion provides a general overview of the key areas in which environmental mitigation activities are focused.

**Wetlands and Floodplains.** In the development of a federally funded project, special requirements are imposed by Executive Order 11988 when the project will entail a significant floodplain encroachment. Floodplain management establishes corrective and preventative measures to avoid the adverse impacts associated with the occupancy and modification of floodplains. To the extent practicable, transportation agencies are required by Executive Order 11990, Protection of Wetlands, to first avoid and then minimize impacts to wetlands in the development of projects. Unavoidable impacts are mitigated by way of wetland compensation through either restoration or creation of wetlands. This activity is enhanced by the recent flood study completed by the Federal Emergency Management Agency and the Army Corps of Engineers to re-define the floodplain and floodways of the largest waterway in the MPO region outside of the South Holston River; namely, Beaver Creek and several of its tributaries. This waterway, which flows from Washington County northeast of Exit 7 through downtown Bristol and empties into the South Holston River northwest of Bluff City, is surrounded by developed properties for most of its length, and defines the valley between the Beaver Creek and White Top Knobs where the oldest developments in the Bristol area have taken place; thus, many of the transportation elements, while not using Beaver Creek directly, are historically influenced by its course.
Cultural and Historic Sites. Historic and natural resources are important to identify as part of the decision-making process for transportation projects due to their unique and irreplaceable nature. Section 106 of the National Historic Preservation Act requires a historical review process to determine the effects of a project on all properties on or eligible for inclusion on the national Register of Historic Places. Where such properties will be affected, coordination with the State Historic Preservation Officer and Advisory Council are required prior to project approval. It should be noted the following table of historic places represents the listing on the National Register and many other historic sites have been designated by the State of Tennessee and/or the Commonwealth of Virginia.

Endangered Species and Natural Areas. In the development of a project, special studies and coordination are required when the action may affect Federal- or State-listed threatened or endangered species. This includes fish, wildlife, and plants facing extinction as well as actions that result in destruction or modification of critical habitat. The Endangered Species Act of 1973 establishes processes for avoiding and/or mitigating impacts on endangered or threatened species and Natural Areas including consultation with Fish and Wildlife agencies and Natural Resource agencies. The following list includes the federal status of endangered species within the MPO region; however, many other species have received endangered or threatened designation at the state level.
### Table 10-1
**National Register of Historic Places**

<table>
<thead>
<tr>
<th>Historic Place</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alison, Jesse, House</td>
<td>SW of Bluff City, TN off US 11E</td>
</tr>
<tr>
<td>Blountville Historic District</td>
<td>Center of Blountville TN</td>
</tr>
<tr>
<td>Bristol Commercial Historic District</td>
<td>Center of Downtown Bristol TN/VA</td>
</tr>
<tr>
<td>Bristol Municipal Stadium</td>
<td>Edgemont Ave., Bristol TN</td>
</tr>
<tr>
<td>Bristol Railroad Station</td>
<td>Martin Luther King Jr. Blvd., Bristol VA</td>
</tr>
<tr>
<td>Bristol Tennessee-Virginia Sign</td>
<td>State St., Bristol TN/VA</td>
</tr>
<tr>
<td>Douglass School</td>
<td>Oakview Ave., Bristol VA</td>
</tr>
<tr>
<td>Euclid Avenue Historic District</td>
<td>Euclid Ave., Bristol VA</td>
</tr>
<tr>
<td>Fairmount Historic District</td>
<td>Fairmount area, Bristol TN</td>
</tr>
<tr>
<td>First National Bank of Bristol</td>
<td>State St., Bristol TN</td>
</tr>
<tr>
<td>King, Edward Washington, House</td>
<td>7th St., Bristol TN</td>
</tr>
<tr>
<td>Old Deery Inn</td>
<td>SR 126, Blountville TN</td>
</tr>
<tr>
<td>Paramount Theatre</td>
<td>State St., Bristol TN</td>
</tr>
<tr>
<td>Parlett House</td>
<td>Georgia Ave., Bristol TN</td>
</tr>
<tr>
<td>Pemberton Mansion and Oak</td>
<td>Pemberton Rd, Sullivan Co. TN</td>
</tr>
<tr>
<td>Steel-Seneker Houses</td>
<td>SR 126, Sullivan Co. TN</td>
</tr>
<tr>
<td>Shelby Street Station Post Office</td>
<td>Shelby St., Bristol TN</td>
</tr>
<tr>
<td>The Grove (Preston House)</td>
<td>Lee Hwy., Washington Co. VA</td>
</tr>
<tr>
<td>Solar Hill Historic District</td>
<td>Solar St., Bristol VA</td>
</tr>
<tr>
<td>Virginia Hill Historic District</td>
<td>Moore St., Bristol VA</td>
</tr>
<tr>
<td>Virginia Intermont College</td>
<td>Moore St., Bristol VA</td>
</tr>
<tr>
<td>Virginia Middle School</td>
<td>Piedmont Ave., Bristol, VA</td>
</tr>
<tr>
<td>Walnut Grove</td>
<td>Lee Hwy., Washington Co. VA</td>
</tr>
</tbody>
</table>

**Parks and Recreational Areas.** Section 4(f) of the USDOT Act of 1966 applies to any federally funded project which involves the use of any significant publicly owned park, recreation area, wildlife and waterfowl refuge, and land from an historic site of national, state or local significance. Special environmental analyses are required to determine if there is a feasible or prudent alternative to taking the proposed action involving the use of such property.
### Table 10-2
Federally Endangered Species

<table>
<thead>
<tr>
<th>Molluscs</th>
<th>Federal Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridwing Pearly Mussel</td>
<td>Listed Endangered</td>
</tr>
<tr>
<td>Tan Riffleshell</td>
<td>Listed Endangered</td>
</tr>
<tr>
<td>Fine-Rayed Pigtoe</td>
<td>Listed Endangered</td>
</tr>
<tr>
<td>Shiny Pigtoe</td>
<td>Listed Endangered</td>
</tr>
<tr>
<td>Little-Wing Pearly Mussel</td>
<td>Listed Endangered</td>
</tr>
<tr>
<td>Cumberland Monkeyface</td>
<td>Listed Endangered</td>
</tr>
</tbody>
</table>

**Birds**

<table>
<thead>
<tr>
<th>Listed Threatened</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bald Eagle</td>
</tr>
</tbody>
</table>

**Fishes**

<table>
<thead>
<tr>
<th>Listed Threatened</th>
<th>Listed Endangered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spotfin Chub</td>
<td></td>
</tr>
<tr>
<td>Duskytail Darter</td>
<td></td>
</tr>
</tbody>
</table>

**Mammals**

<table>
<thead>
<tr>
<th>Listed Endangered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gray Bat</td>
</tr>
</tbody>
</table>

### Map 10-2
Federal Lands
Other Considerations. Other legal and regulator requirements relating to the human and natural environment need to be considered in the development of transportation projects that pertain to neighborhoods and communities, homes and businesses, noise abatement, air quality, farmland and agricultural areas, and forested areas. Topography should also be a consideration in environmental analysis due to the karst regions of Northeast Tennessee and Southwest Virginia, which are characterized by caves, sinkholes and depressions.

Map 10-3
Bristol MPO Geography

Environmental Mitigation

Due to the hilly terrain, presence of karst topography, floodplains, neighborhoods, businesses, and government-preserved lands in the Bristol area, the majority of projects in this plan may require some type of mitigation efforts. With the numerous environmentally sensitive areas in the region, the Bristol MPO consulted with natural resource and environmental agencies when developing the Long-Range Transportation Plan Year 2035. Detailed environmental analyses of the recommended projects should occur as projects enter the preliminary development phase, when more specific environmental impacts and mitigation strategies can be better determined on a project-by-project basis.
While mitigation efforts need to be included in any project that has an impact on an environmentally sensitive area, it should be recognized that not every project will have the same level of impact. Some projects involve major construction with considerable earth disturbance, such as new roadways and roadway widening projects. Other projects involve minor construction and minimal earth disturbance, such as signalization, installation of streetlights, and resurfacing projects. The mitigation efforts used for a project should be dependent upon how severe the impact on environmentally sensitive areas will be.

Mitigation is the attempt to offset potential adverse effects of human activity on the environment. Potential environmental mitigation activities may include, but are not limited to: avoiding impacts altogether, minimizing a proposed project’s size, abatement measures to reduce construction impacts, and compensating for environmental impacts by providing suitable, replacement or substitute environmental resources on- or off-site. Table 10-3 illustrates potential mitigation activities that could be considered for specific environmental concerns.

In determining which mitigation strategies to utilize, each project identified as having an impact on an environmentally sensitive area should follow a mitigation planning process prior to construction, consisting of:

1. Identification of all environmentally sensitive areas throughout the project study area;
2. Determination of how and to what extent the project will impact these areas; and
3. Development of appropriate mitigation strategies to lessen the impact of projects on the environmentally sensitive areas.

**Context Sensitive Solutions.** Many transportation agencies, including the Tennessee Department of Transportation have utilized a Context Sensitive Solutions (CSS) process for major construction projects. Context Sensitive Solutions balance safety and mobility and the preservation of scenic, aesthetic, historic, environmental and other community values. The CSS process strives to provide transportation projects designed to improve the quality of life for the community by developing a consensus with a full range of stakeholders for solutions to transportation needs. The process involves considerable public participation and the flexibility to consider alternative designs to lessen the impact of the project on the community. Context Sensitive Solutions can be a valuable tool to ensure that appropriate environmental mitigation activities are considered.

Within the Bristol MPO Region, the CSS process was utilized by TDOT for the proposed extension of State Route 357 from the Tri-Cities Airport eastward to a point on Highway 11E near Bluff City.
Table 10-3
Potential Environmental Mitigation Activities

<table>
<thead>
<tr>
<th>Resource</th>
<th>Potential Mitigation Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetlands or Water Resources</td>
<td>Mitigation sequencing requirements involving avoidance, minimization, compensation (preservation, creation, restoration); design exceptions; and environmental compliance monitoring</td>
</tr>
<tr>
<td>Forested and Natural Areas</td>
<td>Avoidance, minimization; replacement property for open space easements; design exceptions and variance; environmental compliance monitoring</td>
</tr>
<tr>
<td>Agricultural Areas</td>
<td>Avoidance, minimization; design exceptions and variance; environmental compliance monitoring</td>
</tr>
<tr>
<td>Endangered and Threatened Species</td>
<td>Avoidance, minimization; time of year restriction; construction sequencing; design exceptions; species research; Memoranda of Agreements for species management; environmental compliance monitoring.</td>
</tr>
<tr>
<td>Air Quality</td>
<td>Transportation control measures, transportation emission reduction measures</td>
</tr>
<tr>
<td>Neighborhoods, Communities and Businesses</td>
<td>Impact avoidance or minimization; context sensitive solutions</td>
</tr>
<tr>
<td>Cultural Resources</td>
<td>Avoidance, minimization; preservation in place or excavation for archeological sites; Memoranda of Agreement with Department of Historic Resources; design exceptions and variances; environmental compliance monitoring</td>
</tr>
<tr>
<td>Parks and Recreation Areas</td>
<td>Avoidance, minimization, mitigation; design exceptions and variance; environmental compliance monitoring</td>
</tr>
</tbody>
</table>

**CLIMATE CHANGE**

Climate change refers to any significant change in measures of climate (such as temperature, precipitation or wind) lasting for an extended period (decades or longer). Gases that trap heat in the atmosphere are often called greenhouse gases (GHG). Naturally occurring greenhouse gases include water vapor, carbon dioxide (CO$_2$), methane (CH$_4$), nitrous oxide (N$_2$O), and ozone (O$_3$). Greenhouse gases prevent heat from escaping to the atmosphere and contribute to an increase in global average temperature and related climate changes. During the past century, energy-related activities have substantially added to the amount of greenhouse gases in the atmosphere in the form of carbon dioxide emissions from burning fossil fuels.

**Existing Conditions.** Based on the Inventory of U.S. Greenhouse Gas Emission and Sinks (EPA) the primary greenhouse gas emitted by human activities in the U.S. is CO$_2$, representing approximately 85 percent of total greenhouse gases. The largest source of CO$_2$ is fossil fuel combustion. In 2008, transportation activities accounted for 32 percent of the CO$_2$ emissions from fossil fuel combustion. From 1990 to 2008, transportation emissions rose by 22 percent, due largely to increases in travel demand and leveling of vehicle fuel economy.
Almost all of the energy consumed for transportation is supplied by petroleum-based products, with more than half being related to gasoline consumption in highway vehicles. Other fuel uses, especially diesel fuel for locomotives and trucks, and jet fuel for aircraft, account for the remainder. The 2009 Freight Facts and Figures report from FHWA indicates gasoline-fueled passenger cars and light-duty trucks are responsible for about 60 percent of GHG emissions in the transportation sector; however, since 1990, the rate of growth of GHG emissions from freight sources has been more than double the rate for passenger travel (57 percent vs. 24 percent). Trucking accounts for the major portion of freight emissions followed by freight rail.

### Table 10-5

**U.S. Greenhouse Gas Emissions from Passenger and Freight Transportation**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger Vehicles</td>
<td>1,144.3</td>
<td>1,237.2</td>
<td>1,386.1</td>
<td>1,438.8</td>
<td>1,421.6</td>
<td>1,415.1</td>
<td>24.0</td>
</tr>
<tr>
<td>Freight Transportation</td>
<td>355.7</td>
<td>415.6</td>
<td>504.0</td>
<td>536.6</td>
<td>551.2</td>
<td>558.7</td>
<td>57.0</td>
</tr>
<tr>
<td>Total</td>
<td>1,546.7</td>
<td>1,688.3</td>
<td>1,923.2</td>
<td>2,003.6</td>
<td>1,999.0</td>
<td>2,000.1</td>
<td>29.0</td>
</tr>
</tbody>
</table>

Source: *Freight Facts and Figures 2009*, FHWA

### POTENTIAL GHG MITIGATION ACTIONS

The goal of minimizing fuel consumption and air pollution can be interpreted as a direct link to climate change and justification for metropolitan transportation planning to consider climate change mitigation strategies. Transportation GHG emissions are related to numerous decisions by government, businesses, and individuals. These decisions can range from the choice of vehicle type to land use activities. Mitigation of climate change means the reduction of GHG emissions released by human activities. For the transportation sector, provisions that relate to efficient management and operation of the
transportation system, coordination with land use plans, and congestion mitigation can all relate to reducing GHG emissions.

