Roanoke Valley Alleghany Regional Commission

Constrained Long-Range Transportation Plan 2035

Roanoke Valley Area Metropolitan Planning Organization
Approved - June 23, 2011

Acknowledgments

Roanoke Valley Area Metropolitan Planning Organization Policy Board

David Trinkle, Chair
Richard Flora, Vice Chair
Doug Adams
Richard Caywood
Tony Cho
Tammye Davis
Jeff Sizemore
Dr. M. Rupert Cutler
Carl Palmer.
Billy Martin, Sr.
Charlotte Moore
J. Lee E. Osborne
Jane Johnson
Melinda Payne
Carolyn Fidler
Jackie Shuck
Ron Smith
Dave Wheeler

Metropolitan Planning Organization Secretary/ Roanoke Valley-Alleghany Regional Commission Executive Director

Project Team

Mark McCaskill, AICP
Matthew Rehnborg
Jake Gilmer, AICP
Matt Miller, GISP
Shane Sawyer
Jeremy Holmes
Cristina Finch, AICP, LEED AP

Review Team

Mike Borger
Martha Cousins
Alexandra King
Laura Mitchell
John Mobley
Erik Wampler
Linda Goodrich

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Roanoke Valley Area
Metropolitan Planning Organization
313 Luck Avenue, SW / PO Box 2569 / Roanoke, Virginia 24010
TEL: 540.343.4417 / FAX: 540.343.4416 / www.rvarc.org / rvarc@rvarc.org

The 23rd day of June, 2011

RESOLUTION

Endorsement of the Roanoke Valley Area Metropolitan Planning Organization Constrained Long-Range Transportation Plan 2035

WHEREAS, federal regulations implemented as a result of the Safe Accountable Flexible Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) require urbanized area metropolitan planning organizations to develop and approve a financially constrained long range transportation plan; and

WHEREAS, the Roanoke Valley Area Metropolitan Planning Organization Constrained Long-Range Transportation Plan 2035 has been developed as a result of a continuing, comprehensive, and cooperative (3-C) transportation planning process; and

WHEREAS, a major feature of the 3-C urban transportation planning process is the continuing observation and reappraisal of the urban transportation plan, and the Roanoke Valley Area Metropolitan Planning Organization Constrained Long-Range Transportation Plan 2035 will serve as the existing urban transportation plan, officially updating and replacing the Roanoke Valley Area 2025 Constrained Long- Range Transportation Plan; and

WHEREAS, every effort has been made to prioritize projects which can be reasonably implemented within projected funding limits for the twenty-year horizon; and

WHEREAS, public input has been sought in developing the Plan through public meetings, in accordance with the Public Participation Policy and Procedure Manual approved by the Roanoke Valley Area Metropolitan Planning Organization Policy Board on August 18, 2004.

NOW, THEREFORE BE IT RESOLVED, that the Roanoke Valley Area Metropolitan Planning Organization Policy Board endorses the Roanoke Valley Area Metropolitan Planning Organization Constrained Long-Range Transportation Plan 2035 and the financially constrained program of projects contained within,

AND, THEREFORE BE IT FURTHER RESOLVED, that this plan shall serve the Commonwealth of Virginia and the federal government as the primary guidance for future transportation related investments in the Roanoke Valley area.

David B. Trinkle
Chairman

Members: Bedford, Botetourt and Roanoke counties, cities of Roanoke and Salem, Town of Vinton, Greater Roanoke Transit Company, Roanoke Regional Airport Commission, Roanoke Valley-Alleghany Regional Commission, Virginia Department of Transportation

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INTRODUCTION 1

THE ROLE OF PLANNING

The concept of long-range planning can often be under-appreciated, especially in tight budgetary times. Conventional wisdom holds that any positive outcomes in public administration or society at large are the result of unseen natural processes or market forces. However, when a disaster arises, one of the first questions people ask is, "Why didn't anyone ***plan*** for this?" In fact, it can be argued that planning is most necessary at times of scarce resources, because elected officials and other decision makers will need all the help and information they can get to make wise decisions with limited funds.

> Ironically, many successful plans go without recognition because their consequences—clean air, uncongested traffic flow, grand public vistas, reliable storm water drainage, plenty of affordable housing, and urban estuaries teeming with wildlife—***appear natural or unplanned***. (emphasis added)[1]

1. The Practice of Local Government Planning - Third Edition, 2000, p 4.

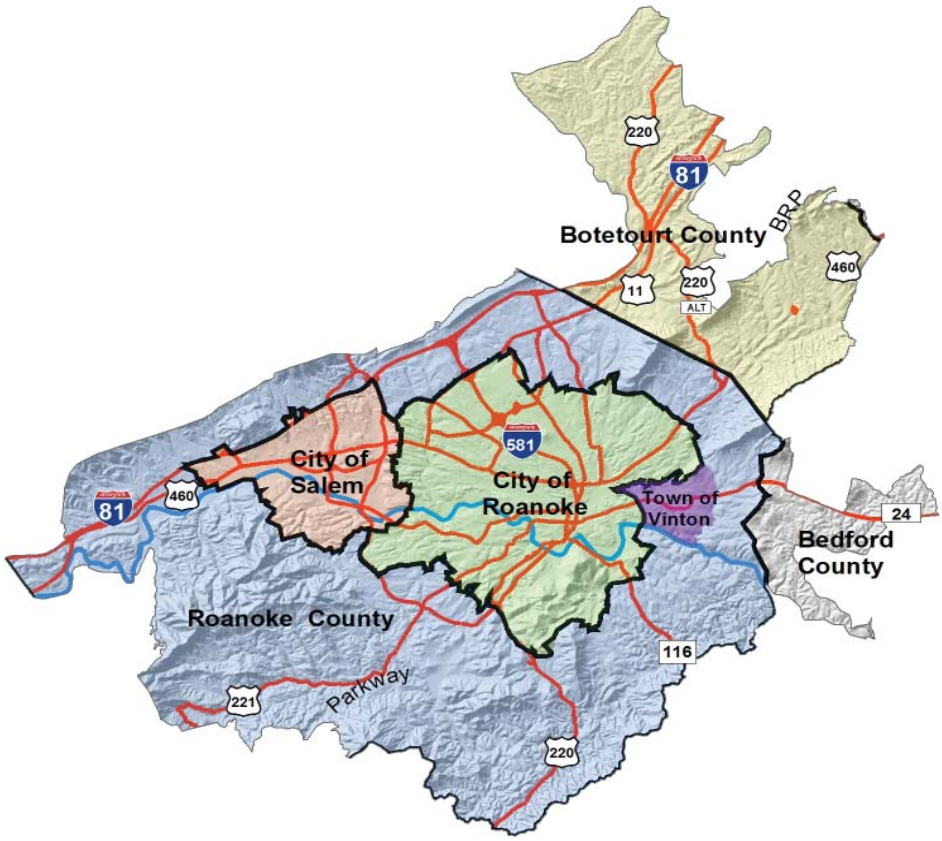
Federal legislation has defined a specific role for long-range urban transportation planning in Title 23, United States Code, Sec. 134 as reported in "Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users" or SAFETEA-LU.

SAFETEA-LU sets out the vision that: "It is in the national interest to… encourage and promote the safe and efficient management, operation, and development of surface transportation systems that will serve the mobility needs of people and freight and foster economic growth and development within and between States and urbanized areas, while minimizing transportation-related fuel consumption and air pollution…."

SAFETEA-LU further states: "To accomplish the[se] objectives, metropolitan planning organizations [MPOs]…in cooperation with the State and public transportation operators, shall develop long-range transportation plans..."[2]

In practice, an MPO's Financially Constrained Long-Range Transportation Plan (CLRTP) serves as the first step in a system of checks and balances to ensure that federal surface transportation funds are spent with buy-in from the federal, state, and local/regional levels of government. This check and balance is similar to what most people learned in their high school government classes concerning the legislative, executive, and judicial branches of government. However, the long-range transportation planning checks and balances unfold within the executive/administrative branch of government and are designed to ensure that local elected officials, acting through their respective MPOs, have a say in the expenditure of federal surface transportation funds within their Study Area Boundary. MPOs exercise this control by either including or not including funding for specific regional transportation projects in the CLRTP's Financially Constrained List of Projects.

The 2035 Study Area Boundary for the Roanoke Valley Area MPO (RVAMPO) is depicted below:



2. Title 23, United States Code, Sec. 134 (a) & (c), as reported in "Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, Conference Report of the Committee of Conference on H.R. 3"

Complementary Planning Processes

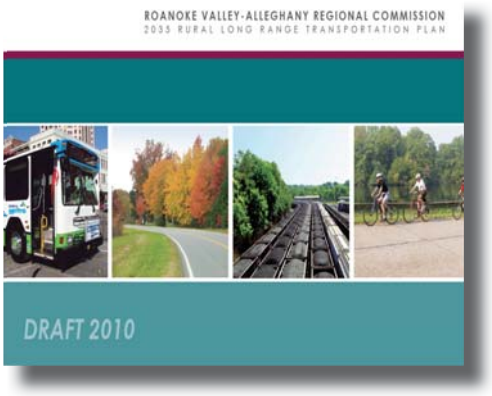
Other Regional Transportation Plans

There are other regional and multi-jurisdictional transportation planning processes that overlap in geography and scope with the RVAMPO long-range transportation planning process. Although these other regional transportation plans do not fulfill the check and balance function described previously, they often fulfill specific funding or grant requirements. Examples of regional long and medium range transportation plans and processes that complement or supplement the RVAMPO CLRTP 2035 process are listed below.

- **Long-Range Transportation Demand Management (TDM) Plan**
- **Rural Long-Range Transportation Plans**
- **Regional Transit Development Plans**
- **Coordinated Human Service Mobility Plan**

Long-Range Transportation Demand Management Plan: The Virginia Department of Rail and Public Transportation (DRPT) has set up a requirement whereby all Rideshare and Transportation Demand Management (TDM) agencies in Virginia will develop a Long-Range TDM Plan. RIDE Solutions, the regional rideshare agency serving the Roanoke and New River Valleys, will develop the TDM plan that covers both the RVAMPO and the nearby Blacksburg-Christiansburg-Montgomery Area MPO (BCMMPO). The TDM plan will have the same 2035 time horizon as this plan, and future updates will mirror the RVAMPO CLRTP update schedule. The RIDE Solutions TDM plan is scheduled to be completed in a similar time frame as the RVAMPO CLRTP 2035. Chapter 7 of this document will further detail TDM planning principles and program characteristics. Increasingly strained budgets at the federal, state, and local levels make TDM planning critical.

Rural Long-Range Transportation Plan: The Virginia Department of Transportation (VDOT) and a private sector consultant are partnering with the Planning District Commissions (PDCs) in Virginia to produce Rural Long-Range Transportation Plans. The plan for the Roanoke Valley-Alleghany Regional Commission (RVARC) is expected to be completed between 6 to 12 months after the completion of RVAMPO CLRTP 2035. Nevertheless, chapter 16 of this document summarizes the rural planning process and progress at the time of completion of this document. It is expected that the rural planning process will inform financially constrained and vision list project candidates near the RVAMPO 2035 Study Area Boundary.



Regional Transit Development Plans: The Virginia DRPT has reinitiated the Transit Development Planning Process for Virginia's fixed route and paratransit providers. Within the RVAMPO this process applies to both the fixed route provider Greater Roanoke Transit Company (Valley Metro) and the regional paratransit provider Unified Human Services Transportation Systems Inc. (RADAR). As of the writing of this plan, both providers are awaiting grant availability information for the development of their respective plans. These plans are expected to focus on public transportation operations and expansion possibilities.

Coordinated Human Service Mobility Plan: The Coordinated Human Service Mobility (CHSM) Plan is prepared in response to the coordinated planning requirements of SAFETEA-LU as set forth in three sections of the Act: Section 5316, Job Access and Reverse Commute; Section 5317, New Freedom Program; and Section 5310, Elderly Individuals and Individuals with Disabilities Program. The CHSM establishes the construct for a comprehensive strategy for delivering transportation services to seniors, people with disabilities, and individuals of low income in the Roanoke Valley-Alleghany Regional Commission Planning District (PDC 5). Virginia Tech's Center for Transportation Policy prepared a CHSM for PDCs 4 and 5, as well as the RVAMPO and BCMMPO. In September 2008, Virginia DRPT and its consultants updated the CHSM plan for RVARC (PDC 5). Findings, analysis, and data from the most recent regional CHSM plan will be reflected throughout this document with special emphasis in chapter 6, "Scenario Planning."

Local Government Comprehensive Plans

In Virginia, local governments develop comprehensive plans as a general guide for future growth and related impacts within their jurisdictions. In general, transportation is but one area of specific focus in comprehensive plans. Other areas may include natural resources, water and wastewater facilities, parks and recreation, public safety, and future school needs. However, transportation directly or indirectly affects many of these other areas. In the RVAMPO long-range transportation planning process, comprehensive plans are generally used as a guide in project selection for either the Financially Constrained List of Projects (Chapter 11) or the Vision List of Projects (Chapter 15).

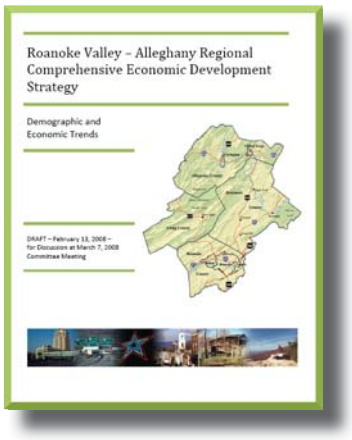
Projects that offer potential improvements but that are too costly to fit within current financial constraints are identified during the technical planning process, which uses a computerized "Travel Demand Model" (chapter 5). Comprehensive Plans, Neighborhood Plans, and other local government plans can be used to help decide which of these potential projects should go on the Vision List of Projects.

Some local governments develop more specialized plans that supplement comprehensive plans or are sometimes added to comprehensive plans through an amendment process. The City of Roanoke has a "Street Design Guidelines" document that has a direct impact on the RVAMPO long-range transportation planning process. "Street Design Guidelines" sets out standards for streets within the city based on neighborhood factors, the role of the street, and functional class. These additional standards will be incorporated into cost estimates for the City of Roanoke Urban System construction projects.

RVARC Comprehensive Economic Development Strategy

A Comprehensive Economic Development Strategy (CEDS) is designed to bring together the public and private sectors in the creation of an economic road map to diversify and strengthen regional economies. A CEDS analyzes regional economies and serves as a guide for establishing regional goals and objectives, developing and implementing regional action plans, and identifying investment priorities and funding sources.

A CEDS, which integrates a region's human and physical capital planning in the service of economic development, provides a flexible framework for adapting to global economic conditions and for fully utilizing a region's unique advantages to maximize economic opportunity for its residents. A CEDS is a continuing economic development planning tool developed with broad-based and diverse public- and private-sector participation, which must set forth the goals and objectives necessary to solve economic development problems of the region and must clearly define metrics of success. Finally, a CEDS provides a useful benchmark by which a regional economy can evaluate opportunities to participate with other regions in the national economy.

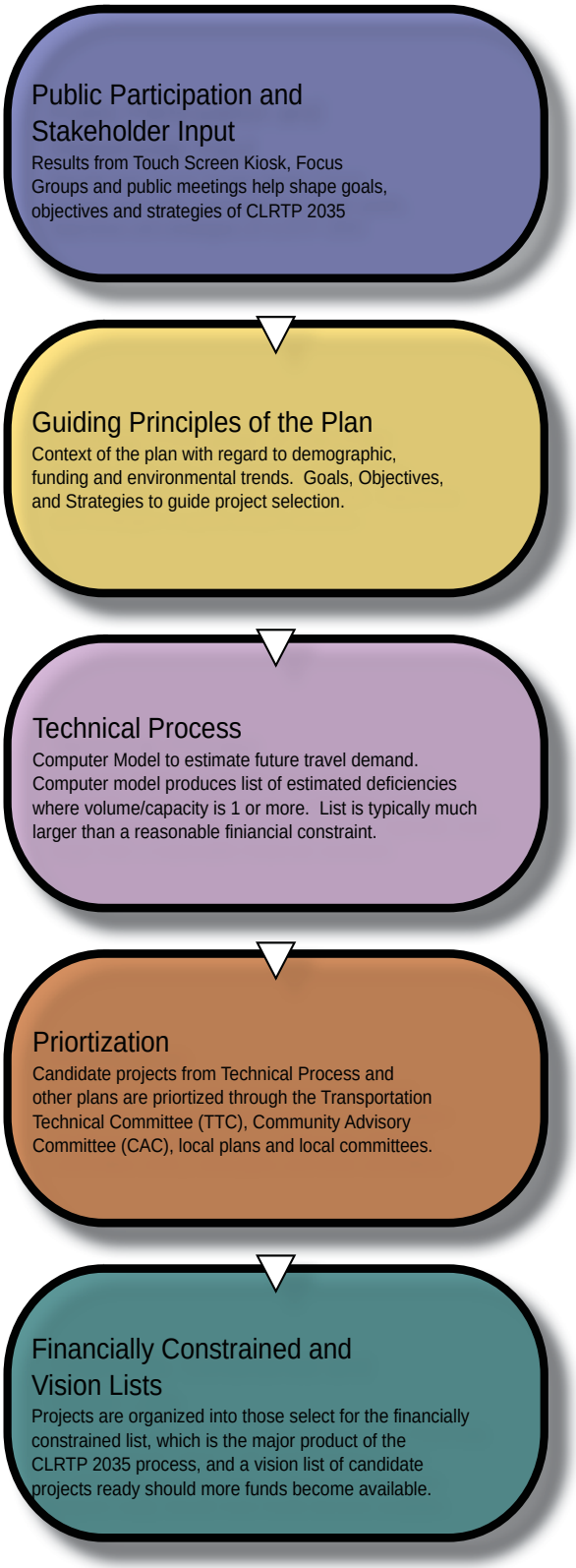


Preparing a CEDS is a precondition for funding under most of the Economic Development Administration's grant funding programs. This provides regions with an additional funding avenue for public infrastructure improvements that support regional economic development and alleviate economic development problems in a region.

Long-Range Planning Process

RVAMPO Long-Range Plan in a Nutshell

A simplified concept of the RVAMPO CLRTP is as follows:



Guiding Principles 2

THE ROANOKE VALLEY AREA METROPOLITAN PLANNING ORGANIZATION CONSTRAINED LONG-RANGE TRANSPORTATION PLAN 2035 (CLRTP 2035) consists of three fundamental elements:

- Guiding Principles
- Financially Constrained List of Transportation Projects
- Vision List of Transportation Projects

The Guiding Principles set both the policy tone and spirit in which to assess the Financially Constrained and Vision Lists of Projects against expected future project costs and funding allocations. To help with the assessment, Guiding Principles use a Vision Statement, examination of major societal and demographic trends, SAFETEA-LU Planning Factors, and Goals, Objectives, and Strategies to articulate a leadership vision for the CLRTP 2035.

Vision Statement: By the year 2035, RVAMPO will have made the most of limited federal surface transportation funds by acting upon opportunities to:

- manage the existing system using technology
- extend public transportation in a targeted manner
- provide opportunities for non-interstate ridesharing
- complement and complete existing transportation corridors, and
- provide safer transportation for all users.

The time horizon for the CLRTP extends until the year 2035. Within that time frame there are major societal and demographic trends that are both difficult to forecast with accuracy and profoundly important in their impact on future travel patterns, transportation demand, and transportation safety. These forces represent major variables affecting the decisions and trade-offs and are necessary in the planning process. The summaries below will be supplemented by more detailed information throughout the plan.

Societal and Demographic Trends

Retirement of Baby Boom Generation

The Baby Boom generation represents those born after World War II until 1964. If current retirement ages and trends continue, all members of this sizeable population group will retire within the time horizon of this long-range plan. Most past plans relied on extrapolations of trends occurring in the decades preceding the plan. In almost all cases this meant extrapolating travel trends of the Baby Boom generation as they reached employment age, raised families, and achieved their highest earning potential and employment responsibilities. In retirement, these past transportation trends which were based on work and family will change to trends based on leisure, volunteering, medical appointments, and shopping/retail. In addition, as the Baby Boom generation ages, transportation safety and accessibility issues will come to the forefront.

Air Quality and Global Climate Change

RVAMPO localities meet not only the 1997 National Ambient Air Quality Standard for 8-hour ozone under the Ozone Early Action Plan protocol but also the new 8-hour Ozone standards adopted by the EPA in March 2008. Similarly, RVAMPO localities are currently in compliance with the Fine Particulate Matter (PM 2.5) standard. It is likely that both of these standards will be further tightened during the time frame of this plan, so projects selected for inclusion in this plan should seek to maximize air quality improvement in balance with safety, financial, and other trade-offs.

Recent indications are that global warming is not only happening, but that it may be happening faster than projected and its consequences may be more widespread and more severe than forecast. The most likely negative effect of global climate change on RVAMPO localities would be increased flooding. Although there is no way to predict the timeline, scale, or severity of these changes in the CLRTP 2035, long-range transportation plans should consider the potential changes (heat, drought, floods, and sea level rise) that may cause major (possibly catastrophic) agricultural, economic, social, and geopolitical changes.

Energy Prices

Despite daily fluctuations, oil and gasoline prices continue to trend upward. Global oil prices no longer reflect simple supply and demand calculations. Even with level demand, oil prices rise due to increasing research and development costs. However, as traditional energy costs increase, technology can provide cheaper alternatives. One example is the rise of hybrid gas/electrical engine cars – which get higher mpg efficiency, require less gasoline, and reduce air pollution. The next level of automobile fuel technology – the hydrogen battery cell – represents a cleaner fuel source, but the technology needed for its use and delivery is still 10 to 15 years away. During this period, if gas prices go to four to six dollars per gallon (or higher), more drivers may turn to mass transit. Carpooling, van sharing and/or bicycling to work might become more attractive alternatives. Alternative transportation amenities may need to be ramped up in order to meet the increased demand.

Funding trends

At present, transportation funds for construction and maintenance are trending downward. The LRTP 2025, originally adopted in February 2004, was amended in April 2008 to account for updated projected financial revenue and project costs. In many cases, locality systems -- urban and secondary -- saw reductions in nominal dollars (not accounting for reductions due to inflation), and some secondary systems saw a nearly 50% reduction in projected transportation revenues through 2025. If this downward trend continues during this plan's time frame, non-traditional and relatively less expensive projects -- such as Intelligent Transportation Systems (ITS), Travel Demand Management (TDM) and Operations Management -- will become more important and must be given serious consideration.

SAFETEA-LU Planning Factors

Through SAFETEA-LU, the federal government provides long-range planning factors to guide MPOs through the planning process. The federal planning factors are listed below along with possible regional project selection criteria.

One: "Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency." Select projects which provide congestion relief. Select cost-effective projects (e.g. lowest cost per new user).

Two: "Increase the safety of the transportation system for motorized and non-motorized users." Select projects with potential to improve safety.

Three: "Increase the ability of the transportation system to support homeland security and to safeguard the personal security of all motorized and non-motorized users."

Four: "Increase the accessibility and mobility options available to people and for freight." Set aside funding for mass transit projects. Select cost-effective projects (e.g. lowest cost per new user).

Five: "Protect and enhance the environment, promote energy conservation, and improve quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns." Select projects which promote efficient growth patterns identified in local Comprehensive Plans.

Six: "Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight."

Seven: "Promote efficient system management and operation." Set aside funding for cost-effective ITS projects.

Eight: "Emphasize the preservation of the existing transportation system." Consider long-term operations and maintenance costs in the selection process.

Goals and Objectives

The RVAMPO CLRTP 2035 establishes a set of goals, objectives, and strategies to help guide the planning process. For the purposes of this plan the following definitions are used for goal, objective, and strategy:

Goal - A long-term end toward which efforts are directed.
Objective - A specific, intermediate program or activity that marks progress toward a goal.
Strategy - A measurable plan of action or way in which programs and activities are coordinated to achieve an identified goal and objective.

Goal One: Improve transportation system performance and air quality *and* reduce growth in transportation-related energy use by reducing the growth rate of Vehicle Miles Traveled (VMT)

- **Objective:** Plan for non-interstate park and ride lots by including construction costs or private sector partnership costs in the Financially Constrained List of Transportation Projects (FCLTP).
  - **Strategy:** Develop a program, focused on key regional arterial corridors, to encourage businesses, churches, and other organizations with pre-existing excess parking capacity, to officially section off portions of their existing parking lots as park and ride sections. Progress on this objective can be measured by the number of such partnerships by a certain date.
  - **Strategy:** Add the estimated construction cost of one non-interstate 20-space park and ride lot to the project costs of major arterial construction projects over one mile in length in the FCLTP.
- **Objective:** Increase performance and awareness of Travel Demand Management (TDM) Program.
  - **Strategy:** Conduct professional target market analysis and create campaign for commuters near major regional corridors using transportation funds from construction revenues.
  - **Strategy:** Develop VMT reduction awareness campaign using a wide variety of communication products, possibly including: public service announcements, advertising, social networking, and other appropriate channels using transportation funds from construction revenues. Measure results of awareness campaign.
  - **Strategy:** Investigate public-private partnerships to implement a car sharing system focused on downtown, village centers, and mixed use residential areas.

Goal Two: Increase percentage of "complete streets" by adding elements that adapt existing right-of-way (ROW) and travel corridors for safe use by multiple transportation modes.

- **Objective:** Provide bicycle accommodations on key commute corridors.
  - **Strategy:** Apply at least 2% of total FCLTP funds to bicycle enhancements.
  - **Strategy:** Install or provide installation incentives for an additional 50 bicycle racks by the time horizon of this plan.
- **Objective:** Increase pedestrian access and safety on collector and arterial roads.
  - **Strategy:** Include sidewalk costs in FCLTP project cost estimates for roadways that function at the collector or arterial level and currently lack sidewalks.
  - **Strategy:** Include costs for crosswalks and pedestrian crossing signals to connect sidewalks already present or to be constructed in FCLTP project cost estimates.
- **Objective:** Reconfigure, restripe, and/or resurface urban collectors and arterials to include bicycle lanes, sidewalks, or pedestrian paths in accordance with local comprehensive plans and local design guidelines.
  - **Strategy:** Include "stand alone" bicycle or pedestrian accommodations that are attached to existing collectors or arterials in FCLTP where appropriate.

Goal Three: Assure that transportation improvements are compatible with local comprehensive plans and regional economic development activities.

- **Objective:** Consult local government design guidelines and neighborhood plans to more accurately develop project cost estimates for candidate LRTP 2035 projects.
- **Objective:** Construct "Roanoke River Greenway" as defined in "2007 Update to the Roanoke Valley Conceptual Greenway Plan" by the end of CLRTP 2035 time horizon.
  - **Strategy:** Periodically monitor "Roanoke River Greenway" implementation and schedule.
  - **Strategy:** Apply surface transportation funds, as appropriate, to "Roanoke River Greenway" construction.

Goal Three - continued:

- **Objective:** Assure adequate transportation connectivity between Downtown Roanoke and Biomedical Center Complex on Reserve Avenue.
- **Objective:** Plan for freight needs on applicable corridors.
  - **Strategy:** Review candidate CLRTP 2035 projects for inclusion in the 2002-03 "Roanoke Valley – Alleghany Regional Freight Study" and give special consideration to included projects.
  - **Strategy:** Consider extra costs needed to accommodate vehicles with long wheel bases in appropriate candidate CLRTP 2035 projects.
- **Objective:** Develop telework as a complement to existing commuting patterns and as an inter-regional transportation option for those living in the RVAMPO area and teleworking to larger metropolitan areas.
  - **Strategy:** Continue to work with City of Roanoke Economic Development and Telework VA program to expand telework options both inter- and intra–regionally. Report number of registered telework participants on an annual basis.
- **Objective:** Continue to investigate an increased role for rail, both intermodal freight and a possible re-establishment of passenger rail service.
  - **Strategy:** Investigate under-analyzed niche markets for passenger rail service and cross reference with existing economic development and tourism planning initiatives.
  - **Strategy:** Assess intermodal freight aspect of candidate CLRTP 2035 projects.

Goal Four: Maximize benefits from limited transportation funds by focusing on bottleneck improvements, spot improvements, and/or technology improvements to be applied to the transportation system at a lower cost than traditional construction costs.

- **Objective:** Provide funds for signal timing coordination and synchronization plans and studies on key regional corridors.
- **Objective:** Consider corridor improvements as a combination of a series of intersection or bottleneck improvements coupled with appropriate safety and accessibility.
  - **Strategy:** Program costs for roundabouts where feasible and track number of roundabouts implemented.
  - **Strategy:** Program costs for signal timing, reversible lane or other operations systems designed to get extra capacity out of existing infrastructure.

Goal Five: Enhance transportation safety for all users and by-standers.

- **Objective:** Develop at least 10 active or completed Safe Routes to Schools (SRTS) plans or projects by the end of the CLRTP 2035 time horizon.
  - **Strategy:** Develop at least one SRTS plan in each RVAMPO locality within the next 10 years.
- **Objective:** Use data analysis to identify top regional accident locations on a vehicle miles traveled, entering volume or other standard measure.
- **Objective:** Identify regionally significant right of way or human factors that have the potential to lead to accidents in anticipated projects listed in this plan.
  - **Strategy:** Investigate whether public policies such as limiting mobile phone use in operating vehicles can be implemented at the local or regional level.

Goal Six: Anticipate transportation needs of retiring Baby Boom population in projects selected for CLRTP 2035.

- **Objective:** Target future areas that are projected to have a concentration of "carless households" in retirement age ranges.
  - **Strategy:** Develop regional "non-commute trip" ridesharing system for non-emergency medical, shopping, and social trips. Have such a program in operation by 2012.

GOAL SIX - CONTINUED:

- **Strategy:** Investigate a regional car sharing system designed to appeal to households who want to own one vehicle or less on a permanent basis. Report feasibility by 2012.
- **Strategy:** Investigate feeder system (e.g. taxi, jitney-style, or other para-transit feeder system) that targets concentrations of "future carless households" to the current fixed route transit system. Integrate concept into regional transit development plan by 2012.
- **Strategy:** Investigate bicycle sharing/renting systems that could serve as a transit feeder system. Integrate concept into regional bicycle plan by 2010.

- **Objective:** Investigate daily bus service between Roanoke Valley and Smith Mountain Lake to connect retired lake residents with regional airport and other transportation connections.

Public Participation 3

PUBLIC PARTICIPATION, STAKEHOLDER REVIEW AND ENVIRONMENTAL JUSTICE

Public Participation, Stakeholder Review and Environmental Justice (EJ) are interrelated concepts aimed at encouraging citizen and stakeholder participation throughout the planning process. Environmental Justice (EJ) is especially concerned with identifying, minimizing, and/or eliminating "disproportionate impacts" of planned projects on low-income or minority communities. The concept of Environmental Justice will be described in greater detail in chapter 13, "Environmental Justice Screening."

The RVAMPO public participation and stakeholder review process can be represented by the following:

Direct Public Input
- Touch Screen Kiosk
- Neighborhood Groups/ Civic Organizations Focus Groups
- Annual Public Meeting Concerning CLRTP Process and Assumptions

SAFETEA-LU Stakeholder Review
- Database of Stakeholder Agencies to review plan Drafts
- Agencies include: State Government, Non-Profit Organizations and Transportation Modal Interests

Representative Group Input
- Community Advisory Committee (CAC)
- Transportation Technical Committee (TTC)
- AD-HOC committees: Bicycle, Greenway and Other

Each component will be further explained in the remaining pages of this chapter.

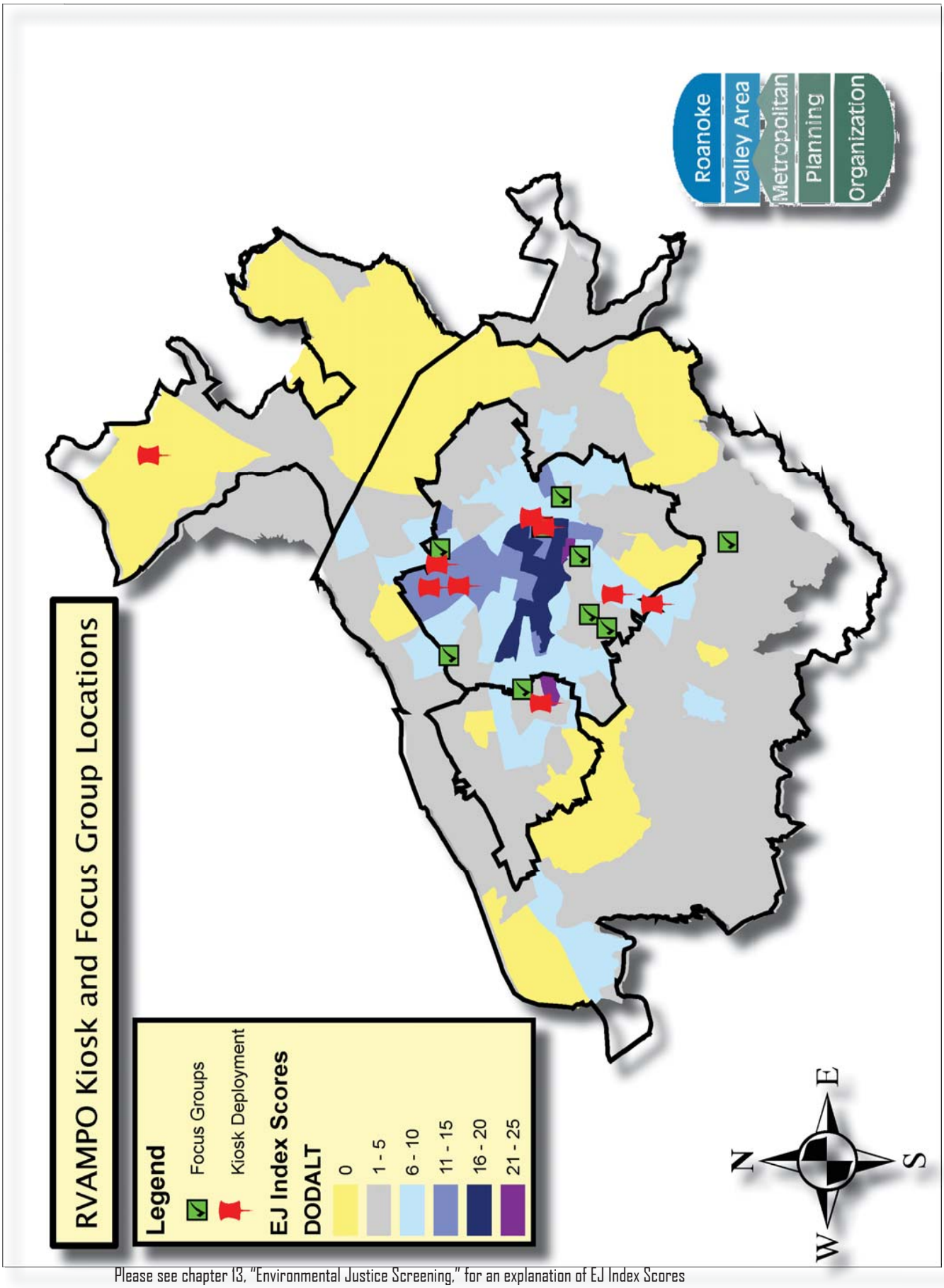
Direct Public Input

Touch Screen Kiosk

The Electronic Touch Screen Kiosk provides a portable method for directly engaging citizens throughout the planning process. The kiosk was developed in a partnership between RVAMPO and Radford University (RU). RVAMPO funds paid for the kiosk

hardware while two successive semesters of students in RU's Information Science and Systems Senior Capstone Course programmed the kiosk. The kiosk has been continuously deployed, except for routine maintenance and location transfer delay, since July 2006. Since the kiosk is moved from location to location, it can be targeted to locations of specific interest such as the Roanoke Regional Airport, the Virginia

- July 11–September 18, 2006: Roanoke Higher Education Center main entrance
- September 29–November 20, 2006: Virginia Workforce Center (VEC)
- November 20, 2006–January 5, 2007: Roanoke Regional Airport
- January 12–March 2, 2007: Virginia Western Community College
- March 2–July 27, 2007: Department of Motor Vehicles (DMV)
- July 31–September 13, 2007: Tanglewood Mall
- September 13, 2007 (1-day event—Valley Forward Forum for the Future): Roanoke Civic Center
- October 5, 2007 (1-day event—Entrepreneurship Fair): Roanoke Civic Center
- October 8–December 20, 2007 – Arnold R. Burton Career and Technical Center
- February 7–May 2, 2008: The Franklin Center, Rocky Mount, VA
- May 2–July 22, 2008: The Greenfield Center, Botetourt County
- July 22–October 1, 2008: Dabney S. Lancaster Community College Moomaw Center



Please see chapter 13, "Environmental Justice Screening," for an explanation of EJ Index Scores

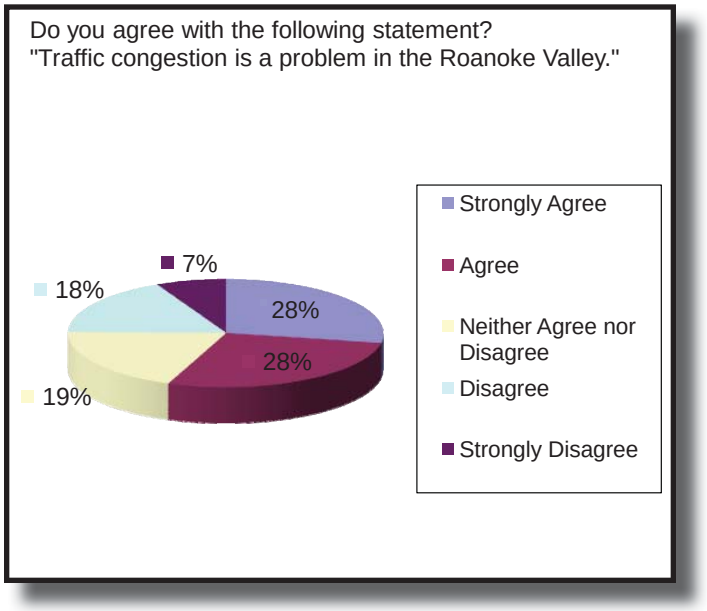
Kiosk Results

Background

A note of caution: the following data represent selected results from all of the kiosk locations, but do not represent a statistically valid random sample. The touch screen kiosk is a public involvement tool, and as such, we do not pre-select or pre-qualify respondents. Quite the opposite. We invite any and all citizens to use the kiosk when it is deployed on location. Therefore, the following results are valid only for kiosk respondents, and we cannot extrapolate these results to the larger regional community. Nonetheless, the results can be useful as a point of reference in the long-range transportation planning process.