The Commonwealth of Virginia has developed *A Climate Change Action Plan* under the direction of the Governors Commission on Climate. The plan outlines recommendations for Virginia to reduce GHG emissions and includes transportation and land use strategies. Although the State of Tennessee doesn’t have a formal climate mitigation plan, the state participated in the Southern Governors’ Association development of the *Southern Regional Economic Assessment of Climate Policy Options and Review of Economic Studies of Climate Policy*. This report provides an overview of policy strategies and was developed with assistance of the Center for Climate Strategies, which is a nonprofit organization that provides assistance to government agencies with climate change issues.

To work most effectively, policy actions in different levels of government needs to be integrated to establish a comprehensive approach to climate policy. The potential mitigation actions to reduce GHG for the Bristol MPO are drawn from a larger group of stakeholder-recommended options in states with completed climate action plans as well as the Southern Governors’ Association policy strategies.

Table 10-6
**Potential Climate Mitigation Strategies**

<table>
<thead>
<tr>
<th>Climate Mitigation Strategies</th>
<th>Potential Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Vehicle Standards</td>
<td>Improve fuel economy</td>
</tr>
<tr>
<td></td>
<td>Vehicle technology improvements</td>
</tr>
<tr>
<td>Anti-Idling Practices</td>
<td>Truck stop electrification</td>
</tr>
<tr>
<td></td>
<td>Vehicle idling restrictions</td>
</tr>
<tr>
<td></td>
<td>Traffic signal optimization</td>
</tr>
<tr>
<td>Mode Shift from Truck to Rail</td>
<td>Improve railroad infrastructure</td>
</tr>
<tr>
<td></td>
<td>Increase rail capacity</td>
</tr>
<tr>
<td></td>
<td>Intermodal terminal development</td>
</tr>
<tr>
<td>Renewable Fuels</td>
<td>Biodiesel expansion</td>
</tr>
<tr>
<td></td>
<td>Low-carbon fuel standards</td>
</tr>
<tr>
<td>Transportation System Management</td>
<td>Traffic signal synchronization</td>
</tr>
<tr>
<td></td>
<td>Intelligent transportation systems</td>
</tr>
<tr>
<td>Smart Growth/Land Use</td>
<td>Establish energy efficient land-use patterns</td>
</tr>
<tr>
<td></td>
<td>Promote redevelopment projects</td>
</tr>
<tr>
<td>Other Modes</td>
<td>Expand public transit infrastructure</td>
</tr>
<tr>
<td></td>
<td>Develop pedestrian/bicycle facilities</td>
</tr>
<tr>
<td></td>
<td>Promote carpools, vanpools, telecommuting</td>
</tr>
</tbody>
</table>
APPENDIX A

MAJOR EMPLOYERS IN THE BRISTOL STUDY AREA IN A SINGLE LOCATION
(November 2007)

Sullivan County, Tennessee
Aeronautical Accessories, Industrial Park Road
Aurora Hardwoods, Industrial Park Road
Bill Gatton Chevrolet, West State Street
Bristol Metals, Bristol Metals Road
Bristol Nursing Home, North Street
Bristol Products, Shelby Street
Bristol Regional Medical Center, Medical Park Boulevard
Cambridge House, Bellebrook Road
Capro, Incorporated, Industrial Park Road
Coyne Textile Services, 7th Street
CTMS, Volunteer Parkway
Edwards and Associates, Industrial Park Road
Exide Corporation, Exide Drive
GlaxoSmithKline, Industrial Drive
HVAC, 3rd Street
King College, King College Road
King Pharmaceuticals, 5th Street
Kysor Panel Systems, Industrial Park Road
Lowe’s, Volunteer Parkway
Microporous Products, Industrial Park Road
Modern Forge, Rock Lane
Monarch Pharmaceuticals, 5th Street
R. H. Donnelley Corporation, Bluff City Highway
Robinette Company, Blackley Road
Sullivan County Highway Department, County Hill Road
Sullivan County Sheriff’s Office, Blountville Bypass
Sullivan East High School, Weaver Pike
Tennessee High School/Viking Hall, Edgemont Avenue
Touchstone Wireless, West State Street
United States Post Office, 6th Street
Wal-Mart, Century Boulevard
YMCA, Edgemont Avenue

City of Bristol Virginia
Aerus, East Valley Drive
Belk, Gate City Highway
Bristol Herald Courier, Bob Morrison Boulevard
Ball Metal Beverage Packaging, Old Abingdon Highway
Bristol Nursing Home, North Street
Cracker Barrel, Village Circle
Dana Corporation, Thomas Road
Federal Pacific Corporation, Old Airport Road
Gordon Garment Corporation, Rhode Island Avenue
Holiday Inn, Linden Drive
J. C. Penney Company, Gate City Highway
Line Power Manufacturing Corporation, Williams Street
Logan’s Roadhouse, Linden Drive
NHC Health Care, North Street
Permatile, Beacon Road
Red Lobster, Linden Drive
Snack Alliance, Commonwealth Avenue Extension
Sprint Telecenters, Commerce Court
Strongwell Corporation, Commonwealth Avenue
United Central, Glenway Avenue
Virginia Department of Transportation, Bonham Road
WCYB-TV, Lee Street

Washington County, Virginia

Bristol Compressors, Incorporated, Industrial Park Road
Bristol Virginia Utilities Board, Lee Highway
Lowe’s, Lee Highway
Sandvik Manufacturing, Industrial Park Road
Steel Fab, Lee Highway
Universal Fiber Systems, Industrial Park Road
Wal-Mart, Lee Highway
## APPENDIX B: FEDERAL AND STATE PRIMARY ROUTES IN THE BRISTOL STUDY AREA: December 31, 2010

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>ENTERS STUDY AREA, WEST OR SOUTH</th>
<th>ENTERS STUDY AREA, NORTH OR EAST</th>
<th>NEAREST SERVED COMMUNITY OUTSIDE STUDY AREA, WEST OR SOUTH</th>
<th>NEAREST SERVED COMMUNITY OUTSIDE STUDY AREA, NORTH OR EAST</th>
<th>ULTIMATE ROUTE END, WEST OR SOUTH</th>
<th>ULTIMATE ROUTE END, NORTH OR EAST</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-81</td>
<td>cordon line west</td>
<td>cordon line east</td>
<td>Kingsport, Tennessee</td>
<td>Abingdon, Virginia</td>
<td>I-40 in Jefferson Country, Tennessee</td>
<td>Canadian border near Lake Ontario, New York</td>
</tr>
<tr>
<td>I-381</td>
<td>contained entirely within the Bristol study area</td>
<td>Bristol, Virginia (end of route)</td>
<td>Bristol, Virginia (end of route)</td>
<td>Commonwealth Ave and Keys St in Bristol, Virginia</td>
<td>I-81 Exit 3 in Bristol, Virginia</td>
<td>Bristol, Virginia</td>
</tr>
<tr>
<td>US 11</td>
<td>does not reach cordon line</td>
<td>cordon line east</td>
<td>Bristol, Virginia (end of route)</td>
<td>Abingdon, Virginia</td>
<td>Commonwealth Ave and Euclid Ave in Bristol, Virginia</td>
<td>Lake Champlain, New York</td>
</tr>
<tr>
<td>Truck US 11</td>
<td>contained entirely within the Bristol study area</td>
<td>Bristol, Virginia (end of route)</td>
<td>Bristol, Virginia (end of route)</td>
<td>Knoxville, Tennessee</td>
<td>Commonwealth Ave and Euclid Ave in Bristol, Virginia</td>
<td>Euclid Ave and Lee Hwy/ Moore St in Bristol, Virginia</td>
</tr>
<tr>
<td>US 11E</td>
<td>cordon line south (Highway 11E)</td>
<td>does not reach cordon line</td>
<td>Johnson City, Tennessee</td>
<td>Bristol, Virginia (end of route)</td>
<td>Knoxville, Tennessee</td>
<td>Commonwealth Ave and Euclid Ave in Bristol, Virginia</td>
</tr>
<tr>
<td>US 11W</td>
<td>cordon line west (Highway 11W)</td>
<td>does not reach cordon line</td>
<td>Kingsport, Tennessee</td>
<td>Bristol, Virginia (end of route)</td>
<td>Knoxville, Tennessee</td>
<td>Commonwealth Ave and Euclid Ave in Bristol, Virginia</td>
</tr>
<tr>
<td>US 19</td>
<td>does not reach cordon line</td>
<td>cordon line east</td>
<td>Bluff City, Tennessee</td>
<td>Abingdon, Virginia</td>
<td>Bluff City, Tennessee</td>
<td>Erie, Pennsylvania</td>
</tr>
<tr>
<td>Truck US 19</td>
<td>contained entirely within the Bristol study area</td>
<td>Bristol, Virginia (end of route)</td>
<td>Bristol, Virginia (end of route)</td>
<td>Commonwealth Ave and Goode St in Bristol, Virginia</td>
<td>Euclid Ave and Lee Hwy/ Moore St in Bristol, Virginia</td>
<td>Euclid Ave and Lee Hwy/ Moore St in Bristol, Virginia</td>
</tr>
<tr>
<td>US 19E</td>
<td>cordon line south (Highway 19E)</td>
<td>does not reach cordon line</td>
<td>Elizabethon, Tennessee</td>
<td>Bluff City, Tennessee</td>
<td>Bald Creek, North Carolina</td>
<td>Bluff City, Tennessee</td>
</tr>
<tr>
<td>US 19W</td>
<td>cordon line south (Highway 11E)</td>
<td>does not reach cordon line</td>
<td>Johnson City, Tennessee</td>
<td>Bluff City, Tennessee</td>
<td>Bluff City, Tennessee</td>
<td>Bluff City, Tennessee</td>
</tr>
<tr>
<td>US 58</td>
<td>cordon line west (Gate City Hwy)</td>
<td>cordon line east</td>
<td>Weber City, Virginia</td>
<td>Abingdon, Virginia</td>
<td>Cumberland Gap, Tennessee</td>
<td>Virginia Beach, Tennessee</td>
</tr>
<tr>
<td>US 421</td>
<td>cordon line west (Gate City Hwy)</td>
<td>cordon line east</td>
<td>Weber City, Virginia</td>
<td>Abingdon, Virginia</td>
<td>Carolina Beach, North Carolina</td>
<td>Michigan City, Indiana</td>
</tr>
<tr>
<td>Tennessee SR 1</td>
<td>cordon line west (Hwy 11W)</td>
<td>does not reach cordon line</td>
<td>Kingsport, Tennessee</td>
<td>Bristol, Tennessee</td>
<td>Memphis, Tennessee</td>
<td>Volunteer Pkwy and Broad St in Bristol, Tennessee</td>
</tr>
<tr>
<td>Tennessee SR 54</td>
<td>cordon line south</td>
<td>cordon line east</td>
<td>Johnson City, Tennessee</td>
<td>Mountain City, Tennessee</td>
<td>Knoxville, Tennessee</td>
<td>North Carolina border south of Trade, Tennessee</td>
</tr>
<tr>
<td>Tennessee SR 37</td>
<td>cordon line south (Highway 19E)</td>
<td>does not reach cordon line</td>
<td>Elizabethon, Tennessee</td>
<td>Bluff City, Tennessee</td>
<td>Hwy 11E and Hwy 19E in Bluff City, Tennessee</td>
<td>North Carolina border east of Roan Mountain, Tenn</td>
</tr>
<tr>
<td>Tennessee SR 44</td>
<td>contained entirely within the Bristol study area</td>
<td>Bluff City, Tennessee (end of route)</td>
<td>Holston Valley area on state line</td>
<td>Bluff City Hwy and Hwy 11E in Bluff City, Tennessee</td>
<td>Green Springs Rd at state line</td>
<td></td>
</tr>
<tr>
<td>Tennessee SR 75</td>
<td>cordon line west (hwy 75)</td>
<td>does not reach cordon line</td>
<td>Tri-Cities Regional Airport</td>
<td>Blountville, Tennessee</td>
<td>US 11E/US 321 in Greene County, Tennessee</td>
<td>Hwy 75 and Hwy 126 in Blountville, Tennessee</td>
</tr>
<tr>
<td>Tennessee SR 126</td>
<td>cordon line west (Highway 126)</td>
<td>does not reach cordon line</td>
<td>Kingsport, Tennessee</td>
<td>Bristol, Tennessee</td>
<td>Kingsport, Tennessee</td>
<td>Blountville Hwy and W State St in Bristol, Tennessee</td>
</tr>
<tr>
<td>Tennessee SR 358</td>
<td>contained entirely within the Bristol study area</td>
<td>Bristol, Tennessee (end of route)</td>
<td>Bristol, Tennessee (end of route)</td>
<td>Bristol, Tennessee (end of route)</td>
<td>Bristol, Tennessee (end of route)</td>
<td>Volunteer Pkwy and Weaver Pk in Bristol, Tennessee</td>
</tr>
<tr>
<td>Tennessee SR 390</td>
<td>contained entirely within the Bristol study area</td>
<td>Bluff City, Tennessee (end of route)</td>
<td>Bluff City, Tennessee (end of route)</td>
<td>Bluff City Hwy and Fleming Dr in Bluff City, Tenn</td>
<td>Hwy 390 and Hwy 394 in Bristol, Tennessee</td>
<td></td>
</tr>
<tr>
<td>Tennessee SR 354</td>
<td>contained entirely within the Bristol study area</td>
<td>north of Blountville, Tenn</td>
<td>Bristol, Tennessee</td>
<td>Hwy 11W and Hwy 394 in Sullivan County, Tenn</td>
<td>Hwy 394 and Hwy 421 in Bristol, Tennessee</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- The table lists federal and state primary routes in the Bristol study area as of December 31, 2010.
- The routes and their corresponding endpoints are detailed for the study area, including nearest served communities outside the study area.
- The ultimate route endpoints include various locations in the region.
- The table highlights the importance of understanding route configurations for effective transportation planning and infrastructure development.

---

**Appendix B**

---

**APPENDIX B**

---

**APPENDIX B**

---

**APPENDIX B**

---

**APPENDIX B**
### APPENDIX B: FEDERAL AND STATE PRIMARY ROUTES IN THE BRISTOL STUDY AREA: December 31, 2010

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>ENTERS STUDY AREA, WEST OR SOUTH</th>
<th>ENTERS STUDY AREA, NORTH OR EAST</th>
<th>NEAREST SERVED COMMUNITY OUTSIDE STUDY AREA, WEST OR SOUTH</th>
<th>NEAREST SERVED COMMUNITY OUTSIDE STUDY AREA, NORTH OR EAST</th>
<th>ULTIMATE ROUTE END, WEST OR SOUTH</th>
<th>ULTIMATE ROUTE END, NORTH OR EAST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tennessee SR 435</td>
<td>contained entirely within the Bristol study area</td>
<td></td>
<td>Bristol, Tennessee (end of route)</td>
<td>Holston Valley area, Sullivan County, Tennessee (end of route)</td>
<td>Hwy 421 and Hwy 394 in Bristol, Tennessee</td>
<td>Hwy 321 and Bristol Caverns Hwy (eastern intersection) in Sullivan County, Tennessee</td>
</tr>
<tr>
<td>Tennessee SR 473</td>
<td>contained entirely within the Bristol study area</td>
<td></td>
<td>Bristol, Tennessee (end of route)</td>
<td>Bristol, Tennessee (end of route)</td>
<td>Martin Luther King, Jr Blvd and Anderson St in Bristol, Tennessee</td>
<td>Martin Luther King, Jr Blvd and State St on state line</td>
</tr>
<tr>
<td>Virginia SR 75</td>
<td>does not reach cordon line</td>
<td>cordon line east (Green Springs Rd)</td>
<td>Holston Valley area, Washington County, Virginia</td>
<td>Abingdon, Virginia</td>
<td>Green Springs Rd at state line in Washington County, Va</td>
<td>Abingdon, Virginia</td>
</tr>
<tr>
<td>Virginia SR 113</td>
<td>contained entirely within the Bristol study area</td>
<td></td>
<td>Bristol, Virginia (end of route)</td>
<td>Bristol, Virginia (end of route)</td>
<td>Commonwealth Ave and Cumberland St in Bristol, Va</td>
<td>Euclid Ave and Lee Hwy/ Moore St in Bristol, Virginia</td>
</tr>
<tr>
<td>Virginia SR 381</td>
<td>contained entirely within the Bristol study area</td>
<td></td>
<td>Bristol, Virginia (end of route)</td>
<td>Bristol, Virginia (end of route)</td>
<td>Commonwealth Ave and State St in Bristol, Virginia</td>
<td>I-381 and Keys St in Bristol, Virginia</td>
</tr>
</tbody>
</table>
APPENDIX C

LIST OF MODELED ROADWAYS

The December 2010 E+C network for the Bristol study area contains over 800 modeled individual roadway sections, as listed below. The modeled 2010 E+C network reflects actual conditions in the field, with a few exceptions for anticipated projects as explained below.

_Bristol, Virginia_

Bob Morrison Boulevard, West State Street to Euclid Avenue
Bonham Road, Lee Highway to south end of road ¹
Campground Road, Bristol corporate limits to Island Road
Catherine Street, Gate City Highway to Vance Street
Clear Creek Road, Bristol corporate limits to Lee Highway
Commonwealth Avenue, State Street/West State Street to Keys Street
Commonwealth Avenue Extension, Keys Street to Island Road
Cumberland Street, Commonwealth Avenue to Martin Luther King Jr. Boulevard
East Mary Street, Goodson Street to Fairview Street
East Valley Drive, Kings Mill Pike to Lee Highway
Euclid Avenue, Gate City Highway/West State Street to Lee Highway/Moore Street
Exit 1 ramps (six ramps)
Exit 3 ramps (four ramps)
Exit 5 ramps (six ramps)
Exit 7 ramps (four ramps)
Fairview Street, East Mary Street to Massachusetts Avenue
Gate City Highway, Bristol corporate limits to Euclid Avenue/West State Street
Glenway Avenue, Commonwealth Avenue to Piedmont Avenue
Goode Street, Commonwealth Avenue to Piedmont Avenue
Goodson Street, State Street/East State Street to East Mary Street/West Mary Street
Harleywood Road, cordon line north to Wallace Pike
Hillside Avenue, Massachusetts Avenue to Kings Mill Pike
Interstate 81, Bristol western corporate limits to Bristol eastern corporate limits
Interstate 381, Interstate 81 to Keys Street
Island Road, Gate City Highway to Lee Highway
Keys Street, Interstate 381/Commonwealth Avenue to Commonwealth Avenue Extension
Kings Mill Pike, Hillside Avenue to Bristol corporate limits
Lee Highway, Euclid Avenue to Bristol corporate limits ²
Linden Drive, Bonham Road to Old Airport Road ¹
Martin Luther King Jr. Boulevard, State Street to Moore Street/Oakview Avenue
Massachusetts Avenue, Fairview Street to Hillside Avenue
Moore Street, State Street to Euclid Avenue
Oakview Avenue, Piedmont Avenue to Moore Street/Martin Luther King, Jr. Boulevard
Old Abingdon Highway, Lee Highway to East Valley Drive
Old Airport Road, Lee Highway to Kings Mill Pike ³

---

¹ The 2010 E+C network includes the current TIP project of installing a traffic signal at the intersection of Bonham Road and Linden Drive; however, it is not yet in place as of the plan date of December 2010. Engineering is underway as of December 2010. It is anticipated to be in operation in 2011.

² The 2010 E+C network includes the current TIP project of installing at traffic signal at the intersection of Lee Highway and Alexis Drive/Travalite Drive (Alexis Drive and Travalite Drive are not modeled roadways, but this intersection is modeled as a node; the attributes of the Lee Highway links approaching this node reflect the conditions of signalization). Engineering is underway as of December 2010. It is anticipated to be in operation in 2011.

---
Osborne Street, Gate City Highway to Page Street
Page Street, Vance Street to Osborne Street
Peters Street, West State Street to Vance Street
Piedmont Avenue, State Street to West Valley Drive
Reedy Creek Road, Bristol corporate limits east of Harleywood Road to Bristol corporate limits west of Harleywood Road
Shakesville Road, Kings Mill Pike (eastern intersection) to Kings Mill Pike (western intersection)
Sycamore Street, Commonwealth Avenue to Piedmont Avenue
Texas Avenue, East Valley Drive to Massachusetts Avenue
Vance Street, Peters Street to Page Street
Wagner Road, Randolph Street to Bristol corporate limits
Wagner Street, West State Street to Euclid Avenue
Wallace Pike, Island Road to Bristol corporate limits north of Island Road
Wallace Pike, Astor Road to Bristol corporate limits east of Harleywood Road
West Mary Street, Piedmont Avenue to Goodson Street
West Valley Drive, Lee Highway to Piedmont Avenue

Washington County, Virginia
Abrams Falls Road, cordon line north to Rich Valley Road
Astor Road, Wallace Pike/Wyndale Road to Lee Highway
Benhams Road, Rich Valley Road to Campground Road
Black Hollow Road, Wallace Pike to cordon line east
Bordwine Road, Wallace Pike to Lee Highway
Buffalo Pond Road, corporate limits north to Reedy Creek Road
Campground Road, Reedy Creek Road to Bristol corporate limits
Clear Creek Road, Wallace Pike to Bristol corporate limits
Cleveland Road, Painter Road to cordon line north
Countiss Road, cordon line north to Black Hollow Road
Cowan Drive, Haskell Station Road to Campground Road
Dettor Road, cordon line north to Reedy Creek Road
Exit 10 ramps (four ramps)
Exit 13 ramps (four ramps)
Gate City Highway, cordon line west to Bristol corporate limits
Golden View Drive, cordon line east to Old Jonesboro Road
Green Springs Road, state line to cordon line north
Halls Bottom Road, Lee Highway to Old Jonesboro Road
Haskell Station Road, Rich Valley Road to Cowan Drive
Industrial Park Road, Wallace Pike to Lee Highway
Interstate 81, state line to Bristol western corporate limits
Interstate 81, Bristol eastern corporate limits to cordon line east
Junction Drive, Old Jonesboro Road to Kings Mill Pike
Kings Mill Pike, Bristol corporate limits to Old Jonesboro Road
Lee Highway, Bristol corporate limits to cordon line east
Lime Hill Road, Reedy Creek Road to Rich Valley Road
Livingston Creek Road, cordon line north to Rich Valley Road
Mock Knob Road, Old Jonesboro Road to Cleveland Road
Musick Drive, cordon line north to Reedy Creek Road
Nordyke Road, cordon line north to Benhams Road
Old Jonesboro Road, state line to Junction Drive

3 The 2010 E+C network includes the current TIP project of adding a second through lane to southbound Old Airport Road between the northern and southern ramp intersections of Exit 7, so that the section between the ramp intersections has two through northbound lanes (which are in place in December 2010) and two through southbound lanes (of which only one is in place in December 2010). Installation is anticipated to be complete by 2012.
Old Jonesboro Road, Kings Mill Pike to cordon line east
Pairgin Road, Reedy Creek Road to Wallace Pike
Providence Road, cordon line north to Lee Highway
Reedy Creek Road, state line to Bristol corporate limits west of Harleywood Road
Reedy Creek Road, Bristol corporate limits east of Harleywood Road to Black Hollow Road
Rich Valley Road, Gate City Highway to cordon line north
Smith Creek Road, cordon line north to Black Hollow Road
Spring Valley Road, Lee Highway to Old Jonesboro Road
Wagner Road, Bristol corporate limits to Campground Road
Wallace Pike, Bristol corporate limits north of Wallace Pike
Wallace Pike, Bristol corporate limits east of Harleywood Road to Astor Road
Wolf Run Road, cordon line north to Rich Valley Road

**Along State Line (eastbound in Sullivan County, Tennessee, westbound in Bristol, Virginia)**

East State Street, Pennsylvania Avenue/Goodson Street to turn at state line at Sullivan Lane
State Street, Volunteer Parkway/Commonwealth Avenue to Pennsylvania Avenue/Goodson Street
West State Street, Euclid Avenue/Gate City Highway to Volunteer Parkway/Commonwealth Avenue

**Sullivan County, Tennessee (including inside Bristol, Tennessee and Bluff City)**

Allison Road, Highway 11E to Haw Ridge Road
Ash Street, Martin Luther King Jr. Boulevard to Pennsylvania Avenue
Anderson Street, 17th Street to Pennsylvania Avenue
Austin Springs Road, cordon line south to Piney Flats Road
Beaver Creek Road, Highway 394 to Enterprise Road
Beidleman Creek Road, Emmett Road to Hickory Tree Road
Bellebrook Road, Wessex Drive to Raytheon Road
Bethel Drive, Highway 126 to Exide Drive
Big Hollow Road, Buffalo Road to Highway 394
Blackley Road, 5th Street to Hazelwood Street
Blountville Boulevard, Highway 126 to Highway 394
Blountville Bypass, Highway 126 to Highway 394
Blountville Highway, Highway 126 to West State Street
Bluff City Highway, Edgemont Avenue to Volunteer Parkway (in Bristol)
Bluff City Highway, Egypt Road to Highway 11E (in Bluff City)
Bristol Caverns Highway, Highway 421 (eastern intersection) to Highway 421 (western intersection)

Broad Street, Volunteer Parkway to Steele Creek Drive
Broyles Lane, Weaver Pike to Vance Tank Road
Buffalo Road, Beaver Creek Road to Fairview School Road/Sugar Hollow Road
Bullock Hollow Road, Weaver Pike to Sugar Hollow Drive/Peoples Road
Buncombe Road, Feathers Chapel Road to Big Hollow Road
Bunker Hill Road, Highway 19E to Chinquapin Grove Road
Carden Hollow Road, Highway 126 to Bethel Drive
Carolina Avenue, Hazelwood Street to Bristol Caverns Highway
Carter Street, Holston Drive to Old Elizabethton Highway
Cedar Valley Road, Lavinder Lane to Weaver Pike
Chinquapin Grove Road, Dry Branch Road/Rockhold Road to Bunker Hill Road
Craig Drive, Volunteer Parkway to Bluff City Highway (the only private road in the network)
DeVault Bridge Road, Haw Ridge Road to Muddy Creek Road
Dry Branch Road, Main Street to Chinquapin Grove Road/Rockhold Road
East Cedar Street, 5th Street to King College Road
East State Street, turn at state line at Sullivan Lane to King College Road
Edgemont Avenue, Melrose Street to Bluff City Highway
Egypt Road, Highway 11E to Bluff City Highway/Highway 390
Emmett Road, Highway 421 to Beidleman Creek Road
Emmett Way, Highway 421 to Bristol Caverns Highway