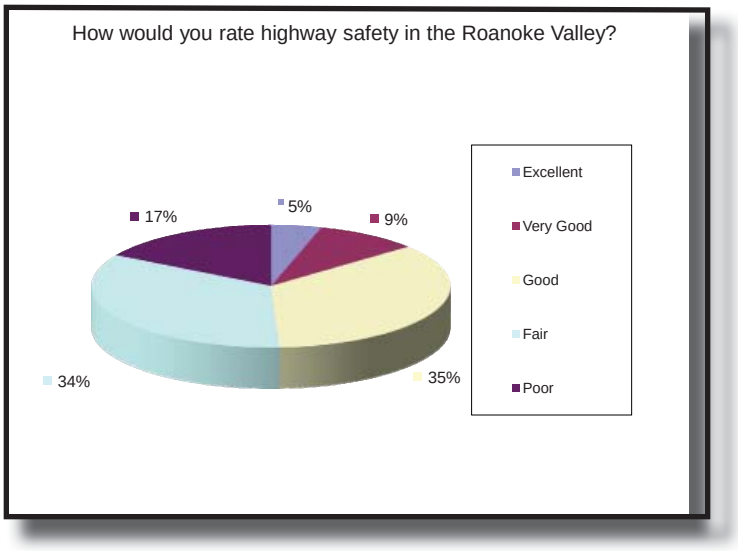
Traffic Congestion

An obvious question to ask is whether or not respondents feel traffic congestion is a problem in the region. The chart at the right represents 2,697 total responses. It is evident that respondents are split on this issue. A slight majority (56%) either agreed or strongly agreed that traffic congestion is a problem. This suggests that the CLRTP 2035 should contain a combination of congestion reduction and mobility measures.



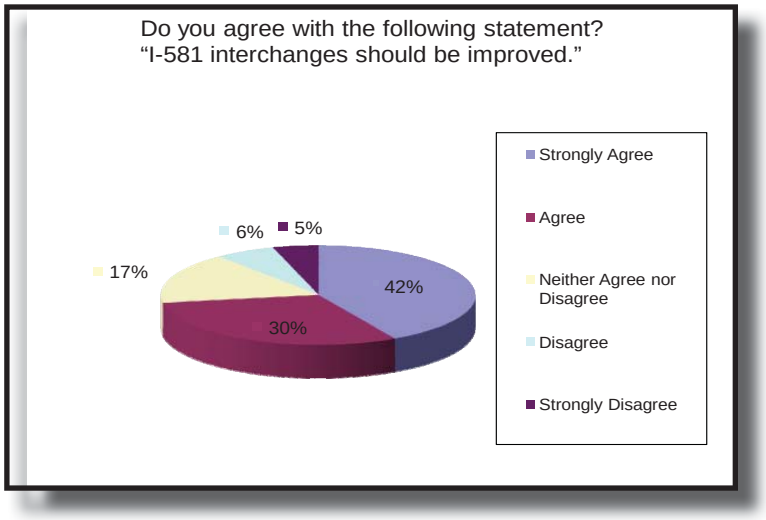
Highway Safety

A similar question asked respondents to rate highway safety in the region. A clear majority (69%) of respondents stated that highway safety is either good or fair. However, only 14% of respondents rated highway safety as either very good or excellent, indicating room for improvement in both congestion and safety.



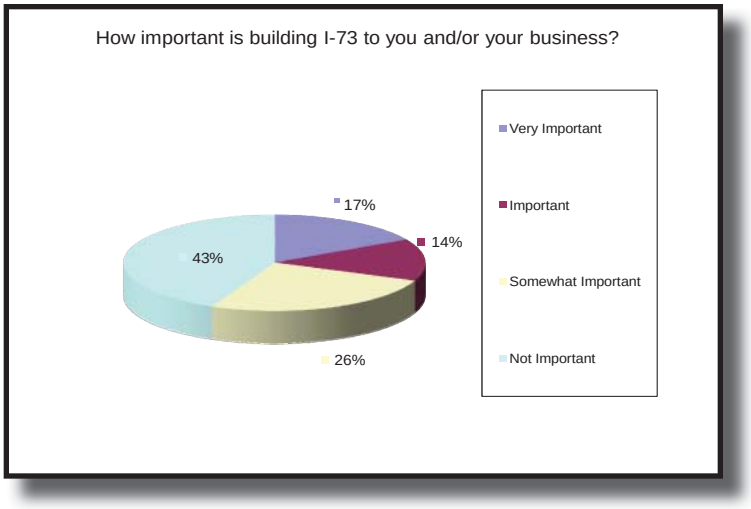
I-581 Interchanges

The kiosk responses provided a good candidate for a project that can address both congestion reduction and safety improvement goals. When asked whether or not Interstate 581 (I-581) interchanges should be improved, an impressive 72% either agreed or strongly agreed, while only 11% either disagreed or strongly disagreed. Improvements to I-581 interchanges can incorporate both congestion reduction and safety improvement aspects. For example, longer acceleration lanes can improve safety in weave and merge areas. Likewise longer exit ramps can add more queueing capacity. A recent study concerning I-581 and US 220 includes recommendations for improving several of the interchanges within the study area.



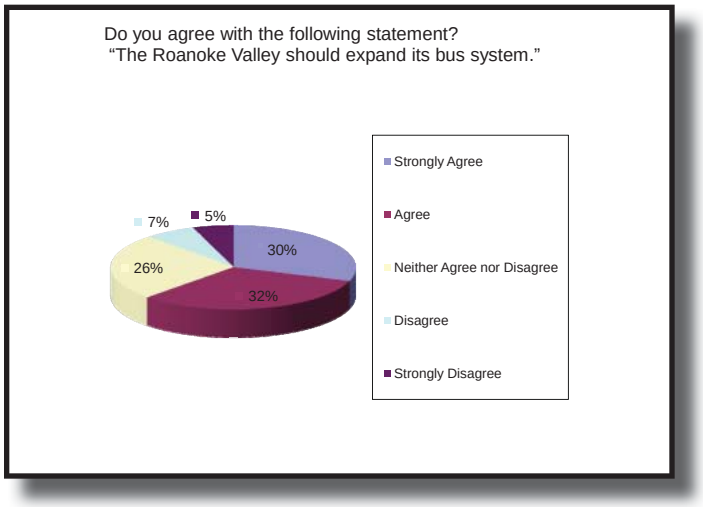
Proposed 1-73 and Congestion on 1-81

A frequent topic at public meetings and other public events is the proposed Interstate 73 (I-73.) The proposed I-73 has been through its own planning, public participation, and federal Record of Decision (ROD) Process, but kiosk respondents appear to be split over the importance to themselves and/or their business of the proposed I-73. A slight majority of respondents (57%) rated the proposed I-73 as somewhat important, important, or very important. However, the remaining 43% rated the proposed I-73 as not important. For more information about the proposed I-73 and interstate projects in general, please see chapter 11 "Financially Constrained List of Projects." However, when asked if adding lanes to I-81 would help relieve traffic congestion, a significant majority (62%) either agreed or strongly agreed with the statement, indicating that kiosk respondents see upgrading I-81 more favorably than they see the construction of I-73. These results are not represented in pie chart format.



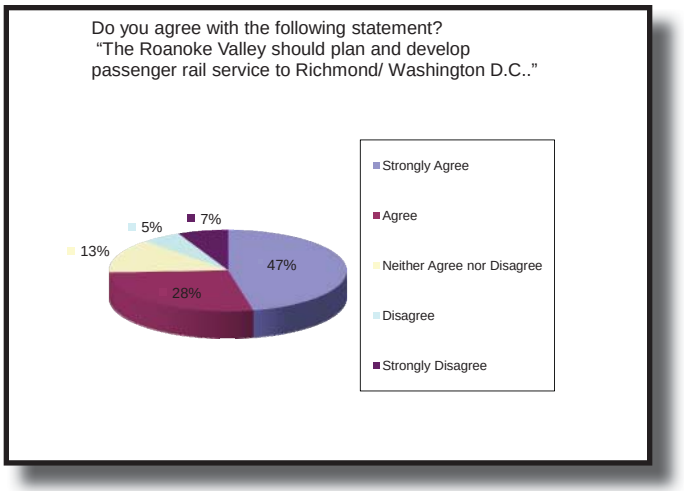
Public Transportation

Public transportation received fairly strong support from kiosk respondents. A full 62% of respondents either agreed or strongly agreed that the Roanoke Valley should expand its bus system. This result is corroborated by recent statements from Valley Metro officials concerning system-wide ridership increases using year over year figures. Similarly, when kiosk respondents were asked "How important is the rideshare/carpool program?" (not presented in pie chart format), a large majority (81%) responded with either somewhat important, important or very important. Rideshare, public transportation and other Transportation Demand Management (TDM) strategies are presented in chapter 7 "TDM and Public Transit" of this report.



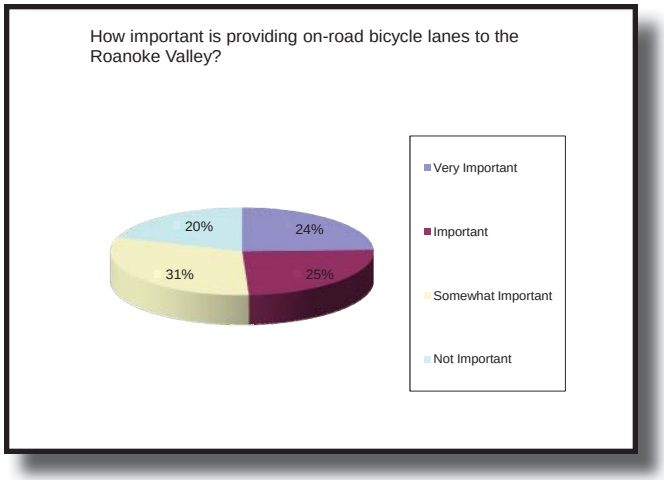
Passenger Rail Transportation

The concept of intercity passenger rail also received a lot of support from kiosk respondents. Nearly half of respondents (47%) strongly agreed that the Roanoke Valley should plan and develop passenger rail service to Richmond/Washington D.C. As of the writing of this plan, the Statewide Rail Plan is in development by the Virginia Department of Rail and Public Transportation (VDRPT). Draft versions of the plan include increased passenger rail service on the Washington D.C. to Lynchburg, Virginia corridor as a Phase I project, with mention of a later connection from Lynchburg to Roanoke as a Phase II project. In fiscal year 2008, RVAMPO produced a summary report on passenger rail and its potential to serve business- related travel needs. That report was based on results from a survey of business and non-profit organizations and is available on the RVARC website (www.rvarc.org). RVAMPO staff continues to research possibilities concerning passenger rail, but it is unclear what role RVAMPO can play in intercity passenger rail beyond encouragement.



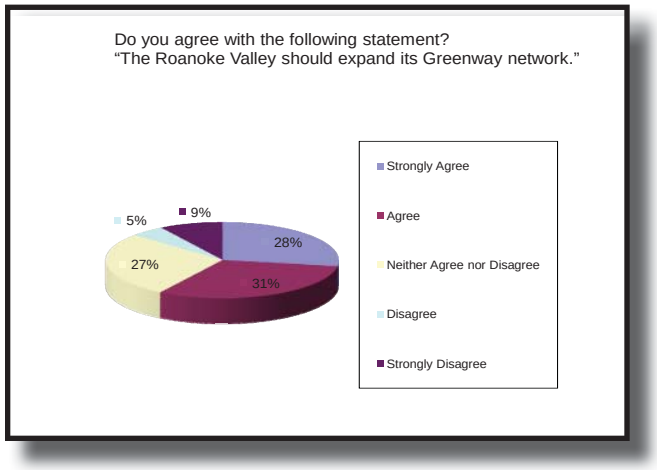
Bicycles and Other Pedestrian Transportation

Bicycle and pedestrian modes of transportation are enjoying increasing attention and support in recent years. The pie chart at the right shows that 49% of respondents indicated that providing on-road bicycle lanes is either important or very important. Only 20% of respondents indicated that providing on-road bicycle lanes is not important. Chapter 8 of this document will explore bicycle, greenway, and pedestrian transportation in more detail and will introduce a range of bicycle accommodations including not only "on-road" bicycle lanes but signage, pavement markings, paved shoulders, wide outside lanes, lowered speed limits for motorized traffic, and shared lanes. Potential bicycle accommodations can be evaluated with spreadsheet tools and models such as the Bicycle Level of Service (BLOS) and the Bicycle Compatibility Index (BCI).



Greenway Trails

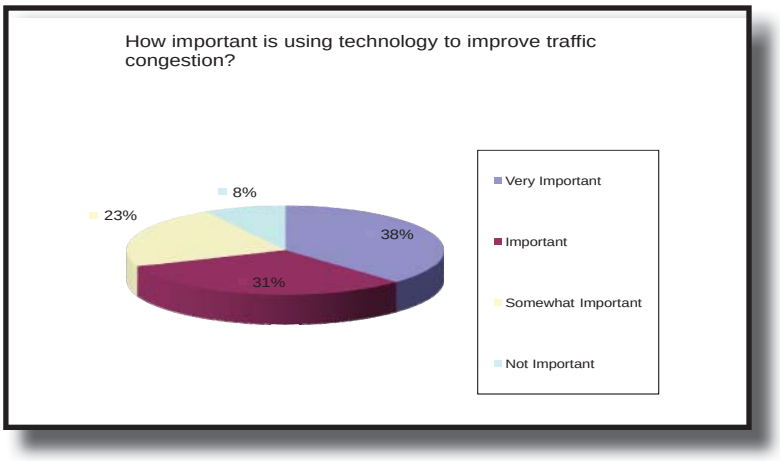
Greenway trails are typically separated paths that are closed to motorized traffic and typically accommodate both pedestrian and bicycle modes of transportation. In some cases, greenways can be open to equestrian riders as well. According to kiosk results, expansion of the Roanoke Valley's Greenway network enjoys wide support. In fact, a clear majority of respondents (59%) either agreed or strongly agreed that the Roanoke Valley should expand its greenway network, while only 11% of respondents either disagreed or strongly disagreed with greenway system expansion.



Greenway system planning efforts will be described in greater detail in chapter 8 of this plan. In summary, RVARC staff, through work with the RVAMPO Unified Planning Work Program (UPWP) and the rural transportation planning process, has assisted the regional greenway commission with the 2007 Update to the Roanoke Valley Conceptual Greenway Plan's greenway usage monitoring and mapping.

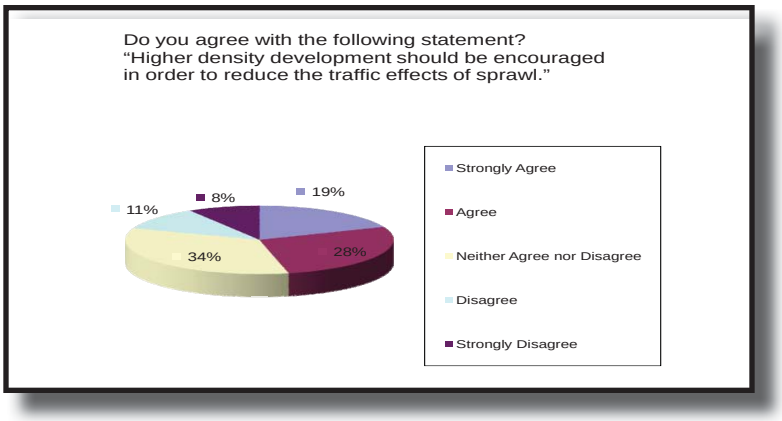
Technology and Intelligent Transportation Systems

Technology can have a potential influence on transportation demand and traffic flow. Kiosk respondents agreed -- nearly 70% rated using technology to improve traffic congestion as important or very important. One form of technology is Intelligent Transportation Systems (ITS), which encompasses a wide variety of technological and management approaches to existing transportation infrastructure. Chapter 10 will further describe ITS, Operations Management, and Safety Planning approaches to both new and existing transportation infrastructure. Chapter 10 will also feature photo simulations of potential ITS approaches on regional transportation facilities.



Settlement Patterns and Urban Form

Changes in settlement patterns and urban form can also influence transportation demand and traffic flow, and urban design and urban form are popular topics in civic, planning, and environmental circles. The kiosk question most closely related to urban form focused on density, asking if higher density development should be encouraged in order to reduce the traffic effects of sprawl. Slightly less than a majority (47%) either agreed or strongly agreed with that statement. More importantly, a much smaller percentage (19%) either disagreed or strongly disagreed with the statement. This indicates a potential for infill development and other strategies at the local planning level. RVAMPO does not have direct authority over land-use in the region, as local government members administer their own comprehensive planning and zoning programs. Nevertheless, themes of density and urban form occur throughout this document, as these concepts have a connection with the environmental and accessibility goals of this plan.



Focus Groups

Neighborhood Group/Civic Organization Focus Groups

Focus Groups provide guided discussion among a small group of participants and allow for a more in-depth conversation and process discussion than purely "quantitative" methods such as surveys or a touch screen kiosk. They allow connections to be made between interrelated, and sometimes seemingly unrelated, ideas. In this regard focus groups are a good supplement to the quantitative and numerical data received by survey or touch screen kiosk approaches. Established neighborhood groups or civic organizations are chosen for focus group participation because they already have a well established membership of citizens who volunteer their time to the civic organization and who have experience in facing civic or neighborhood public policy discussions through their group's activities.

In conjunction with the Community Advisory Committee (CAC), RVAMPO staff established a framework and general questions to guide focus group discussion. These questions served as a conversation guide only. Ample time was given at each focus group to add new discussion topics and/or to explore interrelationships between various topics under consideration. A geographic representation of the focus groups held during the time period 2005-08 can be found at the beginning of this chapter.

Neighborhood Focus Group Questions

- **Do you feel your neighborhood is well connected to the regional transportation system?**
- **Are there any groups of people (e.g. teenagers, elderly, low-income) in your neighborhood that could benefit from additional or expanded transportation options? What forms of transportation do you feel would be effective?**
- **What features work to enhance transportation safety in your neighborhood? How do you feel transportation safety could be improved?**
- **What role do you see technology playing in transportation? In your neighborhood?**
- **Over the next twenty years, how can transportation in your neighborhood and the region be improved?**

Following is a listing of focus groups held during the CLRTP 2035 planning process:

- April 1, 2005 – Gainsboro Neighborhood Alliance
- April 21, 2005 – Gainsboro Steering Committee
- May 12, 2005 – Greater Raleigh Court Civic League
- February 27, 2006 – Miller Court Neighborhood Alliance
- March 9, 2006 – Grandin Court Civic League
- August 10, 2006 – Ridgewood Park Neighborhood League
- September 5, 2006 – Airlee Court Neighborhood Watch
- February 15, 2007 – Old Southwest Incorporated
- October 3, 2007 – Southeast Neighborhood Action Forum
- April 17, 2007 – Clearbrook Civic League

The purpose of conducting multiple focus groups is to detect patterns in responses given by successive groups. Topics that are discussed by multiple groups may indicate a regional trend that is worthy of note in the long-range transportation planning process. For example, participants in nearly 80% of the focus groups changed the subject to inter-city passenger rail when asked "Do you feel your neighborhood is well connected to the regional transportation system?" Specifically, participants advocated a service such as Amtrak or TransDominion Express that would connect Roanoke to Washington D.C. This focus group feedback is in line with the overwhelmingly positive results from the kiosk responses (previously discussed in this chapter) concerning passenger rail.

Ridgewood Park Neighborhood League - August 10, 2006

Southeast Neighborhood Action Forum - October 3, 2007

Clearbrook Civic League - April 17,2008

Neighborhood Group/Civic Organization Focus Groups - Continued

Other popular responses to the neighborhood connection question were additional trails, greenways, and bicycle lanes. According to the focus groups, participants saw safe bicycle and greenway systems as essential to connecting their neighborhoods to other neighborhoods and activity centers within the region. Finally, a number of focus group respondents from several focus groups indicated that enhancements to public transit would go a long way to connect their neighborhoods to the rest of the region. Specifically, respondents felt that increased frequency for existing fixed route bus service, coupled with bus shelters or improved bus stops, would help attract additional riders and offer an alternative to driving for greater transportation accessibility. Potential public transportation strategies will be further discussed in chapter 7 of this plan, and Bicycle, Pedestrian, and Greenway planning will be further described in chapter 8 of this plan.

A pattern emerged in response to the questions: "What features work to enhance transportation safety in your neighborhood?" and "How do you feel transportation safety could be improved?" Specifically, focus group respondents added that driver education, especially concerning mobile phone use while driving, should be enhanced. Some focus groups even suggested that there should be a ban on mobile phone use while driving in Virginia. Long-range transportation plans do not usually have influence over legal and policy issues such as mobile phone usage in vehicles; however, it is important to note that citizens are interested in the transportation safety effects of mobile phone use while driving. Another pattern observed in multiple focus groups concerning transportation safety dealt with cross walks and other pedestrian accommodations. Specifically, several focus groups advocated for painted, textured, or other visually distinguishable cross walks in residential neighborhoods.

In response to the questions: "What role do you see technology playing in transportation? In your neighborhood?" a pattern developed over multiple focus groups for traffic light synchronization or another form of centralized traffic light control that would include both the City of Roanoke and Roanoke County. Furthermore, multiple focus groups advocated the installation of automated red-light and/or speed detection cameras to enhance transportation safety through enforcement. As of the writing of CLRTP 2035, the legal ability for localities to employ traffic light or speed enforcement automated technology has not been granted. However, since this is a long-range planning document, such technologies bear mentioning in case such authority is given by the General Assembly in the future. Intelligent Transportation Systems and Safety Planning will be further discussed in chapter 10 of this plan.

Annual Public Meeting And Other Public Information Tools

RVAMPO staff hold an annual public meeting that is advertised to the public according to provisions of the "RVAMPO Public Participation Plan." (Appendix C) The purpose of the Annual Public Meeting is to invite citizens to review and discuss the planning assumptions, data, and concepts that will eventually lead to the CLRTP 2035. These meetings take place well before any decisions or other features of the plan are developed. Following is a schedule of recently held CLRTP Annual Public Meetings:

- March 9, 2006 – First Annual Public Input Open House - 3:00 – 7:00 p.m. Roanoke Higher Education Center
- March 26, 2007 – Annual Open House - 4:00 - 6:00 p.m. RVARC Conference Room
- April 15, 2008 – Annual Open House - 4:00 - 6:00 p.m. RVARC Conference Room
- June 23, 2010 - 12:00 - 5:00 p.m.

Annual Open House - March 26, 2007

Feedback from annual public meetings tended to focus on bicycle and pedestrian accommodations. Also, feedback concerning proposed I-73 was common at all three annual public meetings. Specifically, several citizens advocated for a US 220 upgrade using extensive Transportation Systems Management and Access Management techniques in lieu of new terrain construction for the proposed I-73.

CLRTP 2035 Process Web Page- November 10, 2008

Other Direct Public Information Tools

RVAMPO staff employs other direct public information and public involvement tools that directly target the long-range transportation planning process such as:

- CLRTP 2035 Process Public Web Page (Pictured above);
- On-line transportation web surveys (web version of kiosk);
- Display tables at various VDOT 6-Year Improvement Program or other VDOT and VDRPT events in the RVAMPO Service Area.

SAFETEA-LU List of Stakeholders

A draft of chapter 2, "Guiding Principles," was mailed to the SAFETEA-LU Stakeholders for comment, and the comments received are in Appendix D. Likewise, an entire draft CLRTP 2035 was mailed to the SAFETEA-LU Stakeholders for a 30-day comment period, and these comments are also included in Appendix D. The review of the Guiding Principles was completed months before the rest of the draft plan was written, allowing for a stakeholder review before any substantial decisions had been made.

The SAFETEA-LU List of Stakeholders is a contact list primarily comprising local, state, and federal agencies that could either influence or be impacted by CLRTP projects, including agencies concerned with Economic Development, Historic Resources, Environmental Issues, and other areas of focus. The list was developed using an initial suggested list of contacts from VDOT and was enhanced by local contacts. Below is the list as it was in December 2008:

Contact Person	Title	Organization	Classification
Tom Driscoll	Strategic Planner	Virginia Board for People with Disabilities	Representative of Populations with Disability or Limited Mobility
Ronald Lanier	Director	Virginia Department for Deaf and Hard of Hearing	Representative of Populations with Disability or Limited Mobility
Stephen Aukward	Roanoke Regional Office Manager	Virginia Department for Blind and Vision Impaired	Representative of Populations with Disability or Limited Mobility
Colleen Miller	Executive Director	Virginia Office for Protection and Advocacy	Representative of Populations with Disability or Limited Mobility
Michele Daley		Local Office on Aging	Representative of Populations with Disability or Limited Mobility
Julie Stanley	Director	Community Integration for People with Disabilities	Representative of Populations with Disability or Limited Mobility
Gloria Cary	Legislation and Advocay	AARP Virginia State Office	Representative of Populations with Disability or Limited Mobility
Kimberly Perry		Bike Walk Virginia	Representative of Users of Public Walkways and Bicycle Facilities
Allen Muchnik	President	Virginia Bicycling Federation	Representative of Users of Public Walkways and Bicycle Facilities

SAFETEA-LU List of Stakeholders - Continued

Contact Person	Title	Organization	Classification
David K. Paylor	DEQ Director	Virginia Department of Environmental Quality	State Environmental Mitigation Agency
Traycie West	Environmental Engineer	Virginia Marine Resources Commission	State Environmental Mitigation Agency
Amy Martin	Environmental Services Biologist	Virginia Department of Game and Inland Fisheries	State Environmental Mitigation Agency
Dennis McCarthy		Virginia Department of Forestry	State Environmental Mitigation Agency
Angela Coleman		USDA Forest Service	Federal Environmental Mitigation Agency
Pat Paul		USDA Natural Resources Conservation Service	Federal Environmental Mitigation Agency
William Hester		U.S. Fish and Wildlife Service	Federal Environmental Mitigation Agency
Pat Hooks	Regional Director	National Park Service	Federal Environmental Mitigation Agency
Chris Jaeschke	Planning Engineer	Federal Highway Administration	Federal Environmental Mitigation Agency
Alisa Bailey	President and CEO	Virginia Tourism Corporation	State Planning Agency
Vernon Hodge		Department of Housing and Community Development	State Planning Agency
Robbie Rhur		Department of Conservation and Recreation	State Planning Agency
Ted Costin	Director of Preparedness, Training and Exercises Division	Department of Emergency Management	State Planning Agency
Matt Heller	Manager, Geologic Mapping	Department of Mines, Minerals, and Energy	State Planning Agency
Marc Holma	DHR Project Review	Virginia Deparment of Historic Resources	State Planning Agency

Representative Group Input

Community Advisory Committee

The Community Advisory Committee (CAC) is an advisory committee to the RVAMPO Policy Board. The CAC is a citizen representative committee made up of members appointed by local governments and other organizations such as the Blue Ridge Bicycle Club, Virginians for Appropriate Roads, and other organizations. The membership of the CAC is somewhat fluid due to its inclusive nature and no one interested in participating on the CAC has been denied membership. The CAC meets on an as needed basis averaging four meetings per year and operates on a consensus meeting style that does not rely on formal motions or resolutions. One of the main duties of the CAC is to help develop the goals and objectives for the RVAMPO Constrained Long-Range Transportation Plan. The CAC was instrumental in developing the final goals and objectives featured in chapter 2 of this plan.

Community Advisory Committee (CAC) meeting- March 28, 2008

Transportation Technical Committee

The Transportation Technical Committee (TTC) is a technical advisory committee to the RVAMPO Policy Board. The TTC is primarily comprised of local government planners and engineers that have some expertise in the technical aspects of transportation planning, programming, or engineering.

The TTC operates on a more formalized basis than the CAC, in that TTC members make motions and pass advisory resolutions for the RVAMPO policy board. The TTC also meets on a more formalized schedule similar to the RVAMPO Policy Board.

One of the TTC's main responsibilities is to review RVAMPO planning products, including this plan, and to provide feedback to RVAMPO planners concerning accuracy and applicability of RVAMPO planning products.

TTC meeting- March, 2008 - VDOT Smart Travel Center

TTC membership as of December 2008:

ROANOKE VALLEY AREA METROPOLITAN PLANNING ORGANIZATION
TRANSPORTATION TECHNICAL COMMITTEE (TTC)

VOTING MEMBERS:

County of Bedford (1 member)
Mr. Kevin Leamy

County of Botetourt (1 member)
Mr. Jeff Busby

County of Roanoke (2 members)
Mr. Tim Beard
Mr. Philip Thompson

City of Roanoke (2 members)
Mr. Ian Shaw
Mr. Mark Jamison

City of Salem (2 members)
Mr. Ben Tripp
Ms. Melinda Payne

Town of Vinton (1 member)
Mr. Mike Kennedy

Unified Human Services Transportation System (1 member)
Mr. Curtis Andrews

Greater Roanoke Transit Company (1 member)

Roanoke Regional Airport (1 member)
Mrs. Jacqueline Shuck
(Alternate: Efren Gonzalez)

Virginia Department of Transportation - Salem Office (1 member)
Mr. Jeff A. Echols

Virginia Department of Transportation – Planning Office (1 member)
Mr. Michael Gray
(Alternate: Walter Pribble)

Greenway Commission (1 member)
Mrs. Liz Belcher

Virginia Department of Rail & Public Transportation (1 member)
Mr. Jeff Sizemore

NON-VOTING MEMBERS:

Federal Highway Administration
Ms. Tammye Davis

Federal Transit Administration
Mr. Tony Cho

Virginia Department of Aviation

Ad Hoc and Special Purpose Committees

Occasionally, RVAMPO planners engage in projects that employ special purpose or *ad hoc* committees for input and feedback. In many cases the TTC or CAC would encompass the expertise to fulfill these rolls; however, the planning process requires a group that can meet more regularly, or a group that can meet exclusively about one planning topic. Generally, RVAMPO planners have sought to form special purpose committees in the areas of Air Quality Planning and Bicycle/ Pedestrian Planning.

Air Quality Planning

The area served by the majority of the RVAMPO urbanized boundary is an Ozone Early Action Compact (EAC) and Ozone Early Action Plan (EAP) area. RVAMPO planners developed an Ozone EAC and EAP for the region and, based on current data, these efforts have been successful, resulting in compliance with the Federal 8-hour Average Ozone standard. Similarily, RVAMPO planners have engaged stakeholders in the development of a voluntary compact concerning Fine Particulate Matter (FPM). The area served by RVAMPO is in compliance, but near the limit, of federal FPM 2.5 standards. Special purpose stakeholder committees were used for both of the air quality planning processes. There was considerable overlap in stakeholders participating in both the Ozone and the Fine Particulate Matter planning processes. Chapter 12 of this plan will more fully describe the air quality planning process as it relates to the RVAMPO long-range transportation planning process.

Ozone EAP Committee Meeting - August 2003

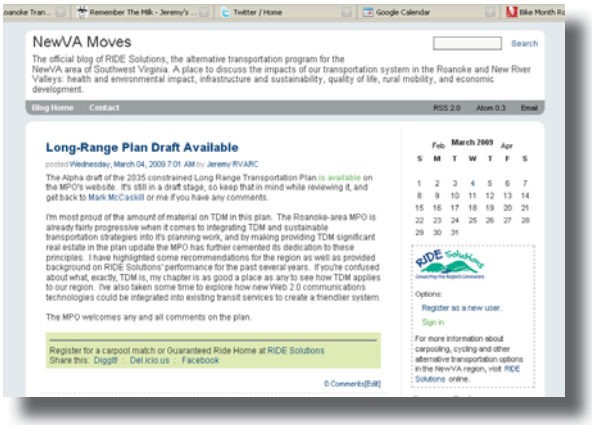
Bicycle and Pedestrian Planning

To assist in these planning efforts, RVAMPO established a Regional Bicycle Advisory Committee (BAC). BAC representation includes local governments, RVAMPO, Virginia Department of Transportation, local bicycle clubs and advocacy groups, and citizens. The BAC meets periodically to provide input on bicycle, pedestrian, and greenway planning efforts, to participate in training/workshops, and to provide a forum for discussion of a range of bike/pedestrian issues and activities. Chapter 8 of this plan will more fully describe the Pedestrian, Bicycle and Greenway planning processes.

Document Development and Stakeholder Review

ALPHA and BETA Draft Releases

Many of the previously mentioned stakeholder and public involvement strategies - touch screen kiosk, focus groups, etc. - are designed to provide input before the draft CLRTP 2035 is written. These strategies provide input continually between successive CLRTP updates. Once substantial progress in developing a draft document has been made, a new type of stakeholder review process begins. This review process is focused on releasing a successive series of draft documents for review and comment by stakeholders and the general public. The CLRTP 2035 planning process uses an Alpha and Beta draft document release and review system that is commonly found in software development and other creative industries. Alpha drafts are 80% or more complete, but they lack complete information in some chapters or lack any information in one or two chapters. They are adequate in demonstrating the overall direction, tone, and look-and-feel of the draft document. Beta drafts are essentially complete drafts and mark the beginning of the final review and adoption process. A Beta draft will be sent to the SAFETEA-LU Stakeholders. The official 30-day public comment period does not start until the document is in the Beta stage. There will be several Alpha and Beta drafts. Below is a log of draft document releases for stakeholder comment. All releases are featured on the CLRTP 2035 official webpage: http://www.rvarc.org/mpo/lrtp.htm . Some draft releases will be emailed, mailed or otherwise distributed to specific stakeholder groups or featured in public meetings.



Alpha 1 Draft Release featured on NewVA Moves Blog 03-04-2009

- Alpha 1 - released February 27, 2009, and emailed to TTC and CAC
- TTC reviews 3-step model transportation network on March 12, 2009
- MPO reviews 3-step model transportation network on March 26, 2009
- Alpha 2 - released March 30, 2009, and emailed to TTC and CAC
- Mid May 2009 to Mid June 2009 - Western Virginia Water Authority Bill insert (see image next page) distributed to approximately 53,000 accounts (commercial and residential). Bill insert encourages citizens to follow LRTP 2035 progress on website.


TDM Model Network Review - March 12, 2009 TTC Meeting

Further Public Participation

Newspaper advertised public meetings:

The following opportunities for public comment and review were advertised in the Roanoke Times (the newspaper of major circultaion in the region):

Dates reflect when notice ran in newspaper.

Envelope Insert distributed with Western Virginia Water Authority water bills. The insert reached a total of approximately 53,000 accounts in 4 staggered billing cycles from mid May 2009 to mid June 2009. The Water Authority covers the City of Roanoke and most of Roanoke County.

- Minimum 30-day Public Comment Period - May 8, 2011
- Public Open House - May 29, 2011
-Official Public Hearing - June 12, 2011 and June 19, 2011

The following opportunities for public comment and review were advertised in the Roanoke Tribune (the newspaper which serves the historically minority neighborhoods and popultaions). Dates reflect when notice ran in newspaper:

- Minimum 30-day Public Comment Period - May 12, 2011
- Public Open House - June 2, 2011
- Official Public Hearing - June 9, 2011 and June 16, 2011

The Public Open House was held at RVARC Conference Room from 4:00 to 6:30 p.m. on June 6, 2011. The Official Public Hearing takes place at RVARC Conference Room at 1:30 p.m. Thursday June 23, 2011.

Socioeconomic Data, TAZ 4

To aid the planning process, RVARC staff compiles transportation planning data under the direction of RVAMPO. Transportation planning data for the Roanoke Metropolitan Planning Area is a special tabulation of socioeconomic information intended to aid transportation planners in designing responsive and needed transportation services and facilities in their communities. Transportation planners and design agencies use this data in a three-step Unified Transportation Planning process to assess the impact of changes in the transportation system on present demand. This process is important to Roanoke Valley's development and evaluation of urban transportation plans and policies.

The transportation planning data serves many other related transportation and regional planning purposes. The data provides dependable background information for large sub-area studies, public transportation and facilities plans, transportation demand analysis, and land use and rezoning studies. Historical comparisons of the Transportation Planning Data provide an indicator of the ongoing health of the region's socioeconomic assets.

Transportation planning data for prior years is known as the Data Maintenance Report (DMR) for the Roanoke Urban Study Area. Methodologies for the preparation of the DMR were published in fiscal years 1972, 1977, and 1998. It appears that previous DMRs were timed to coincide with the publication of the 1970 and 1980 census figures for the region. The availability of the Census data greatly simplifies the data collection process and provides the most reliable source of data for modeling the Roanoke urban area transportation system.

Transportation Planning Data

Census Transportation Planning Package

Base data is obtained from the US Census Bureau's Census Transportation Planning Package (CTPP). Historically, this product is released four to six years after each decennial census. For example, the 1990 CTPP was released in 1996, and the 2000 CTPP was released in 2003-2004. The CTPP is a special set of tabulations designed primarily for transportation planners, policy analysts, and engineers. It is developed by the Bureau of the Census using decennial census data and provides detailed population, housing, worker, and commuter characteristics for a number of geographic levels. The CTPP data is compiled by place of work and by place of residence.

The urban element of the CTPP contains selected information at the Traffic Analysis Zone (TAZ) level and is designed specifically to assist MPOs in carrying out their planning responsibilities. In 1999, commission staff participated in the US Census Bureau's "TAZ-Up" program to better define TAZ boundaries based on Census block boundaries. The 2000 and later TAZ boundaries and data should fix many errors that existed in prior data sets.

Traffic Analysis Zones (TAZ)

As previously mentioned, information collected for the Transportation Planning Data is published at the Traffic Analysis Zone (TAZ) level. TAZs are geographic units representing sizable portions of the region which impact, or in some cases are predicted to impact, the transportation and transit networks. For this reason, TAZs in more heavily developed areas and rapid growth areas tend to be smaller than those in outlying zones. Ideally, TAZs have distinct geographic boundaries with relatively few access points to the region's overall transportation network. Ideal boundaries often include limited access highways, railroad lines, water boundaries, and ridgelines. Because the impact of different types of trips (e.g. home to work, home to shopping, etc.) may be assessed, TAZs should be of fairly homogeneous land use. Of course, no urban area follows this ideal criteria. Therefore, a good deal of judgment is involved in determining appropriate TAZ boundaries. Two principles should be observed in delineated TAZ boundaries. First, TAZ boundaries should coincide with jurisdictional boundaries. Second, in order to compare previously developed Transportation Planning Data, adjusting TAZ boundaries should be avoided, if possible. This does not preclude the subdivision of existing zones, a natural process of individual zone urbanization.