APPENDIX C  C-3
Enterprise Road, Beaver Creek Road to Warren Road
Ethel Beard Road, Fairview School Road/Ridge Drive to Big Hollow Road
Exide Drive, Highway 394 to Highway 11E/Volunteer Parkway
Exit 69 ramps (four ramps)
Exit 74 ramps (eight ramps)
Fairview School Road, Buffalo Road/Sugar Hollow Drive to Ridge Drive
Feathers Chapel Road, Highway 394 (eastern intersection) to Highway 394 (western Intersection)
5th Street, Ash Street to Weaver Pike
Fleming Drive, Bluff City Highway to Main Street
Franklin Drive, Highway 126 to Blountville Boulevard
Hazelwood Street, Blackley Road to Carolina Avenue
Haw Ridge Road, cordon line west to Allison Road/DeVault Bridge Road
Hickory Tree Road, Old Weaver Pike/Possum Creek Road to Bristol Caverns Highway
Highway 11E, cordon line south to Exide Drive
Highway 11W, cordon line west to Interstate 81
Highway 19E, cordon line south to Highway 11E
Highway 44, state line to Highway 421
Highway 75, cordon line west to Highway 126
Highway 126, Blountville Highway to cordon line west
Highway 390, Egypt Road/Silver Grove Road to Highway 394
Highway 394, Highway 11W to Highway 421
Highway 421, Virginia Avenue to cordon line east
Industrial Drive, Weaver Pike to Highway 421
Interstate 81, cordon line west to state line
Island Road, cordon line west to Highway 11W
King College Road, East State Street to Old Jonesboro Road
Lakeview Drive, Bluff City Highway to Weaver Branch Road
Lavender Lane, Volunteer Parkway to Cedar Valley Road
Main Street, Fleming Drive to Dry Branch Road (Bluff City)
Main Street, Mountain View Drive to Piney Flats Road (Piney Flats)
Maple Street, Pennsylvania Avenue to Virginia Avenue
Martin Luther King Jr. Boulevard, State Street to Melrose Street
Meadow View Road, Highway 126 to Walnut Hill Road
Medical Park Boulevard, West State Street to Meadow View Road
Mountain View Drive, Main Street to Highway 19E (Piney Flats)
Muddy Creek Road, Highway 75 to cordon line west
Old Elizabethton Highway, Carter Street to Highway 19E
Old Jonesboro Road, Weaver Pike to state line
Old Weaver Pike, Weaver Pike to Hickory Tree Road/Rockhold Road
Painter Road, state line to Highway 44
Paperville Road, Old Jonesboro Road to Bristol Caverns Highway
Piney Flats Road, Highway 11E to cordon line south
Peoples Road, Weaver Pike to Bullock Hollow Road
Pennsylvania Avenue, State Street/East State Street to Maple Street
Pickens Bridge Road, cordon line south to Allison Road
Pleasant Grove Road, Weaver Pike to Silver Grove Road
Possum Creek Road, Hickory Tree Road to Ryder Church Road
ramp (two-way) connecting Highway 394 and Weaver Pike (unnamed)
Raytheon Road, Bluff City Highway to Vance Tank Road
Reedy Creek Road, Seneca Road to state line
Ridge Drive, Fairview School Road to DeVault Bridge Road

4 The 2010 E+C network includes the current TIP project of widening the northbound Exit 69 off-ramp to two lanes, with the assumption that the two-lane section will extend all the way back to the Interstate 81 mainline. Engineering is underway as of December 2010.
Riverside Road, Old Weaver Pike to Silver Grove Road
Rockhold Road, Old Weaver Pike to Dry Branch Road/Chinquapin Grove Road
Rocky Springs Road, Warren Road to Allison Road
Ryder Church Road, Hickory Tree Road to Possum Creek Road
Seneker Road, Highway 11W to Reedy Creek Road
7th Street, Shelby Street to State Street
17th Street, Windsor Avenue to West State Street
Shelby Street, Volunteer Parkway to Martin Luther King Jr. Boulevard
Silver Grove Road, Weaver Pike to Bluff City Highway/Highway 390
6th Street, Anderson Street to State Street
Steele Creek Drive, Broad Street to Highway 126
Sugar Hollow Drive, Bullock Hollow Road to Hickory Tree Road
Sugar Hollow Road, Buffalo Road/Fairview School Road to DeVault Bridge Road
Sweet Knobs Trail, Vance Tank Road to Highway 394
24th Street, Windsor Avenue to West State Street
Valley Pike Road, Carolina Avenue to Old Jonesboro Road
Vance Tank Road, White Top Road to Weaver Pike
Virginia Avenue, Highway 421 to Maple Street
Volunteer Parkway, State Street/West State Street to Exide Drive
Walnut Hill Road, Island Road to Highway 126
Warren Road, Allison Road to Enterprise Road/Rocky Springs Road
Weaver Branch Road, Lakeview Drive to Warren Road
Weaver Pike, Volunteer Parkway to Rockhold Road
Wessex Drive, Raytheon Road to Bellebrook Road
West State Street, Interstate 81 to Euclid Avenue/Gate City Highway
White Top Road, Highway 11E to Pleasant Grove Road
Windsor Avenue, 24th Street to Volunteer Parkway

APPENDIX C
### Appendix D

#### Tennessee Projects: Horizon Years 2030-2020

<table>
<thead>
<tr>
<th>PROJECT No.</th>
<th>JURISDICTION</th>
<th>ROADWAY</th>
<th>FROM/AT</th>
<th>LINE MILE</th>
<th>TO</th>
<th>LINE MILE</th>
<th>LENGTH (ft)</th>
<th>PROJECT DESCRIPTION</th>
<th>COST ($1,000)</th>
<th>FUND SOURCE</th>
<th>LRP GOALS ADDRESSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1-1</td>
<td>Sullivan Co., Tenn</td>
<td>Interstate 81</td>
<td>northbound off-ramp at Exit 69</td>
<td>0.3</td>
<td>Widen ramp from one lane to two lanes</td>
<td>$426</td>
<td>NHS IM ST</td>
<td>Efficiency, Mobility, Safety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1-2</td>
<td>Bristol, Tenn</td>
<td>E Cedar St</td>
<td>5th St</td>
<td>King College Rd</td>
<td>1.2</td>
<td>Modify existing horizontal and vertical alignment; add selected medians and turn lanes; upgrade traffic signals; reconnect 5th St signal with railroad signal</td>
<td>$5,657</td>
<td>STP-L Local</td>
<td>Efficiency, Environment, Mobility, Safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1-3</td>
<td>Bluff City and Sullivan Co., Tenn</td>
<td>Hwy 11E (US 11E/19/19W SR 34)</td>
<td>Hwy 19E (US 19E-SR 37)</td>
<td>SR 34</td>
<td>Bluff City Hwy (SR 44)</td>
<td>0.6</td>
<td>Replace signalized intersection with diamond grade-separated interchange and modify adjacent roadways; disconnect SR 44 from Hwy 11E</td>
<td>$17,567</td>
<td>STP-L ST</td>
<td>Efficiency, Environment, Mobility, Safety</td>
<td></td>
</tr>
</tbody>
</table>

#### Tennessee Projects: Horizon Years 2021-2035

<table>
<thead>
<tr>
<th>PROJECT No.</th>
<th>JURISDICTION</th>
<th>ROADWAY</th>
<th>FROM/AT</th>
<th>LINE MILE</th>
<th>TO</th>
<th>LINE MILE</th>
<th>LENGTH (ft)</th>
<th>PROJECT DESCRIPTION</th>
<th>COST ($1,000)</th>
<th>FUND SOURCE</th>
<th>LRP GOALS ADDRESSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1-1</td>
<td>Bristol, Tenn</td>
<td>Cross Bristol Thoroughfare, eastern portion (Hwy 421, Virginia Ave, Maple St, Pennsylvania Ave) (US 421-SR 34)</td>
<td>Anderson St (US 421-SR 34)</td>
<td>SR 34</td>
<td>Hwy 394</td>
<td>2.5</td>
<td>Widen from two-lane facility to three lanes; realign route shift between Pennsylvania Ave and Virginia Ave to new alignment; move left turn lanes at SR 394</td>
<td>$16,998</td>
<td>STP-L ST</td>
<td>Efficiency, Econ Dev, Environment, Mobility, Safety</td>
<td></td>
</tr>
<tr>
<td>T2-2 Part a</td>
<td>Bristol, Tenn</td>
<td>Medical Park Blvd</td>
<td>W State St (US 11W/SR 1)</td>
<td>SR 1</td>
<td>Meadow View Rd</td>
<td>0.4</td>
<td>Widen Medical Park Blvd from hospital entrance to Meadow View Rd from two lanes to a four-lane divided facility (0.18 mi); lengthen westbound W State St left-turn lane to southbound Medical Park Blvd</td>
<td>$7,208</td>
<td>STP-L Local</td>
<td>Efficiency, Econ Dev, Mobility, Safety</td>
<td></td>
</tr>
<tr>
<td>T2-2 Part b</td>
<td>Bristol, Tenn</td>
<td>Medical Park Blvd</td>
<td>Meadow View Rd at Medical Park Blvd</td>
<td>Meadow View Rd near Kinkaid Dr</td>
<td>0.5</td>
<td>Widen Meadow View Rd as part of new Medical Park Blvd from the Medical Park Blvd intersection to a point near Kinkaid Dr from two lanes to four lanes with improved vertical alignment</td>
<td>$2,922</td>
<td>STP-L Local</td>
<td>Efficiency, Econ Dev, Mobility, Safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T2-2 Part c</td>
<td>Bristol, Tenn</td>
<td>Medical Park Blvd</td>
<td>Meadow View Rd near Kinkaid Dr</td>
<td>Hwy 126 at Steele Creek Rd intersection (SR 126)</td>
<td>0.7</td>
<td>Construct new four-lane facility from Meadow View Rd near Kinkaid Dr to Hwy 126 and Steele Creek Dr intersection; install turn lanes at latter intersection on other approaches</td>
<td>$1,948</td>
<td>STP-L Local</td>
<td>Efficiency, Econ Dev, Mobility, Safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROJECT No.</td>
<td>JURISDICTION</td>
<td>ROADWAY</td>
<td>FROMAT</td>
<td>LINE MILE</td>
<td>TO</td>
<td>LINE MILE</td>
<td>LENGTH (MI)</td>
<td>PROJECT DESCRIPTION</td>
<td>COST ($1,000)</td>
<td>SOURCE</td>
<td>LRP GOALS ADDRESSED</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------</td>
<td>--------------------------------</td>
<td>-------------------------</td>
<td>-----------</td>
<td>------------------</td>
<td>-----------</td>
<td>-------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>---------------</td>
<td>--------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>TIL-1</td>
<td>Sullivan Co., Tenn</td>
<td>Carden Hollow Rd</td>
<td>Bethel Dr</td>
<td>Island Rd</td>
<td></td>
<td></td>
<td>1.7 *</td>
<td>Construct new two-lane roadway from Hwy 126 using the Maengill Rd overpass over I-81 to Island Rd; construct new Exit 72 interchange at Interstate 81; add turn lanes at Carden Hollow Rd and Hwy 126; add turn lanes and modify curvature at Bethel Dr intersection</td>
<td>$14,624</td>
<td></td>
<td>Efficiency, Economy, Environment, Mobility, Safety</td>
</tr>
<tr>
<td>TIL-2</td>
<td>Bristol, Tenn</td>
<td>Cross-Bristol Thoroughfare, western portion (Windsor Ave, Broad St, Anderson St, Steele Creek Dr)</td>
<td>Volunteer Pkwy (US 11E/19-SR 34) at Windsor Ave</td>
<td>SR 34</td>
<td>SR 126 (SR 126) at Steele Creek Dr</td>
<td>SR 126</td>
<td>1.5</td>
<td>Replace existing two-lane roadways with new four-lane alignment as a continuous facility with intersection improvements</td>
<td>$75,744</td>
<td></td>
<td>Efficiency, Mobility, Safety</td>
</tr>
<tr>
<td>TIL-3</td>
<td>Bristol, Tenn</td>
<td>Edgemont Ave/Bluff City Hwy</td>
<td>Queen St</td>
<td>Volunteer Pkwy (US 11E/19-SR 34)</td>
<td>SR 34</td>
<td></td>
<td>2.75</td>
<td>Replace two-lane divided Edgemont Ave with four-lane divided facility; Replace two-lane Bluff City Hwy with three-lane facility; intersection modifications throughout project</td>
<td>$9,739</td>
<td></td>
<td>Efficiency, Mobility, Safety</td>
</tr>
<tr>
<td>TIL-4</td>
<td>Bristol, Tenn</td>
<td>King College Rd</td>
<td>Tadlock Rd</td>
<td>Old Jonesboro Rd</td>
<td></td>
<td></td>
<td>2.3 *</td>
<td>Add turn lanes at Old Jonesboro Rd, Holston View School, Trammel Rd, and E Cedar St; add shoulders for bicycle lanes from Tadlock Rd to Trammel Rd; widen and modify rail systems on bridges over Sinking Creek and two of its tributaries</td>
<td>$2,871</td>
<td></td>
<td>Efficiency, Environment, Mobility, Safety</td>
</tr>
<tr>
<td>TIL-5</td>
<td>Bristol, Tenn</td>
<td>Meadow View Rd</td>
<td>new Medical Park Blvd, eastern intersection</td>
<td>Hwy 126 (SR 126) and W State St (US 11W-SR 1)</td>
<td>SR 126</td>
<td></td>
<td>0.9</td>
<td>Improve vertical and horizontal alignment of two-lane facility from new Medical Park Blvd intersection to Hwy 126; construct new four-lane connector facility (0.1 mi long) from Meadow View Rd to W State St at LM 21.54</td>
<td>$10,067</td>
<td></td>
<td>Efficiency, Economy, Mobility, Safety</td>
</tr>
<tr>
<td>TIL-6</td>
<td>Bristol and Sullivan Co., Tenn</td>
<td>Old Jonesboro Rd</td>
<td>Bristol Caverns Hwy (SR 435)</td>
<td>SR 435</td>
<td>Killgoose Way</td>
<td>3.2 *</td>
<td>Add left-turn lanes at Trammel Rd, Paperville Rd, King College Rd, Valley Pike Rd, Carolina Ave, and Bristol Caverns Hwy; modify vertical alignment at Carolina Ave; widen two-lane facility from Carolina Ave to Valley Pike Rd; add shoulders for bicycle lanes from Trammel Rd to Killgoose Way</td>
<td>$3,893</td>
<td></td>
<td>Efficiency, Environment, Mobility, Safety</td>
<td></td>
</tr>
</tbody>
</table>