The US Census Bureau defines a TAZ the following way:

"A traffic analysis zone (TAZ) is a special area delineated by state and/or local transportation officials for tabulating traffic-related data- especially journey-to-work and place-of-work statistics. A TAZ usually consists of one or more census blocks, block groups, or census tracts."

2035 Boundary Adjustments

The MPO study area boundary was reviewed as part of the 2035 projections. The boundary has to include all areas that were urbanized in the 2000 Census and should include areas that are expected to be urbanized (as defined by the US Census Bureau) within the projected time frame. Several areas in Bedford County previously not part of the MPO study area were added as a result.

Botetourt County provided input to remove TAZ 400 and a section of 411. These two areas were forested mountain areas that are not expected to be developed. A new TAZ (420) was added to Botetourt County. In Roanoke County, TAZ 368 was rolled into TAZ 367 and a new TAZ 368 was created. TAZs 379, 371, 372, and 373 were also added to Roanoke County. The boundary of 366 was adjusted. TAZ 2 in downtown Roanoke was split into TAZ 2 and TAZ 46 (the number 46 was not used in the 2000 Census.) TAZs for Bedford County were 500-506. TAZ 506 is small, but had to be added to include a 2000 urbanized area in Bedford County.

The resulting map is at the end of this chapter.

Methodology for 2000 and 2005 Updates

Population

The population for each TAZ was calculated by aggregating the 2000 census block data for each TAZ. Estimates for 2005 were made by using both local government input and documented county and city growth rates.

Employment

Employment data from the 2000 CTPP was used for most localities. Employment data from the US Census for Botetourt and Bedford counties did not seem accurate, so previous estimates were used. (Please refer to the 2025 Long-Range Plan-Technical Document chapter 2 for more information.) Employment data for 2005 was estimated using employment data obtained from the Virginia Employment Commission (VEC). Each locality was given the option to review the data and provide input on the increase or decrease of small businesses by TAZ.

Methodology for 2035 Projections

Population

The Virginia Employment Commission has projected population for each county to 2030. MPO staff created a linear regression that took population estimates for 2000-2030, in five-year increments, and projected them another five years to 2035. The resulting locality-wide growth rates were applied to each TAZ. Each locality reviewed the data and made changes to account for projected high and low growth areas. Overall growth rates and totals by locality can be seen in the figures on the following page.

Employment

The Virginia Employment Commission has projected employment by locality to 2012. Using the growth rate from 2000-2012, in tandem with population growth rates, the employment for each TAZ was estimated. Each locality reviewed and adjusted the individual numbers as necessary. Estimated employment growth rates and overall totals by locality can be seen in the figures on the following page.

Locality*	2000-2035 Population Growth	2000-2035 Employment Growth
Roanoke city	1.6%	13.0%
Salem City	7.5%	9.2%
Town of Vinton	5.2%	5.0%
Roanoke County*	18.4%	27.8%
Botetourt County*	60.0%	80.0%
Bedford County*	60.0%	50.0%

*Portions in MPO only.
Roanoke County data does not include Town of Vinton

Locality*	2000 US Census Population	2000 Employment Estimates**	2005 Population Estimate	2005 Employment Estimate	2035 Population Estimate	2035 Employment Estimate
Roanoke city	94911	74630	93586	70305	96432	84330
Salem City	24747	23740	25143	21841	26603	25922
Town of Vinton	7782	3547	7931	3582	8183	3724
Roanoke County*	73089	27644	76743	27920	86537	35317
Botetourt County*	15771	5213	17348	5213	25234	9383
Bedford County*	2822	197	2991	197	4515	296

*Portions in MPO only. Roanoke County data does not include Town of Vinton
Estimates made by the Roanoke Valley-Alleghany Regional Commission, 2006

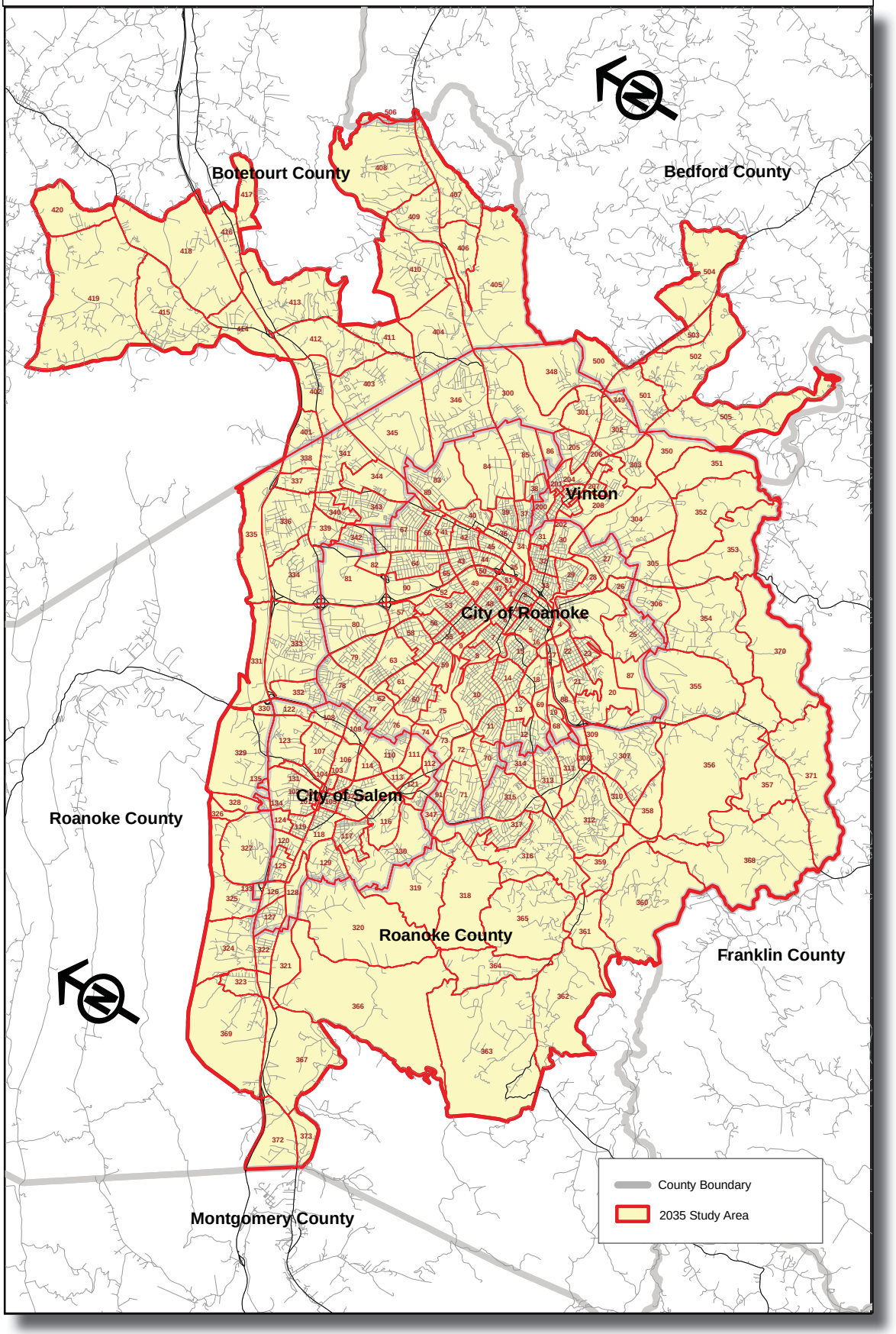
Locality and Public Input

Each locality was given several opportunities to review proposed boundary changes and projected TAZ data. Input was received from most member localities. A public information meeting was advertised and held in July 2006 to solicit public comment on the boundary and TAZ data, but the public meeting did not have any attendees.

TAZ Detailed Data (Appendix A)

The tables in Appendix A contain population and employment data for each TAZ in the 2035 study area. Refer to the map on the following page for TAZ locations. In general, TAZ 1-91 are in the City of Roanoke, TAZ 100-135 are in the City of Salem, TAZ 200-208 are in the Town of Vinton, TAZ 300-369 are in Roanoke County, TAZ 400-420 are in Botetourt County, and TAZ 500-506 are in Bedford County.

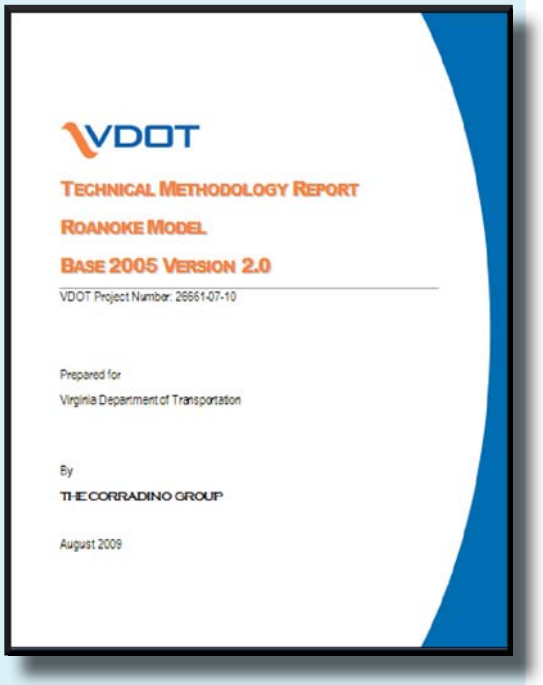
Roanoke Valley Area MPO 2035 Study Area Boundary



Travel Demand Model 5

This chapter contains technical information about the Travel Demand Model used to predict future travel demand using the transportation planning data featured in chapter 4. For readers who would like to skip the technical details, proceed to chapter 6.

To estimate travel demand, the RVAMPO Travel Demand Model follows a standard four-step process which includes trip generation, trip distribution, and highway assignment.



Trip generation determines the total number of trips produced and attracted each day for each trip purpose. Trip distribution finds the number of person trips that go between all pair of zones. Highway assignment determines which route highway and transit trips will follow.

Most of the information in this chapter is copied or adapted from the VDOT Technical Methodology Report written by The Corradino Group, a consulting group that is a national leader in transportation engineering.

Overview of Model

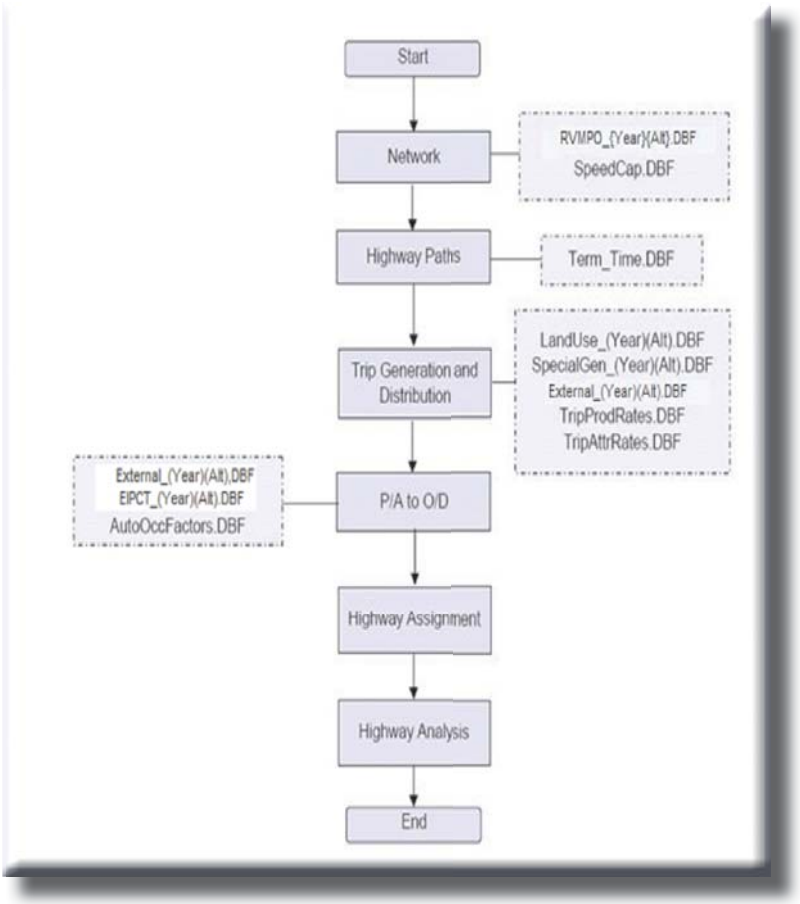
Introduction

The figure below shows the macro flow chart of the RVAMPO Travel Demand Model and identifies all the user-supplied input files that are used by each of the modules. It also shows all RVAMPO specific programs used in these modules.

The RVAMPO model quantifies the travel anticipated on the transportation system. The results are then used to estimate the impact of constructing new or improved highway and transit facilities and of implementing new transportation services or demand management activities.

The year-2000 RVAMPO Travel Demand Model was updated to a base year of 2005 for the Cube Voyager transportation forecasting platform. It had two main tasks: identifying and implementing short term improvements.

The 2005 RVAMPO Travel Demand Mode follows the guidelines as established in the Virginia Travel Demand Modeling Policies and Procedures Manual (PPM). However, guidelines regarding data storage formats and directory structure have not yet been specified in the PPM guidelines. VDOT and The Corradino Group staff jointly established standards for these missing guidelines, and these guidelines have been implemented in other VDOT models -- such as those in Fredericksburg and Hampton Roads -- as well as in the RVAMPO Travel Demand Model.



Full Model Macro Flow Chart

While the Fredericksburg Area MPO (FAMPO) model served as a basis for the RVAMPO model, the RVAMPO model includes several enhancements and new features.

Model Enhancement Summary

The following is a list of the key enhancements and new features of RVAMPO model:

- The speeds and capacities are now contained in an external file, which is read by the NETWORK and HIGHWAY step scripts.

- The trip generation program has been borrowed from the FAMPO model after customizing it for the Roanoke region. The new code does not include any hard-coded values for trip rates and other general parameters. All the system parameters are either accessed from Catalog Keys or from external files. The new program uses land use data from a Dbase file. The production and attraction rates are accessed from TripProdRates.DBF and TripAttrRates.DBF files, respectively.

- The trip generation program now includes special generator trips for all purposes. In the previous version, trip generation program could only handle HBW special generator trips. The special generator trips have been more extensively used in the Roanoke model.

- A new Fratar model was developed for creating the analysis year external-external trip table. This is done by developing traffic estimates for external stations for future years. The base year trip table resides in the "Calibration Constants" folder, while the external traffic count file, (External_(Year)(Alternative).DBF, is a scenario specific file.

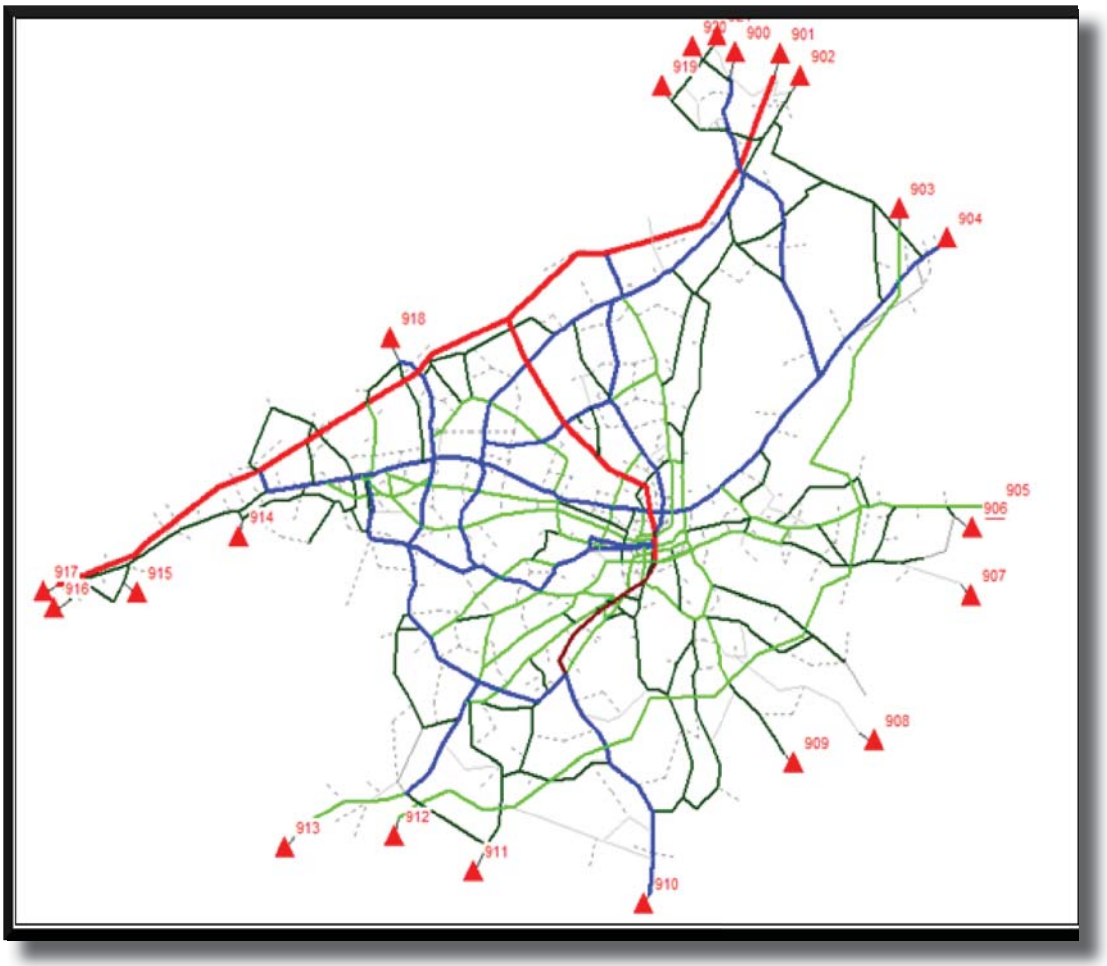
- The auto occupancy rates are now part of a Dbase file (AutoOccFactors.DBF), which resides in the "Calibration Constants" folder.

- The convergence criteria for the highway assignment process have been revised and now include new features available in Cube Voyager 5.0.2

Trip Generation

Trip generation determines the number of person trips that originate or are produced in any specific zone and those that are destined for or attracted to that zone. This section highlights several key processes of the RVAMPO trip generation process and summarizes the validated rates and results. The initial step of the model applies the Fratar model, an iterative proportional fitting model, to factor external survey trips to a year-2000 base, which used a combined matrix for external to external (E-E) and external to internal (E-I) trips. Highway external trips are divided into E-I person trip ends and E-E through vehicle trip ends. E-I trip ends are further divided by type of trip end (trip productions and trip attractions.) The E-I trip productions and attractions by trip purpose are distributed and assigned with the I-I trip ends.

External stations are intersections between the network and the study area boundary. These stations serve as ports of entry and exits to/from the study area. Each station was coded with a TAZ number (900 to 921). Two of these stations (903 & 912) represent the Blue Ridge Parkway and are not used to simulate any external traffic. External stations are shown in the figure below.



External Station Traffic Counts

Model Enhancements and Validation

Future year scenarios in the RVAMPO model have been modified substantially to make better use of available information on traffic flows and to be easier for the user to configure as new data on travel patterns become available. The new process, which starts with a separate E-E matrix, uses a regression model for predicting the E-I trips. The year 2000 E-E matrix serves as the seed matrix, and the analysis year matrix is developed by factoring the seed matrix using a Fratar model, so that the row and column totals match the user supplied traffic counts for E-E trips at that station. These traffic counts contain both E-E and E-I trips. These two trip purposes are allocated by predetermined factors specific to each external station.

The enhancements to both I-E and E-E processes that were adopted in the 2000 model update were also continued in the current model update study. The modified process identifies I-E and E-I as separate trip purposes. The I-E/E-I trips in the modified process were modeled as part of the internal trip purpose.

Validation of the E-E trips file was based on extrapolation and professional judgment. The E-E trips file validation generally relied upon recently collected roadside or cordon line surveys to determine the proportion of the vehicle traffic that passes through the study area. The final EETRIPS file is summarized in the table at right.

Initial external station productions and attractions for I-E person trips were developed from traffic counts. After the completion of a simulation run, the assigned volume at the external links may not sum to the counts. The validation of the external model adjusted both the I-E person trips and E-E vehicle trips to match the assigned volumes with the traffic counts.

The distribution process determined the number of I-E trips (present in the internal trip tables.) Some adjustments to productions and attractions were made so that the model produced the desired volumes at the external stations. The travel times on the external connectors represent the average time from the station to a typical destination outside the study area. The trips produced at an external station are assumed to be equal to the attractions (a very standard assumption), which is equal to half the daily volume on that link.

External Station	Traffic Count
900	11,100
901	37,000
902	5,300
903	-
904	15,600
905	8,000
906	3,000
907	4,000
908	100
909	5,400
910	24,500
911	1,400
912	-
913	7,200
914	1,200
915	1,100
916	8,600
917	49,100
918	9,200
919	2,560
920	950
921	1,150

External to External Trips

Results and Comparisons

The I-E trip ends were developed by subtracting the E-E trip ends from the count. The I-E trip ends were then divided by two to obtain the directional values and multiplied by an auto occupancy rate to obtain person trips. The splits of I-E and E-I trips are summarized in the table on the below.

External Station	Traffic Count	Percent External Internal	External Internal Trips
900	11,100	93%	10,367
901	37,000	40%	14,652
902	5,300	95%	5,009
903	-	0%	-
904	15,600	86%	13,369
905	8,000	95%	7,592
906	3,000	98%	2,931
907	4,000	100%	4,000
908	100	99%	99
909	5,400	55%	2,970
910	24,500	100%	24,476
911	1,400	82%	1,144
912	-	74%	-
913	7,200	100%	7,178
914	1,200	99%	1,192
915	1,100	77%	844
916	8,600	95%	8,196
917	49,100	60%	29,607
918	9,200	98%	9,016
919	2,560	98%	2,506
920	950	100%	950
921	1,150	100%	1,150

External Internal Traffic Counts - Base Year (2005) Model

Adjustments were made at some external stations. The actual I-E trip ends at each external zone were determined by the trip distribution. The trip ends thus had to be adjusted so that post distribution trip ends more closely matched traffic counts.

Several runs were made to validate the external station volumes. The I-E productions, attractions, and extra-regional times for each external station were modified through the validation runs to replicate each of the external station volumes to traffic counts. With the exception of a few low volume roads (within one percent), all external station volumes closely match the actual traffic counts.

This section provides a brief description of the modified trip generation program by explaining the functions of each subroutine. It then provides a discussion of several key issues related to the lifestyle trip generation program.

A combination of simple linear and multiple regression models were used in RVAMPO's trip generation model. Simple regression models were used for all trip purposes but one, Non-Home Based. The household and population data at the zonal level was classified into different household occupancy levels. The trip production file contains county specific trip rates corresponding to different household occupancy levels. Different trip rates were then applied to the household data for all home based trips and employment data from the non-home based trips. The trip generation model estimates productions (trip ends at a person's home) and attractions (trip ends at the non-home end of a trip.) NCHRP 365 suggests using different trip rates for different household occupancy levels because "the variation in trips between household sizes is so large that models without this variable are inferior in approximating travel patterns in a region."

Trip Productions

The trip productions rates from the FAMPO model were applied to the zonal data to get the trip productions. The table below shows the trip production rates for Roanoke. Currently, only trip rates for county 3 are being used for the Roanoke region.

Trips were ultimately categorized into the four traditional purposes of Home Based Work (HBW), Home Based Shopping (HBSH), Home Based Other (HBO), Non-Home Based (NHB), integrating Internal External (IE) and External Internal (EI) counts.

County	1 Person per HH	2 Person per HH	3 Person per HH	4 Person per HH	5 Person per HH	% IX HBW	% IX HBSH	% IX HBO	% IX NHB	% HBW	% HBSH	% HBO
1	3.43	6.68	12.10	15.60	21.70	0.54	0.08	0.15	0.28	0.18	0.18	0.30
2	3.00	6.20	11.00	15.40	21.20	0.22	0.08	0.15	0.28	0.18	0.18	0.30
3	4.12	7.80	11.40	16.00	19.10	0.20	0.08	0.15	0.28	0.18	0.18	0.30
4	3.48	6.87	11.90	16.50	21.10	0.32	0.08	0.15	0.28	0.18	0.18	0.30
5	3.00	5.90	9.48	13.30	23.30	0.40	0.08	0.15	0.28	0.18	0.18	0.30

Trip Production Rates

Trip Attractions

The HBW trip attraction rates for each of the trip purposes are shown on the next page. The attractions were also borrowed from the FAMPO model. Note that the coefficients for the HBW, HBSH, and HBO trip equations are derived so that the total productions are equal to the total attractions for the respective purpose. Just as in trip production, the Roanoke model uses trip attraction rates from county 3 in the following table.

County	HBW	HBSH	HBO HH	HEO Non-Retail	NHB Retail	NHB Non-Retail	NHB HH	% IX HBW	% IX HBSH	% IX HBO	% IX NHB
1	1.40	6.00	1.90	0.80	7.20	0.70	1.10	0.19	0.06	0.10	0.19
2	1.40	6.00	1.90	0.80	7.20	0.70	1.10	0.22	0.06	0.10	0.19
3	1.40	6.00	1.90	0.80	7.20	0.70	1.10	0.20	0.06	0.10	0.19
4	1.40	6.00	1.90	0.80	7.20	0.70	1.10	0.32	0.06	0.10	0.19
5	1.40	6.00	1.90	0.80	7.20	0.70	1.10	0.40	0.06	0.10	0.19

Trip Attraction Rates

Generator Process

Activity within some zones is significantly different from the regional averages. The differences in predicted trips would be large enough to change planning decisions on specific roadways or transit facilities. These facilities might include some airports, recreation and amusement areas, regional shopping centers, military and government complexes, hospitals, and colleges and universities. These facilities are often treated as special generators. The result is that the sums of productions and attractions are equal, and the special generator portions of a TAZ's trip attraction are not adjusted. The RVAMPO model has a process in which the special generated trips, which are user inputs, are added to the final trips at a zonal level.

Results and Comparisons

The number of unadjusted and adjusted productions and attractions in the 2005 validated model are presented in the following table. In the 2005 model, more than 700,000 person trips are generated. The overall trips per household and employee are 7.28 and 5.23, respectively. The trips per household and trips per employee are lower than recommended by NCHRP, but the characteristics of the Roanoke area and the final model calibration, in which we compare the model reported volume and ground traffic counts, justify such low trip numbers.

Trip Purpose	Trips
Home Based Work	123,331
Home Based Shopping	142,618
Home Based Other	219,854
Non-Home Based	215,832
Total	**701,635**

Person Trips per Household	7.28
Person Trips per Employee	5.23

Trip Generation Summary RVAMPO Model - Base Year (2005)

Trip Distribution

Except for through vehicles, RVAMPO uses the Cube Voyager distribution program to distribute trips between the production and attraction zones for all trips and purposes. The results of the trip distribution step become an input to the P/A to O/D conversion step, where person trips are converted to vehicle trips. RVAMPO trip distribution uses a standard gravity model. The distribution is done using uncongested travel time as a measure of spatial separation.

Highway Paths and Skims

This section describes the enhancements that were used in model validation and then presents the key modeling data. Minimum impedance travel paths are calculated using time over the highway network. In building paths, a turning penalty file is used. Paths are not built through prohibited movements. Initial paths are built using the link free-flow speeds. Terminal times and intrazonal times are also added.

The RVAMPO highway path module uses standard Cube Voyager procedures to build time and distance skim matrices for highway paths. The highway paths are defined as the shortest time path through the portion of the highway network available to all vehicles.

To check the network for coding errors and to ensure reasonable paths were built through the network, Cube Voyager determines the shortest path using the network impedance of time or distance with the summation of link impedances computed. Numerous paths were drawn on the computer screen to make sure that paths drawn were "reasonable".

In RVAMPO, in-vehicle travel time variables are considered as significant in determining the minimum paths between any given pair of zones. In-vehicle travel (IVT) time is the primary variable, which is determined as a function of distance and input speed.

Model Enhancements

Enhancements were made to the RVAMPO distribution model by improving the key inputs to the model. These enhancements include the following:

- Conversion of Friction Factors format to DBase
- Frequency distribution of trips with time

Attention has been given to refining production and attraction data as well as trip purpose data and to improving the measure of spatial separation to be sensitive to the impacts of future congestion. The following subsections describe the enhancements incorporated into the trip distribution process.

Internal External (I-E) and External-Internal (E-I) trips are instead included in the internal trip productions and attractions. Thus, the external TAZs (900-921) have productions and attractions associated with them. The trip distribution model determines the number of I-E trips. K factors are not used to influence travel between any origin and destination zones.

Treating external-to-internal and internal-to-external trips as internal trips is one of the key enhancements to RVAMPO. Benefits realized from this enhancement include the following:

- Permits trips generated inside of study area to be attracted to locations outside.
- Routine external-internal trip productions can now compete with internal-internal trips for attractions.
- Routine internal-external trip attractions can now satisfy some internal trip productions.
- Trip length distributions from external stations will vary based upon the types of trips made at those points.
- The total number of trips generated by a household is no longer influenced by its location in the study area.

Model Calibration and Validation

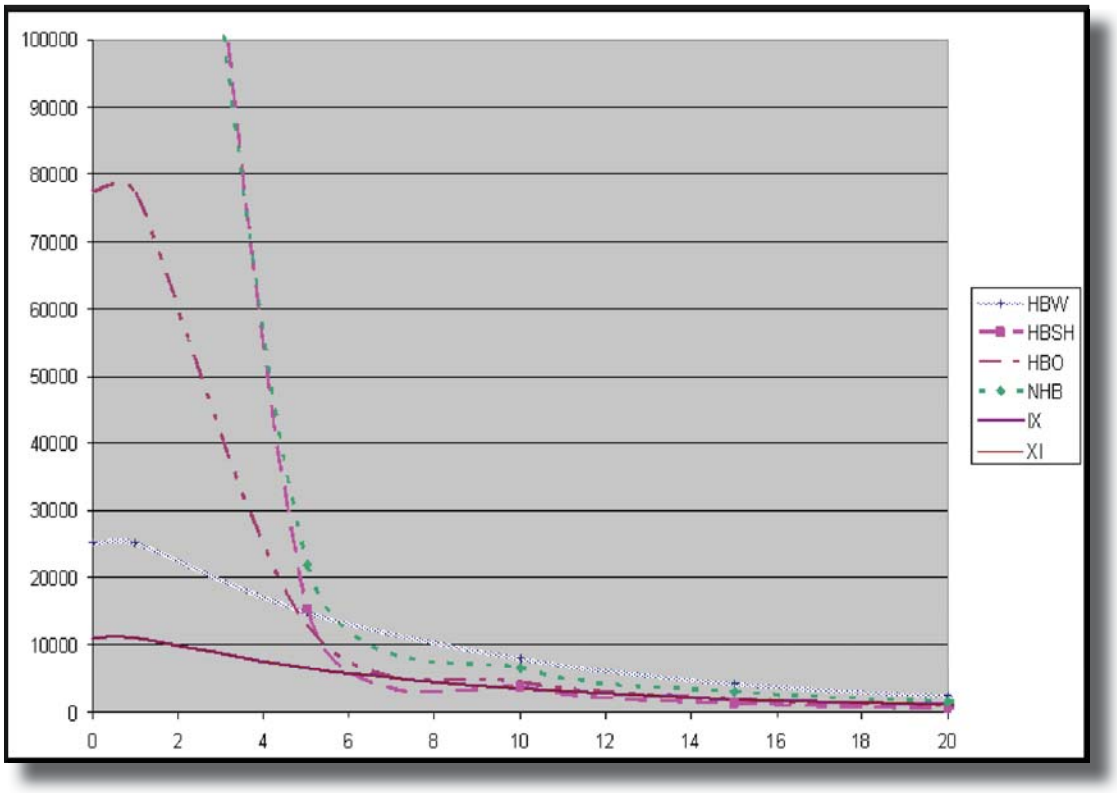
The gravity model formulation includes friction factors, and calibration of the gravity model centers on the adjustment of the friction factor component of the equation. For RVAMPO, K-factors were not considered due to the reasonable aggregate performance of the gravity model with friction factors alone.

The trip distribution model was calibrated using the guidelines from NCHRP 365. The calibrated friction factors are shown in the figure on the next page.

The 2005 validation of the model started with the calibrated gamma function parameters. The trip distribution validation procedure is an iterative process, where a set of travel time factors is developed for each trip purpose. The model computed trip length statistics, which were then compared to the observed/target trip lengths. Based on the results shown in the following table, no further adjustment was made to the friction factors.

Trip Purpose	Average Trip Length (min)	
	Model	NCHRP
Home-based Work	14.81	13-15
Home-based Shopping	13.07	13-15
Home-based Other	12.45	10-14
Non-home-based	12.85	13-15
Internal-External	22.43	-

Trip Length and Intrazonal Percentages RVAMPO Model - Base Year (2005)



Calibrated Friction Factors RVAMPO Model - Base Year (2005)

The validation process generally used in other models could be followed if further validation was warranted. The process of this validation uses an iterative adjustment to the friction factors through use of a "Gamma" function (a function most commonly used for synthesized friction factors). The gamma function is defined in the following form:

$$F(I)_p = a_p * (I **- b_p) * EXP(-c_p * I)$$

Where,

a_p, b_p, and c_p	=	calibration coefficients for trip purpose "p",
$F(I)_p$	=	friction factor for impedance value "I" and trip purpose "p",
I	=	impedance value, and
EXP	=	exponential function (the base of natural logarithm).

The gamma function usually does a very good job for trip distribution. Further validation of the calibrated friction factors could be done using the "Gamma" function through a non-linear curve fitting technique. This will give the starting point for any adjustment to the calibration coefficient.

The parameter "a" (known as scale factor) can be varied without changing the distribution and is usually not subject to change in model validation. The coefficients b and c, known as shape factors, are usually varied iteratively to match against the target trip lengths and trip length distribution.

Results and Comparisons

In addition to interzonal travel time, the gravity model requires two additional measures of time – intrazonal travel time and out-of-vehicle travel (terminal time). Intrazonal travel time is the time needed for a trip between two sites within the same zone. This time is usually smaller than the interzonal time. Cube Voyager estimates intrazonal time based on the Nearest Neighbor Theory. The theory states that intrazonal travel time is proportional to the amount of time it takes to get to the nearest adjacent zone or zones. The half of the nearest zone IVT time is taken as measure of intrazonal time. In RVAMPO, 2 adjacent zones are used to compute the intrazonal travel time during the trip distributions.

Intrazonal trips are not loaded onto network and are effectively subtracted from total trips before assignment. They play a significant role in estimating the local VMT for air pollution analysis. Calibration of intrazonal trips is not easy unless a good sample size of shorter trips exists in the observed database. These trips, in general, are underreported in most household surveys.

Terminal times are the average times required to get in a vehicle and go from the driveway to the street at the origin (production) end of the trip, or to get the average time required to park the vehicle and reach the final destination point at the destination (attraction) end of the trips. Terminal times vary according to the area type of a zone. The values applied for terminal times in the RVAMPO are shown in the following figure.

Area Type	Terminal Time (minute)	
	Origin	Destination
1. Urbanized Area	*2*	*2*
2. Residential	*1*	*1*
3. Rural	*1*	*1*

Terminal Times (Minutes)

Terminal times are added to the in-vehicle travel time for both ends of a trip, resulting in total travel time between a pair of zones. The resulting travel times are ready for input into the gravity model.

Trip length statistics (average and standard deviation) as well as intrazonal trip percentages are summarized for final trip distribution. Since there were no survey reported trip lengths for Roanoke area, the trip lengths were generally compared to NCHRP recommended trip lengths for areas the size of Roanoke.

Auto Occupancy Factors

Based on the close match between the model trip lengths and target trip lengths as well as reasonable intrazonal trip percentages, calibrated friction factors were not adjusted further in the model validation phase.

Although the final model forecasts only highway auto travel, the initial person-trips developed in the trip generation phase of the model must still be converted to vehicle trips. For the I-E portion of the HBW trips, the auto occupancy factors were derived from the Fredericksburg model, which in turn derived the target numbers from VRE survey data from the Department of Rail and Public Transportation – DPRT. The mode split also includes 1,600 persons (40 busesx40 persons) reported to be using buses (data from GWRPC). This mode split is significant only for the I-X work trips, since this is the only trip purpose with a significant shift to modes other than auto.

The following table shows the final auto occupancies used in the model for all trip purposes. For the internal work trips, the Census and the survey indicated average auto occupancy of 1.14 and 1.13 persons per vehicle, respectively. For the E-I work trips, a value of 1.43 was used since it is probable that less transit and car-pooling would occur for these trips than for the I-E work trips. For the HBO trip purpose, the NCHRP 365 recommends an auto occupancy rate of 1.62 persons per vehicle. The auto occupancy numbers in the Roanoke model are close to NCHRPO recommended numbers.

Purpose	Auto Occupancy Factors
HBW	1.16
HBsh	1.38
HBO	1.55
NHB	1.49
IE	1.43
EI	1.43

Auto Occupancy Factors - Base Year (2005) RVAMPO Model

Highway Assignment

The last step of the four-step modeling process is assignment. Highway assignments are normally performed on a daily basis with trips factored to a peak hour for volume-to-capacity calculations. The RVAMPO model uses an equilibrium assignment process. Evaluation of the highway assignment model is based on comparisons between traffic counts and model assigned volumes. Simulated traffic volumes are compared to traffic counts in several different ways to determine whether the coded highway network accurately represents the highway systems, and to determine whether the various assumptions used in the model chain are reasonable.

Model Enhancements

The highway assignment model uses an equilibrium assignment algorithm. In equilibrium, all travelers are assigned to their optimum path; no traveler can have a shorter path available. Each assignment of trips from all zones is considered one assignment iteration. Typically, multiple iterations are required before networks can reach full equilibrium. After each assignment's iteration, link speeds are adjusted and the next assignment is performed.

Multiple BPR Curves

$$T_c = T_f + \alpha * (v/c)^{\beta}$$

Where,

T_c = congested link travel time
T_f = link free-flow travel time
v = assigned volume
c = link capacity
α, β = BPR parameters

Link Class	α	β
Centroid Connectors	0.15	4
Freeways/Arterials	0.2	10
Local Streets	0.05	10

An iterative equilibrium technique is used in RVAMPO. In this type of assignment, all of the trips are loaded, the paths are revised, the trips are again loaded, and the procedure is repeated until equilibrium is reached. This technique uses the BPR formulation, in which link travel time is recomputed using the following relationship:

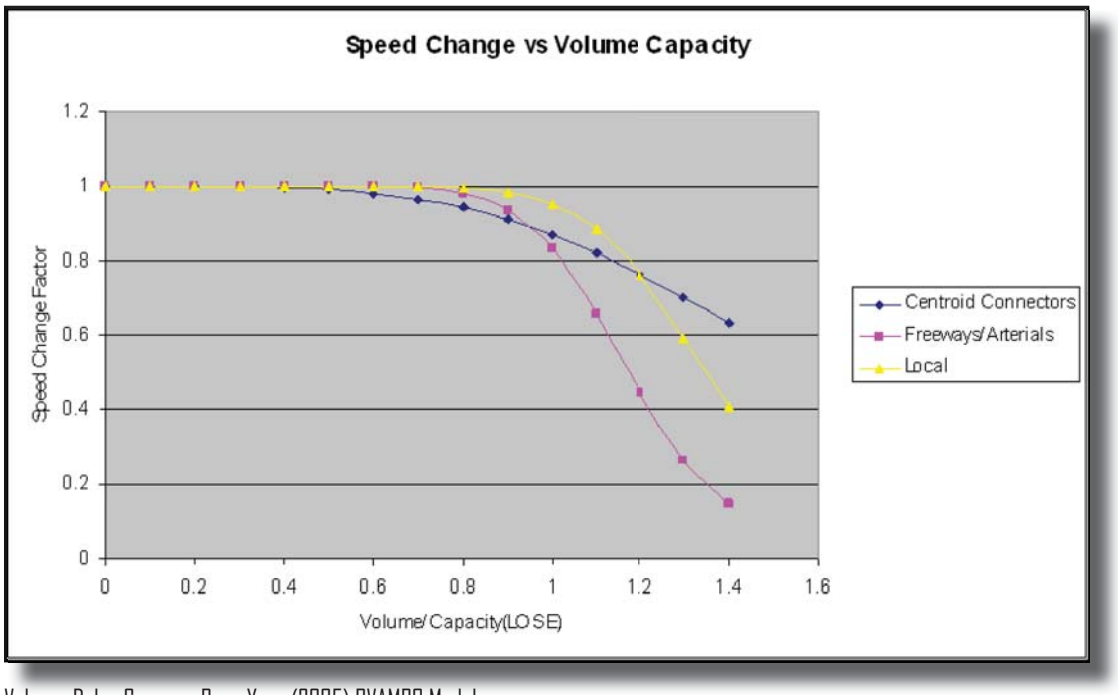
$$S_c = S_f / \{1 + \alpha (v/c)^{\beta}\}$$

Where,

S_c = estimated congested speed
S_f = link free-flow speed

Another enhancement in the RVAMPO highway assignment process is the incorporation of different BPR curves for different types of facilities. This recognizes that each facility type has its own unique characteristics for responding to congestion. For example, freeways can generally handle a higher level of congestion than surface streets before speeds begin to deteriorate. However, with more congestion, speeds deteriorate to stop-and-go conditions much more quickly on freeways than they do on surface streets. It should be noted that the BPR curve is not sensitive to the impacts of signal spacing, timing, and coordination.

The BPR curves determine both the level of congestion (the volume/capacity ratio at which speeds begin to deteriorate) and the rate at which they deteriorate as congestion increases. The adjustment to the BPR curves was done by changing the alpha and the beta values. In addition, speeds and capacities were also adjusted. The facility specific BPR curves, used in the 2005 validated model, are shown in the following Figure. A relatively steeper curve was used for freeways, while the curves for arterials were comparatively less steep.



Volume-Delay Curves - Base Year (2005) RVAMPO Model

For the 24-hour model, Capacity conversion factor (CAPCONFAC) is the ratio between the peak hour traffic and the daily traffic. The programs use the CONFAC parameter to convert hourly capacity to a daily value so that a 24-hour assignment can be made. Historically, the method for obtaining daily capacity restrained traffic assignments has been to multiply the hourly capacity by CAPCONFAC (say, 10) to reflect the daily highway capacity.

Model Calibration

Calibration of a traffic assignment involves an examination of several statistics, most of which are related to actual ground counts taken on various links throughout the network. The traffic counts for RVAMPO were identified through a variety of sources. One key to successful highway model validation is the availability of accurate traffic counts, in sufficient quantity. Efforts were made to insure that sufficient counts were included in the model for all available area type and facility type combinations. The percentages of the links with traffic counts by the facility and area types were shown previously in this chapter. Overall, 15 percent of the links have traffic counts. The statistics of number of links and percent of links with traffic counts will be very useful in evaluating the validation results presented in this chapter. For example, there will be less confidence in the evaluation results (say volume-over-count ratio) in locations where fewer links have traffic counts. These counts provide the basis for highway assignment evaluation, and are input into the model as link attributes.

Volume-over-Count and %RMSE (Percent Root Mean Square Error) Statistics

Several indicators are available for determining the overall performance of the highway assignment model. Volume-over-count (V/C) statistics are one of the key indicators. The simple ratio of assigned volume over count was recorded. A ratio of 1.0 indicates exact agreement between the assignment and the traffic count.

PPM recommends a ±15 percent accuracy for assigned VMT to count VMT. It is assumed that each combination of area/facility/number of lanes and link group contains a statistically valid number of links. For link groups having less than 100,000 VMT, only a ±25 percent accuracy level is desired. Assigned V/C ratios by their facility and area type were also analyzed. The analysis was based on a ±10 percent accuracy level, as was recommended for screenlines and cutlines.

The previous version of the model had a very high percent root mean square error (RMSE). The RMSE was equal to 38.6 percent. The consultant observed that error statistics were skewed because of the high number of low volume links. On investigation it was observed that many low volume counts were not taken as point observations, and instead of just being on the actual traffic count station link, they were propagated to the surrounding links as well. This observation was reported to VDOT, and its staff conducted an extensive effort to reconcile count locations with the corresponding links that must store the traffic count information.

Since this project involves short-term improvements, the consultant primarily focused on the traffic volume to count relationship. To check the validity of the trip generation and trip distribution characteristics was beyond the scope of this project and will be part of the future efforts on this model. After the count locations were reconciled, the RMSE dropped to 29.3 percent, which was a positive sign. The consultant observed that the traffic flow to malls in the Roanoke area did not match the ground reality. This was improved by the use of special generator trips. Adjustments were also made to the E-I trips to produce a better match of model volume to traffic counts on I-81.

The overall percent RMSE value is 29.3 percent, which is within the VTM threshold of 30 percent.

The next table shows the volume over count ratios by roadway facilities. It also shows that, with the exception of facility type 6, all facilities (which are local streets) are within five percent and meet the VTM guidelines.

Functional Group	Model Volume	Traffic Count	Volume/ Count	PPM Recommendation	Number of Observations
1	1,202,525	1,150,302	1.05	0.9 to 1.10	19
2	313,582	307,128	1.02	0.85 to 1.15	5
3	1,575,596	1,533,320	1.03	0.80 to 1.20	78
4	1,276,048	1,286,982	0.99	0.75 to 1.25	117
5	595,939	623,345	0.96	0.75 to 1.25	116
6	20,930	29,184	0.72	0.75 to 1.25	8
All	4,984,620	4,930,261	1.01	.95-1.05	361

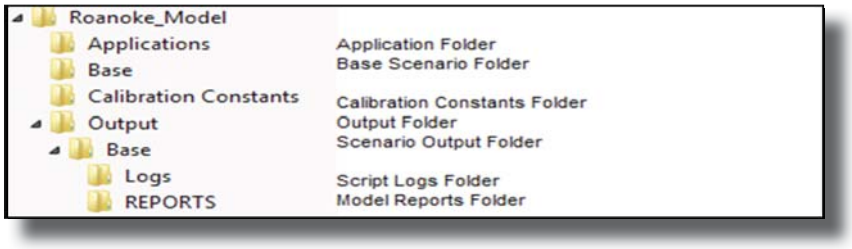
Volume/Count Ratios by Facility Types

Model Directory Structure

The consultant has made many improvements to the directory structure of the RVAMPO model. The structure of the previous version of the model contained a separate directory for each analysis year. There were two analysis years, 2005 as the base year and 2035 as the future year. The directory of each analysis year contained separate Cube applications and scripts. These applications and scripts were accessed from the same catalog file. This was not consistent with the basic idea of Cube catalogs and applications. The Cube Voyager models must have common applications and scripts for all scenarios which, in turn, have their independent data.

The new structure of the RVAMPO model has been divided into three sub-folders which reside under the parent folder, "Roanoke Model." These three folders contain data files, applications, and script files. The catalog file for the model resides in the "Roanoke_Model" folder.

A snapshot of the model directories follows:



Roanoke Model Folder

This folder contains the Cube Voyager Catalog file, "Roanoke_Regional_Model.cat." It also contains three subfolders, Applications, Base and Calibration Constants.

Applications

This folder contains all the associated applications and scripts for this model. This folder is also known as the working folder of the model because this is where all the intermediate output files are stored. All application files in this folder have an extension *.app and all the script files have an extension *.s.

Base

This folder is called the scenario folder. This folder is created when the first scenario is created from the Scenario Manager in the Cube Catalog. The scenario folder can be accessed from the script by using the {Scenario_dir} key. This folder contains all the scenario-specific input files for this model. All the scenario-specific files have been given a suffix, which is a combination of the scenario year and the one letter scenario identifier. For example: 2000 year scenario B will have a suffix "2000B" at the end of the file name. It should be noted that this suffix is not the extension of the file name. The file name extensions correspond to the file type. A DBase file will have a *.dbf extension.

The files contained in this folder are shown in the following table.

File Name	Contents
RVAMPO_(Year)(Alternative).NET	The Input Highway Network
Landuse_(Year)(Alternative).DBF	Land Use Data (Household and Employment)
SpecialGen_(Year)(Alternative).DBF	Special Generator
External_(Year)(Alternative).DBF	External-External Data
EIPCT_(Year)(Alternative).DBF	External-Internal Data

Contents of Input Data Folder

Calibration Constants

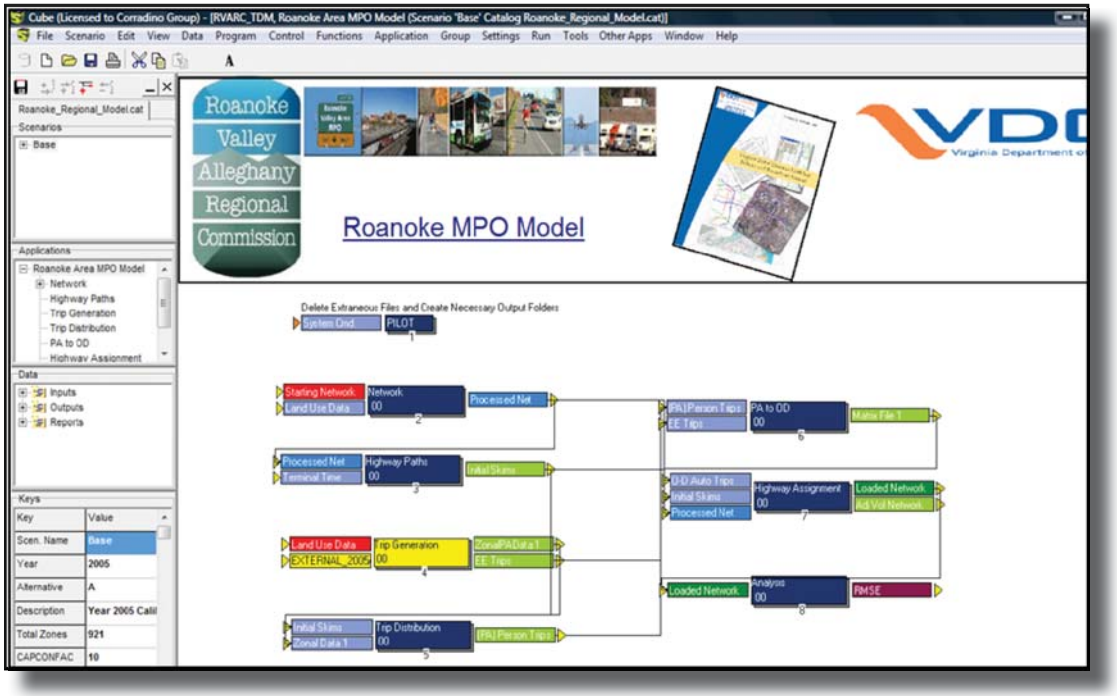
This folder contains files that are common across all scenarios and were finalized during model calibration and validation process. These files should not be changed unless there is a need to adjust model behavior across all scenarios. The contents of this folder are shown in the table on the next page.

File Name	Contents
AutoOccFactors.DBF	Auto Occupancy Factors
FFACTORS.DBF	Friction Factors
SPEEDS.DBF	Speed
Term_Time.DBF	Terminal Time
TripAttrRates.DBF	Trip Attraction Rates
TripProdRates.DBF	Trip Production Rates
CAPACITY.DBF	Highway Capacities

Contents of Calibration Constants Folder

RVAMPO Model's New Features

As stated earlier, the previous version of the RVAMPO Cube catalog contained two applications: one for the base year 2005, and the other one for the future year 2035. Generally, a model should be developed so that there is only one application. This single application should be applied to multiple scenarios. Scenarios may be different years, networks, or comprehensive alternatives (years, networks, costs, and other assumptions). Sometimes one-time or infrequent procedures are stored as another application, but applications should not generally be used in place of the scenarios. So, the catalog was restructured to use a single parent application. A snapshot of the RVAMPO model is shown in the following figure.



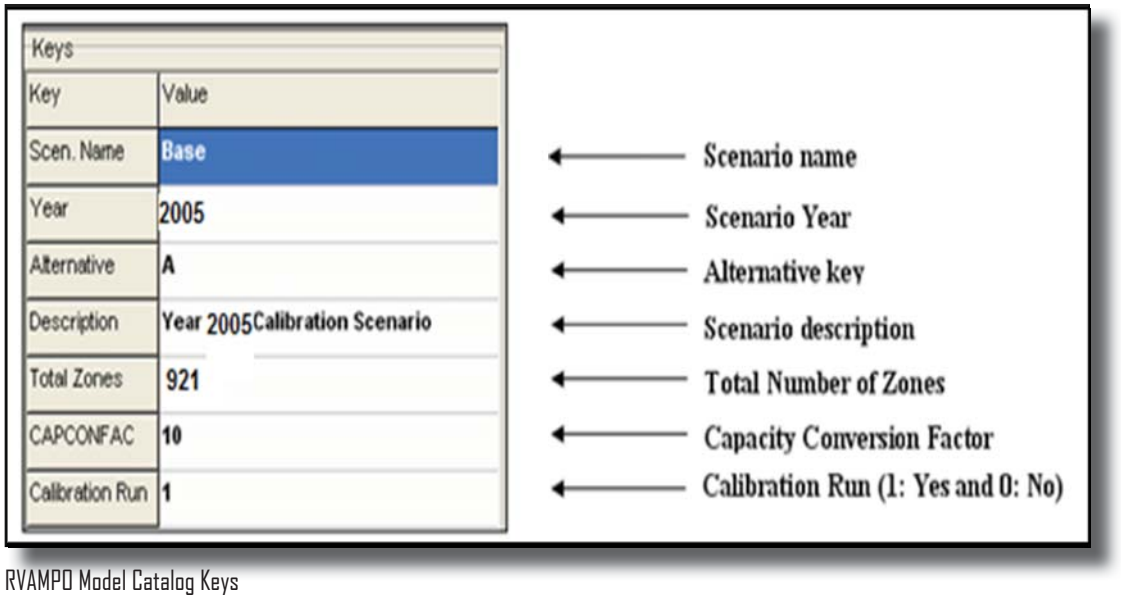
RVAMPO Model Catelog and Parent Application Snapshot

Various applications in the old RVAMPO model were not designed to exploit the full potential of features in Cube Voyager. One of these features is Catalog Keys. The consultant identified all the places in the scripts that needed common values. One example is value of total number of zones, which was hard-coded in the scripts. The consultant replaced all these common values by Catalog Keys to reduce the chances of error by a model user.

The application set has not been changed. There are still as many applications as there were in the previous version. However, changes have been made to link files between various applications. File linking has been made at the parent application. Most of the important input and output files have been made "public," which means that they are visible from the parent model application. This helps a model user better understand the flow of data between various applications and steps. Also for the same reason, wherever applicable, file linking has been made inside applications as well.

The applications in the Catalog window have been given self-explanatory names. The data section in the Catalog has been used to provide quick links to some of the main input and output files. These links have been made scenario specific.

Some new catalog keys have been introduced. These catalog keys can be changed for every scenario. There are a few keys that are scenario specific. The keys are listed in the following Figure.



RVAMPO Model Catalog Keys

Network

In the previous version of the model, the Network application had two steps. The first step converted a MINUTP network to a Voyager network. The second step processed the Voyager network for use in path building. The first step was eliminated because the starting Voyager networks for the base year and the future year are available now, and the second step has been given more functionality.

The Network step now extracts speeds and capacities from speed and capacity tables in SPEEDS.DBF and CAPACITY.DBF, respectively, which reside in the Calibration Constants folder. The speeds and capacities are added to the network based on the speed-capacity classification specified on the links.

Highway Paths

The only change made to this application was removal of hard-coded values of speeds for path building purposes. As mentioned in the Network application, this functionality has been transferred to the Network application.

Trip Generation and Distribution

This application contains both Trip Generation and Trip Distribution. The trip generation script was rewritten to make it more efficient and less prone to errors. The script in the previous version contained repetitive lines of code which were calculating trips by using hard-coded values for coefficients for various zonal data like population and employment. The generation step now reads the zonal socioeconomic, special generator and external-internal data from Dbase files that reside in the Input Data folder inside the scenario folder. These changes to the code have reduced it to a third of its original size. Another important change to this step is removal of the hard-coded values for different purpose-specific trip production and attraction coefficients. These coefficients are now being read from external files, TripProdRates.DBF and TripAttrRates.DBF. These files reside in the Calibration Constants folder and are common across all scenarios.

The distribution step was changed to read friction factors from a Dbase file instead of an ASCII text file. The friction factors file, FFACTORS.DBF, resides in the Calibration Constants folder.

Conversion of P/A to O/D

This application converts the P/A tables to O/D format, and prepares the trip tables for highway assignment. The major change to this step has been addition of a FRATAR step which will create the future external-external trip matrix by "fratarting" the base year trip table to external station traffic volumes specified in External_{Year)(Alternative).DBF.

Highway Assignment

The Highway Assignment application has been modified in consultation with VDOT staff. The lines of code that assigned hard-coded values of speed and capacities for link volumes have been removed. Instead, the speeds and capacities are now being added on the highway network in the Network application. Other changes made to the script involve changes to convergence methodology. In this setup Voyager's Highway program parameters RGAP and RGAPCUTOFF have been used in the CONVERGE phase.

Scenario Planning 6

ANTICIPATING THE FUTURE WITH SCENARIO PLANNING

Long-range transportation planning deals with a variety of social, demographic, fiscal, and environmental possibilities that can, individually or in combination, have a profound impact on future conditions. The purpose of planning is not to forecast each detail of a future society with complete certainty, but rather to envision and anticipate possible changes and to suggest strategies to deal with these future realities.

Scenario planning is one useful tool to help accomplish this.

RVAMPO's CLRTP 2035 uses scenario planning to look at specific trends or events that are likely to occur during the time horizon of this plan. Specifically, this chapter deals the following four scenarios:

- Retirement of Baby Boom Generation
- Global Climate Change
- Fuel and Energy Prices
- Water and Sewer Service Expansion

These trends have significant implications for long-range transportation planning, and the forces contributing to the trends are likely to remain relevant throughout the time horizon of this plan.

Retirement of Baby Boom Generation

Background

This scenario helps guide the long-range transportation planning process with issues concerning the retirement of the Baby Boom demographic. In general the term Baby Boom applies to those born just after World War II until 1964. This scenario uses two overlapping age groups which approximate, but do not precisely conform to, the Baby Boom demographic:

1) Age Group 1 - those who were age 45 to 64 in the year 2000

2) Age Group 2 - those who were age 35 to 54 in the year 2000

This scenario evaluates these two age groups at two distinct points in the future: year 2020 and year 2030. Members of Age Group 1 will be between 65 and 84 in 2020 and between 75 and 94 in 2030. Members of Age Group 2 will be between 55 and 74 in 2020 and between 65 and 84 in 2030. Two broad assumptions serve as underlying themes throughout this scenario and are designed to assist in discussing the macro issues of Baby Boom retirement in the context of long-range planning.

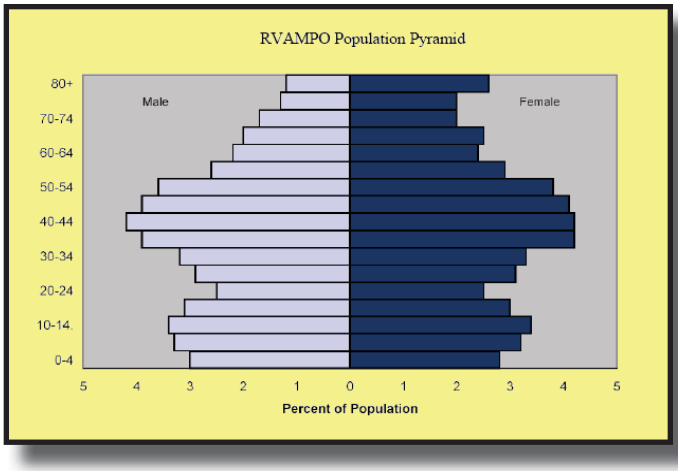
1) Current residents of the region age in place

2) Retirees from other regions and some current residents choose retirement housing in the area

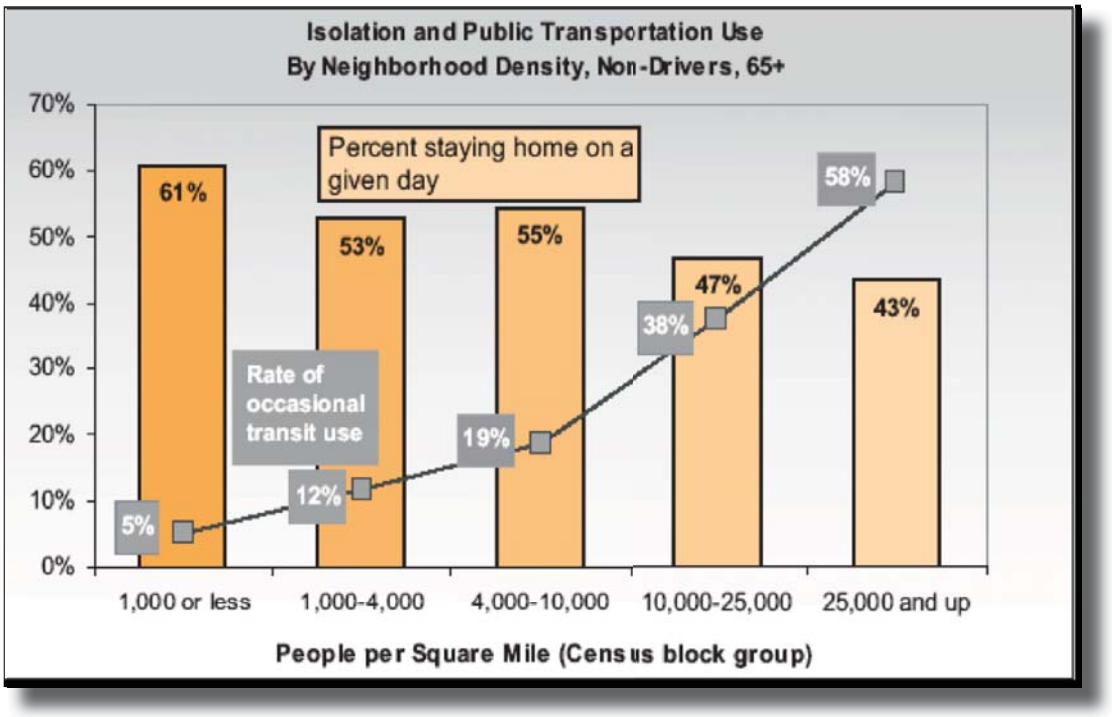
In some cases they will be explicitly stated in the diagrams and maps, in other cases the assumptions will be used for background analysis. Obviously, there are a range of housing options between aging in place and retirement housing. However, this scenario will focus on these two possibilities in order to get a general sense of appropriate transportation strategies.

Planning for Elderly and Disabled Mobility

In Fiscal Year 2005, RVAMPO staff developed a report on planning for elderly and disabled mobility. That report can be found at www.rvarc.org/work/mobilityfinal.pdf. The Elderly and Disabled Mobility report made use of the RVAMPO Population Pyramid shown to the right (based on Census 2000 data) which shows our two overlapping age groups - Group 1, 45 to 64 in 2000 and Group 2, 35 - 54 in 2000 - comprise nearly 50 percent of the total population.



One important issue the report identified was isolation among non-drivers. The graph below [3] shows the relationship between isolation (that is, those staying home on a certain day,) neighborhood density, and public transportation use.

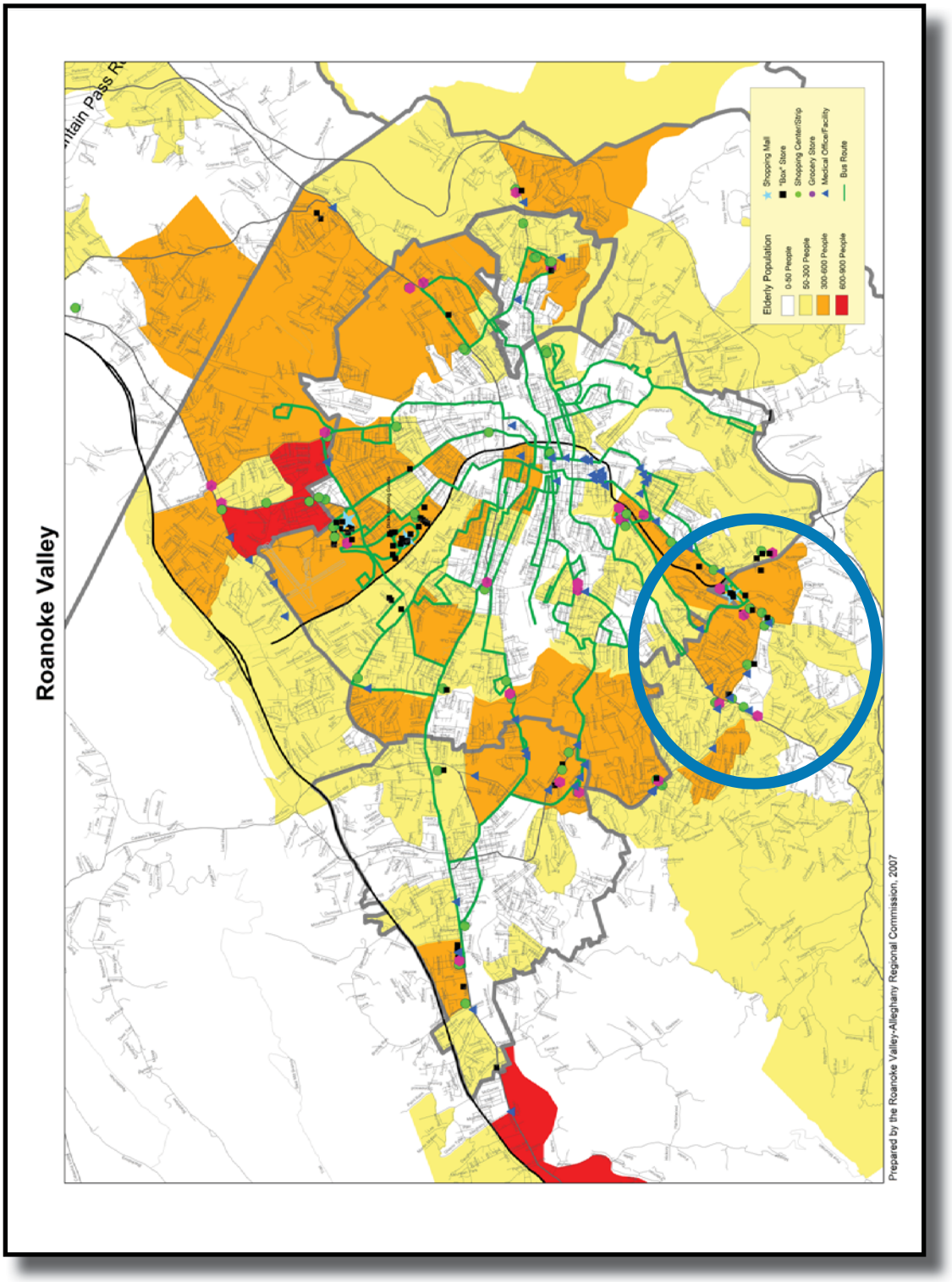


Later in this chapter, this scenario will be incorporated into the "Carless Households" at the TAZ level analysis as reported by the Census Transportation Planning Package (CTPP 2000) for both Group 1 and Group 2. Subsequent analysis considers all households at the TAZ level and represents the potential "Choice Rider" market for transportation alternatives. Members of the "Choice Rider" market may consider one or more transportation alternatives for safety, convenience, health, or social reasons. Transportation alternatives will be presented in the following section. Population density considerations will be addressed at the end of this scenario. In addition, a complementary transportation process (The Coordinated Human Service Mobility Plan) will be described. Although this plan's focus is broader than only Baby Boomers, many of the issues overlap and will become more relevant as Baby Boomers retire.

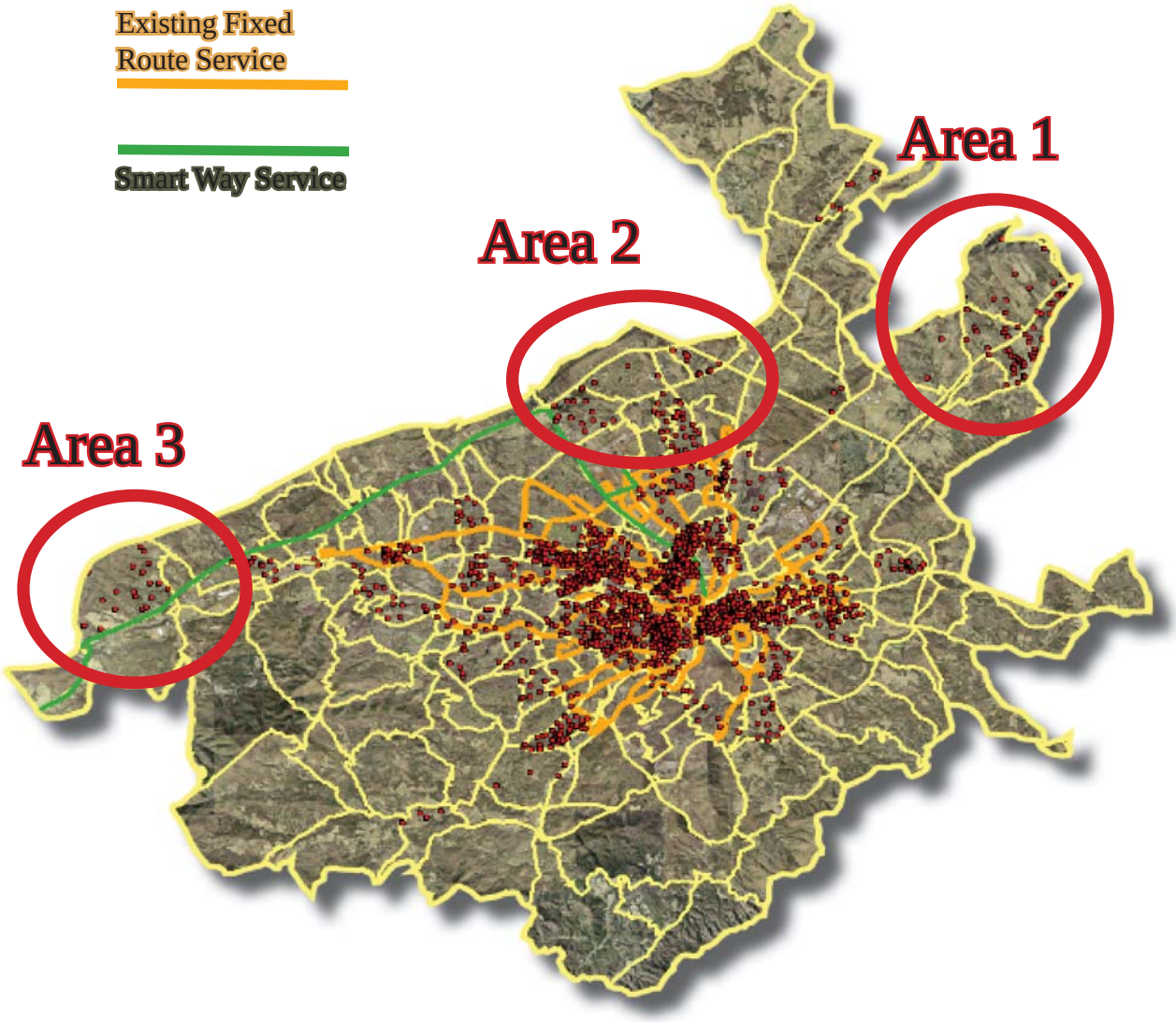
The map on the next page shows the relationship between elderly population (current 2000), shopping destinations, medical centers, and bus routes. The light blue circle on the map highlights a concentration of shopping destinations and medical facilities in the Southwest Roanoke City and Roanoke County area that will likely be attractive to the Baby Boom generation as they age. Currently there is no fixed route transit in the Roanoke County portion. This area will be a prime candidate for several of the alternative transportation strategies described later in this plan, which could include public transit service along Electric Road (US 419.) The circled area will be featured later in this scenario due to the large "Choice Rider" market that is predicted to be present in the years 2020 and 2030.

3. Planning for Elderly and Disabled Mobility, RVAMPO FY 2005 - Page 21

Concentration of Services of Interest to Retired Population



Future Carless Households (Age 65 to 84 in 2020)



Note: Data from CTPP 2000. One dot represents one household. Bedford County TAZ level data was unavailable in CTPP 2000.

The above map depicts future carless households with the primary householder ranging in age from 65 to 84 in the year 2020. The map follows an "Age in Place" assumption and shows pockets of potential future carless households that lie outside the existing fixed route transit system (Valley Metro) or the Roanoke to New River Valley service (Smart Way). Areas within the circles labeled Areas 1 - 3 will be further detailed on the next page. These are areas within RVAMPO that could benefit from a future feeder type of service that would connect residents in these areas to the fixed route system.

Future Carless Households (Age 65 to 84 in 2020) - Areas 1 - 3

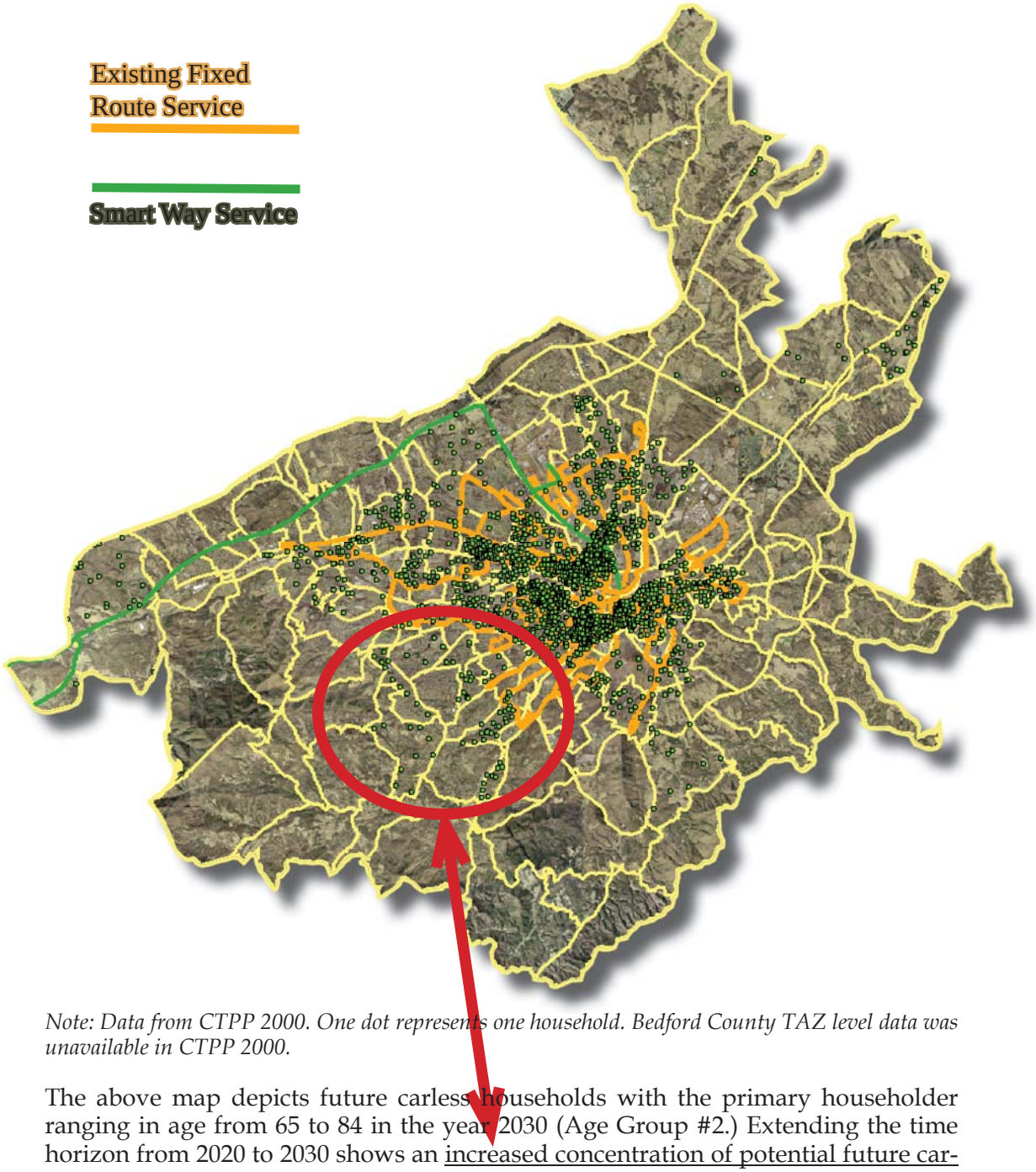
Area 1: TAZs 407, 408, 409 in Botetourt County indicate a possible candidate for transit, paratransit, or taxi feeder service based on an "Age in Place" assumption. Feeder service could connect with Valley Metro's system via US 460 or deliver patrons for transfer to Valley Metro's fixed route system.