* - not continuous
## Appendix D
### Tennessee Projects: Illustrative (Costs shown are in 2011 dollars)

<table>
<thead>
<tr>
<th>PROJECT No.</th>
<th>JURISDICTION</th>
<th>ROADWAY</th>
<th>FROM/AT</th>
<th>LINE MILE</th>
<th>TO</th>
<th>LINE MILE</th>
<th>LENGTH (miles)</th>
<th>PROJECT DESCRIPTION</th>
<th>COST ($1,000)</th>
<th>FUND SOURCE</th>
<th>LRP GOALS Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIL-7</td>
<td>Bristol, Tenn</td>
<td>Volunteer Pkwy and Hwy 11E (US 11E-19/SR 34)</td>
<td>W Cedar St</td>
<td>SR 34 LM 15.84±</td>
<td>River Rd</td>
<td>SR 34 LM 6.12±</td>
<td>9.7</td>
<td>Install left-turn lanes at selected median openings along SR 34; modify intersections at Avoca Rd/Phillipswood Dr (SR 34 LM 13.00±), Blue Bonnet Dr/Main St (SR 34 LM 12.36±), and consolidate median openings near Hilltop St (SR 34 LM 10.80±)</td>
<td>$3,042</td>
<td>• Efficiency • Econ Dev • Mobility • Safety</td>
<td></td>
</tr>
<tr>
<td>TIL-8</td>
<td>Bristol, Tenn</td>
<td>Weaver Pike (SR 358)</td>
<td>Volunteer Pkwy (US 11E/19-SR 34)</td>
<td>SR 34 LM 16.15±</td>
<td>Partnership Park Rd</td>
<td>SR 358 LM 6.28±</td>
<td>3.2</td>
<td>Install turn lanes at Volunteer Pkwy, Stoneroft Rd/Sline St, 5th St, Cedar Valley Rd, Industrial Dr, Bellebrooke Rd/Industrial Blvd, and Partnership Park Rd; relocate Vance Tank Rd intersection approx 400 ft north of railroad bridge and construct new intersection and connector; add shoulders from Bellebrooke Rd to Industrial Dr for bicycle lanes; modify bridges over Cedar Creek, Hogtown Creek, and Beecher Branch for rail treatments</td>
<td>$6,428</td>
<td>• Efficiency • Econ Dev • Mobility • Safety</td>
<td></td>
</tr>
<tr>
<td>TIL-9</td>
<td>Bristol, Tenn</td>
<td>W State St and Hwy 11W (US 11W-SR 1)</td>
<td>Sycamore St</td>
<td>SR 1 LM 23.69±</td>
<td>Holiday Dr/Island Rd</td>
<td>SR 1 LM 20.87±</td>
<td>2.8</td>
<td>Install left-turn lanes at selected median openings along SR 1 and lengthen westbound left-turn lane at Medical Park Blvd</td>
<td>$1,948</td>
<td>• Efficiency • Econ Dev • Mobility • Safety</td>
<td></td>
</tr>
<tr>
<td>TIL-10</td>
<td>Bristol, Tenn</td>
<td>W State St (US 11W-SR 1)</td>
<td>at Memorial Dr/K-Mart Drive intersection</td>
<td>SR 1 LM 23.62±</td>
<td></td>
<td></td>
<td>0.2</td>
<td>Reconstruct intersection to allow northbound K-Mart Dr left turns and through movements, upgrade signal</td>
<td>$554</td>
<td>• Efficiency • Mobility • Safety</td>
<td></td>
</tr>
</tbody>
</table>

* = not continuous
<table>
<thead>
<tr>
<th>PROJECT No.</th>
<th>JURISDICTION</th>
<th>ROADWAY</th>
<th>FROM AT</th>
<th>LINE MILE</th>
<th>TO</th>
<th>LINE MILE</th>
<th>LENGTH (mi)</th>
<th>PROJECT DESCRIPTION</th>
<th>COST ($1,000)</th>
<th>FUND SOURCE</th>
<th>LRP GOALS ADDRESSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR-1</td>
<td>Bristol and Sullivan Co., Tenn</td>
<td>Blountville Hwy/ Hwy 126 (SR 126)</td>
<td>Blountville Hwy (SR 126) at Neal Dr (end of existing four-lane section)</td>
<td>SR 126 LM 23.00</td>
<td>Hwy 126 (SR 126) at Hwy 75 (SR 75)</td>
<td>SR 75 LM 15.4+</td>
<td>6.2</td>
<td>Replace existing two-lane facilities with four-lane facilities; tie to other four-lane widening project beyond cordon line west; realign Walnut Hill Rd and Paramount Dr approaches to intersection; widen several bridges</td>
<td>$33,161</td>
<td></td>
<td>Efficiency, Econ Dev, Environment, Mobility, Safety</td>
</tr>
<tr>
<td>TR-2</td>
<td>Bluff City and Sullivan Co., Tenn</td>
<td>Hwy 357 (SR 357)</td>
<td>Interchange of Hwy 11E (US 11E/ 19/19W-SR 34) and Hwy 19E (US 19E-SR 37)</td>
<td>SR 34 LM 5.20</td>
<td>cordon line west</td>
<td></td>
<td>5.7</td>
<td>Construct four-lane facility from Hwy 11E and Hwy 19E interchange on Whitehead Rd (western) approach to other four-lane construction project beyond cordon line west</td>
<td>$18,250</td>
<td></td>
<td>Efficiency, Econ Dev, Environment, Mobility, Safety</td>
</tr>
</tbody>
</table>
## Appendix D

### Tennessee-Virginia Projects: Horizon Years 2010-2020

<table>
<thead>
<tr>
<th>PROJECT No.</th>
<th>JURISDICTION</th>
<th>ROADWAY</th>
<th>FROM/AT</th>
<th>LINE MILE</th>
<th>TO</th>
<th>LINE MILE</th>
<th>LENGTH (mi)</th>
<th>PROJECT DESCRIPTION</th>
<th>COST ($1,000)</th>
<th>FUND SOURCE</th>
<th>LRP GOALS ADDRESSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST-1</td>
<td>Bristol, Tenn and Bristol, Virginia</td>
<td>W State St (TN SR 1)</td>
<td>24th St</td>
<td>SR 1 LM 24.06+</td>
<td>Volunteer Pkwy/ Commonwealth Ave (US 11E-19- TN SR 34 - VA SR 381)</td>
<td>SR 1 LM 25.17+</td>
<td>1.2</td>
<td>Remove selected on-street parking and modify two-lane configuration to allow three-lane operation; install dual left-turn lanes on northbound Volunteer Pkwy at W State St and modify traffic signal accordingly</td>
<td>$1,582</td>
<td>ST Local</td>
<td>Efficiency, Mobility, Safety</td>
</tr>
</tbody>
</table>

### Tennessee-Virginia Projects: Regional (Costs shown are in 2011 dollars)

<table>
<thead>
<tr>
<th>PROJECT No.</th>
<th>JURISDICTION</th>
<th>ROADWAY</th>
<th>FROM/AT</th>
<th>LINE MILE</th>
<th>TO</th>
<th>LINE MILE</th>
<th>LENGTH (mi)</th>
<th>PROJECT DESCRIPTION</th>
<th>COST ($1,000)</th>
<th>FUND SOURCE</th>
<th>LRP GOALS ADDRESSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR-1</td>
<td>Sullivan Co, Tenn</td>
<td>&quot;Bristol Beltway&quot; (SR 394) and Hwy 421 (US 421-TN SR 34)</td>
<td>east end of four-lane roadway east of Bristol and Caverns Hwy, eastern intersection on Hwy 421</td>
<td>SR 34 LM 24.69+</td>
<td>Hwy 44 (TN SR 44)</td>
<td>SR 34 LM 26.19+</td>
<td>1.5</td>
<td>Replace two-lane facility with four-lane divided facility</td>
<td>$12,993 (Tenn)</td>
<td></td>
<td>Efficiency, Mobility, Safety</td>
</tr>
<tr>
<td></td>
<td>Sullivan Co, Tenn</td>
<td>Hwy 44 (TN SR 44)</td>
<td></td>
<td>SR 34 TM 26.19+</td>
<td>Tennessee/Virginia state line</td>
<td>TN SR 44 LM 17.12+</td>
<td>2.5</td>
<td>Replace two-lane facility with four-lane divided facility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Washington Co, Va</td>
<td>Green Springs Rd (VA SR 75)</td>
<td></td>
<td>Tennessee/Virginia state line</td>
<td></td>
<td></td>
<td>1.0</td>
<td>Replace two-lane facility with four-lane divided facility (extends to I-61 at Virginia Exit 17 beyond cordon line)</td>
<td>$4,116 (Va)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
BRISTOL URBAN AREA LONG-RANGE TRANSPORTATION PLAN
YEAR 2035

** This page intentionally left blank **
<table>
<thead>
<tr>
<th>PROJECT No.</th>
<th>JURISDICTION</th>
<th>ROADWAY</th>
<th>FROM/AT</th>
<th>LINE MILE</th>
<th>TO</th>
<th>LINE MILE</th>
<th>LENGTH (mi)</th>
<th>PROJECT DESCRIPTION</th>
<th>COST ($1,000)</th>
<th>FUND SOURCE</th>
<th>LRP GOALS ADDRESSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1-1</td>
<td>Bristol and Washington Co., Va</td>
<td>Lee Hwy (US 11/19)</td>
<td>Alexis Dr</td>
<td></td>
<td>Ole Dominion Rd</td>
<td></td>
<td>1.9</td>
<td>Interconnect Lee Hwy traffic signals (Alexis Dr, Bonham Rd, shopping center, Clear Creek Rd/Old Airport Rd, Plaza Dr, Forsythe Rd, Resting Tree Dr, E Highlands Blvd, W Highlands Blvd, Ole Dominion Rd) with those on Clear Creek Rd (shopping center) and Old Airport Rd (both Exit 7 ramp intersections)</td>
<td>$864</td>
<td>NHS</td>
<td>Efficiency, Environment, Mobility, Safety</td>
</tr>
<tr>
<td>V1-2</td>
<td>Bristol, Virginia</td>
<td>Old Airport Rd (US 11/19)</td>
<td>Lee Hwy (US 11/19)</td>
<td></td>
<td>Stagecoach Rd</td>
<td></td>
<td>0.37</td>
<td>Widen Old Airport Rd from Lee Hwy to Exit 7 to add southbound right-turn lane and future median; modify intersection at Linden Dr to prevent eastbound left turns; add one lane under Exit 7 bridges; add northbound right-turn lane on Old Airport Rd leading to Exit 7 northbound on-ramp; modify traffic signals to accommodate changes</td>
<td>$5,103</td>
<td>NHS</td>
<td>Efficiency, Econ Dev, Environment, Mobility, Safety</td>
</tr>
<tr>
<td>V1-3</td>
<td>Washington Co., Va</td>
<td>Providence Rd (Rte 611)</td>
<td>Lee Hwy (US 11/19)</td>
<td></td>
<td>north of western end of Virginia Highlands Airport Runway</td>
<td></td>
<td>1.2</td>
<td>Relocate Providence Rd westward and connect to Westinghouse Rd at Lee Hwy with a two-lane facility to move roadway out of the way for airport runway lengthening</td>
<td>$7,806</td>
<td>BR</td>
<td>Econ Dev, Mobility, HSIP, Safety</td>
</tr>
<tr>
<td>V1-4</td>
<td>Washington Co., Va</td>
<td>Spring Creek Rd (Rte 611)</td>
<td>Lee Hwy (US 11/19)</td>
<td></td>
<td>Old Jonesboro Rd (Rte 647)</td>
<td></td>
<td>0.7</td>
<td>Replace existing two-lane facility with new two-lane facility with improved alignment, widened shoulders, and new bridge over Spring Creek</td>
<td>$840</td>
<td>BR</td>
<td>Efficiency, Mobility, HSIP, Safety</td>
</tr>
</tbody>
</table>

* = not continuous
### Virginia Projects: Horizon Years 2021-2035

<table>
<thead>
<tr>
<th>PROJECT No.</th>
<th>JURISDICTION</th>
<th>ROADWAY</th>
<th>FROM/AT</th>
<th>LINE MILE</th>
<th>TO</th>
<th>LINE MILE</th>
<th>LENGTH (mi)</th>
<th>PROJECT DESCRIPTION</th>
<th>COST ($1,000)</th>
<th>FUND SOURCE</th>
<th>LRP GOALS ADDRESSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>V2-1</td>
<td>Bristol, Virginia</td>
<td>Lee Hwy (US 11/19)</td>
<td>Kerin Dr (north end of existing five-lane section)</td>
<td>north corporate limits</td>
<td>2.1</td>
<td>Replace existing facility (three-lane and four-lane undivided) with new four-lane facility with turn lanes as needed; replace Lee Highway bridge over Goose Creek; replace Bonham Road bridge over Beaver Creek with wider bridge (six lanes or more); extend Bonham Road and/or Travailte Drive to shopping center; adjust traffic signals accordingly</td>
<td>$11,146</td>
<td>BR STP HSIP STP Local</td>
<td>• Efficiency • Econ Dev • Mobility • Safety</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Virginia Projects: Ilustrative (Costs shown are in 2011 dollars)