Area 2: Connectivity could be provided through enhanced neighborhood accessibility, neighborhood electric vehicles, or special feeder service.

Area 3: Connectivity could be provided through enhanced accessibility such as additional Smart Way Stops.

Note: Data from CTPP 2000. One dot represents one household. Bedford County TAZ level data was unavailable in CTPP 2000.

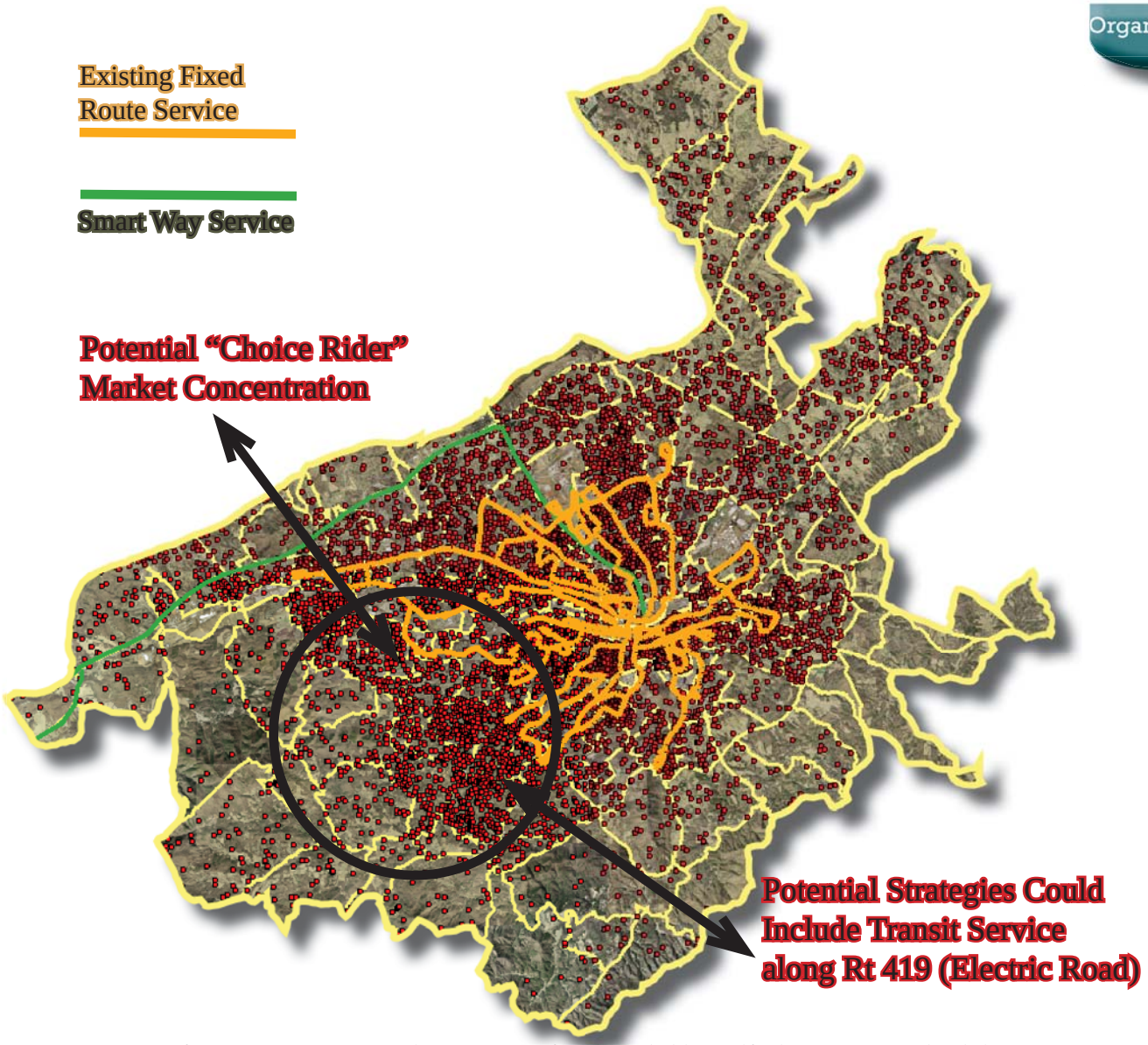
Future Carless Households (Age 65 to 84 in 2030)



Note: Data from CTPP 2000. One dot represents one household. Bedford County TAZ level data was unavailable in CTPP 2000.

The above map depicts future carless households with the primary householder ranging in age from 65 to 84 in the year 2030 (Age Group #2.) Extending the time horizon from 2020 to 2030 shows an increased concentration of potential future carless households in the Southwest Roanoke City and Roanoke County area. The map follows an Age in Place assumption and shows pockets of potential future carless households that lie outside the existing Valley Metro or Smart Way services.

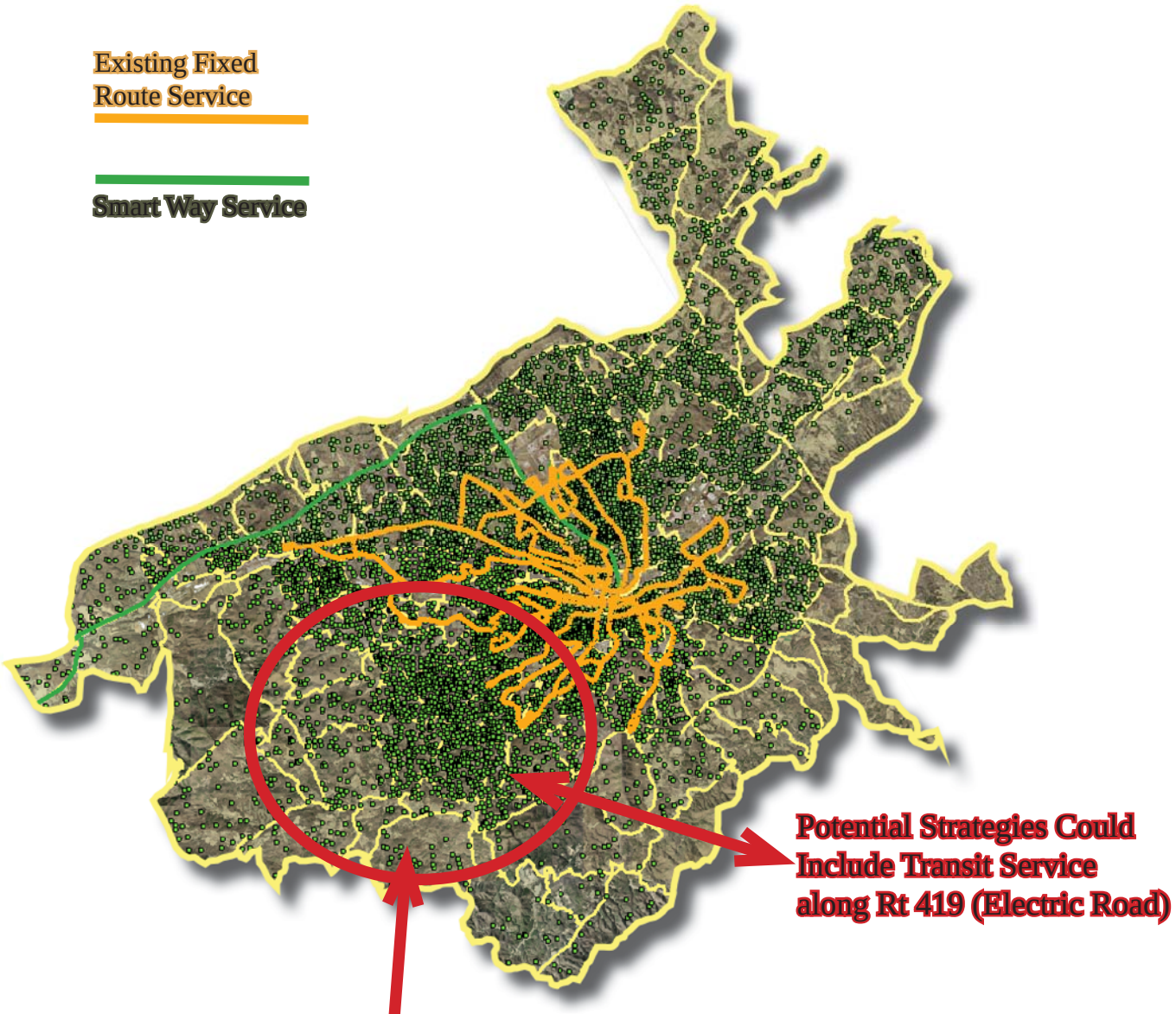
Future Total Households (Age 65 to 84 in 2020)



Note: Data from CTPP 2000. One dot represents four households. Bedford County TAZ level data unavailable in CTPP 2000.

The above map depicts future households, both with vehicles available and otherwise, with the primary householder ranging in age from 65 to 84 in the year 2020 (Age Group #1.) The map follows an Age in Place assumption and shows pockets of potential retired households that lie outside the existing Valley Metro or Smart Way services. These areas define a potential "Choice Rider"market for transportation services such as public transportation, non-work trip ridesharing, or car sharing systems. Households headed by retired individuals may choose these services for a variety of reasons including but not limited to: financial, social, or safety.

Future Total Households (Age 65 to 84 in 2030)

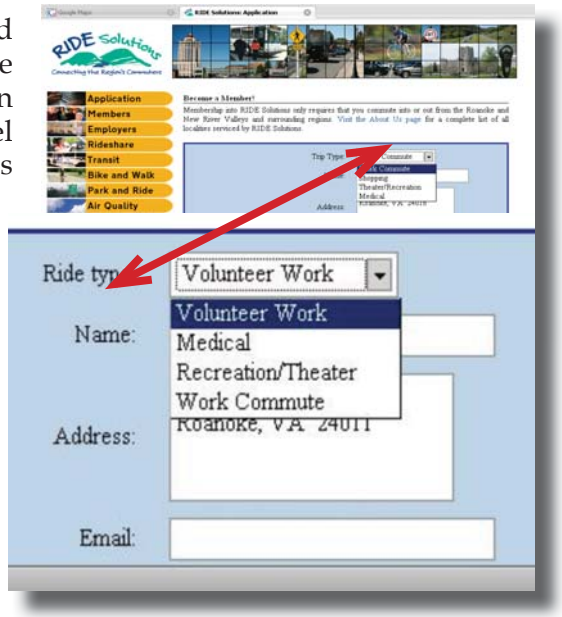


Note: Data from CTPP 2000. One dot represents four household and Bedford County TAZ level data unavailable in CTPP 2000.

The above map depicts future households, with vehicles available or otherwise, with the primary householder ranging in age from 65 to 84 in the year 2030 (Age Group #2). Likewise, the geographic pattern for the potential "Choice Rider" market for the second age group extends the trend seen on the previous page. Once again, Southwest City of Roanoke and Southwest Roanoke County show significant concentrations. Potential strategies (such as ridesharing, car sharing, feeder systems, and bicycle/pedestrian accomodations) to address future "Choice Rider" market and Carless Household markets are described in the following pages.

Non-Work Trip Ridesharing

Traditionally, ridesharing centered around the work trip. However, more recently the non-work portion of all trips has been on the rise. The National Household Travel Survey (NHTS) Brief - April 2007 reports that non-work trips account for 40% to 80% of all peak period trips, depending on day of the week and peak period in question. This trend is likely to intensify as increasing numbers of people move from the full-time work force to part-time work or full retirement. Rideshare programs are uniquely positioned to serve the non-work trip. There are several compelling reasons that future retirees would want to participate in non-work rideshares:



Representation of multi-trip purpose rideshare system.

1) To share the cost of gasoline and car maintenance

2) To maintain social bonds that were provided by the workplace

3) To reduce the stress of driving

4) To reduce the negative environmental impact of travel.

Rideshare programs can address these issues at a significantly reduced cost compared to traditional highway construction. Although the only immediate costs for non-work trip rideshare management may be software, marketing, and additional employee costs, rideshare programs are sometimes overlooked as an integral part of management of the existing transportation system. Currently the work-commute rideshare program (RIDE Solutions) is funded by a State grant administered by the Virginia Department of Rail and Public Transit (VDRPT). Funding for non-work trip rideshare could come from a variety of sources. Capital expenses, such as the purchase of computers and software, may be eligible for traditional transportation funding sources listed in the CLRTP. Non-work trip rideshare should be given consideration as either a stand alone element or as part of a larger strategy.

Rideshare programs are generally publicly supported and, as such, are free to the end user. Current trends indicate that Baby Boomers will form an increasingly large percentage of the region's volunteer force, and that they intend to be more actively engaged in the community than the current generation of retirees. By working with local volunteer organizations and umbrella groups, the services provided by RIDE Solutions can easily be migrated to meet this additional transportation need.

Car Sharing Systems

Car sharing should not be confused with ridesharing. Car sharing is essentially a trip-by-trip car rental program. Typically, members join a car sharing system and pay a monthly fee for access to cars at various predetermined parking spaces or pods. The membership plans are similar to a mobile telephone plan. Generally, a certain number of miles at peak times or non-peak times are allocated based on the membership plan chosen. Car sharing systems transform the automobile from a possession to a service and typically take care of insurance, maintenance, taxes, and even gas. Car sharing systems are already present in large European and U.S. cities. In the Washington D.C. area, car sharing systems tie into the park-and-ride system at Metro stations.

Hypothetical RVAMPO Regional Car-Share System. Dots represent hypothetical car-share stations

A car sharing system in the RVAMPO would have the following advantages:

1) Provide predictable transportation expenses for those on a fixed budget (no surprise repairs); 2) Serve as a feeder system for fixed route transit or for node-to-node transportation; and, 3) Provide an opportunity for car share agencies to supply energy efficient vehicles for the system in order to minimize fuel costs.

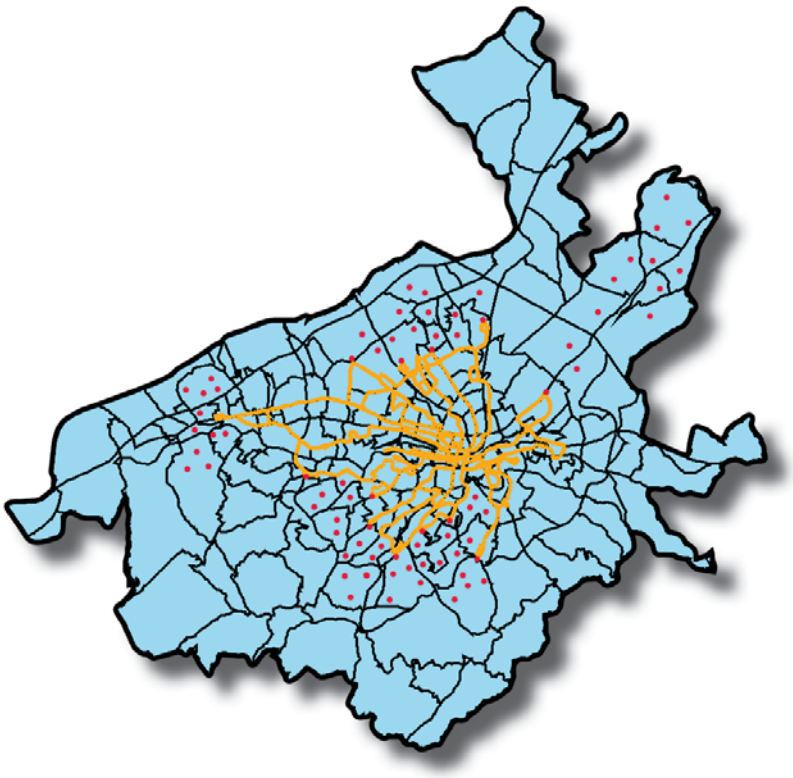
Currently, the RVAMPO area may not have the market density to support a car sharing system. However, the future "Choice Rider" markets previously described could provide the necessary density and demand. In addition, such markets as Downtown residents might be possible markets for car sharing. A car sharing system would also benefit some of the carless -- but able bodied -- households, whose main barrier to car ownership is cost. These households could likely afford the minimal subscription service of car sharing, if they know that they aren't responsible maintenance or repair costs.

A car sharing system, as described here, would be operated and maintained by the private sector. Public sector participation could involve the construction, reservation, and leasing of public right-of-way for the car sharing parking spaces. Under a public-private partnership, parking spaces could be provided at select transit stops, and subscribers could receive a transit pass to complement their car sharing usage. In addition, car sharing subscribers could participate in a non-work trip ridesharing system, thereby sharing subscription costs with their ride share partners.

Paratransit or Taxi Feeder Systems

Paratransit or taxi feeder systems are designed to augment fixed route bus service by collecting customers from designated pick-up points and delivering them to a designated bus stop, but they are not a curb to curb service. Typically, feeder service fare is included in the transit fare. If this is not feasible a special flat-rate fare or transit transfer system can be established. Typically 30 minute advanced notice is necessary to use a feeder system.

The image at the right represents a conceptual feeder system based on CTPP analysis. The conceptual feeder system would work in a manner similar to the Car Share system on the previous page. In fact, a feeder system could supplement a car sharing system by addressing citizens who could not afford the minimum car sharing subscription service and by serving those who cannot drive themselves. Designated feeder system pick-up points and designated car sharing parking could be co-located to serve a greater variety of citizens. Additionally the feeder system could be incorporated into a regional non-work trip rideshare system that could coordinate paratransit and taxi trips to pick up multiple rideshare participants.



It is currently unclear if transportation funds from the CLRTP can be used to help fund a feeder service. However, SAFETEA-LU's Planning Factor 7 encourages planners to "Promote efficient system management and operation," and a Paratransit/ Taxi feeder system is one possible management transportation solution.

Bicycle and Pedestrian Accommodations as Feeder Systems

Bicycle and pedestrian accomodations are excellent transportation options for able bodied people of all ages and, when properly constructed, can even qualify as handicapped accessible. The image to the right illustrates what is possible using only 12 feet of paved surface. Such lanes may be retrofitted into the existing transportation system (with proper separation of course), or constructed adjacent or parallel to current infrastructure.

Each lane is 4 feet wide for a total of 12 feet - equivalent to a vehicle lane.

In Fiscal Year 2006 RVAMPO staff completed "Pedestrian Access to Commercial Centers: Connecting Residential and Commercial Land Uses." The study focused on 20 study areas with high residential population counts close to commercial land uses. The study found that in many cases there were no formal pedestrian facilities, sidewalks or other means to access the nearby commercial and retail establishments.

Safe pedestrian access to commercial and retail establishments would benefit citizens of all ages. A combination pedestrian/bicycle facility similar to the one shown above would greatly increase accessibility between residential, commercial, and retail establishments. The facility could also act as a feeder mechanism to bus stops, designated pick-up points, park and ride lots, or car sharing spaces. In addition the facility could serve a network of publicly available bicycles as described on the next page.

Bicycle and pedestrian facilities can accommodate electric scooters and similar vehicles, keeping them out of a dangerous situation in the normal street right-of-way.

Transportation safety can be enhanced by providing more bicycle and pedestrian facilities that can also accommodate the growing number of electronic scooters and similar vehicles. Currently such slow moving vehicles are often in the normal street right-of-way causing an unsafe situation for both the scooter driver and other drivers. These scooters are being advertised on television and the internet as being eligible for medicare and/or medicaid reimbursement. The combination of increasing numbers of retirees and subsidized electric scooters could cause an increasingly unsafe situation unless adequate parallel facilities are provided for bicycles, pedestrians, and electric scooters.

Publicly Available Bicycles as Feeder System

Publicly available bicycle systems can range from the informal to the highly organized. One example of a highly organized system is the one in Lyon, France. It uses an extensive node system, with a kiosk and bicycle locking mechanisms, throughout the metropolitan area. The bicycles are free for one hour with a small rental charge for each additional hour of use. A two Euro coin is deposited in a special slot on the bicycle to unlock it from the post. The coin is returned to the user upon return of the bicycle to any of the nodes located in the metropolitan area. The deposit ensures that the bicycles will likely be returned to a node by either the original user or any other citizen wishing to obtain the 2 Euro coin.

Public Bicycle System Lyon, France - Bicycles are free for 1 hour and available for a small fee thereafter.

Sharebike.org is the Roanoke area's non-profit civic organization dedicated to publicly available bicycles. This service could be expanded to tie into Valley Metro's fixed bus routes. Many Valley Metro buses now have bicycle racks attached to the front of the vehicle. Public bicycle racks or pods could be provided at strategic bus stops and other locations. Public bicycle racks could also be developed along with bicycle and pedestrian lanes as described on the previous page.

Bicycle racks on Valley Metro Busses.

Funds for the construction of bicycle and pedestrian lanes and/or for the construction of bicycle racks should be eligible for inclusion in the CLRTP.

Sharebike.org - Roanoke Based

Coordinated Human Service Mobility Plan - Identified Strategies

Coordinated Human Service Mobility Plan - Identified Strategies

In 2006, RVAMPO developed a Coordinated Human Service Mobility Plan in partnership with Virginia Tech Transportation Institute, RVARC, New River Valley Planning District Commission and the Blacksburg-Christiansburg-Montgomery MPO. In 2008 the Virginia Department of Rail and Public Transportation (DRPT) developed and updated CHSM Plans for all planning districts in the Commonwealth of Virginia. The plan for RVARC (PDC #5) covers the vast majority of the RVAMPO study area. The updated CHSM Plan was finalized by DRPT and its consultants in September 2008. The updated plan identifies 11 strategies, listed below, from which to develop specific CHSM projects. Projects receiving funding from the following categories need to be referenced in a CHSM plan: S. 5310 – Elderly and Disabled, S. 5316 – JARC, and S. 5317 – New Freedom. Several of the following strategies are further developed on previous pages of this section.[4]

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

2. Support new mobility management and coordination programs among public transportation providers and other human service agencies providing transportation.

3. Expand availability of demand-response service and specialized transportation services to provide additional trips for older adults, people with disabilities, and people with lower incomes.

4. Provide flexible transportation options and more specialized transportation services or one-to-one services through expanded use of volunteers.

5. Provide targeted shuttle services to access employment opportunities.

6. Expand outreach and information on use of available mobility options in the region.

7. Establish a ride-sharing program for long-distance medical transportation.

8. Implement new public transportation services or operate existing public transit services on a more frequent basis.

9. Expand access to taxi services and other private transportation operators.

10. Establish or expand programs that train customers, human service agency staff, medical facility personnel, and others in the use and availability of transportation services.

11. Bring new funding partners to public transit/human service transportation.[4]

4. RVARC CHSM Plan pages 35 and 36

Potential TAZ Level Effects

Retirement of the Baby Boom generation could have an effect on future demographic, population, and employment estimates for TAZs that have existing large scale retirement communities or assisted living centers. Some of these TAZs are listed below with 2035 population and employment estimates based on regional trends. Also included are revised 2035 population and employment estimates based on input from the management of retirement facilities in the TAZs about possible future expansion plans to serve the Baby Boom generation's retirement needs. *Note: the travel demand model (chapter 5) used the original figures to derive model results.*

The Friendship Retirement Company operates two campuses in TAZ 339. The campus on Dent Road is bordered by one of Roanoke Regional Airport's runway approach zones and Regional Airport owned land. The campus on Hershberger Road is not significantly affected by Regional Airport approach zones and has room to grow.

TAZ 339	Population Estimates	Employment Estimates
2035 Estimates	1,038	506
Revised 2035 Estimates	1,113	512

TAZ 339 - Friendship Retirement Inc.

Richfield Retirement Center is in TAZ 322.

Population Year 2035 1312

Employment Year 2035 1344

Management of Richfield Retirement Center indicated that current estimates are adequate due to their future strategic plans.

TAZ 322- Ritchfield Retirement Inc.

Brandon Oaks is in TAZ 72.

TAX 72	Population Estimates	Employment Estimates
2035 Estimates	1,038	336
Revised 2035 Estimates	1,113	512

Brandon Oaks has maxed out the density allowed by zoning on their current property. There are two adjacent properties that could provide room for expansion should they come on the market. Management has been interested in acquiring these properties in the past but has not yet found willing sellers.

TAZ 72 - Brandon Oaks

The following two population and employment projection revisions are based on acquiring either one or both of the properties:

TAZ 72	Population Estimates	Employment Estimates
Acquiring one property before 2035	944	340
Acquiring both properties before 2035	1,057	341

Pheasant Ridge is in TAZ 87.

Pheasant Ridge Management stated that their typical market planning process is short term. Generally, management plans for the next building based on the current building's market performance. With this in mind, management estimated that a maximum of 6 buildings might be added over a 30 year time horizon. This would lead to the revised estimates.

TAZ 87	Population Estimates	Employment Estimates
2035 Estimates	1,042	945
Revised 2035 Estimates	1,378	946

TAZ 87 - Pheasant Ridge

Multimodal/Village Centers

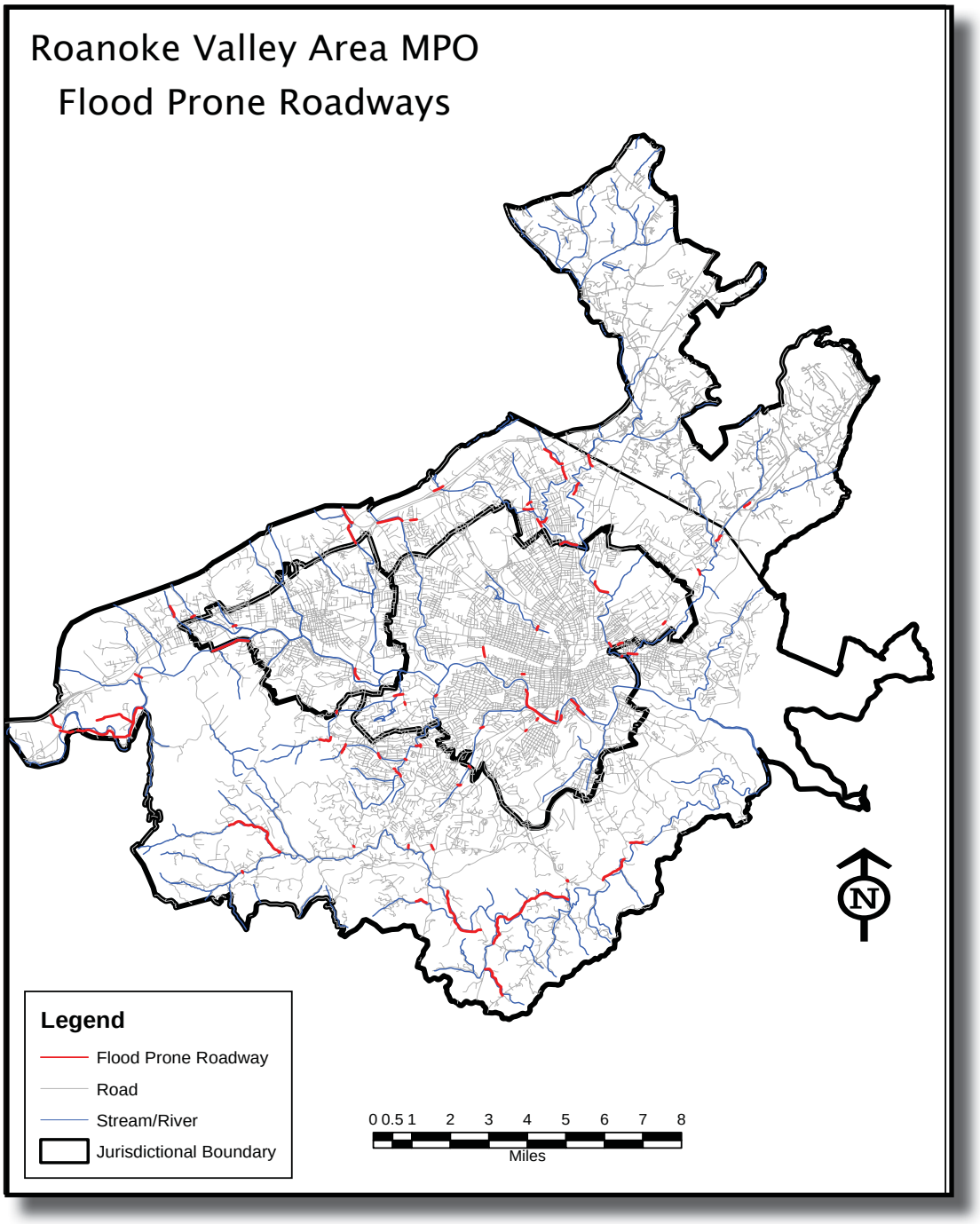
Many of the suggested strategies in this scenario could be addressed by placing multimodal hubs in existing village centers. Village Centers are being promoted by both the City of Roanoke and Roanoke County planning processes. An illustration of multimodal center elements is depicted below.

Global Climate Change - Adaptation

Flooding

This scenario deals with possible effects and possible adaptations to Global Climate Change. Chapter 12 will describe environmental planning as it relates to regional air-quality and transportation planning. Chapter 12 will also discuss specific pollutants and greenhouse gases in general.

The most likely negative effect of global climate change on RVAMPO would be a change in weather patterns which would produce more flooding. In FY2006 RVAMPO and RVARC produced a joint "Flood Prone Roadway" study. Flood prone roadways within the RVAMPO study area are depicted below:



Flood Prone Roadways

The flood prone roadways were determined by comparing the intersection of flood plains with transportation infrastructure, historical records of past flooding, and expert input from public works and emergency services personnel. A variety of situational and design variables determines whether a roadway floods. Using Geographic Information Systems (GIS) to identify roadway segments in the flood plain in combination with input from public and emergency services personnel presents a more accurate picture than using GIS data alone.

The following tables contain flood prone roadways by locality within the RVAMPO service area. The cities of Roanoke and Salem and the Town of Vinton are completely contained within the RVAMPO boundary. Only portions of the counties of Botetourt and Roanoke are within the RVAMPO study area.

Route Name	Flooding Location Description
10th Street	Intersection of Shadelawn Avenue
13th Street	Intersection with Eastern Avenue and Tinker Creek
Arbor Avenue	Riverview Area
Arbutus Avenue	Riverview Area
Baldwin Avenue	Intersection with Tuck Street
Bennington Street	Jamestown Area
Boulevard Street	Intersection with Salem Ave. (Shaffers Crossing)
Brambleton Avenue	Crossing of Murray Run Creek
Campbell Avenue	Near intersection of 10th Street
Cravens Creek Road	Intersection with Deyerle Road
Deyerle Road	Intersection with Valentine Road
Edgewood Street	Near intersection with Brandon Road
Franklin Road	Intersection with Brandon Road
Franklin Road	Intersection with Broadway Avenue
Jefferson Street	Intersection with Reserve Avenue
King Street	Intersection of Berkeley Avenue and Richards Avenue
Piedmont Street	Intersection with Hamilton Terrace
Wiley Drive	Various spots
Wise Avenue	Crossing of Tinker Creek

City of Roanoke - Flood Prone Roadways

Route Name	Flooding Location Description
Apperson Drive	Between Orchard Drive and Riverside
Colorado Street	Between Rowan Street and Riverside Drive
East Main Street	Intersection with Kessler Mill
East Riverside Drive	Between Apperson and McVitty
Electric Road	Near intersection with Apperson Drive
Epperly Lane	Kessler Mill Road to Terminus
Front Avenue	Between Riverside Drive and Riverside Drive
Horner Lane	Near Wildwood Road
Lancing Drive	Salem Ridge Apartments, aka Willow River
Mill Lane	Between West Main Street and Riverside Drive
Pine Bluff	Kessler Mill Road to Sycamore
River Side Drive	Apperson Drive to Colorado Street
Sycamore Drive	Pine Bluff to Terminus
Union Street	Between Fourth Street and Eddy Street
West Main Street	Intersection with Wildwood Road
West Main Street	Between Poplar Street and Turner Street
Wildwood Road	Intersection with West Main Street

City of Salem - Flood Prone Roadways

Route Name	Flooding Location Description
Hardy Road	Town of Vinton / City of Roanoke CL
Virginia Avenue	Town of Vinton / City of Roanoke CL
Walnut Avenue	From 4th Street to 8th Street

Town of Vinton - Flood Prone Roadways

Route Name	Flooding Location
Tinker Mill Road	Daleville area 0.5 miles west of US 220
Willowbrook Lane	Glade Creek near Willow Brook Mobile Home Park

Botetourt County (portion within RVAMPO 2035 Study Area Boundary) - Flood Prone Roadways

Route Name	Flooding Location
Back Creek Rd.	Between US 220 and SR 615
Bandy Rd.	Middle Back Creek Bridge
Bandy Rd.	5000 Bandy Rd.
Barley Dr.	Various spots near River
Bent Mountain Road	Intersection of Twelve O'Clock Knob Road (SR 694)
Carson Rd.	Near intersection with Lake Back O Beyond Dr.
Cartwright	Near Crystal Creek
Clearwater Ave.	Various spots near Creek
Coleman Rd.	Various points
Cotton Hill Rd.	West of Intersection with Route 613
Crawford Road	400 block
Creekwood Dr.	Near intersection with Beaverbrook
Cresthill Dr.	Garst Mill Bridge
Dent Rd.	From Williamson Rd. to Brookside
Dutch Oven Rd.	Various spots near Creek
Electric Rd.	Near intersection with Cordell Dr.
Electric Rd.	Intersection with McVitty Rd.
Ferguson Valley Rd.	Various spots along Creek
Five Oaks Road	Intersection with Bent Mountain Road
Florist Rd.	Near intersection with Verndale Dr.
Garst Mill Rd.	Near Intersection with Halevan Rd.
Glade Creek Rd.	Near intersection with Bonsack Rd.
Grandin Road Extension	West of Meadow Creek Drive (1390)
Green Ridge Rd.	3000 Block of Green Ridge Rd.
Halevan Road	At Garst Mill Park Road
Harwick Dr.	Various spots
Hershberger Rd.	East of intersection with Plantation Rd.
Indian Head Rd/Bohon Hollow Rd.	Various spots
John Richardson Rd.	Near intersection of Hershberger Rd. and Plantation Rd.
Keagy Rd.	4400 Keagy Rd.
Kessler Mill Rd.	Various spots
Lakemont Drive	Various locations
LaMarre Dr.	Various spots near Creek
Little Bear Rd.	Various spots

Roanoke County (portion within RVAMPO 2035 Study Area Boundary) - Flood Prone Roadways - Table 1

Route Name	Flooding Location
Loch Haven Rd.	2 miles east of US 419
McVitty Rd.	Intersection with Castle Rock Rd.
McVitty Rd.	3100 McVitty Rd.
Merriman Rd.	Near Penn Forest Elemantary
Ogden Rd.	At Pebble Creek
Old Mountain Rd.	Various spots near Creek
Palm Valley Rd.	Sun Valley Subdivision
Plymouth St.	Near Brookside
Ran Lyn Dr.	Near Intersection with South Roselawn
River Rd.	Various places near river
Shadwell Rd.	Near intersections with Ashton Rd. and Summerview
South Campus Dr.	Various spots near Creek
Starkey Road	At Back Creek Tributary B
Starlight Ln.	Between Boones Chapel Rd. and Blue Ridge Parkway
Sugarloaf Mountain Rd.	Near Mud Lick Creek
Texas Hollow Rd.	Various spots
Tree Top Camp Rd.	Various spots
Twelve O'Clock Knob Road	Various locations
Verndale Dr.	Sun Valley Subdivision
West River Rd.	Various places
West Riverside Dr.	Various spots near River
Willow Branch Rd.	Various spots near Creek
Wood Haven Rd.	Near intersection with Willow Creek Dr.
Yellow Mountain Rd.	Near intersection with US 220

Roanoke County (portion within RVAMPO 2035 Study Area Boundary) - Flood Prone Roadways - Table 2 - Continued from Previous Page

GIS analysis reveals that the linear distance of flood prone roadways within the GIS RVAMPO study area boundary is 27.18 miles. According to VDOT project cost estimates, if 2 lanes, on average, had to be reconstructed due to excessive and repeated flooding on the entire 27.18 miles the total would be approximately **$84 million in current dollars**. Similarily if 2.5 lanes, on average, had to be reconstructed the approximate total would be **$122 million in current dollars.** Although these figures represent worst case scenarios (complete or near-complete reconstruction of flood prone roadways) it is important to keep this climate change related possibility in mind for the long-range transportation planning process.

Potential TAZ Level Effects

Increased flooding due to global climate change will not only affect transportation safety and transportation maintenance costs due to flood prone roadways, it may also alter future population and employment predictions at the TAZ level. Residential and commercial structures within the flood plain may or may not be rebuilt after a catastrophic flood. The decision to rebuild will be affected by flood insurance program rules, local government zoning, and state health and safety regulations. Structures that are rebuilt after a catastrophic flood are often redesigned to either raise the entire structure above the flood plain or to place residential or office space above the first floor. Due to the multitude of health and safety regulations, insurance rules, and design considerations involved, it is impossible to forecast exactly how many residential or commercial structures will be rebuilt after a catastrophic flood. Instead, the methodology employed in this scenario seeks to establish a possible maximum population and employment loss due to a catastrophic flood on a TAZ by TAZ level. This maximum loss assumes 100% of affected structures being removed from the flood plain. Actual flood plain development loss will undoubtedly be below this maximum estimate.

This methodology uses aerial photography to visually inspect the number of land parcels and the structures on each parcel affected by the 100-year flood plain (Flood Elevation Certificates 2002) using GIS software. Once the number of structures is determined the following are used to determine maximum population and employment reductions per TAZ:

- 2.5 persons per single family housing unit
- multi-family housing unit based on visual inspection (24 persons default)
- employment based on visual inspection of building size and business type

The following map is an example of this, indicating affected parcels in the Town of Vinton.

Town of Vinton - TAZs outlined in yellow. 100 year flood plane (2002 Flood Insurance Certificates) displayed in light blue. Further detail on example TAZs follow on the next page.

Town of Vinton

Using TAZ 200 to demonstrate this methodology, GIS software yields the following results:

Number of Parcels Affected: 47

Number of Residential Structures Affected: 39 single-family and 8 multi-family

Number of Commercial Structures Affected: 8

Estimated Maximum Population Displacement: 290

Estimated Maximum Employment Displacement: 100

TAZ 200 - Town of Vinton, Virginia

The following table summarizes estimates for affected TAZs within the Town of Vinton.