<table>
<thead>
<tr>
<th>PROJECT No.</th>
<th>JURISDICTION</th>
<th>ROADWAY</th>
<th>FROM/AT</th>
<th>LINE MILE</th>
<th>TO</th>
<th>LINE MILE</th>
<th>LENGTH (mi)</th>
<th>PROJECT DESCRIPTION</th>
<th>COST ($1,000)</th>
<th>FUND SOURCE</th>
<th>LRP GOALS ADDRESSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIL-1</td>
<td>Bristol, Virginia</td>
<td>Bonham Rd</td>
<td>Lee Hwy (US 11/19)</td>
<td>Old Airport Rd, northern intersection</td>
<td>0.8</td>
<td>Replace existing facility (two- and three-lanes) with five-lane facility north of Interstate 81 and four-lane facility with turn lanes south of Interstate 81; replace Bonham Road bridge over Beaver Creek with wider bridge (six lanes or more)</td>
<td>$5,443</td>
<td>• Efficiency • Mobility • Safety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIL-2</td>
<td>Bristol, Virginia</td>
<td>E Valley Dr</td>
<td>(US 11/19)</td>
<td>Kings Mill Pike</td>
<td>1.7</td>
<td>Replace existing two-lane facility with four-lane facility; replace underheight railroad overpass and widen Beaver Creek bridge; adjust traffic signals accordingly</td>
<td>$8,700</td>
<td>• Efficiency • Econ Dev • Environment • Mobility • Safety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROJECT No.</td>
<td>JURISDICTION</td>
<td>ROADWAY</td>
<td>FROM/AT</td>
<td>ORIGIN LINE MILE</td>
<td>TO</td>
<td>DESTINATION LINE MILE</td>
<td>LENGTH (mi)</td>
<td>PROJECT DESCRIPTION</td>
<td>COST ($1,000)</td>
<td>FUND SOURCE</td>
<td>LRP GOALS ADDRESSED</td>
</tr>
<tr>
<td>------------</td>
<td>--------------</td>
<td>---------</td>
<td>---------</td>
<td>------------------</td>
<td>----</td>
<td>-----------------------</td>
<td>-------------</td>
<td>---------------------</td>
<td>---------------</td>
<td>-------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>VIL-3</td>
<td>Bristol, VA</td>
<td>Kings Mill Pike</td>
<td>E Valley Dr</td>
<td>east corporate limits</td>
<td>east corporate limits</td>
<td>1.6</td>
<td>Replace existing two-lane facility with four-lane or five-lane facility with improved alignment; adjust traffic signals accordingly</td>
<td>$20,229</td>
<td>Efficiency</td>
<td>Mobility Safety</td>
<td></td>
</tr>
<tr>
<td>VIL-4</td>
<td>Washington Co., Va</td>
<td>Kings Mill Pike (Rte 647)</td>
<td>east corporate limits</td>
<td>Old Jonesboro Rd (Rte 647)</td>
<td>cordon line east</td>
<td>2.5</td>
<td>Replace existing two-lane facility with new two-lane facility with improved alignment; add turn lanes at Sinking Springs Rd, Junction Dr, High Point Rd, Mock Knob Rd, Halls Bottom Rd, and Spring Creek Rd</td>
<td>$5,426</td>
<td>Efficiency</td>
<td>Mobility Safety</td>
<td></td>
</tr>
<tr>
<td>VIL-5</td>
<td>Bristol, VA</td>
<td>Lee Hwy (US 11/19)</td>
<td>Euclid Ave/Euclid Ave Ext (Truck US 11-19 at SR 113)</td>
<td>Overhill Rd/ Winstead Dr (south end of existing 5-lane section)</td>
<td>1.1</td>
<td>Replace three-lane facility with five-lane facility</td>
<td>$6,179</td>
<td>Efficiency</td>
<td>Mobility Safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIL-6</td>
<td>Bristol, VA</td>
<td>Lee Hwy (US 11/19)</td>
<td>Old Airport Rd/ Clear Creek Rd and</td>
<td>New intersection</td>
<td>0.1</td>
<td>Install median on Old Airport Rd to prevent all left turns; connect Linden Dr to Lee Hwy (2-lane west of Clear Creek Rd/Old Airport Rd; modify commercial access points along Old Airport Rd accordingly</td>
<td>$5,720</td>
<td>Efficiency</td>
<td>Econ Dev Mobility Safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIL-7</td>
<td>Bristol, VA</td>
<td>Old Abingdon Hwy</td>
<td>Railroad overpass</td>
<td></td>
<td>0.3</td>
<td>Replace narrow passage under railroad with new passage</td>
<td>$1,281</td>
<td>Efficiency</td>
<td>Econ Dev Environment Mobility Safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIL-8</td>
<td>Bristol, VA</td>
<td>Old Airport Rd</td>
<td>Kings Mill Pike</td>
<td>Bonham Rd, southern intersection</td>
<td>1.0</td>
<td>Replace two-lane facility with either four-lane or five-lane facility</td>
<td>$20,554</td>
<td>Efficiency</td>
<td>Mobility Safety</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Appendix E
Virginia Projects: Regional (Costs shown are in 2011 dollars)

<table>
<thead>
<tr>
<th>PROJECT No.</th>
<th>JURISDICTION</th>
<th>ROADWAY</th>
<th>FROM/AT</th>
<th>LINE MILE</th>
<th>TO</th>
<th>LENGTH (mi)</th>
<th>PROJECT DESCRIPTION</th>
<th>COST ($1,000)</th>
<th>FIND SOURCE</th>
<th>LRP GOALS ADDRESSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>VR-1</td>
<td>Washington Co., Va (US 58/421)</td>
<td>Gate City Hwy</td>
<td>Gordon line west at Scott Co line (project extends beyond cordon)</td>
<td>Interstate 81 at Exit 1</td>
<td>6.2</td>
<td>Replace existing two-lane facility with four-lane facility and turn lanes as appropriate</td>
<td>$171,743</td>
<td>Efficiency</td>
<td>Efficiency, Environment, Mobility, Safety</td>
<td></td>
</tr>
<tr>
<td>VR-2</td>
<td>Washington Co., Va</td>
<td>Exit 11 connector and interchange</td>
<td>Interstate 81 at new Exit 11 interchange</td>
<td>Industrial Park Rd (Rte 1717) north of residential area</td>
<td>2.9</td>
<td>Construct four-lane connector roadway and new diamond Exit 11 interchange; install traffic signals at Lee Hwy</td>
<td>$5,668</td>
<td>Efficiency</td>
<td>Efficiency, Econ Dev, Mobility, Safety</td>
<td></td>
</tr>
<tr>
<td>VR-3</td>
<td>Washington Co., Va</td>
<td>Interstate 81</td>
<td>North end of existing six-lane section</td>
<td>Gordon line east (project extends beyond cordon)</td>
<td>5.5</td>
<td>Modify in accordance with strategy developed by VDOT</td>
<td>$34,889</td>
<td>Efficiency</td>
<td>Efficiency, Econ Dev, Mobility, Safety</td>
<td></td>
</tr>
<tr>
<td>VR-4</td>
<td>Washington Co., Va (US 11/19)</td>
<td>Lee Hwy</td>
<td>Bristol corporate limits</td>
<td>Majestic Dr (F-310, connector road to Exit 10 interchange)</td>
<td>1.9</td>
<td>Replace existing three-lane facility with four-lane divided facility with turn and bicycle lanes, modify selected side street approaches accordingly</td>
<td>$41,999</td>
<td>Efficiency</td>
<td>Efficiency, Econ Dev, Environment, Mobility, Safety</td>
<td></td>
</tr>
<tr>
<td>VR-5</td>
<td>Washington Co., Va (US 11/19)</td>
<td>Lee Hwy</td>
<td>Majestic Dr (F-310, connector road to Exit 10 interchange)</td>
<td>Gordon line east (project extends beyond cordon)</td>
<td>3.5</td>
<td>Replace existing three-lane facility with four-lane divided facility with turn and bicycle lanes, modify selected side street approaches accordingly</td>
<td>$36,574</td>
<td>Efficiency</td>
<td>Efficiency, Econ Dev, Environment, Mobility, Safety</td>
<td></td>
</tr>
</tbody>
</table>
### Virginia-Tennessee Projects: Horizon Years 2010-2020

#### Appendix E

<table>
<thead>
<tr>
<th>PROJECT NO.</th>
<th>JURISDICTION</th>
<th>ROADWAY</th>
<th>FROM/AT</th>
<th>LINE MILE</th>
<th>TO</th>
<th>LINE MILE</th>
<th>LENGTH (mi)</th>
<th>PROJECT DESCRIPTION</th>
<th>COST ($)</th>
<th>FUND SOURCE</th>
<th>LRP GOALS ADDRESSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>51-1</td>
<td>Bristol, Tenn and Bristol, Virginia</td>
<td>W State St (TN SR 1)</td>
<td>24th St</td>
<td>SR 1 LM 24.66</td>
<td>Volunteer Pkwy/ Commonwealth Ave (US 11E-19 - TN SR 34 - VA SR 381)</td>
<td>SR 1 LM 25.17</td>
<td>1.2</td>
<td>Remove selected on-street parking and modify two-lane configuration to allow three-lane operation; install dual left-turn lanes on northbound Volunteer Pkwy at W State St and modify traffic signal accordingly</td>
<td>$1.582</td>
<td>ST Local</td>
<td>Efficiency Mobility Safety</td>
</tr>
</tbody>
</table>

#### Virginia-Tennessee Projects: Regional (Costs shown are in 2011 dollars)

<table>
<thead>
<tr>
<th>PROJECT NO.</th>
<th>JURISDICTION</th>
<th>ROADWAY</th>
<th>FROM/AT</th>
<th>LINE MILE</th>
<th>TO</th>
<th>LINE MILE</th>
<th>LENGTH (mi)</th>
<th>PROJECT DESCRIPTION</th>
<th>COST ($)</th>
<th>FUND SOURCE</th>
<th>LRP GOALS ADDRESSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR-1</td>
<td>Sullivan Co, Tenn and Sullivan Co, Tenn</td>
<td>&quot;Bristol Beltway&quot; (TN SR 394) and Hwy 421 (US 421 - TN SR 34)</td>
<td>east end of four-lane roadway east of Bristol Caverns Hwy, eastern intersection on Hwy 421</td>
<td>SR 34 LM 24.66</td>
<td>Hwy 44 (TN SR 44)</td>
<td>SR 34 LM 26.19</td>
<td>1.5</td>
<td>Replace two-lane facility with four-lane divided facility</td>
<td>$12,993 (Tenn)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Washington Co, Va</td>
<td>Green Springs Rd</td>
<td>Tennessee/Virginia state line</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Replace two-lane facility with Four-lane divided facility (extends to I-81 at Virginia Exit 17 beyond cordon line)</td>
<td>$4,116 (VA)</td>
<td></td>
<td>Efficiency Mobility Safety</td>
</tr>
</tbody>
</table>
BRISTOL URBAN AREA LONG-RANGE TRANSPORTATION PLAN
YEAR 2035

** This page intentionally left blank **
## Appendix F

### Bristol Tennessee Transit Projects Horizon Year 2010-2020

<table>
<thead>
<tr>
<th>PROJECT No.</th>
<th>JURISDICTION</th>
<th>DESCRIPTION</th>
<th>COST</th>
<th>FUNDING SOURCE</th>
<th>LRP GOALS Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>BTT-1</td>
<td>Bristol, Tennessee</td>
<td>Operating Assistance</td>
<td>$5,339,233</td>
<td>FTA State Local</td>
<td>Efficiency • Mobility • Safety</td>
</tr>
<tr>
<td>BTT-2</td>
<td>Bristol, Tennessee</td>
<td>Capital - 5 Replacement Buses</td>
<td>$779,752</td>
<td>FTA State Local</td>
<td>Efficiency • Environment • Mobility • Safety</td>
</tr>
<tr>
<td>BTT-2</td>
<td>Bristol, Tennessee</td>
<td>Capital - 8 Replacement Lift-Equipped Vans</td>
<td>$300,982</td>
<td>FTA State Local</td>
<td>Efficiency • Environment • Mobility • Safety</td>
</tr>
<tr>
<td>BTT-2</td>
<td>Bristol, Tennessee</td>
<td>Capital - 4 Replacement Support Vehicles</td>
<td>$101,588</td>
<td>FTA State Local</td>
<td>Efficiency • Environment • Mobility • Safety</td>
</tr>
<tr>
<td>BTT-2</td>
<td>Bristol, Tennessee</td>
<td>Associated Capital Maintenance Items and Facility Maintenance</td>
<td>$249,727</td>
<td>FTA State Local</td>
<td>Efficiency</td>
</tr>
</tbody>
</table>

### Bristol Tennessee Transit Projects Horizon Year 2021-2035

<table>
<thead>
<tr>
<th>PROJECT No.</th>
<th>JURISDICTION</th>
<th>DESCRIPTION</th>
<th>COST</th>
<th>FUNDING SOURCE</th>
<th>LRP GOALS Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>BTT-1</td>
<td>Bristol, Tennessee</td>
<td>Operating Assistance</td>
<td>$11,641,450</td>
<td>FTA State Local</td>
<td>Efficiency • Mobility • Safety</td>
</tr>
<tr>
<td>BTT-2</td>
<td>Bristol, Tennessee</td>
<td>Capital - 6 Replacement Buses</td>
<td>$1,225,620</td>
<td>FTA State Local</td>
<td>Efficiency • Environment • Mobility • Safety</td>
</tr>
<tr>
<td>BTT-2</td>
<td>Bristol, Tennessee</td>
<td>Capital - 12 Replacement Lift-Equipped Vans</td>
<td>$743,043</td>
<td>FTA State Local</td>
<td>Efficiency • Environment • Mobility • Safety</td>
</tr>
<tr>
<td>BTT-2</td>
<td>Bristol, Tennessee</td>
<td>Capital - 6 Replacement Support Vehicles</td>
<td>$248,391</td>
<td>FTA State Local</td>
<td>Efficiency • Environment • Mobility • Safety</td>
</tr>
<tr>
<td>BTT-2</td>
<td>Bristol, Tennessee</td>
<td>Associated Capital Maintenance Items and Facility Maintenance</td>
<td>$616,507</td>
<td>FTA State Local</td>
<td>Efficiency</td>
</tr>
</tbody>
</table>
## Appendix F