TAZ	Parcels Affected	Residential Structures	Commercial Structures	Maximum Population Affected	Maximum Employment Affected
200	47	39 single, 8 multi	8	290	100
202	14	17 single, 5 multi	2	83	30
208	2	0	2	0	350

Affected TAZs in Town of Vinton - Visual Representation of Affected TAZs similar to TAZ 200 example available in a separate report.

City of Roanoke

TAZ 15 City of Roanoke

TAZ 78 City of Roanoke

Two of the affected TAZs in City of Roanoke. The table on the following page(s) summarizes all affected TAZs in City of Roanoke. Each affected TAZ has a similar aerial image that is available in a separate report.

City of Roanoke

TAZ	Residential Structures	Commercial Structures	Maximum Population Affected	Maximum Employment Affected	Notes
38	17	1	43	32	
89	12	0	95	0	
67	0	25% of total	0	273	
34	0	80% of total	0	960	NS facilities
31	62	3	155	45	
30	13	3	33	296	
27	74	100	185	100	
28	0	95% of total	0	95% of total	site design
4	0	95% of total	0	95% of total	site design
2	0	20% of total	0	20% of total	Downtown
32	20	10	50	300	
51	10	0	25	0	
49	33	3	83	20	
52	9	4	23	40	
53	14	0	35	0	
1	0	50% of total	0	50% of total	Coca-Cola
33	4	50% of total	10	440	
15	27	80% of total	68	357	
17	0	70% of total	0	500	
88	0	15% of total	0	173	
3	0	6	0	150	
7	45	4	113	75	
8	0	5	0	94	
10	74	27	185	638	
11	20	0	115	0	
70	10	0	25	0	
48	14	3	35	10	
75	31	10	515	559	
60	22	0	55	0	
62	4	3	80	50	
63	3	8	8	82	
78	115	21	390	181	
73	1	12	3	546	

City of Roanoke affected TAZs part I - Flooding issue in established areas such as "Downtown" or established industrial parks will likely be addressed by site and structural design and rehabilitation. These areas are indicated in the "notes" column.

TAZ	Residential Structures	Commercial Structures	Maximum Population Affected	Maximum Employment Affected	Notes
72	15	1	38	15	
71	19	0	48	0	
24	70	4	175	35	
25	16	4	40	30	

City of Roanoke affected TAZs part 2

City of Salem

TAZ	Residential Structures	Commercial Structures	Maximum Population Affected	Maximum Employment Affected	Notes
122	19	2	48	50	
108	19	11	48	321	
109	3	5	8	298	
110	139	4	348	30	
111	0	1	0	100	VA Hospital
112	0	5	0	611	
121	7	5	678	30	multi-family
116	83	15	268	204	
117	178	9	445	50	
115	0	70% of total	0	2944	
105	21	7	53	100	
107	14	6	35	378	
100	0	6	0	134	
101	0	6	0	67	
102	9	7	250	100	
124	15	0	38	0	
119	9	0	23	0	
118	30	37	75	375	
129	11	22	28	353	
120	5	5	13	302	
128	4	37	10	604	
126	42	7	105	84	
127	27	3	68	40	

City of Salem affected TAZs - Note: TAZ 121 has a series of affected multifamily structures, leading to a large maximum estimate of population affected.

Roanoke County

TAZ	Residential Structures	Commercial Structures	Maximum Population Affected	Maximum Employment Affected	Notes
321	2	10	5	285	
369	23	0	58	0	
367	34	0	85	0	
373	21	7	53	15	
333	28	3	70	10	
332	18	0	45	0	
339	6	7	30	60	
341	21	6	98	71	
344	7	3	18	37	
343	56	0	140	0	
300	10	1	25	10	
311	12	0	188	0	
315	25	0	63	0	
359	18	4	45	20	
310	5	6	13	92	
361	7	0	18	0	
362	19	1	48	0	
366	11	2	28	42	
320	21	1	53	66	

Roanoke County affected TAZs

Botetourt County

TAZ	Residential Structures	Commercial Structures	Maximum Population Affected	Maximum Employment Affected	Notes
401	0	5	0	118	

Botetourt County affected TAZs

TAZ 401 - Botetourt County

Fuel and Energy Prices

High Fuel Prices

This scenario briefly discusses the possible ramifications of fuel prices remaining relatively high in the mid and long term. The East-West Gateway Council of Governments (Gateway COG) serving the St. Louis metropolitan region, recently completed research into the effects of sustained fuel prices and Vehicle Miles Traveled (VMT.) The Gateway COG presented their research at the 2008 Association of Metropolitan Planning Organizations conference in Seattle, Washington. The main findings from this research, which employed a national data source, are as follows:

	1 Year	5 Year
Total VMT	1.1%	3.9%
Rural Other	1.7%	5.6%
Rural Arterial	1.5%	5.2%
Rural Interstate	1.2%	3.5%
Urban Other	1.4%	3.6%
Urban Arterial	1.0%	3.6%
Urban Interstate	0.8%	3.4%

"Trends in Regional Traffic Volumes: Signs of Change?" October 29, 2008 - AMPO Annual Meeting, Seattle, Washington

The figure above indicates that if gasoline prices rise 10% and stay at that price for one year, it is predicted that VMT will be reduced by 1.1% from the level before the rise in price. Likewise, if gasoline prices rise 10% and stay at that level for five years, the VMT will be reduced by 3.9% from the original level. The research does not indicate whether the reductions in VMT are a result of mode shifting (carpool, vanpool, transit or bicycle) or if they represent trips that are foregone. It is likely that some of the trips are foregone and others are shifted to another transportation mode. Of course, if fuel prices experience a greater than 10% rise, the reductions in VMT are likely to be larger than those previously cited. One cannot simply assume the reductions in VMT to be simple linear projection from the 10% figures. At different price levels, different relationships between fuel prices and VMT reduction may result, but any sustained average increase in fuel prices should increase demand for bicycle, carpool, and transit modes of transportation. Many of the strategies presented in the Baby Boom Retirement scenarios would be applicable under a higher (inflation adjusted) average future fuel price. In fact, the presenters from East-West Gateway COG related the age of the population with annual miles driven in the United States.

Age of the Population

Annual Miles Driven, US

Age of Driver	Annual Miles
0-15	353
16-19	6,638
20-24	13,982
25-29	15,902
30-34	16,265
35-39	16,309
40-44	15,817
45-49	15,674
50-54	14,733
55-59	13,753
60-64	12,124
65+	8,223

Source: National Household Travel Survey, 2001

"Trends in Regional Traffic Volumes: Signs of Change?" October 29, 2008 - AMPO Annual Meeting, Seattle, Washington

The above chart indicates that on average, drivers 65 or older only drive around 8,223 miles per year compared to 16,309 per year for drivers in the 35 to 39 year old age range.

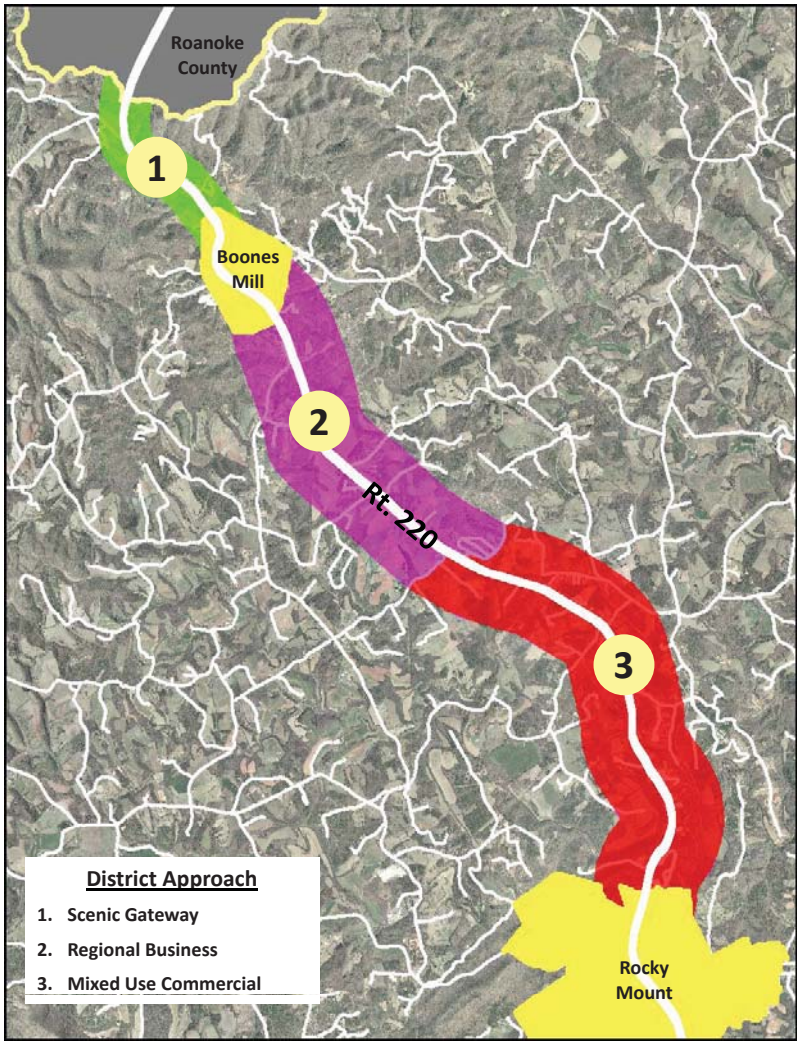
As with the fuel price results, the research does not indicate if the reduction in annual mileage for the 65 and over age range is primarily from shifting to transit or if the trips are simply foregone altogether. In any case, a scenario of both higher fuel prices and an aging population would indicate reduced average VMT during the time horizon of this plan and an increased demand for the transit, carpool, and car sharing strategies mentioned in the Baby Boom Retirement scenario.

Water and Sewer Service Expansion

Franklin County

The Western Virginia Water Authority plans to extend a 12-inch water line from southern Roanoke County deep into neighboring Franklin County. The current RVAMPO study area boundary ends at the Roanoke County/Franklin County border in the US 220 Corridor. The extension of the water line may enable development in Franklin County that would necessitate inclusion in future RVAMPO transportation planning. Fortunately, Franklin County has been pro-active in planning for the water line extension. A map of proposed overlay districts to correspond with the water line extension follows:

Fig. 2 220-North Corridor Plan: District Approach

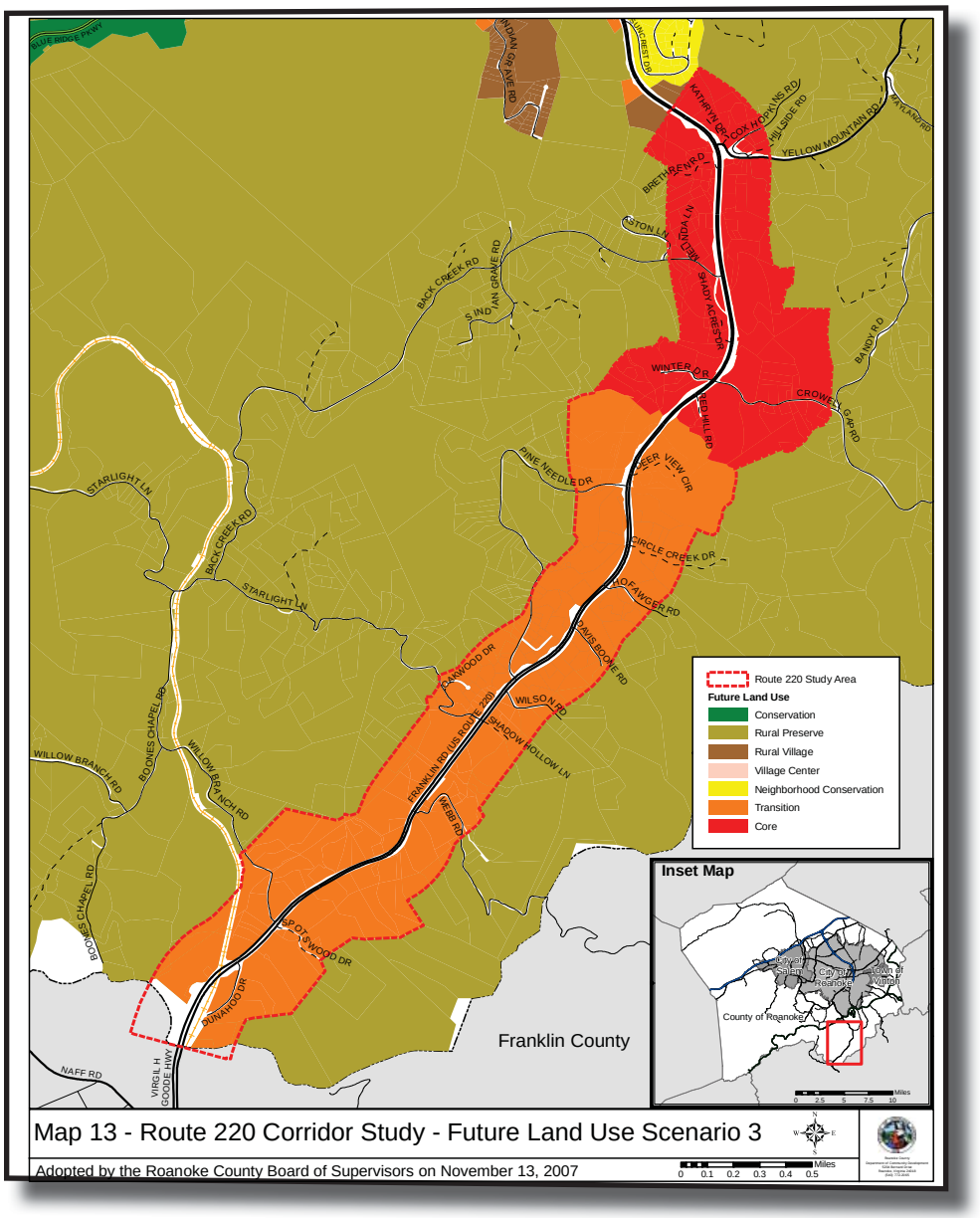


220-North Corridor Plan 5 DRAFT 01.27.2009

The Scenic Gateway, the district closest to the RVAMPO 2035 study area, calls for a preservation of the current scenic character of the corridor and consequently allows for lower levels of development than the other districts. The Regional Business and Mixed Use Commercial districts allow for more commercial development in the corridor south of the Town of Boones Mill to the Town of Rocky Mount.

It is difficult to predict if the development resulting from the water line extension in the Regional Business and Mixed Use Commercial districts will be enough to extend the RVAMPO Urban Area Boundary into Franklin County, but it is a possibility despite the fact that the district which allows the least development is closest to the current RVAMPO boundary.

Likewise, Roanoke County developed a draft study for the US 220 Corridor (see map).



The Roanoke County Future Land Use map classifies the majority of this corridor as "Transition." The definition of Transition is as follows: A future land use area that encourages the orderly development of highway frontage *parcels. Transition areas generally serve as developed buffers between highways and nearby or adjacent lower intensity development. Intense retail and highway oriented commercial uses are discouraged in transition areas, which are more suitable for office, institutional and small-scale, coordinated retail uses.* It remains to be seen if future comprehensive plans for either county maintain low density land uses once the water line has been constructed.

TDM and Public Transit 7

Transportation Demand Management, or TDM, is an increasingly important tool to address worsening traffic congestion, increasing travel times and parking demands, and air quality issues in the region. The main focus of TDM is to move the public away from trips made by automobiles and Single Occupant Vehicles (SOVs) and toward bicycling, walking, telecommuting, carpooling, vanpooling, or public transit.

In a period when revenues that support the maintenance and expansion of traditional transportation infrastructure are shrinking, TDM offers a compelling alternative because it allows for the movement of the same number of people in a more efficient manner without new infrastructure demands. Further, it serves as an attractive option for commuters looking to cut their transportation costs by allowing them to share costs with other commuters. TDM provides both a viable transportation improvement strategy for a growing region, as well as a valuable public service.

At its core, TDM is a marketing and educational endeavor, but successful implementation of a TDM program requires:

- some basic infrastructure elements (such as park-and-rides)
- incentives (such as HOV lanes)
- disincentives (such as the reduction or limitation of free parking).

Benefits of TDM

TDM has been shown to help areas deal with congestion mitigation, air quality/environmental improvement, and mobility/transportation choices. Though each of these has a role to play in the Roanoke region, the two primary drivers for the RIDE Solutions program have been air quality improvement and the desire to offer transportation options to commuters in the region.

Air quality is measured by the Ozone Early Action Plan (EAP) through the Environmental Protection Agency. In 2003 the Roanoke region was at risk of receiving a noncompliance designation, but the Ozone EAP allowed the region to take steps to reduce ozone over the next five years. Local governments enacted such measures as moving to biodiesel in vehicle fleets and burning bans, but mode shift away from single-occupant vehicles to cleaner, less-polluting alternatives became a key component of the effort. The successful implementation of these strategies led to the Roanoke area reaching ozone compliance in March of 2008, and the continuing growth of these efforts will be key to remaining in compliance.

Another important benefit of TDM is increased commuting options, especially in regions of diverse geography, varying commuting distances, and limited transit options such as the Roanoke Valley, Blacksburg, and the surrounding communities. The transit agencies serving the region have limited penetration in the non-metropolitan areas. Blacksburg Transit serves the Town of Blacksburg and Virginia Tech, with limited service to Christiansburg and no service to outside areas such as Radford or south Christiansburg. Pulaski Area Transit is a non-fixed-route service supporting the Pulaski County area. The Greater Roanoke Transit Company (GRTC) offers regular bus service within the City of Roanoke, limited connection to the City of Salem and the Town of Vinton, and no service into Roanoke County. GRTC also offers a commuter bus, Smart Way, between the Roanoke and New River Valleys that has grown increasingly popular since March of 2008 when gas prices soared.

Many commuters in the region travel long distances to the urban employment centers in Roanoke and Blacksburg. Roanoke regularly draws commuters from all over Franklin and Bedford Counties, particularly as the Smith Mountain Lake area has seen incredible development and growth. Virginia Tech aided in the launch of RIDE Solutions service in the New River Valley because it draws employees from as far away as West Virginia and other communities further southwest in Virginia. Many commuters have regular one-way trips of 35 miles or more. With limited or no transit options, carpool facilitation with RIDE Solutions is often the only viable option. Roanoke serves as the headquarters for the region's largest employer, Carilion Clinic, with 11,000 employees from across both the Roanoke and New River Valleys. Carilion is in the process of building a new clinic, a medical school (in cooperation with Virginia Tech), and a biomedical research facility near downtown Roanoke. It also plans to redevelop a brownfield. A 1,600 space parking garage was built to support these new developments, which will create additional congestion and parking demand in an already busy Downtown Roanoke Jefferson Street Corridor and along the 581/Route 220 corridor.

What Constitutes a TDM Activity or Accommodation?

The menu of TDM activities is both broad and flexible in order to provide the greatest number of strategies, but this flexibility can lead to confusion over what constitutes a TDM activity.

TDM's focus is to increase the efficiency of existing systems by reducing Vehicle Miles Traveled (VMT) through mode shift or moving vehicle trips into higher-occupancy and non-motorized modes. TDM activities and accommodations include:

- Marketing or outreach efforts that encourage commuters to move to carpools, vanpools, transit, biking, walking, or telecommuting
- Parking buyouts or reducing free parking
- Commuter Choice tax benefits for transit, vanpooling, or bicycling subsidies
- Commuter Choice tax benefits for parking subsidies only if used as an incentive for carpooling or vanpooling
- Bicycle accommodations such as bike lanes, wide shoulders, shared-used paths, and bike trails
- Bicycle traffic control devices such as sharrows
- Sidewalks and greenways
- Public park-and-ride lots
- Private park-and-ride lots such as those made through informal arrangements by carpool participants, or those dedicated to commuters through leasing or other arrangement between the TDM agency and private owner
- High-Occupancy Vehicle (HOV) lanes
- Transit service, particularly express commuters buses or bus rapid transit service
- Car sharing, either through local nonprofit efforts or with a for-profit service such as Zipcar, to provide access to a vehicle during the day for those who carpool or use transit to get to work
- Zoning policies that reduce the number of required parking spaces for new development
- Carpool matching services

Such activities may be undertaken by the TDM agency itself, by local governments, by private businesses, or by any combination thereof. In fact, a TDM agency's main activities are education and advocacy to encourage organizations to take on TDM efforts on their own.

TDM Partners

Local Governments

TDM programs work with local governments and the private sector to provide best practice strategies for promoting or marketing TDM services. These include accommodations such as bike lanes, as well as data collection and reporting to measure the effectiveness of TDM efforts. Public awareness of transportation options can lead commuters to use agency services (such as a carpool database) or to pursue similar activities on their own. Therefore, TDM effectiveness is often measured both in the number of commuters registered with a TDM agency and transportation mode shifts over time. These shifts are measured by census or American Community Survey data, and the Commonwealth of Virginia also deploys an annual State of the Commute survey that measures mode split specifically for the work commute.

RIDE Solutions: The Region's TDM Services Provider

Established in a cooperative effort between RVARC and the New River Valley Planning District Commission, RIDE Solutions is the regional TDM agency for the Roanoke and New River Valley regions of Southwest Virginia. RIDE Solutions has been housed within RVARC since its inception in 2001. In 2006, an agreement was made to offer ridematching services in the New River Valley region. RIDE Solutions is funded primarily by VDRPT's Commuter Assistance grant with matching funds coming from each PDC and additional financial support from Virginia Tech. Current staff consists of a Program Director at RVARC, whose responsibilities include: general marketing, branding, and awareness campaigns; all technical work (including web site development, ridematching, database maintenance); and employer outreach efforts within the Roanoke Valley region. An Employer Outreach Coordinator is staffed part-time out of the New River Valley Planning District Commission and works exclusively with New River Valley businesses and professional organizations to establish employer programs and build program awareness.

Defined by the boundaries of its parent Planning District Commissions, the area serviced by RIDE Solutions is primarily rural with two urban centers (RVAMPO and the Blacksburg-Christiansburg-Montgomery Area MPO). Commuting between the two regions accounts for a significant number of daily trips up and down the congested I-81 corridor, a major freight route. Trucks and other traffic along this corridor will likely increase with the installation of an intermodal center in Elliston and the expansion of Virginia Tech's Corporate Research Center in Blacksburg.

RIDE Solutions has seen tremendous growth since its inception, particularly during the spring and summer of 2008 -- when gas prices skyrocketed. During that period, RIDE Solutions saw its database of carpoolers, bicyclists, transit users, and pedestrian commuters swell by nearly 300% (see chart below.)

RIDE Solutions Database growth, 11/2006 through 01/2009.

The spike in registrations starting in June of 2008 corresponds both to sustained increases in gas prices as well as the launch of a Workplace program with Carilion Clinic at the end of May.

Registration rates began to level in October, though growth remained steady.

During the same period, RIDE Solutions also established or renewed partnerships with a number of Workplace partners, including the largest employers in the region - Carilion Clinic and Virginia Tech. In all, RIDE Solutions served over 40,000 employees of the Roanoke and New River Valleys through its Workplace partnerships.

RIDE Solutions was involved with air quality mitigation efforts, and as a result became recognized as a leader in the field of sustainable transportation in the region. Many localities are becoming increasingly interested in, or have already undertaken steps towards, policies that address local contributions to climate change. Blacksburg is seeking designation from the Sierra Club's Cool Cities program, and Blacksburg's Mayor Ron Rordam serves on the Governor's Climate Change Committee. The Roanoke Valley Cool Cities Coalition, of which RIDE Solutions is an affiliate, has worked to get Roanoke City, Roanoke County, and the City of Salem to measure their carbon footprints via the ICLEI process and is developing strategies to bring down overall greenhouse gas emissions.

In all of these efforts, a regional approach will be necessary to reduce emissions generated by vehicles, and RIDE Solutions will continue to be a major player in implementing regional trip reduction programs.

TDM vs TSM

Transportation Supply Management
Some confusion exists when distinguishing between Transportation Demand Management and Transportation Supply Management (TSM). While
TSM's focus is to increase the efficiency of existing systems by reducing vehicle travel time through congestion mitigation efforts, though not necessarily by reducing the number of cars on the road.

TSM activities include:

- Signal timing coordination to move traffic more quickly down specific congested corridors
- Access management provisions to reduce conflict caused by vehicles entering and exiting roadways
- Connectivity enhancements such as the reduction of cul-de-sacs and the addition of neighborhood connections to each other and to the primary road systems
- Intelligent Transportation System products such as multi-directional lanes and variable message signs
- Information resources for route planning such as the Virginia 511 website and phone number

Activities under TSM are generally undertaken by local or state governments and often involve infrastructure enhancements that might be included in new construction or maintenance projects.

The basic difference between the TDM and TSM comes down to activities or accommodations that influence either driver mode choice or traffic flow. In other words, TDM can be considered a function of driver behavior, while TSM is a product of engineering.

Measuring the Effectiveness of TDM

The most common effectiveness measures for TDM agencies are mode shift and VMT. The goal of a TDM program is to move people either to a higher occupancy vehicle or out of an automobile altogether through a combination of activities which promote the benefits of TDM activities to individual commuters. These activities generally emphasize cost-savings associated with both ridesharing and transit use or the health benefits of bicycling and walking.

Mode shift measures a TDM program's *public awareness* and *effectiveness* by recording changes in individual commuter behavior (i.e., how many commuters shifted out of single-occupancy vehicles into HOV mode) and indicates how successful the program has been in getting commuters to change their behavior.

VMT measures the reduction in the actual number of vehicle miles traveled. For example, two commuters driving separate cars 10 miles each day would have a total VMT of 20 miles. If those commuters carpool, their VMT is reduced to 10 miles.

VMT is generally an aggregate measure of all or part of a transportation network, but can also be effective when looking at individual commuters. Two commuters who begin carpooling together each reduce their VMT by half; two commuters who begin using transit drop their VMT to zero. VMT measures a program's actual *impact*.

To illustrate the difference between the mode shift and VMT, consider the following scenarios: imagine a TDM program that succeeds in bringing broad awareness to the suburbs immediately surrounding a central business district. Consequently, 10% of the area's 20,000 commuters shift to transit. The mode shift in this case would be admirable -- 2,000 commuters are now in an HOV mode. Even the individual VMT impact would be impressive. Those 2,000 commuters all reduced their individual VMT to zero. If each of those commuters were driving 4 miles round trip to the central business district, the aggregate VMT impact is 8,000 miles a day.

Compare that to a TDM program that concentrates its efforts on commuters traveling to a major university 35 miles away. Marketing to its 7,000 employees results in a 4% mode shift to carpooling, for a total mode shift of 280 commuters. The total number of participants is small, and each carpooler has only reduced their effective VMT by half. However, because each commuter is traveling a much longer distance - 35 miles one way - the total VMT has actually been reduced by 9,800 miles a day, a 22.5% improvement over the previous example. In this case, the TDM program has had a much larger impact by concentrating on a much smaller audience with a larger base VMT.

By making assumptions about average fuel economy, vehicle type, driver speed, and other factors, VMT can be used to calculate other impacts such as congestion mitigation, air quality improvement, mobility, providing a public service, or reducing a region's carbon footprint.

The Commonwealth of Virginia provides financial support for local TDM activities through the VDRPT Commuter Assistance grant program using a 20% local match. VDRPT encourages local TDM programs to diversify funding sources to include partnerships with the private sector, grants from outside foundations or non-profits, and programmed funds through RVAMPO's constrained long-range planning process. Future funding for TDM activities will, of necessity, concentrate on local support from these diverse sources or run the risk of their state-level funds being reduced or their ability to grow being severely constrained.

The 2005 SAFETEA-LU provides explicit policy statements allowing federal transportation funds to be programmed to support non-motorized transportation activities. It includes references to "pedestrian walkways and bicycle transportation facilities" in the scope of planning work and states explicitly that whenever possible no new projects should remove existing facilities unless alternative accommodations are provided for. Importantly, "transportation plans and projects" require "contiguous routes for bicycles and pedestrians" (23 U.S.C. 217(g)(2)). Connectivity of pedestrian and bicycle accommodations are particularly important for a successful non-motorized transportation network, as significant gaps can create safety concerns that reduce the effectiveness of existing facilities.

Funding TDM Programs

In addition to the federal policy, VDOT's Bicycle and Pedestrian Accommodation Policy allows primary and urban system funds to be used in the creation of bicycle lanes, wide shoulders, off-road trails, shared-used paths, and projects related to any of these things. In fact, VDOT is required to set aside 2% of its paving budget to be used for the creation of bicycle accommodations. To date, RVAMPO has not actively directed set aside funds in this manner. Further, projects like park-and-ride lot creation or expansion can be programmed through the TIP.

RVAMPO has included TDM accommodations in the planning process through its "Bikeway Plan for the Roanoke Valley Area MPO," the "Rural Bikeway Plans," the "Conceptual Greenway Plan," and related planning projects. The next step for RVAMPO is to actively pursue implementation of the recommendations developed in these plans through vigorous use of VDOT paving and maintenance funds and by adding TDM-related efforts to the list of constrained projects. In addition, if RVAMPO is designated as a Transportation Management Area (TMA) after the 2010 census, under current SAFETEA-LU regulations additional funds could be allocated for TDM activities through the TMA's Congestion Management Process.

TDM Priorities in the Roanoke Valley

A detailed list of priority TDM projects for the region is contained in the Long Range TDM Plan. When completed, the Long Range TDM Plan should be considered for integration into CLRPT 2035. However, some improvements are needed in the region to lay the foundation for a stronger TDM program. Detailing these priorities, as well as a handful of long-range national trends that will no doubt reach the Roanoke area, can provide insight into their connections with the broader transportation goals.

Increase Park-and-Ride Capacity: Because of the region's rural character, park-and-ride lots are an important TDM tool to connect long-distance commuters to each other. Commuters are generally more willing to connect with other carpoolers if there is a convenient place to leave their car during the day, and park-and-ride lots offer that amenity. Park-and-rides also collect vehicles at traffic pinch points and therefore alleviate congestion on major roads. Most formal park-and-ride lots in the greater Roanoke region are located along major highways such as I-81 and Route 220.

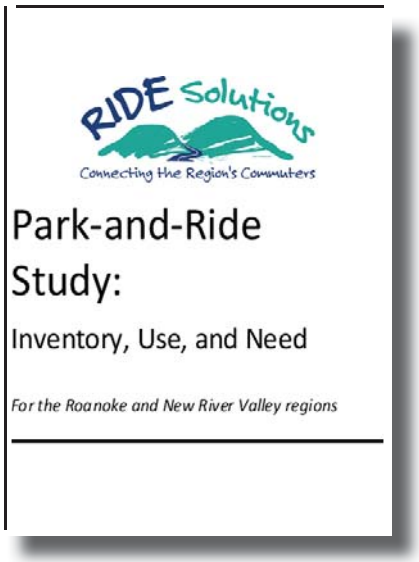
However, informal park-and-ride locations within the urban area can also be beneficial. As there are no formal park-and-ride accommodations for urban commuters, informal lots have met this demand. The known informal lots are primarily at shopping centers, such as the one at Gander Mountain parking lot on north Plantation Road in Roanoke County. Sometimes the lots are associated with existing transit stops, such as the Tanglewood Mall parking lot. In these cases, collecting information on usage is difficult, since the use of the lots as park-and-rides is not sanctioned or is outright banned by the private lot owners. This creates difficulties when matching commuters, as it would be inappropriate for a TDM agency to encourage the use of such lots. They are used nonetheless, suggesting that a more formalized approach to urban park-and-rides is needed, and Valley Metro's Transit Development Plan (TDP) includes the development of park-and-rides within its service area as goal 4.2 in its *Goals, Objectives, and Standards*.

Existing park-and-ride lots in the Roanoke region are either at or over capacity and have been for several years. Of particular concern are the VDOT lots at I-81 exits 150 and 140, which suffer from significant overcrowding. This has been particularly acute at the exit 140 lot, which also serves as a Smart Way bus stop. Gas price spikes in 2008 caused a significant increase in both transit ridership and carpooling, and consequently caused demand for this lot to outpace its capacity and other regional park-and-rides.

Where additional right-of-way cannot be purchased to expand existing lots, VDOT and localities (in coordination with RIDE Solutions) should consider the creation of overflow lots at the next closest highway interchange or through leasing arrangements with private retail lot owners. To improve transit accommodations, bus shelters should be installed at both the exit 140 lot and the Falling Branch Park-and-Ride in Christiansburg.

Other major corridors leading into the Roanoke metro area should also be examined for possible park-and-ride lots. Route 419 in Salem at I-81 should be considered not only for a park-and-ride lot, but also as a connector transit service to Valley Metro. Both Route 220 south near Boones Mill and 221 South near Bent Mountain provide ride share opportunities if safe park-and-ride options were available.

In situations where the spot best suited for a park-and-ride lot is not available for purchase, either because funding isn't available or the land is privately held, every attempt should be made to arrange for informal park-and-ride availability through leasing agreements or other formal arrangements between RIDE Solutions and a private party such as a church or shopping center. In the Roanoke region, churches are especially likely candidates for informal park-and-ride arrangements due to their prevalence, proximity to major corridors, and operational hours that leave much of their parking capacity open during the work week. An update of the 2005 Park-and-Ride Study completed by RIDE Solutions will address the capacity issues facing the region and offer suggestions both for informal lot locations as well as a list of best-practice recommendations for leasing or sharing arrangements.



The 2009 Park-and-Ride study updates the Park-and-Ride inventory and conditions in the Roanoke and New River Valleys and recommends improvements in key areas.

RIDE Solutions recommends expanding, or creating supplemental capacity for, the exit 140 and 150 park-and-ride lots and the construction of bus shelters at exit 140 and Falling Branch within the next 12 months. Within the next 12 to 18 months, RIDE Solutions recommends creating additional park-and-ride lots either through the purchase of land by VDOT or the leasing of parking surplus from a private enterprise for routes 419 at I-81, 221 South between Bent Mountain and Back Creek, 220 South at Boones Mill, and route 460 near Bedford.

Implement Car Sharing: One often-cited barrier to the use of alternative transportation has been the need for access to a vehicle during the day or for emergencies. RIDE Solutions addressed this through its Guaranteed Ride Home program, which pays for up to four taxi rides a year for commuters who are registered in the ride share database and who use an alternative mode at least twice a week.

Another way to address this barrier could be through car sharing. Car sharing is essentially short-term vehicle rental. Users pay a monthly or annual subscription fee to gain access to a fleet of vehicles, generally parked in strategic areas in a central business district or other destination locations.

Through their subscription, users have the ability to reserve a vehicle, generally paying some additional usage cost such as refueling. All maintenance, insurance, and other costs are handled through the service provider. Local government plays a role in promoting car sharing by providing dedicated parking spaces and signage for car share locations. Local government can also allow exceptions to parking regulations that would allow developers to reduce the number of required parking spaces in exchange for offering car sharing.

There are several methods by which a car share program can be organized and managed. A grass roots nonprofit arrangement has been successful in many areas of the country including San Francisco, Philadelphia, and Ithaca, NY. Car sharing can also be provided through smaller, informal efforts, often by a collectively formed, well-defined neighborhood or other group. In addition, there is a national for-profit car sharing service, Zipcar, which has seen significant growth since its inception.

Car share programs such as the City of Boulder's provide an incentive for the use of alternative commuting options.

RIDE Solutions recommends pursuing the implementation of car share service in the Roanoke region. A feasibility study completed by RIDE Solutions in FY2010 recommends concentrating on the downtown core and Hollins University and partnerting with a business or local government to swap out fleet vehicles with carshare membersips,

Increase Bike and Pedestrian Accommodations for Elderly Mobility: Providing safe bicycle and pedestrian accommodations continues to be a TDM priority in the Roanoke valley. Bicycling and walking are not only the cleanest, most environmentally friendly transportation modes, they also provide options to improve physical fitness and public health, and they contribute to a more sustainable community by emphasizing non-motorized transportation and greenspaces.

In general, the primary drivers for the inclusion of bicycle and pedestrian accommodations have been transportation equity, availability of transportation options, environmental preservation, and recreation. In the Roanoke region, recreation has been the dominant driver, with environmental preservation growing in popularity recently. However, as our population ages, transportation options may become increasingly important, and bicycle and pedestrian accommodations may need to

expand to include nontraditional vehicles such as golf carts and mobility scooters.

For the Roanoke region, whose population growth has remained flat for the past several years, the aging of the baby boom generation will put enormous pressure on its transportation and health care systems. More than in previous generations, Baby Boomers are likely to value their independence, meaning many will choose to age in place, i.e., remaining in their own homes, opting out of retirement and nursing homes, and taking advantage of home health care and traveling nurses. Similarly, many will be loathe to have their mobility reduced even as their ability to drive safely becomes impaired. For some, the inflexibility of public transit schedules and routes may become a barrier. For them, moving to alternative vehicles may be their best option. In addition, persons with disabilities and those struggling with obesity may turn to scooters, Segways, and similar vehicles to increase their mobility options.

RIDE Solutions recommends that RVAMPO plan for the increased use of these vehicles. This includes determining whether existing bike and pedestrian accommodations – particularly bike lanes, bike routes, sidewalks, and shared-used paths – can double as lanes for scooters and Segways and whether implementation of existing bikeway and pedestrian planning – particularly existing vision list projects – will not only contribute to mode shift now, but will lay the foundation for accommodations for mobility devices.

Increase Transit Service Capacity: While broader issues of transit service expansion are beyond the scope of this section, RIDE Solutions recommends immediate attention to the gaps in transit service created by jurisdictional boundaries. Some of the areas of particular concern are:

- Route 419 corridor at Tanglewood Mall
- Brambleton Avenue
- Shenandoah Avenue and Main Street in Salem

Significant service gaps are created by the termination of existing routes and what might be considered natural stops (such as the Cave Spring Corner shopping plaza on Brambleton Avenue, a mile from the terminal of the route) or by jurisdictional boundaries. Existing stops at intersections along 419 should be considered the hubs of connecting service along the corridor.

In addition, service issues for paratransit should be reviewed and addressed as soon as possible. RVAMPO and VDOT have undertaken a corridor study of Route 419/ Electric Road addressing this issue. The draft of that study suggests the creation of transit service connecting Tanglewood Mall with the Exit 140 Smart Way stop, with park-and-rides at the intersection of 419 and Brambleton Avenue, as well as the in-

tersections of Braeburn Drive and Electric Road, Roanoke Boulevard and Electric Road, Main Street and Electric Road in Salem, and Green Ridge Road and Electric in Roanoke County. The park-and-rides would provide direct access to the proposed transit service as well as provide carpool meeting locations for those traveling into Downtown Roanoke, which could reduce traffic congestion along a few key corridors.

RIDE Solutions recommends RVAMPO take a leadership role in this. Lacking the presence of a regional transportation authority, RVAMPO has the best opportunity to deal with issues of jurisdictional boundaries and funding limitations. Transit service in the Roanoke Valley will best reach its potential as a public service if its routes are driven by user need and trip paths rather than by artificial boundaries.

Grow RIDE Solutions' Promotional Capacity: As a program driven by public awareness and outreach efforts, RIDE Solutions' success is directly related to its ability to market itself. To date, the program has seen great success with low- or no-cost promotional efforts such as online social networking and a successful public relations campaign; however these efforts have primarily appealed to market segments that are naturally inclined towards behavior change/mode shift and for whom a simple awareness effort is sufficient. This might include the growing number of people concerned with their environmental impact, or long-distance commuters actively searching for a way to cut their commute costs. As current promotional efforts saturate these niche markets, the need for more mass-media efforts, creative online promotions, incentives, and other tools will be required. Long-term, high visibility branding campaigns will need to be put into place and maintained so that RIDE Solutions is always top-of-mind when commuters are ready for a change, even if they aren't prepared for mode shift initially.

The City of Roanoke's central business district is the region's primary employment destination. This will grow as the Riverside Park medical complex nears completion and development along the Jefferson Street corridor adds additional destinations within a mile radius of downtown. Therefore, it is certainly in RVAMPO's best interest to invest now in branding and awareness efforts that will slow the growth of transportation demand in this area, and will position RIDE Solutions to spend its resources encouraging commuters to keep vehicles off the road, rather than attempting to build awareness as a reaction to growing congestion after the damage has been done.

In a similar vein, RIDE Solutions and its TDM strategies set the foundation for local governments to quickly react to volatile shifts in gas prices. By investing in awareness campaigns now and continuing to grow promotional capacity, public awareness and brand-recognition of RIDE Solutions' services, they will be high enough that commuters will know exactly how we are able to help them.

RIDE Solutions recommends that the local match necessary for its operations continues to grow at a rate of at least 5% per year.

Transit

Transit services are provided in the Roanoke region by the Greater Roanoke Transit Company (GRTC), which operates not only the fixed-route Valley Metro service and the Smart Way commuter bus between the Roanoke and New River valleys, but also limited-schedule shuttle service to Roanoke College, Ferrum College, and Hollins University. GRTC operates a fleet of thirty-eight Valley Metro buses and five Smart Way buses. In addition, GRTC has four Star Line trollies along the Jefferson Street corridor between the Downtown Roanoke market and Carilion Roanoke Memorial Hospital.

RADAR provides paratransit service to both Roanoke City and Roanoke County and also operates fixed-route transit service in Alleghany County.

Valley Metro operates an average of 1.6 million revenue miles per year. In 2007, this represented 2.2 million passengers. For 2008, Valley Metro saw a 10% increase in ridership, while the Smart Way bus saw a 20% increase. These ridership levels have been maintained even as gas prices dropped in the last quarter of 2008 in reaction to a softening economy nationwide.

Year	Passenger Trips		O&M Costs		O&M/Pass Trip	
	MB	DR	MB	DR	MB	DR
2003	1,913,318	35,225	$ 4,661,638	$ 539,491	$ 0.41	$ 0.07
2004	1,887,571	38,410	$ 4,985,780	$ 623,201	$ 0.38	$ 0.06
2005	1,923,317	41,959	$ 5,534,724	$ 723,998	$ 0.35	$ 0.06
2006	2,023,169	45,048	$ 5,987,860	$ 796,158	$ 0.34	$ 0.06
2007	2,143,146	46,085	$ 6,187,868	$ 889,210	$ 0.35	$ 0.05

These are ridership numbers as reported in the Valley Metro (Greater Roanoke Transit Company) Transit Development Plan, 2010-2015, and show an increase in total passenger trips as well as a reduction in operations and maintenance cost per trip, indicating that the growth of paying passengers has increased along with the growth of free riders, such as student and Star Line Trolley users.

The result of on-board surveys completed for the Transit Development Plan (TDP) reveals the profile of a Valley Metro rider as a transit-dependent user.

The typical Valley Metro rider (including Star Line riders):

- Is female
- Is over 30 years old
- Is Caucasian
- Is at least a High School graduate
- Has $20,000 annual household income for fixed-route service, $50,000 annual household income for Star Line service.

To provide the broadest range of transportation alternatives and mobility options to the region, transit service will need to become an even more important part of the long-range planning process. For many reasons, transit service and other TDM strategies are well positioned to meet this need. They are able to react quickly to changing conditions in the transportation network, whether driven by spikes in commuter costs, reductions in road transportation service through cancelled or delayed projects, or even short-term congestion issues caused by construction and other projects. Routes can be changed quickly, and buses added or subtracted from service, to meet changing demands. In addition, transit provides a valuable tool for both economic and transportation equity by supplying transportation alternatives to citizens who, by choice or hardship, do not have access to a vehicle. It will also be an important component in the ongoing efforts to improve air quality measures and address ozone and particulate matter pollution.

Since funding of transit service in the region is done through formula grants requiring local matching funds, localities need to financially support the growth of Valley Metro to meet ridership and public service demands.

Like the Long-Range Transportation Demand Management Plan, Virginia Transit agencies are required to create a Transit Development Plan that will guide the growth of transit service over the next 10 years. This document guides the growth of existing service and the addition of new service through careful analysis of demographic and economic trends in the Valley.

The proliferation of new technologies -- including GPS-enabled mobile devices, 3G and 4G cellular networks, WiFi access, and application-enabled mobile devices like iPhone and Google Android -- affords users an ever increasing amount of information at their fingertips in an instant. Mobile devices that were once segregated by function (a user might carry a laptop, a cell phone, an MP3 player, and a Palm Pilot) have been integrated into single devices that are faster, more versatile, and more powerful than their predecessors. Many believe that these devices make driving in one's own car not only safer and easier, but more fun.

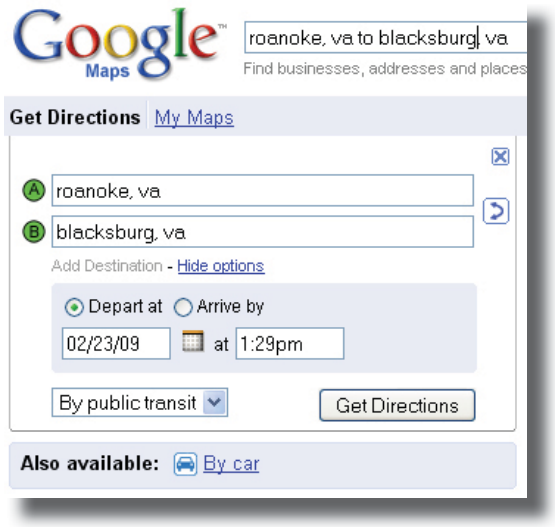
For transit service to compete against single-occupant vehicle travel among choice riders, it must provide trip planning tools as well as real-time, on-demand information to users about route delays, bus locations, route deviations, and other news and services. Mobile devices with web access can already be used to browse an agency's website for some of this information, but agencies will need to provide more, better, and faster information that takes advantage of the full features of their customers' technology. Unfortunately, the expense associated with GPS technologies (such as Automatic Vehicle Locators) can be cost prohibitive for smaller regional systems like Valley Metro. Fortunately, the information is increasingly available for free. In particular, two recent technologies, Google Transit and Google Latitude, have paved the way for a vast amount of information to be offered with little or no investment. Even social networking services can provide valuable free information.

Google Transit

Launched in June 2007, Google Transit integrates bus stop and route travel time

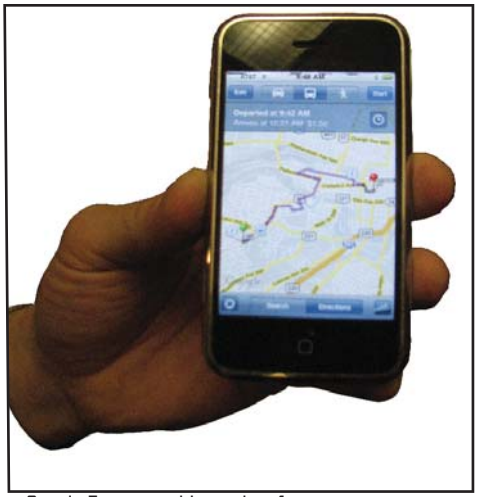
Online Transit Tools

data into its existing Google Maps driving directions tool. In some areas, walking routes are also available. Google identifies the closest bus stop and times, provides walking directions to that stop, and provides information for all pertinent transfers. Google also provides total trip time.



Unlike Google Maps, Google Transit requires the participation of local transit agencies and their partners to provide and update route and schedule information. This is generally done by uploading the necessary files onto a local server with scheduled, regular visits from a Google robot to update the data on their end. There is no cost to participate except that which is incurred in formatting route data to Google's specifications, and even this can be done relatively easily with interns and volunteers.

Google Transit can be accessed via computer or mobile device at http://transit.google.com, and transit directions are offered as an option when searching for driving directions from http://maps.google.com. In addition, other websites can embed links into their sites that access Google Transit. Valley Metro did this on its website, as has RIDE Solutions on the Transit section of the website http://www.ridesolutions.org. This provides both users and developers a number of convenient ways to embed transit information in trip planning tools.



Google Transit and Latitude information can easily be accessed through new mobile devices such as the iPhone.

In 2008, the Commonwealth of Virginia partnered with Google to have all major fixed-route transit services in the state available through Google Transit. As of March of 2009, Virginia surpassed even California in total number of transit route maps available online – 21 compared to California's 17. In the Roanoke region, this has created a multi-jurisdictional trip planning tool that can map a route from the City of Roanoke to the Town of Blacksburg entirely by transit. With this foundation laid, Valley Metro and the region in general should make education and promotion of this valuable tool a priority.

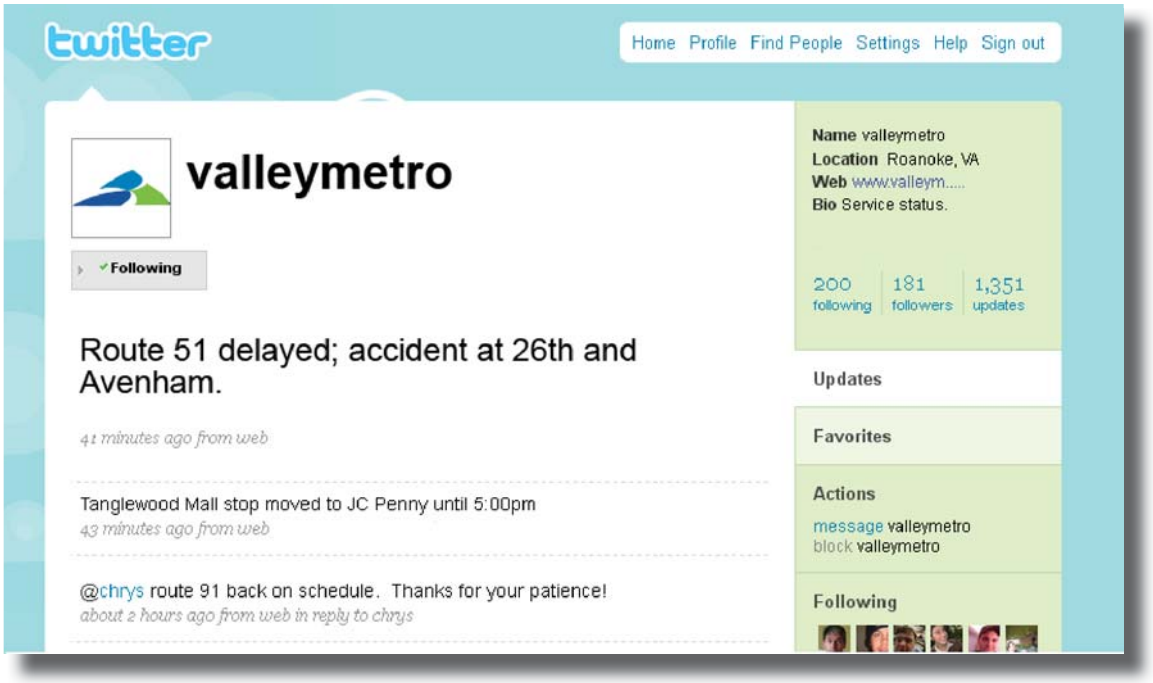
Google Latitude

While Google Transit provides free trip-planning solutions, there is still a need for real-time bus location data. Initially, the software required to accomplish this can be prohibitively expensive. For example, the estimated cost for a system for all Valley

Metro buses is $400,000. Although the system provides more data than simply the location of the nearest bus for riders, that is the piece of information that riders often find most helpful.

For a cost-effective solution, transit agencies might consider Google's newest offering, Google Latitude. Google Latitude combines Google Maps with social networking using the GPS capabilities in certain mobile devices. People who choose to share their information can allow friends to locate them on a map in real time either through a computer or via their mobile device.

The iPhone can accomplish much the same thing, but with Google Latitude not only is the audience much larger, but so is the potential range of devices that support it. A transit service might be able to deliver a similar function with an investment in GPS-enabled



What a Valley Metro Twitter feed might look like

cell phones and an inexpensive cellular plan. Creating Google Latitude accounts for each route, transit users could have free access to add one or more routes to their list of Google Latitude contacts and thus track the location of their preferred bus. Google Latitude allows the status of its users to be displayed, such as a delayed bus, alternate routes, or expected arrival time.

Twitter

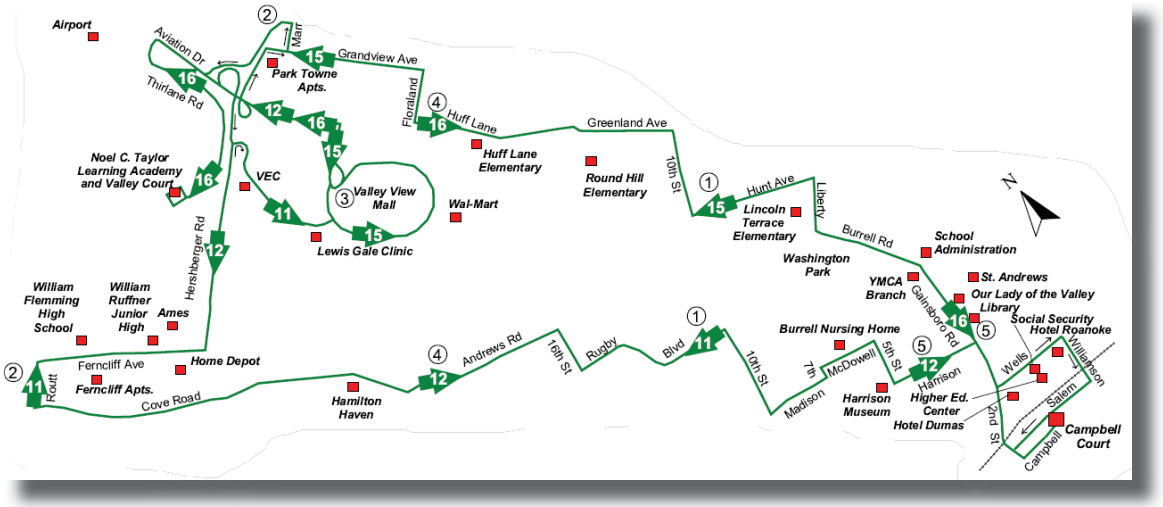
While Google Latitude service is free, there are still some expenses and logistical issues involved with purchasing the mobile devices and data plans and deploying them to the appropriate buses throughout the day. The latter is particularly an issue for systems in which several routes may be run by a single vehicle. One example is Valley Metro's Tanglewood and Valley View Mall loops, where one vehicle covers four separate routes

in a figure-8. If real-time location technology isn't feasible, than communicating through the popular microblogging service, Twitter, might be the answer. Twitter's 140 character limit is generally enough to provide quick information about a route's status and can link back to the agency's main webpage for more information. The already huge and growing Twitter network assures a wide audience, and Twitter's target market of mobile devices users can provide real time data to transit riders as they wait at their stops. Transit agencies could provide one system-wide feed or specific feeds for each route.

Dispatchers may already be updating the agency's website with delay information. Taking the extra step to update Twitter would add little effort to the update process but could potentially reach many more people. Further, Twitter feeds can be included in an RSS (Really Simple Syndication) reader or even be embedded on a website. Employers could embed the agency's feed on a transportation section of their intranet, and local news outlets could include it on their own webpages, significantly broadening the audience even more.

Transit Service Improvements

In FY 2008, RVAMPO staff assisted the Greater Roanoke Transit Company in completing its scheduled National Transit Database (NTD) of unlinked passenger trips for Valley Metro and Smart Way buses. The survey counted boardings and alightings on each stop for over 450 randomly-selected trips throughout the year. The data collected during this survey provides important insights into possible route-specific operations improvements. For example, the data suggests needed improvements along the routes that serve Valley View Mall, the area's largest retail center.



Valley Metro serves Valley View Mall on routes 11 and 15 from Campbell Court to the mall, and on routes 12 and 16 returning from the mall to Campbell Court. Routes 15/16 serve the area of the city between Williamson Road and I-581, while routes 11/12 serve the neighborhoods along Andrews and Cove Roads. William Fleming High School and William Ruffner Junior High are also served on these routes. The buses that run these routes actually travel in a Figure-8 formation, serving Tanglewood Mall in the south via routes 51/52 and 55/56, so that a rider boarding at Tanglewood Mall can travel to Valley View Mall without transferring to a different bus. Thus, it is possible to describe Valley View as being served by a single route of approximately 20 miles in length.

Anecdotal results from the NTD survey process suggested that the Valley View route

had the system's largest ridership and that the stop at the Valley View Walmart, in particular, was often standing-room only. The survey data supports this. The Walmart stop at Valley View had the second highest number of total boardings and alightings. The end-of-line stop had the highest. In all, these two stops accounted for 32% of all traffic on these routes.

Since many of the riders boarding at Walmart and the mall are shoppers, they are filling the bus not only with passengers but with parcels, potentially exacerbating issues of overcrowding. Alightings at subsequent stops are much smaller in number, meaning that the passengers are remaining uncomfortably crowded for longer portions of the trip. In addition, the bus stop at Walmart is essentially a small concrete pad next to the curb with a dirt path leading down a hill to the store's parking lot. These conditions are not only unpleasant in wet weather, when the surrounding area turns to mud, but they make accessibility for wheelchair-bound riders or those with other mobility limitations very difficult.

This data suggests improvements are warranted at this site. A standard bus shelter installed at the Walmart stop would improve service for one of the largest segments of passengers in the system. Given the large number of boardings and alightings at this stop, two shelters or a modified, larger shelter similar to the one on Wells Avenue near the Hotel Roanoke should be considered. To relieve overcrowding, Valley Metro should consider having buses come every 15 minutes (instead of every thirty minutes as it is now) during the peak period. Even if other routes were not doubled and passengers had to wait longer for route transfers at Campbell Court, this might still be preferential to riding a crowded bus. Alternatively, Valley Metro could consider adding a PM Peak shuttle or express bus that served only Campbell Court and Valley View.

Transportation and Housing Connection

The connection and interaction between transportation and housing patterns has become an area of increasing emphasis for MPO planners. This is especially true in the areas of low-income housing, elderly targeted housing or multi-family housing.

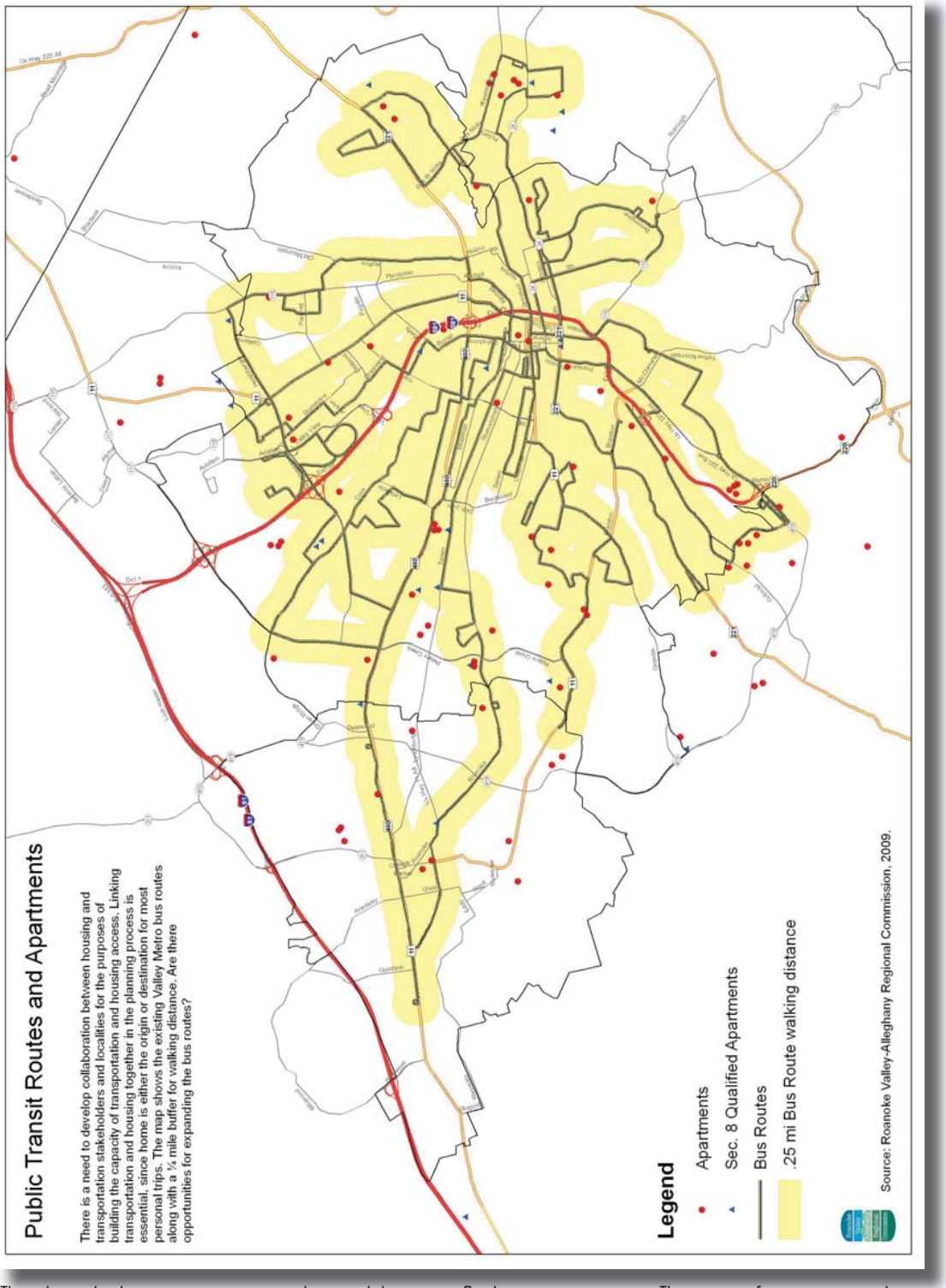
The discussion in Chapter 6 concerning "Baby Boomer Retirement" touched on this issue. That scenario specifically recommended that Baby Boomers who age in place can stay connected to the existing fixed transit system through bicycle, pedestrian, and greenway connections. The scenario also recommended car sharing systems or paratransit connections to serve as a feeder systems to the existing fixed route bus system.

The same recommendations are equally valid for connecting existing multi-family residences (apartments and condominiums) to fixed route bus lines. The map on the following page illustrates the relationship between existing Valley Metro service and existing apartment complexes. The one-quarter mile buffer represented on the map is a typical maximum comfortable walking distance.

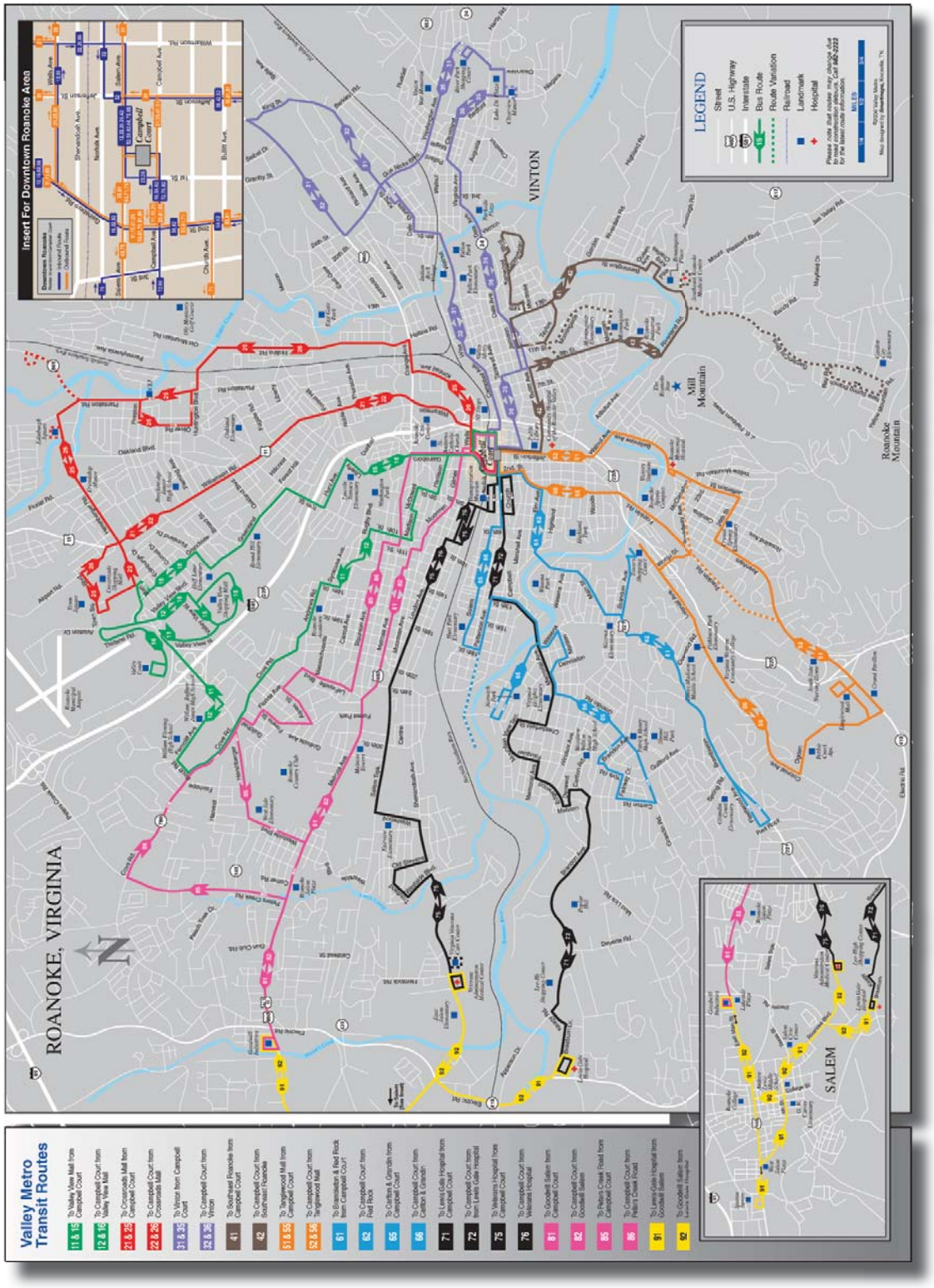
This map shows a pattern similar to the age-in-place scenario maps in Chapter 6. That is, many existing apartment complexes are within the fixed route service area. However, several apartment complexes are several miles to the north and south of the existing system. Connecting these apartments to the existing system via paths, bikeways, or car-sharing systems would serve apartment dwellers and

future retiree populations as described in Chapter 6.

The transportation/housing connection will be an increasing area of emphasis in work leading toward the next CLRTP update.



The relationship between apartment complexes and the current fixed route transit system. The pattern of apartment complexes lying farther than one-quarter mile away from transit service resembles some of the future retiree household maps in Chapter 6.



Valley Metro's system map, including the Salem City route and detail of the downtown Roanoke connections.

Bicycle, Pedestrian, and Greenway Transportation 8

Governments -- from local governments to national government -- are increasingly aware of the need to reduce the nation's dependence on fossil fuels, address global climate change, and improve air quality. Alternative transportation options, such as bicycling and walking, are emerging (or more correctly re-emerging) as viable and increasingly attractive modes of transportation. However, increasing the use of alternative transportation modes requires a comprehensive, multifaceted approach to the planning and provision of the requisite infrastructure, as well as a general paradigm shift in the connection between land use and transportation. Infrastructure, land use policy, education, and advocacy are all vital to facilitating and encouraging bicycling and walking as viable modes of transportation.

In partnership with local governments and other stakeholders, RVAMPO conducts a range of bicycle, pedestrian, and greenway planning and advocacy activities as a complement to its CLRTP. Among the major regional bike and pedestrian transportation studies and plans recently conducted by RVAMPO are:

- *Regional Bicycle Suitability Study (2003-2004)*
- *Bikeway Plan for the Roanoke Valley Area Metropolitan Planning Organization (2005)*
- *Pedestrian Access to Commercial Centers (2006)*
- *2007 Update to the Roanoke Valley Conceptual Greenway Plan*

This chapter provides a brief overview of regional bicycle, pedestrian, and greenway planning activities developed to facilitate and encourage bicycling in the region.

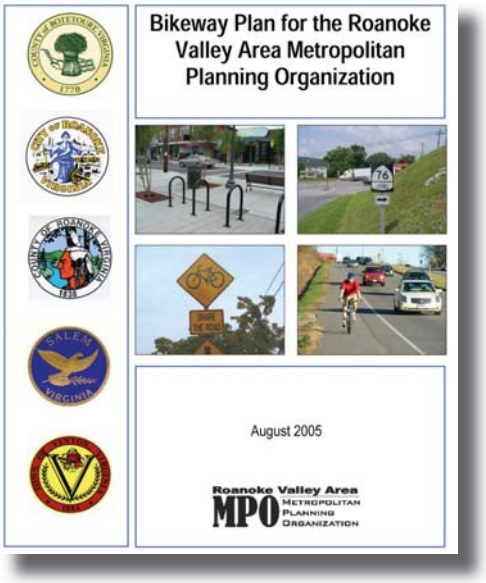
Bicycle and Pedestrian Accommodations

RVAMPO, local jurisdictions, and VDOT continue to work together to develop a regional transportation network that accommodatea and encourage bicycling as an alternative mode of travel and popular form of recreation. The planning and provision of bicycle accommodations is an ongoing process, conducted and influenced by policies and stakeholders at the national , state, regional, and local levels.

BIKEWAY PLAN FOR THE ROANOKE VALLEY AREA MPO

In August 2005, RVAMPO's Executive Board approved the *Bikeway Plan for the Roanoke Valley Area Metropolitan Planning Organization (Bikeway Plan)*. The overall goal of the Bikeway Plan is to provide a coordinated and strategic approach to the development of a regional bicycling network that can offer greater connectivity between activity centers and cultural resources such as greenways, public areas, downtown areas, commercial centers, employment concentrations, educational institutions, transit facilities, scenic corridors and other points of interest in the MPO study area. The *Bikeway Plan* has several key components, including:

- Existing Bicycling Accommodations
- Regional Bicycle Accommodation Best Practices
- Priority List and Vision List of Corridors for Bicycle Accommodation
- Periodic review of the Bikeway Plan



The *Bikeway Plan* lists nine regional bicycle accommodation best practices to be applied, where applicable, in development of a regional bicycling network across the MPO study area. These best practices involve a range of considerations and activities including planning, design and engineering, funding, awareness and education, and political decision-making. These best practices emphasize using existing (and planned) transportation infrastructure to better accommodate bicyclists and capitalizing on opportunities to improve bicycling conditions when they arise. Regional bicycle accommodation best practices from the *Bikeway Plan* include:

- Apply VDOT's Policy for Integrating Bicycle and Pedestrian Accommodations to all corridors in the transportation network
- Encourage adoption and implementation of the *Bikeway Plan* by local governments and other stakeholders
- Utilize cost-effective techniques, where applicable and practicable, to better accommodate bicyclists
- Encourage cross-jurisdictional consistency in bicycle-related signage
- Improve ancillary bicycle accommodations and support facilities

- Develop and distribute a mobility map for the RVAMPO study area
- Incorporate the *Bikeway Plan* into other transportation and community planning documents and efforts
- Increase bicycle-related education, awareness, and advocacy
- Regularly review and update the *Bikeway Plan* for the RVAMPO

Since completing the *Bikeway Plan*, considerable progress has been made in expanding and improving the bicycling network in the RVAMPO study area. Many of the Regional Bicycle Accommodation best practices have been initiated in the region including on-road bicycle accommodations, ancillary facilities, infrastructure improvements, and advocacy and outreach activities.

In support of the *Bikeway Plan*, local governments have developed bicycle related policies and guidance documents. Most notably, the City of Roanoke developed and adopted the *Complete Streets Policy and Street Design Guidelines* as an amendment to its comprehensive plan, *Vision 2001-2020*. The City of Roanoke all reviews all roadways for possible provision of bicycle accmmodations as part of its annual paving program. Roanoke County and the Town of Vinton incorporate bicycle planning components into corridor studies and area plans. Collectively these policies and plans serve to encourage and provide guidance on accommodating bicyclists within the existing and future transportation network.

On-Road Bicycle Accommodations

VDOT's Policy for Integrating Bicycle and Pedestrian Accommodations defines an accommodation as "any facility, design feature, operational change or maintenance activity that improves the environment in which bicyclists and pedestrians travel." This policy provides the framework through which VDOT accommodates bicyclists and pedestrians in the planning, funding, design, construction, operation and maintenance of Virginia's transportation network. The VDOT Policy for Integrating Bicycle and Pedestrian Accommodations is provided in Appendix A.

While the *Bikeway Plan* includes recommended lists of corridors for on-road bicycle accommodation, the VDOT Policy for Integrating Bicycle and Pedestrian Accommodations does not recommend specific bicycle accommodations for listed corridors. Instead the plan recommends the use of "context sensitive design" at the local level to evaluate and select the most appropriate and practicable accommodation for a specific corridor or location.

RVARC and RIDE Solutions developed an interactive bike map showing bicycle accommodations, bicycle routes, and other bicycle-related facilities in the Roanoke Valley and New River Valley that can help assist cyclists in route selection and wayfinding. The *Interactive Bicycle Map* is available at www.bikeroanoke.com/map/index.shtml. Currently bicycle lanes are in place along portions of Colonial Avenue, Gus Nicks Boulevard, Memorial Avenue, and Shenandoah Avenue (City of Roanoke); Hardy Road (Town of Vinton); and Mountain View Road (Roanoke County). Although official bicycle lanes in the region are limited, they offer examples of some of the various options and methods available for use by local governments and VDOT to better accommodate bicyclists.

The Colonial Avenue bicycle lane was created by redesigning the existing pavement, thereby reducing the cost of installation. The existing Colonial Avenue design included on-street parking and a 24-foot wide travel lane (which encouraged higher vehicle traffic speeds) in one direction and an 11-foot wide travel lane in the opposite direction. Using existing pavement (49 feet), the City of Roanoke transportation division re-configured the existing design to maintain on-street parking, to provide two 12.5-foot wide travel lanes and a 5-foot wide bicycle lane. This configuration not only allowed for a bicycle lane, but the narrowing of the travel lane serves to reduce the vehicle speeds (i.e., traffic calming) on this portion of Colonial Avenue. Using the Bicycle Compatibility Index (BCI), this redesign increased the level of service on this roadway from very low (E) to moderately high (C).

Memorial Avenue in the City of Roanoke provides an example of a design concept known as a "road diet", in which a travel lane is removed or narrowed to provide space to better accommodate cyclists. The Memorial Avenue "road diet" removed one travel lane, thereby providing sufficient space for the installation of a bicycle lane. This section of Memorial Avenue now has 5-foot bicycle lanes, and on-street parking on one side of the street. As an added benefit, the bicycle lane is connected to the nearby Roanoke River Greenway via a signed bicycle route.

Other on-road bicycle accommodations are available throughout the region, including paved shoulders, wide travel lanes, and signed bicycle routes. When installed in conjunction with routine maintenance, these accommodations are cost effective ways to better accommodate vehicular traffic and cyclists, as they require limited or no right-of-way acquisition or road widening.

There are two widely accepted methods for measuring how compatible a roadway is for allowing the efficient operation of both bicycles and motor vehicles: the Bicycle Compatibility Index (BCI) and the Bicycle Level of Service (BLOS). Both measures show that paved shoulders provide a level of service (LOS) similar to official bicycle lanes of the same width. While increased separation between motorists and cyclists generally increases the LOS for a given corridor, narrowing an existing arterial travel lane to provide a paved shoulder is effective provided the lane is at least 12 feet wide. Under 12 feet the LOS decreases significantly.

As part of its yearly paving and maintenance schedule, the City of Roanoke evaluates roadway segments for possible bicycle accommodations. Portions of several arterial corridors, including Brandon Avenue, Grandin Road, Shenandoah Avenue, Peters Creek Road, Plantation Road, and Main Street (Wasena) bridge, have already been updated.

Other arterial corridors in the MPO study area have paved shoulders and/or wide travel lanes, most notably Route 419/Electric Road, Portions of US 220 in Botetourt County, and US 221 (Brambleton Avenue) in Roanoke County. While the initial project design to expand Brambleton to four lanes did not include bike accommodations, they were added to the plan after research showed that 2 feet of pavement could be added to the outside travel lanes with little or no additional right of way needed.

Colonial Avenue BEFORE. A high traffic volume arterial in the City of Roanoke. BCI level of service was D (moderately low) and E (low).

Colonial Avenue AFTER. Re-configured existing roadway width. Narrowed travel lanes, provided bike lanes, and kept on-street parking. BCI level of service rose to C (moderately high).

The wide travel lanes, right edge stripe, and Share the Road signage on Brandon Avenue in the City of Roanoke provide separation between cyclists and motorists.

Signed shared bicycle route connecting the Memorial Avenue bicycle lane to the Roanoke River Greenway in the City of Roanoke.