Bristol Virginia Transit Projects Horizon Year 2010-2020

<table>
<thead>
<tr>
<th>PROJECT No.</th>
<th>JURISDICTION</th>
<th>DESCRIPTION</th>
<th>COST</th>
<th>FUNDING SOURCE</th>
<th>LRP GOALS Addressed</th>
</tr>
</thead>
</table>
| BVT-1       | Bristol, Virginia | Operating Assistance  | $ 4,885,734 | FTA STATE LOCAL | • Efficiency  
                      |               |                     |          |                | • Mobility  
                      |               |                     |          |                | • Safety   |
| BVT-2       | Bristol, Virginia | Capital - 7 Replacement Buses                    | $ 362,337 | FTA STATE LOCAL | • Efficiency  
                      |               |                     |          |                | • Environment  
                      |               |                     |          |                | • Mobility  
                      |               |                     |          |                | • Safety   |
| BVT-3       | Bristol, Virginia | Capital - 2 Replacement Lift-Equipped Vans       | $ 73,373  | FTA STATE LOCAL | • Efficiency  
                      |               |                     |          |                | • Environment  
                      |               |                     |          |                | • Mobility  
                      |               |                     |          |                | • Safety   |
| BVT-3       | Bristol, Virginia | Capital - 2 Replacement Support Vehicles         | $ 46,544  | FTA STATE LOCAL | • Efficiency       |
| BVT-3       | Bristol, Virginia | Associated Capital Maintenance Items and Facility Maintenance | $ 124,863 | FTA STATE LOCAL | • Efficiency |

Bristol Virginia Transit Projects Horizon Year 2021-2035

<table>
<thead>
<tr>
<th>PROJECT No.</th>
<th>JURISDICTION</th>
<th>DESCRIPTION</th>
<th>COST</th>
<th>FUNDING SOURCE</th>
<th>LRP GOALS Addressed</th>
</tr>
</thead>
</table>
| BVT-1       | Bristol, Virginia | Operating Assistance  | $ 10,652,658 | FTA STATE LOCAL | • Efficiency  
                      |               |                     |          |                | • Mobility  
                      |               |                     |          |                | • Safety   |
| BVT-2       | Bristol, Virginia | Capital - 10 Replacement Buses                   | $ 831,457 | FTA STATE LOCAL | • Efficiency  
                      |               |                     |          |                | • Environment  
                      |               |                     |          |                | • Mobility  
                      |               |                     |          |                | • Safety   |
| BVT-3       | Bristol, Virginia | Capital - 3 Replacement Lift-Equipped Vans       | $ 181,139 | FTA STATE LOCAL | • Efficiency  
                      |               |                     |          |                | • Environment  
                      |               |                     |          |                | • Mobility  
                      |               |                     |          |                | • Safety   |
| BVT-3       | Bristol, Virginia | Capital - 3 Replacement Support Vehicles         | $ 119,842 | FTA STATE LOCAL | • Efficiency       |
| BVT-3       | Bristol, Virginia | Associated Capital Maintenance Items and Facility Maintenance | $ 308,253 | FTA STATE LOCAL | • Efficiency |
### APPENDIX G

#### Tennessee Pedestrian / Bicycle Projects Horizon Year 2010-2035

<table>
<thead>
<tr>
<th>PROJECT No.</th>
<th>JURISDICTION</th>
<th>LOCATION</th>
<th>DESCRIPTION</th>
<th>FUNDING SOURCE</th>
<th>COST</th>
<th>LRP GOALS ADDRESSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>Bristol, Tennessee</td>
<td>Fairmount Elementary School, Fairmount neighborhood</td>
<td>Construction/reconstruction of sidewalks</td>
<td>SRTS</td>
<td>$385,000</td>
<td>• Environment • Mobility • Safety</td>
</tr>
</tbody>
</table>

#### Virginia Pedestrian / Bicycle Projects Horizon Year 2010-2035

<table>
<thead>
<tr>
<th>PROJECT No.</th>
<th>JURISDICTION</th>
<th>LOCATION</th>
<th>DESCRIPTION</th>
<th>FUNDING SOURCE</th>
<th>Cost</th>
<th>LRP GOALS ADDRESSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>Bristol, Virginia</td>
<td>State Street, Cumberland St, Ncolia Ave, Piedmont Ave, and Lindsay Dr</td>
<td>Pedestrian improvements including signal pushbuttons, pedestrian pavement markings, and sidewalk construction</td>
<td>HSIP</td>
<td>$420,000</td>
<td>• Environment • Mobility • Safety</td>
</tr>
</tbody>
</table>
## Project No. TIL-7: Volunteer Parkway/Highway 11E Median Modification Candidate Locations (US 11E-19/SR 34), listed north to south

<table>
<thead>
<tr>
<th>STREET NAME</th>
<th>AT LOCATION</th>
<th>MILE POST</th>
<th>MODIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volunteer Pkwy</td>
<td>W Cedar St</td>
<td>15.84</td>
<td>install left-turn lane</td>
</tr>
<tr>
<td>Volunteer Pkwy</td>
<td>median opening north of Lavinder Ln</td>
<td>15.11</td>
<td>install left-turn lane</td>
</tr>
<tr>
<td>Volunteer Pkwy</td>
<td>median opening north of Holston Dr</td>
<td>14.92</td>
<td>install left-turn lanes</td>
</tr>
<tr>
<td>Volunteer Pkwy</td>
<td>median opening north of Deer Run</td>
<td>14.79</td>
<td>install left-turn lane</td>
</tr>
<tr>
<td>Volunteer Pkwy</td>
<td>Deer Run</td>
<td>14.58</td>
<td>install left-turn lanes</td>
</tr>
<tr>
<td>Volunteer Pkwy</td>
<td>Shelby Ln</td>
<td>14.47</td>
<td>install left-turn lane</td>
</tr>
<tr>
<td>Volunteer Pkwy</td>
<td>Circle Ct</td>
<td>13.45</td>
<td>install left-turn lane</td>
</tr>
<tr>
<td>Volunteer Pkwy</td>
<td>Gentry Ln</td>
<td>13.23</td>
<td>install left-turn lane</td>
</tr>
<tr>
<td>Volunteer Pkwy</td>
<td>Cemetery Rd</td>
<td>13.09</td>
<td>install left-turn lane</td>
</tr>
<tr>
<td>Volunteer Pkwy</td>
<td>Phillipswood Dr/Avoca Rd (N inter)</td>
<td>13.00, 12.99</td>
<td>realign Avoca Rd and install left-turn lanes in improved median opening</td>
</tr>
<tr>
<td>Volunteer Pkwy</td>
<td>median opening north of Sunnybrook Dr</td>
<td>12.70</td>
<td>install left-turn lane</td>
</tr>
<tr>
<td>Volunteer Pkwy</td>
<td>Sunnybrook Dr</td>
<td>12.53</td>
<td>install left-turn lane</td>
</tr>
<tr>
<td>Volunteer Pkwy</td>
<td>Blue Bonnet Dr/Main St</td>
<td>12.35, 12.38</td>
<td>realign roadway and install left-turn lanes at improved median opening</td>
</tr>
<tr>
<td>Volunteer Pkwy</td>
<td>Old Bristol Hwy</td>
<td>11.85</td>
<td>install left-turn lane</td>
</tr>
<tr>
<td>Volunteer Pkwy</td>
<td>Shady Brook Dr</td>
<td>11.60</td>
<td>install left-turn lanes</td>
</tr>
<tr>
<td>Volunteer Pkwy</td>
<td>two median openings north of Hatchall Way</td>
<td>11.45, 11.32</td>
<td>install left-turn lanes</td>
</tr>
<tr>
<td>Volunteer Pkwy</td>
<td>Avoca School entrance</td>
<td>11.17</td>
<td>install left-turn lane</td>
</tr>
<tr>
<td>Volunteer Pkwy</td>
<td>two median openings north of Watson Rd</td>
<td>11.02, 10.97</td>
<td>install left-turn lanes</td>
</tr>
<tr>
<td>Volunteer Pkwy</td>
<td>Watson Rd</td>
<td>10.88</td>
<td>install left-turn lane</td>
</tr>
<tr>
<td>Volunteer Pkwy</td>
<td>median openings north and south of Hilltop St (Hilltop St LM listed)</td>
<td>10.72</td>
<td>consolidate into single median opening at Hilltop St with left-turn lanes</td>
</tr>
<tr>
<td>Volunteer Pkwy</td>
<td>Winner’s Cir/North Raceway Villas Dr</td>
<td>10.65</td>
<td>adjust median opening location and install left-turn lanes</td>
</tr>
<tr>
<td>Volunteer Pkwy</td>
<td>Sperry View Dr</td>
<td>10.40</td>
<td>install left-turn lane</td>
</tr>
<tr>
<td>Hwy 11E</td>
<td>Hamilton Hill Rd</td>
<td>8.10</td>
<td>install left-turn lane</td>
</tr>
<tr>
<td>Hwy 11E</td>
<td>Hendrickson Ln</td>
<td>7.93</td>
<td>install left-turn lane</td>
</tr>
<tr>
<td>Hwy 11E</td>
<td>median opening south of Hendrickson Ln</td>
<td>7.69</td>
<td>install left-turn lanes</td>
</tr>
<tr>
<td>Hwy 11E</td>
<td>median opening south of Oakdale Rd/Thomas Ln</td>
<td>6.92</td>
<td>install left-turn lane</td>
</tr>
<tr>
<td>Hwy 11E</td>
<td>River Rd</td>
<td>6.12</td>
<td>install left-turn lanes</td>
</tr>
</tbody>
</table>
## Project No. TIL-8: Weaver Pike Spot Modification Candidate Locations (SR 358), listed north to south

<table>
<thead>
<tr>
<th>STREET NAME</th>
<th>AT LOCATION</th>
<th>MILE POST</th>
<th>MODIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weaver Pike</td>
<td>Volunteer Parkway and Beaver Creek bridge</td>
<td>9.45</td>
<td>intersection and bridge modifications</td>
</tr>
<tr>
<td>Weaver Pike</td>
<td>Stonecroft Rd/ Stine St</td>
<td>8.61</td>
<td>install left-turn lanes, sight distance modifications</td>
</tr>
<tr>
<td>Weaver Pike</td>
<td>5th St</td>
<td>8.54</td>
<td>install left-turn lane</td>
</tr>
<tr>
<td>Weaver Pike</td>
<td>Cedar Valley Rd</td>
<td>8.19</td>
<td>install left-turn lane</td>
</tr>
<tr>
<td>Weaver Pike</td>
<td>Cedar Creek bridge</td>
<td>8.15</td>
<td>rail installations</td>
</tr>
<tr>
<td>Weaver Pike</td>
<td>Hogtown Creek bridge</td>
<td>7.82</td>
<td>rail modifications</td>
</tr>
<tr>
<td>Weaver Pike</td>
<td>Industrial Dr</td>
<td>7.36</td>
<td>install left-turn lane, begin shoulder widening for bicycle route</td>
</tr>
<tr>
<td>Weaver Pike</td>
<td>Beeler Branch bridge</td>
<td>7.14</td>
<td>rail installations, widening for bicycle route</td>
</tr>
<tr>
<td>Weaver Pike</td>
<td>Bellebrook Rd/ Industrial Blvd</td>
<td>7.02</td>
<td>install left-turn lanes, end shoulder widening for bicycle route</td>
</tr>
<tr>
<td>Weaver Pike</td>
<td>Vance Tank Rd (current LM listed)</td>
<td>6.73</td>
<td>relocate intersection away from railroad overpass</td>
</tr>
<tr>
<td>Weaver Pike</td>
<td>Partnership Park Rd</td>
<td>6.28</td>
<td>install left-turn lane</td>
</tr>
</tbody>
</table>

## Project No. TIL-9: West State Street/Highway 11W Median Modification Candidate Locations (US 11W/SR 1), listed east to west

<table>
<thead>
<tr>
<th>STREET NAME</th>
<th>AT LOCATION</th>
<th>MILE POST</th>
<th>MODIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>W State St</td>
<td>Sycamore St</td>
<td>23.69</td>
<td>install left-turn lane</td>
</tr>
<tr>
<td>W State St</td>
<td>median opening east of Blountville Hwy</td>
<td>23.51</td>
<td>install left-turn lane</td>
</tr>
<tr>
<td>W State St</td>
<td>median opening west of Blountville Hwy</td>
<td>23.22</td>
<td>install left-turn lanes</td>
</tr>
<tr>
<td>W State St</td>
<td>Shankel Mill Rd</td>
<td>22.95</td>
<td>install left-turn lanes</td>
</tr>
<tr>
<td>W State St</td>
<td>median opening west of Shankel Mill Rd</td>
<td>22.86</td>
<td>install left-turn lanes</td>
</tr>
<tr>
<td>W State St</td>
<td>three median openings east of Island Rd N.E.</td>
<td>22.19</td>
<td>install left-turn lanes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>22.40</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>22.48</td>
<td></td>
</tr>
<tr>
<td>W State St</td>
<td>Island Rd N.E.</td>
<td>22.03</td>
<td>install left-turn lane</td>
</tr>
<tr>
<td>W State St</td>
<td>two median openings east of Medical Park Blvd</td>
<td>21.82</td>
<td>install left-turn lanes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>21.68</td>
<td></td>
</tr>
<tr>
<td>W State St</td>
<td>Medical Park Blvd</td>
<td>21.58</td>
<td>lengthen left-turn lane</td>
</tr>
<tr>
<td>Hwy 11W</td>
<td>Holiday Dr/Island Rd</td>
<td>20.87</td>
<td>install left-turn lanes</td>
</tr>
</tbody>
</table>
### APPENDIX I

**LIST OF ABBREVIATIONS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADA</td>
<td>Americans with Disabilities Act</td>
</tr>
<tr>
<td>ARRA</td>
<td>American Recovery and Reinvestment Act</td>
</tr>
<tr>
<td>BTT</td>
<td>Bristol Tennessee Transit</td>
</tr>
<tr>
<td>BVT</td>
<td>Bristol Virginia Transit</td>
</tr>
<tr>
<td>DOT</td>
<td>Department of Transportation</td>
</tr>
<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
</tr>
<tr>
<td>FAF</td>
<td>Freight Analysis Framework</td>
</tr>
<tr>
<td>FHWA</td>
<td>Federal Highway Administration</td>
</tr>
<tr>
<td>FTA</td>
<td>Federal Transit Administration</td>
</tr>
<tr>
<td>FTHRA</td>
<td>First Tennessee Human Resource Agency</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information System</td>
</tr>
<tr>
<td>ITS</td>
<td>Intelligent Transportation System</td>
</tr>
<tr>
<td>LRTP</td>
<td>Long-Range Transportation Plan</td>
</tr>
<tr>
<td>MPO</td>
<td>Metropolitan Planning Organization</td>
</tr>
<tr>
<td>PPP</td>
<td>Public Participation Plan</td>
</tr>
<tr>
<td>ROW</td>
<td>Right-of-Way</td>
</tr>
<tr>
<td>RTPO</td>
<td>Rural Transportation Planning Organization</td>
</tr>
<tr>
<td>SAFETEA-LU</td>
<td>Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users</td>
</tr>
<tr>
<td>SAGA</td>
<td>Southern Appalachian and Greenways Alliance</td>
</tr>
<tr>
<td>TAZ</td>
<td>Transportation Analysis Zone</td>
</tr>
<tr>
<td>TEA-21</td>
<td>Transportation Equity Act for the 21st Century</td>
</tr>
<tr>
<td>TDOT</td>
<td>Tennessee Department of Transportation</td>
</tr>
<tr>
<td>TIP</td>
<td>Transportation Improvement Program</td>
</tr>
<tr>
<td>TN</td>
<td>Tennessee</td>
</tr>
<tr>
<td>TPR</td>
<td>Transportation Planning Report</td>
</tr>
<tr>
<td>UPWP</td>
<td>Unified Planning Work Program</td>
</tr>
<tr>
<td>VA</td>
<td>Virginia</td>
</tr>
<tr>
<td>VDOT</td>
<td>Virginia Department of Transportation</td>
</tr>
<tr>
<td>VDRPT</td>
<td>Virginia Department of Rail and Public Transportation</td>
</tr>
</tbody>
</table>
APPENDIX J
PUBLIC INVOLVEMENT

Initiated under the mandate of the Intermodal Surface Transportation Efficiency Act of 1991, and with additional requirements and emphasis under the provisions of SAFETEA-LU, public participation in the Metropolitan Planning Organization planning process is an integral part of regional transportation activities. The Bristol MPO encourages the distribution of information related to transportation decisions throughout the region. It is the policy of the MPO to take all public comments into account in the development and adoption of plans and programs, specifically the Transportation Improvement Program and long-range transportation plan.

PUBLIC PARTICIPATION PLAN

The Bristol MPO's Public Participation Plan reflects the current policies for developing transportation planning programs in accordance with the provisions of SAFETEA-LU. The following excerpt from the Public Participation Plan is related to the MPO's policy for the development of the long-range transportation plan.

(1) Reasonable opportunities for public participation and comment during the development of the LRTP will be provided to interested parties by utilizing public notification and outreach tools to gain early and continuing input and interaction with the public on transportation issues.

(2) To provide opportunity for public comment from traditionally underserved groups, special effort will be made to provide MPO announcements and information to local social service agencies, neighborhood groups and minority organizations.

(3) Development of the LRTP shall include consultation with interested parties, other related Federal, State, and local planning agencies affected by transportation, including resource agencies responsible for natural resource management and historic preservation.

(4) Public review and comment opportunities shall be provided when the plan is originally adopted, for amendments to the plan, and during the plan update cycle.

(5) There shall be at least a 30-day comment period on the draft LRTP prior to adoption. The public comment period begins with public notice.

(6) A summary of all comments received, either verbally or in writing, will be made available to the Executive Board prior to adoption, and incorporated into the final LRTP. Before approval by the Executive Board, the public shall be afforded the opportunity to comment on the draft LRTP.

(7) After evaluation of comments received on the draft LRTP, the Executive Board may defer the adoption of the plan if there are significant unresolved comments. The MPO staff will prepare written response to the comments to be incorporated into the document, or suggest amendments to the draft document. Should the amendments be significant, another 30-day review period shall be provided.

(8) Amendments to the long-range transportation plan must follow the same process with the exception of projects deemed to be generally local in nature and scale.

Consultation with Interested Parties and Other Public Agencies. SAFETEA-LU requires the MPO’s public participation process to provide citizens, affected public agencies, representatives of public transportation employees, freight shippers, providers of freight transportation services, private providers of transportation, representatives of users of public transportation, representatives of users of pedestrian walkways and bicycle transportation facilities, representatives of the disabled, and other interested parties with reasonable opportunities to be involved in the metropolitan planning process. This process also includes consultation and coordination, as appropriate, with agencies and official responsible for other planning activities with the metropolitan planning area. In order to facilitate this process, the MPO developed a contact list of interested parties, which were provided notice of the Bristol Urban Area Long-Range Transportation Plan Year 2035 review process. The contact list of stakeholders is included as an appendix to the MPO’s Public Participation Plan documentation.
**Meeting Announcements.** Meeting announcements related to the long-range plan are distributed throughout the community, including press releases. In addition to the press notices, flyers are sent to various locations and organizations including those representing underserved populations as listed below.

- Bristol Virginia Senior Center
- Bristol Tennessee Community Center
- Bristol Tennessee/Virginia Public Library
- Bristol, Tennessee Community Development
- Bristol, Virginia Community Development
- Appalachian Independence Center
- Bristol, Tennessee Housing and Redevelopment Authority
- Bristol, Virginia Housing and Redevelopment Authority

**Public Comment Period.** A 30-day public review period for the *Bristol Urban Area Long-Range Transportation Plan Year 2035* was published in the *Bristol Herald Courier* on December 29, 2010. In addition to the above referenced agencies, the public comment notice was distributed to an expanded list of interested parties, public and environmental agencies required by the Public Participation Plan.

The *Bristol Urban Area Long-Range Transportation Plan Year 2035* was made available for public inspection on the Bristol MPO website and at the office of MPO staff (City of Bristol, Tennessee) located at 104 8th Street, Bristol, Tennessee, during normal working hours. Copies of draft plan update were also placed at the following locations for public access, in addition to appearing electronically on the MPO’s website:

- Bristol, Virginia Department of Community Development and Planning.
- Sullivan County Tennessee Department of Planning and Zoning.
- Washington County Virginia Department of Planning and Zoning.
- Bristol Tennessee/Virginia Public Library.
- Community centers and agencies serving low income and minority areas.

**PUBLIC COMMENTS**

Although attendance was small at the public meetings, some input was received. Other than survey forms, one written comment submitted was from the Appalachian Independence Center, as follows:

“As advocates for persons with disabilities, Appalachian Independence Center (AIC) believes that the Bristol Urban Area Long Range Transportation Plan (Year 2035) decision to merely extend the current level of service for transit and paratransit in the Bristol service area over the next twenty years rather than increase funding/programming for additional routes and shelters ignores the trends propelling growth in transit usage, namely improved healthcare for people with disabilities, an aging general population, increased fuel costs over time and stagnant wages which make individual car ownership disproportionately expensive for the working poor. We would also hope, in future updates, that there be a discussion regarding the potential for cost savings using improved technologies in scheduling on-demand service.”

Four survey forms were returned from the public meetings. A chart included in this section summarizes those responses. No additional comments were received from the general public outside of the public meetings or the survey forms.

**APPENDIX J**
PUBLIC INFORMATION MEETING
ON THE
BRISTOL TENNESSEE-VIRGINIA URBAN AREA
LONG RANGE TRANSPORTATION PLAN YEAR 2035

TRAFFIC ■ PEDESTRIANS ■ BICYCLES ■ TRANSIT ■ HIGHWAYS ■ SAFETY

The Bristol Metropolitan Planning Organization (MPO) is asking for public review and comments on the draft *Bristol Urban Area Long-Range Transportation Plan Year 2035*. The regional transportation plan examines current and future transportation conditions, as well as proposed projects for future mobility needs and transportation options within the Bristol Tennessee – Virginia urban area.

The MPO has scheduled two information meetings for interested stakeholders to provide input and comments on the draft plan. A copy of the draft *Bristol Urban Area Long-Range Transportation Plan Year 2035* is available at [www.bristoltn.org](http://www.bristoltn.org) (link to Metropolitan Planning Organization) or by contacting the MPO.

**TUESDAY, JANUARY 25, 2011**
**EWELL L. EASLEY ANNEX BUILDING**
**104 8TH STREET, BRISTOL, TENNESSEE**
**MEETING #1  2:00 PM**
**MEETING #2  6:00 PM**

**WHO WE ARE:** The Bristol Metropolitan Planning Organization is the agency federally designated with facilitating community-wide transportation planning for the Bristol Tennessee/Virginia region. The MPO is responsible for working with all transportation related agencies to promote multi-modal transportation planning and to provide transportation related information and analyses. The Bristol MPO consists of the Town of Bluff City Tennessee, City of Bristol Tennessee, City of Bristol Virginia, and certain surrounding areas of Sullivan County Tennessee and Washington County Virginia.
Postcard Mailed to Interested Parties

BRISTOL METROPOLITAN PLANNING ORGANIZATION
Bristol, Tennessee • Bristol, Tennessee • Bristol, Virginia • Sullivan County, Tennessee • Washington County, Virginia

BRISTOL URBAN AREA LONG-RANGE TRANSPORTATION PLAN
YEAR 2035

The Bristol Metropolitan Planning Organization is in the process of developing the regional long-range transportation plan for the Bristol Tennessee-Virginia Urbanized Area. The Long-Range Transportation Plan Year 2035 provides an overview of the existing transportation system including roadways, public transportation, bikeways, and pedestrian facilities, and evaluates future transportation improvements. As a valued stakeholder we invite you to review and comment on the draft long-range plan. This document is available at www.bristoltn.org (Link to MPO) or can be provided by contacting the MPO. Please forward any comments you may have to:

Rex Montgomery, Bristol MPO
45 & 7th Street • P.O. Box 1189 • Bristol, TN 37621-1189
(423) 597-5559 • rmontgomery@bristoltn.org

Public Notice of MPO Meeting Adopting the Long-Range Plan
Survey Form Distributed for Public Comments

SURVEY FORM
BRISTOL MPO 2035 LONG RANGE TRANSPORTATION PLAN

Please take a moment to provide us your thoughts and ideas on the Bristol Tennessee/Virginia urban area transportation needs and concerns for the 2035 Long Range Transportation Plan.

1. Overall, how well does the regional transportation system meet your travel needs?
   - Very Well
   - Somewhat Well
   - Not Very Well
   - No Opinion

2. To improve the transportation system, how effective do you think the following areas would be?
   Improving and expanding transit services:
   - Very Effective
   - Somewhat Effective
   - Not Very Effective
   - Not Sure
   Providing better maintenance on existing roads:
   - Very Effective
   - Somewhat Effective
   - Not Very Effective
   - Not Sure
   Widening existing highways:
   - Very Effective
   - Somewhat Effective
   - Not Very Effective
   - Not Sure
   Building more highways:
   - Very Effective
   - Somewhat Effective
   - Not Very Effective
   - Not Sure
   Building more connecting roads between neighborhoods and commercial areas:
   - Very Effective
   - Somewhat Effective
   - Not Very Effective
   - Not Sure
   Expanding bicycle networks:
   - Very Effective
   - Somewhat Effective
   - Not Very Effective
   - Not Sure
   Constructing more sidewalks:
   - Very Effective
   - Somewhat Effective
   - Not Very Effective
   - Not Sure
   Improving railroads so more freight can travel by rail instead of trucks:
   - Very Effective
   - Somewhat Effective
   - Not Very Effective
   - Not Sure
   Developing passenger railroad services:
   - Very Effective
   - Somewhat Effective
   - Not Very Effective
   - Not Sure

3. What are your greatest transportation needs and concerns?_____________________________________
   ____________________________________________________________

4. What transportation improvements would you like to see funded?__________________________________
   ____________________________________________________________

5. Do you have any other comments?________________________________________________________________
   ____________________________________________________________

THANK YOU FOR YOUR COMMENTS
BRISTOL METROPOLITAN PLANNING ORGANIZATION ♦ 423-989-5519 ♦ WWW.BRISTOLTN.ORG/TRANSPORTATION.CFM

APPENDIX J
## Survey Form Responses

<table>
<thead>
<tr>
<th>ITEM</th>
<th>RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VERY WELL or EFFECTIVE</td>
</tr>
<tr>
<td>Overall, how well does the regional transportation system meet your travel needs?</td>
<td>3</td>
</tr>
<tr>
<td>To improve the transportation system, how effective do you think the following areas would be?</td>
<td>3</td>
</tr>
<tr>
<td>Improving and expanding transit services</td>
<td>3</td>
</tr>
<tr>
<td>Providing better maintenance of existing roads</td>
<td>1</td>
</tr>
<tr>
<td>Widening existing highways</td>
<td>1</td>
</tr>
<tr>
<td>Building more highways</td>
<td>2</td>
</tr>
<tr>
<td>Building more connecting roads between neighborhoods and commercial areas</td>
<td>1</td>
</tr>
<tr>
<td>Expanding bicycle networks</td>
<td>3</td>
</tr>
<tr>
<td>Constructing more sidewalks</td>
<td>3</td>
</tr>
<tr>
<td>Improving railroads so more freight can travel by rail instead of trucks</td>
<td>2</td>
</tr>
<tr>
<td>Developing passenger railroad services</td>
<td>3</td>
</tr>
</tbody>
</table>

Q. What are your greatest transportation needs and concerns?

"More sidewalks."
"Extend Hospital Blvd [sic]"
"West State Street"
"more bike lanes – Improved E-West [sic] links in Bristol TN [sic]"

Q. What transportation improvements would you like to see funded?

"Exit 7 is to [sic] congested, traffic signals need to work together."
"Pennsylvania/Virginia Avenue"
"West State Street"
"Upgrade US 421 in Bristol TN [sic]"

Q. Do you have any other comments?

"No thanks"