VDOT maintenance funds cannot be used to install new bicycle accommodations, but these funds can be used to improve or expand existing accommodations. For instance, VDOT maintenance funds could be used to widen an existing paved shoulder. In fact, VDOT is required to use two percent of its maintenance funding for bicycle and pedestrian accommodations. Making effective and coordinated use of these funds could be an effective way to significantly increase bicycle accommodations in Botetourt County and Roanoke County, where VDOT is responsible for road maintenance.

Signed shared roadways and Shared Roadways

A shared roadway is any roadway used by motorists and bicyclists without any special bicycle accommodations. These tend to be lower-traffic, lower speed, collector and neighborhood streets. Some shared roadways have ancillary accommodations, such as signage and pavement markings and may also incorporate minor operational changes to better accommodate cyclists. They often connect activity centers and destinations or serve as connections between existing bicycle accommodations. In cities that are recognized as leaders in facilitating and encouraging cycling (such as Portland, Oregon and Boulder, Colorado) signed shared bicycle routes are by far the most common bicycle accommodation and are the foundation of the bicycling network.

The City of Roanoke and the City of Salem currently have a limited number of signed shared routes in place. The City of Roanoke developed its signed shared routes to provide connections between area greenways, existing bicycle accommodations, and other activity centers.

Ancillary Bicycle Accommodations

In addition to on-road accommodations, ancillary accommodations are an important part of a functional bicycling network. Ancillary accommodations include signage, bike racks and other storage facilities, routing and wayfinding information, and benches. Even bicycle racks on buses, showers, changing facilities, and clothing storage areas can be considered ancillary facilities.

Bicycle racks are the most common ancillary accommodation in the MPO study area. There are currently approximately 100 bicycle racks within the MPO study area and efforts are underway to increase this number. RIDE Solutions has developed a bicycle rack donation program that provides bicycle racks to area businesses, and the City of Roanoke has installed bicycle racks throughout downtown, in parks, and along greenways. In addition to provided bicycle parking the Roanoke Regional Partnership is using the number of bicycle racks (and increase in the number) in the region as a metric in evaluating the region's overall bicycle friendliness.

In the fall of 2006, Valley Metro began installing bicycle racks on its fleet of approximately 45 buses as part of its Bike "n" Ride program. Currently, all Valley Metro buses are now equipped with front mounted racks with a two bicycle capacity. Additionally, all Smartway buses are also equipped with bicycle racks and have also been retrofitted to carry additional bicycles in the underneath compartments.

Bike racks on buses promote multimodalism. A bicycle commuter can cycle from a rural residence to a transit stop, connect to any other part of the region served by the

public transit network, and then use the bicycle to complete the trip. However, before high levels of multimodalism can be achieved, improvements need to be made in not only the bicycle infrastructure, but in the public transits infrastructure as well. Impediments to multimodalism include lack of bike lanes or other on-street bicycle facilities leading to transit stops, lack of covered waiting facilities, lack of bicycle parking and secured storage at transit stops, and limited service to portions of the study area.

Bicycle racks on Valley Metro bus.

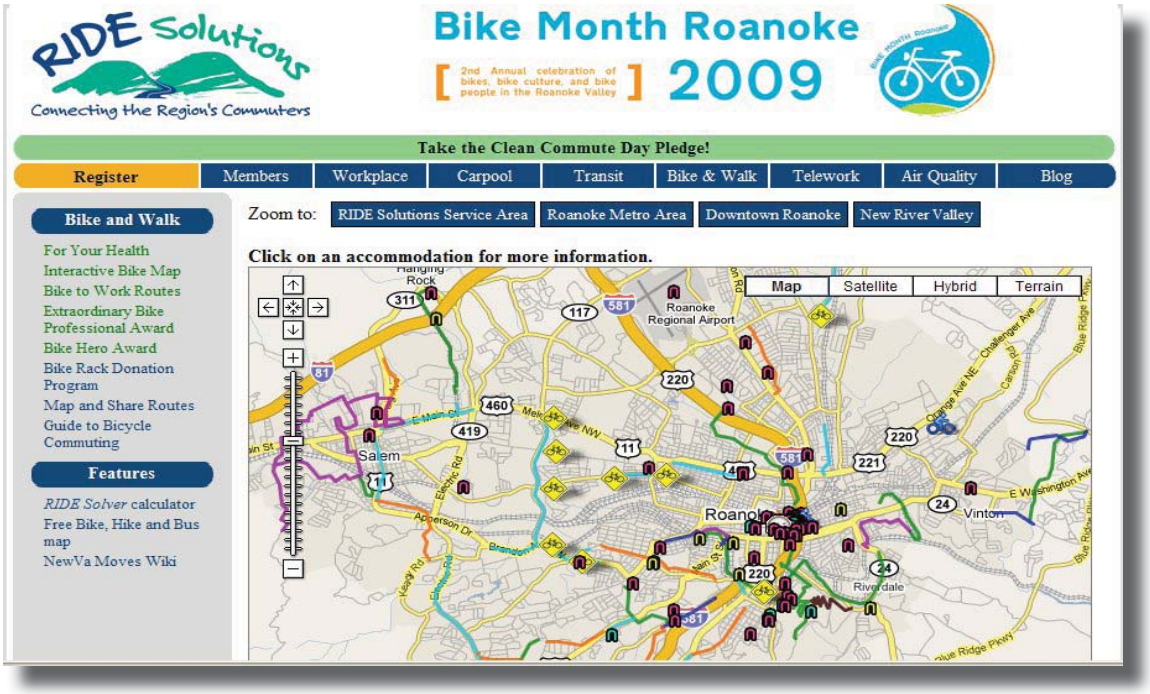
Ancillary accommodations in Grandin Village in the City of Roanoke.

BICYCLE ACCOMMODATIONS MAPPING

Another critical component to increasing bicycle usage is having readily available information. To help meet this need, RVARC provides a range of mapping and spatial data as part of its ongoing regional bicycle, pedestrian, and greenway planning efforts. Using geographic information system software (ArcGIS), RVARC also developed and distributed free copies of the *Bike, Hike and Bus* map to local governments, bike shops and other locations around the Roanoke Valley. Areas covered by the map include the cities of Roanoke and Salem, Roanoke County, and the Town of Vinton. GIS data layers include:

- Bicycle lanes
- Wide travel lanes
- Paved shoulders
- Signage
- Signed shared routes
- Greenways – current, planned, and proposed
- Bike to work/commuting routes
- Bicycle racks
- Bicycle shops
- *Bikeway Plan* Priority List of corridors for bicycle accommodation
- *Bikeway Plan* Vision List of corridors for bicycle accommodation
- Carvins Cove and other trails in the region

RVARC and RIDE Solutions developed an interactive bike map showing bicycle accommodations, bicycle routes, and other bicycle-related facilities in the Roanoke Valley and New River Valley that can help assist cyclists in route selection and wayfinding. The *Interactive Bicycle Map* is available at www.bikeroanoke.com/map/index.shtml



Downtown Roanoke bike rack locations (top) and Interactive Bicycle Map (bottom).


Downtown Roanoke
Bicycle Rack Locations
Roanoke Valley Alleghany Regional Commission, April 2011
Bicycle Rack
Greenway
Park
Signed Bicycle Route
0 0.05 0.1 Miles
0 250 500 Feet
N
GILMER
JEFFERSON
WELLS
GAINSBORO
2ND
LOUDON
HENRY
JORDAN
CENTRE
SHENANDOAH
NORFOLK
SALEM
SALEM AV SE
WILLIAMSON
WALL
CAMPBELL
KIRK
MARKET
3RD
CHURCH
LUCK
TAZEWELL
1ST
FRANKLIN
BULLITT
DAY
JEFFERSON ST SE
ELM
EXIT 1A to ELM
1 1/2

Engineering alone is not enough - cyclist illustrating the need for cyclist education in addition to bicycle accommodations.

Public Education, Outreach, and Advocacy

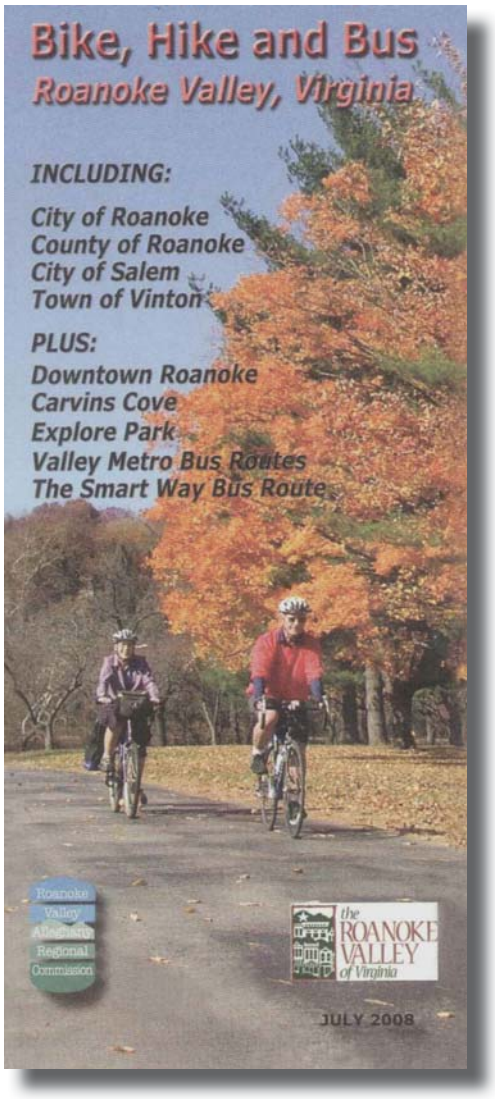
On-road accommodations, shared roadways, and ancillary accommodations are most effective at increasing bike and alternative transportation when complemented by education, safety, and advocacy efforts. The *Bikeway Plan* cites such efforts as a regional best practice and as necessary to improve bicycling conditions in the region. RVAMPO has worked cooperatively with local governments, area cyclists, and other stakeholders to develop and implement bicycle education and advocacy activities to promote and facilitate bicycling in the region.

Bicycle Friendly Community Workshop

In January 2008, the League of American Bicyclists hosted a "Bicycle Friendly Community" (BFC) workshop in Roanoke. Attended by more than seventy local planners, engineers, community leaders, and bicycle enthusiasts, the four-hour workshop explored actions taken by communities across the country to encourage bicycling, including strategies from striping bike lanes, building trails, installing bike parking and signing popular bike routes, to education and encouragement programs to get more people riding safely. The workshop concluded with a series of action items to propel Roanoke Valley communities toward official designation as Bicycle Friendly Communities. Action items developed by the group include:

- That RVAMPO establish a Bicycle Advisory Committee
- That each local jurisdiction establish a Bicycle Advisory Committee
- That each local jurisdiction adopt the *Bikeway Plan*
- Encouraging local interest groups to include non-motorized transit issues in their platforms

- Hosting a candidate forum
- Creating an awards program to recognize government officials or agencies that are instrumental in improving conditions for cycling
- Organizing a community bike ride series
- Organizing a "big ride" with a large number of participants including elected officials
- Notifying businesses of the availability of free bicycle racks through the Bicycle Rack Donation Program
- Launching a bike education program
- Airing television public service announcements to educate bicyclists on how to ride safely and motorists on how to share the road
- Promoting bicycle rodeos, helmet giveaway programs, and Safe Routes to Schools projects
- Participating in VDOT and National Park Service public meetings
- That each attendee participate in his or her Neighborhood Plan update process
- Determining outcomes of action plan



Since the workshop, considerable progress has been made on the action items, including establishing a regional bicycle advisory committee, creating an awards program, promoting the bike rack donation program and the Safe Routes to School project, organizing a planners bicycle ride, providing bicycle education, and hosting a range of Bike month activities. Additionally, the City of Roanoke was designated as a Bicycle Friendly Business at the Bronze level by the League of American Bicyclists. The Regional Commission was the first business in Virginia to receive this designation. In pursuit of this designation, the City of Roanoke officially adopted the 2005 Bikeway Plan, the 2007 Update to the Roanoke Valley Conceptual Greenway Plan, a Complete Streets Policy, and Street Design Guidelines. In addition, the city established a local bicycle advisory committee to guide implementation of the recommendations from the 2008 BFC application.

Websites and Interactive Media

RVARC's Bicycle and Pedestrian Planning: RVARC maintains a website that provides a range of bicycle, pedestrian, and alternative transportation information and resources. The site (www.rvarc.org/bike) is a one-stop portal for bicycle, pedestrian, greenway, and alternative transportation in the Roanoke Valley. Information provided on the website includes:

- News and events
- Local, regional, and state bicycle and pedestrian plans, studies, and reports
- Maps - printable and interactive
- Presentations
- Commuter and public transportation resources
- Local government plans and paving schedules
- Local clubs and organizations
- Trail and outdoor recreation information
- VDOT policies, plans, and resources

RIDE Solutions - Bike & Walk Website:
This site (www.ridesolutions.org/bikewalk) provides information on programs and resources to encourage and facilitate carpooling and alternative transportation in the region. Website resources include:

- For Your Health
- Interactive Bike Map
- Bike to Work Routes
- Bike Rack Donation Program
- Map and Share Routes
- Guide to Bicycle Commuting

Beyond RIDE Solutions utilizes a range of interactive media including discussion forums, blogs, and message boards to disseminate information and receive feedback from the bike/ped community. Media include Twitter, Facebook, YouTube, and NewVa Moves.

BikeRoanoke.com: RVARC, RIDE Solutions, and local governments cooperatively developed this one-stop portal for bicycle information in the region.

Regional Bicycle Advisory Committee

While RVAMPO and local governments have cooperated to improve bicycle accommodations in the region, much of the planning has been coordinated through the Transportation Technical Committees or ad-hoc steering committees. The Regional Bicycle Advisory Committee (BAC), established by RVARC, represents the first standing, regularly convened, alternative transportation planning and advocacy stakeholder group established at the MPO level. The Regional BAC is composed of a range of stakeholders including local government staff, regional and state agencies, and bicycle clubs and advocacy groups, including:

BikeWalk Virginia - Roanoke Valley Chapter
Blue Ridge Bicycle Club
Blue Ridge Parkway (National Park Service)
Botetourt County
Citizen Advocates
City of Roanoke
City of Salem
Cyclo-Ward Bicycle Repair

RIDE Solutions
Roanoke County
Roanoke Valley-Alleghany Regional Commission
Roanoke Regional Partnership
Roanoke Valley Greenway Commission
Sharebike.org
Town of Vinton
Virginia Department of Transportation (Salem District)

To date, the Regional BAC has performed a range of outreach and advocacy efforts including:

- Commenting on VDOT plans and policies
- Developing a regional bicycle awards program
- Organizing a series of planners (and other staff) bicycle rides
- Hosting bicycle-related webinars and workshops
- Route development assistance
- Disseminating bicycle-related information
- Supporting local bicycle events and advocacy efforts
- Providing guidance on the update of the Bikeway Plan

Innaugural Panners' and Engineers' ride - 2009

Safe Routes to Schools

Safe Routes to School Program (SRTS) is a federally-funded program created under Section 1404 of the 2005 SAFETEA-LU whose purpose is to:

- Enable and encourage children, including those with disabilities, to walk and bicycle to school
- Make bicycling and walking to school a safer and more appealing transportation alternative, thereby encouraging a healthy and active lifestyle from an early age
- Facilitate the planning, development, and implementation of projects and

activities that will improve safety and reduce traffic, fuel consumption, and air pollution in the vicinity of schools

Several localities have received funding through SRTS including the City of Salem and Roanoke County. The City of Roanoke and Roanoke City Public Schools were awarded SRTS funding to provide infrastructure improvements both around Addison Middle School and Forest Park Elementary School and in their surrounding neighborhoods. The projects will include new shared-use path connections, new lighting along the Lick Run greenway in Washington Park, and in-fill sidewalk construction in the neighborhoods. Roanoke County and Roanoke County Public Schools also received funding for a bicycle education program and a project to better connect Wolf Creek Greenway Trail, William Byrd Middle School, and surrounding neighborhoods.

Webinars, Workshops, Training, and Reference Materials

In an effort to provide ongoing training opportunities and information, RVARC regularly hosts a range of bicycle related webinars from the Association of Pedestrian and Bicycle Professionals, American Planning Association, and other organizations. Webinars are provided at no cost to participants and are open to local government staff, stakeholders, and citizens. Topics covered include bicycle master plans, shared lane markings, AASHTO (a nonprofit, nonpartisan association representing highway and transportation departments in the 50 states, the District of Columbia, and Puerto Rico) and MUTCD (Manual on Uniform Traffic Control Devices), and bicycle and pedestrian safety.

RVARC maintains a reference library that houses numerous bicycle and pedestrian planning documents available for loan to local government staff and other stakeholders. It also distributes other bike/pedestrian resources from VDOT, Federal Highway Administration, US Department of Transportation, Bike Smart Virginia, the League of American Bicyclists, and other agencies and organizations.

Roanoke Valley Greenways

The Roanoke Valley has an expanding greenway network that serves as recreational, and increasingly, alternative transportation corridors. Working individually and cooperatively, the Roanoke Valley Greenway Commission, Roanoke County, the cities of Roanoke and Salem, and the Town of Vinton continue to develop an extensive, growing, and increasingly interconnected greenway network in the Roanoke Valley. In the 2007 Roanoke City and Roanoke County Park Master Plans, citizens named greenways as the top facility they wanted. The region has already committed millions of dollars to the development of over 20 miles of greenways and 120 miles of trails.

In response, the Roanoke Valley Greenway Commission (herein referred to as the Greenway Commission) was formed in 1997 by an Intergovernmental Agreement among the four Roanoke Valley local governments – City of Roanoke, Roanoke County, City of Salem, and Town of Vinton – under Virginia Code Section 15.2 - 1300. The Greenway Commission has seven voting members: one member appointed from each of the five member governments, one member appointed by RVAMPO, and one representative from the volunteer non-profit group Pathfinders for Greenways. In addition, there are non-voting ex officio members. The purpose of the Greenway Commission is to "promote and facilitate coordinated direction and guidance in the planning, development, and maintenance of a system of greenways

throughout the Roanoke Valley."

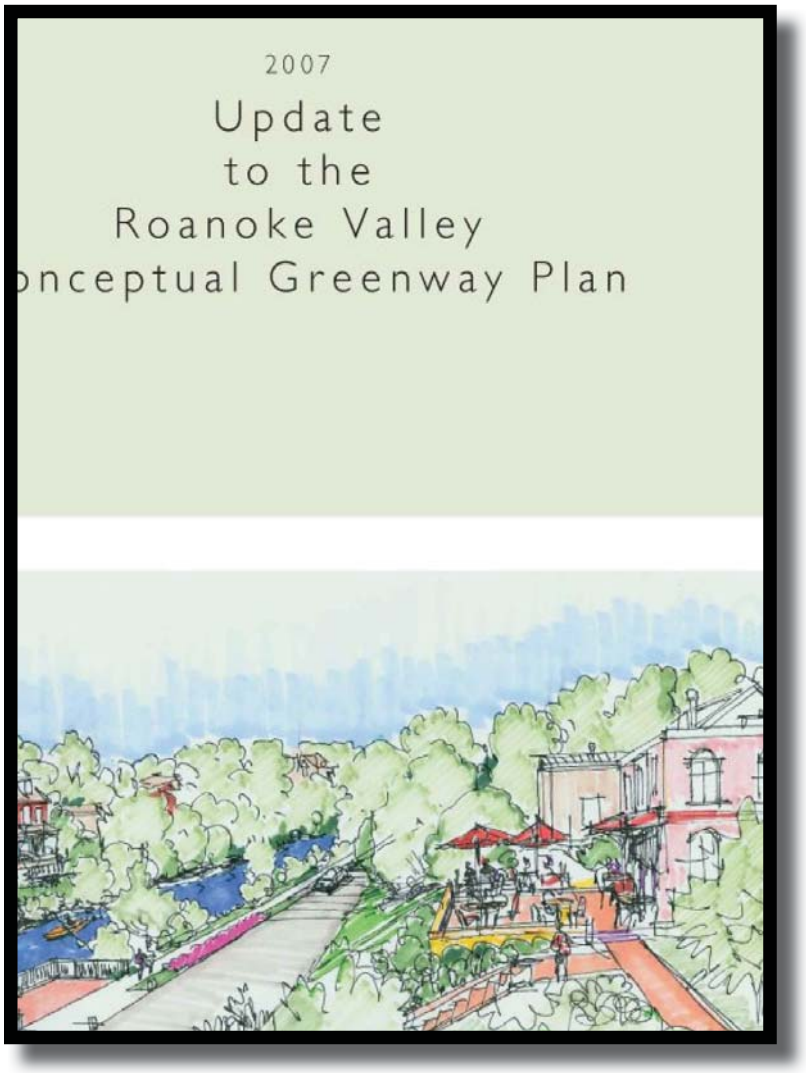
In accordance with the Intergovernmental Agreement, the Greenway Commission's responsibilities are to encourage incorporation of greenways into each jurisdiction's planning efforts, explore greenway opportunities, make recommendations on legislation, investigate funding and grants, recommend standards, pursue partnerships, and coordinate the efforts of the federal, state, and local governments involved.

2007 UPDATE OF THE ROANOKE VALLEY CONCEPTUAL GREENWAY PLAN

The 2007 Update to the Roanoke Valley Conceptual Greenway Plan, an update to the original Conceptual Greenway Plan (1995) was adopted by all four local governments and the Roanoke Valley Area Metropolitan Planning Organization in 2007. Additionally, the Greenway Plan is cited in a range of local, regional, and state planning documents and publications, and the Roanoke River Greenway is included in the MPO Transportation Improvement Program (TIP), the Virginia State Transportation Improvement Program (STIP), and the Virginia Outdoors Plan.

The Roanoke Valley Greenway Network

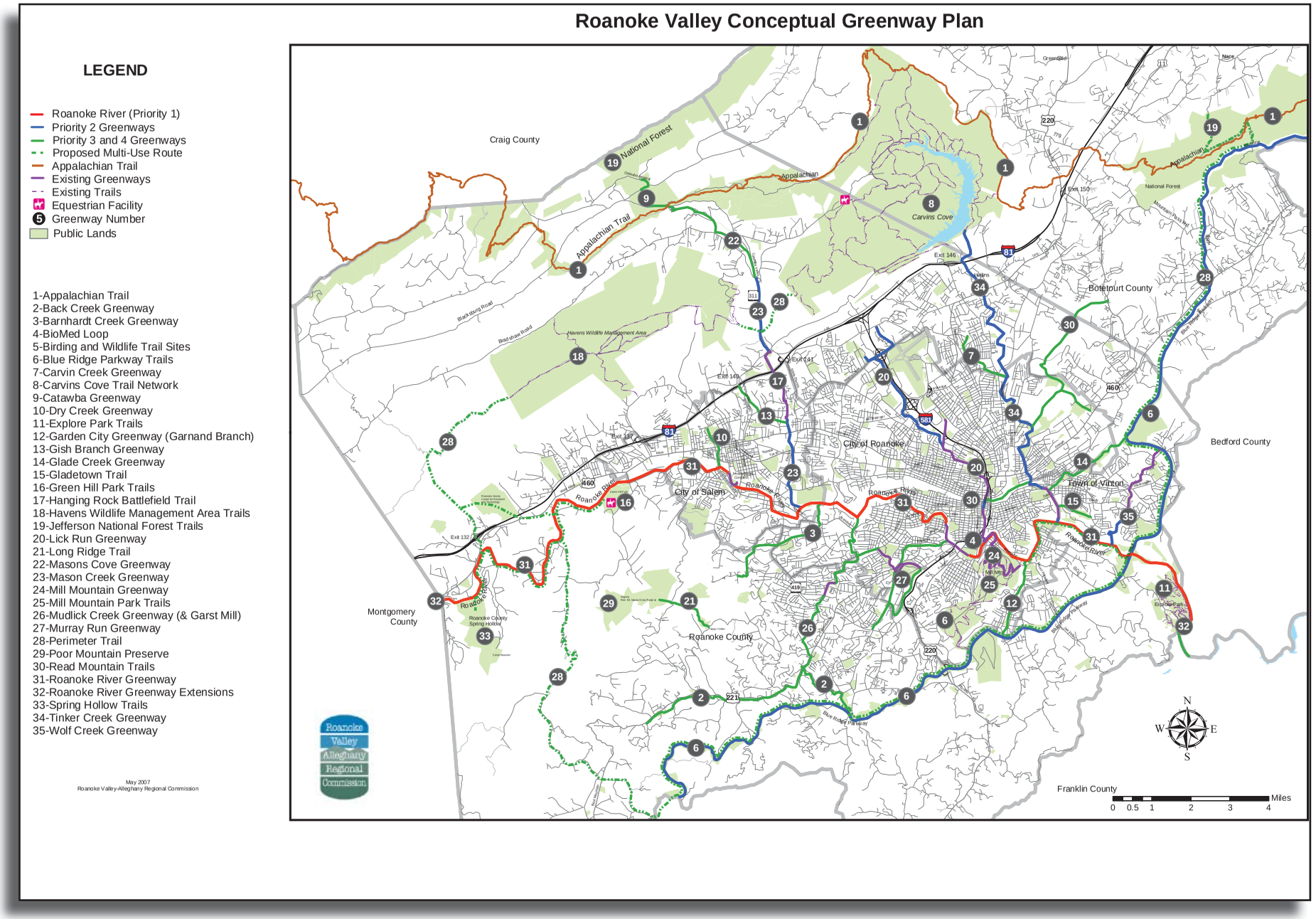
Currently the Roanoke Valley Greenway network consists of more than 25 miles of greenways. The 2007 Update cited the Roanoke River Greenway as the number one priority by all four Greenway Commission governments. The Regional Commission has developed and maintains an interactive Roanoke Valley Greenways map as well as printable (PDF) maps of individual greenways within the network. The Interactive Greenway map is available at www.greenways.org



More than 125 citizens participated in the first 2007 Conceptual Greenway Plan update public meeting

Roanoke Valley Greenway Network				
PROJECT NAME	**Plan #**	**Localities**	**Priority**	**Class**
Appalachian Trail*	1	Roanoke County	4	C
Back Creek Greenway	2	Roanoke County	4	B-C
Barnhardt Creek Greenway	3	Roanoke County, City of Roanoke	4	A-B-C
BioMed Loop	4	City of Roanoke	3	A
Birding and Wildlife Trail Sites	5	All	4	A-B-C
Blue Ridge Parkway Trails*	6	Roanoke County, City of Roanoke	2	C
Carvin Creek Greenway	7	Roanoke County	4	A-B
Carvins Cove Trail Network	8	City of Roanoke	2	C
Catawba Greenway	9	Roanoke County	4	B-C
Dry Creek Greenway	10	Salem	4	A-B
Explore Park Trails	11	Roanoke County	4	B-C
Garden City Greenway (Garnand Branch)	12	City of Roanoke	3	A-B
Gish Branch Greenway	13	Salem	4	B-C
Glade Creek Greenway	14	Roanoke County, Vinton	3	A-B-C
	14	City of Roanoke	4	A-B
Gladetown Trail	15	Vinton	3	C
Green Hill Park Trails	16	Roanoke County	4	B-C
Hanging Rock Battlefield Trail	17	Roanoke County, Salem	2	B-C
Havens Wildlife Management Area Trails+	18	Roanoke County	4	C
Jefferson National Forest Trails*	19	Roanoke County	4	C
Lick Run Greenway	20	City of Roanoke, Roanoke County	2	A
Long Ridge Trail	21	Roanoke County	4	C
Masons Cove Greenway	22	Roanoke County	4	B-C
Mason Creek Greenway	23	Salem, Roanoke County	2	A-B
Mill Mountain Greenway	24	City of Roanoke	2	A
Mill Mountain Park Trails	25	City of Roanoke	2	C
Mudlick Creek Greenway (& Garst Mill)	26	Roanoke County, City of Roanoke	3	A-B
Murray Run Greenway	27	Roanoke County	4	B-C
	27	City of Roanoke	3	B-C
Perimeter Trail	28	Roanoke & Botetourt Counties	4	C
Poor Mountain Preserve Trails+	29	Roanoke County	4	C
Read Mountain Trails	30	Roanoke County	3	C
Roanoke River Greenway	31	All	1	A-B-C
Roanoke River Greenway Extensions	32	Franklin, Montgomery Counties	4	A-B-C
Spring Hollow Trails	33	Roanoke County	4	C
Tinker Creek Greenway	34	City of Roanoke, Roanoke County	2	A-B-C
Wolf Creek Greenway	35	Roanoke County, Vinton	2	B
*Federal Jurisdiction	Class A=	Paved with asphalt or concrete (See Section 2.4.2)		
+State Jurisdiction	Class B=	Crushed aggregate stone or wood chips		
	Class C=	Natural surface, wood chips, or crushed stone		

Roanoke Valley Conceptual Greenway Plan



Regional Greenway and Trail User Count Program

The Regional Commission's Regional Greenway and Trail Users Count Program was initiated in 2010 with the goal of providing quantitative data on greenways and trails use (i.e., trail counts) in the region. Once collected, use data are shared with local governments, the Greenway Commission, media, and other stakeholders to assist in greenway planning, funding, maintenance, and promotion, and public relations efforts. Additionally, trail use data are being shared with the National Bicycle & Pedestrian Documentation Project, a nationwide effort that provides a consistent model of data collection and ongoing data for use by planners, governments, and bicycle and pedestrian professionals.

The Regional Greenway and Trail Users Count Program utilizes both TRAFx and Trail Master infrared counters, as well magnetic counters for counting cyclists. Currently, trail counters area in place in the following locations on the Roanoke River Greenway:

•Roanoke River Greenway - Riverside Drive (City of Salem)
•Roanoke River Greenway - River's Edge Sports Complex (City of Roanoke)
•Roanoke River Greenway –Bennington Avenue (City of Roanoke)

Additionally, trail counts have been conducted on the following greenways:

•Murray Run Greenway (City of Roanoke)
•Lick Run Greenway (City of Roanoke
Beyond greenways, counters are currently in place on the following trails:
•Appalachian Trail (between Route 311 and McAfee's Knob) (Roanoke County)
•Carvins Cove Natural Reserve (City of Roanoke) – magnetic mountain bike counter and infrared counter

Year	Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	AADT	Days with data	Total
2010	Appalachian Trail 311/McAfee's Knob Trailhead							1,308	1,602	2,154	3,300	1,966	226	58.716	169	21,431
	Carvins Cove									716	1,215	1,027		35.417	60	12,927
	Lick Run Greenway Southern End					1,590	1,386							47.355	31	17,285
	Murray Run Greenway					2,095	2,321							61.000	15	22,265
	Roanoke River Bennington									6,652	8,441	5,180	1,629	179.525	122	65,526
	Roanoke River Greenway					20,042	20,366	19,458	20,949	22,437	19,358	13,088	4,006	564.531	228	206,054
2011	Appalachian Trail 311/McAfee's Knob Trailhead	879	1,585	1,570	2,512	1,804								54.696	125	19,964
	Roanoke River Bennington	2,626	4,101	5,851	8,345	8,124	6,285							192.588	153	70,295
	Roanoke River Greenway	7,740	6,515	2,108	12,465	13,425	9,855							283.272	151	103,394
	Roanoke River Riverside		4,482	4,577	7,315	6,838								196.908	109	71,872

Days of the week

From 2010-05-20 to 2011-06-04

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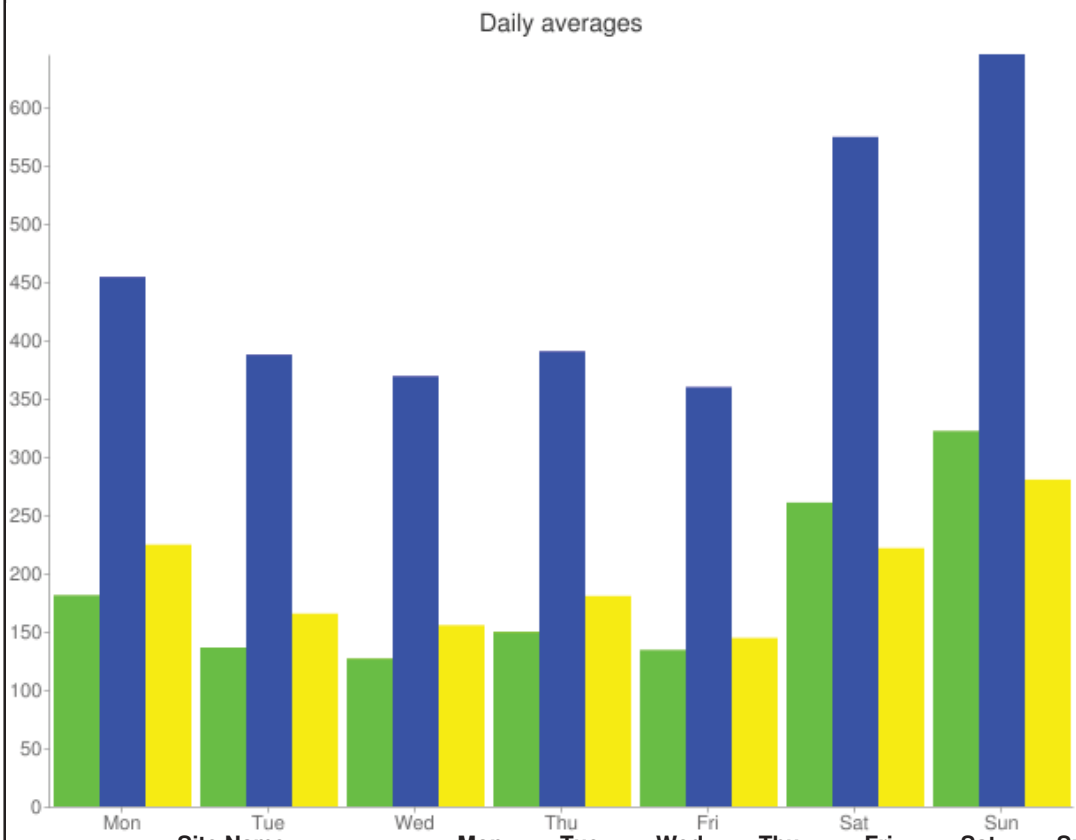
TRAFx DataNet (http://www.trafx.net/)



Site Name		Mon	Tue	Wed	Thu	Fri	Sat	Sun
Roanoke River Bennington		181.1	136.2	126.7	149.5	134.0	260.7	321.9
Roanoke River Greenway		454.2	387.5	369.0	390.3	359.7	574.5	645.5
Roanoke River Riverside		224.6	165.5	155.5	180.6	144.6	221.6	280.4
Daily Averages		287	230	217	240	213	352	416

A = adjustment applied, D = divide by 2 applied, F = filtering applied

Freight 9

FREIGHT TRANSPORTATION PLANNING

In many long-range transportation plans freight transportation is overshadowed by passenger transportation. In recent years the popularity of bicycle accommodations, greenway trails and other forms of non single-occupancy motorized vehicle (SOV) transportation has occupied the spotlight of transportation planning in the United States.

While it may not have the appeal of planning for bicycles and greenways, freight transportation planning is equally important. Trucks deliver nearly 70 percent of all freight transported annually in the U.S.

Freight transportation demand can be driven by many demographic factors. For instance, as gas prices go up, people may order more products from the internet. Freight transportation also has a direct connection to globalized supply chain, just in time delivery and other interregional and international logistics and manufacturing systems. Finally, there is a public safety aspect to large vehicle planning. Fire-trucks and ladder-trucks have large wheel bases and large turning radius requirements. This presents design challenges when initiatives such as complete streets or traffic calming occur in corridors that have to also accommodate freight transportation. Designers should keep freight vehicle characteristics in mind when designing with other planning values in mind.

This chapter presents freight data summaries for the RVAMPO region using 2004 Global Transearch® data. It presents design issues common to freight transportation. It also provides a menu of quick action freight projects that were featured in the 2002-03 RVARC Regional Freight Study for financially constrained or vision list consideration and a proposal for a regional intermodal facility project just outside the MPO.

Freight Data Summary

Truck Freight Arriving in Region

Jurisdiction	Total Truck Tons	Total Value
Alleghany County	371,917.49	$379,787,454.30
Botetourt County	2,402,830.02	$4,983,794,770.05
Clifton Forge	9,241.99	$53,061.80
Covington	955,189.41	$3,835,727,917.87
Craig County	256,053.26	$216,082,306.43
Franklin County	2,624,830.12	$3,310,887,253.13
Roanoke City	4,959,179.38	$7,894,637,680.84
Roanoke County	2,038,499.85	$2,127,568,295.50
Salem	1,386,790.11	$4,129,808,894.83
Grand Total	**15,004,531.65**	**$26,878,347,634.76**

Top Commodities Arriving in Region by Weight

Rank	Commodity	Truck Tons
1	Nonmetallic minerals	6,044,483.06
2	Secondary traffic	3,039,844.42
3	Clay, concrete, glass, or stone	1,927,778.40
4	Lumber or wood products	1,684,156.98
5	Food or kindred products	444,579.46
6	Petroleum or coal products	409,069.35
7	Chemicals or allied products	352,166.90
8	Pulp, paper, or allied products	295,466.20
9	Transportation equipment	145,700.25
10	Primary metal products	107,752.96
	Total Tons of Top Commodities	**14,450,997.98**

Top Commodities Arriving in Region by Value

Rank	Commodity	Value
1	Secondary traffic	$19,842,942,724.65
2	Transportation equipment	$1,067,111,883.68
3	Electrical equipment	$934,889,877.21
4	Chemicals or allied products	$744,921,185.08
5	Lumber or wood products	$701,920,826.72
6	Machinery	$551,038,303.95
7	Pulp, paper, or allied products	$455,818,440.01
8	Food or kindred products	$376,816,905.03
9	Fabricated metal products	$298,661,551.54
10	Rubber or misc. plastics	$288,569,109.58
	Total Value of Top Commodities	**$25,262,690,807.45**

Truck Freight Originating in Region

Jurisdiction	Total Truck Tons	Total Truck Value
Alleghany County	684,925.82	$1,450,049,455.70
Botetourt County	1,696,892.61	$915,736,195.97
Clifton Forge	22.46	$145,851.50
Covington	774,501.91	$1,207,273,452.90
Craig County	252,272.63	$38,401,509.56
Franklin County	2,313,985.69	$1,145,428,418.67
Roanoke City	6,134,110.82	$15,625,412,922.74
Roanoke County	3,261,428.51	$7,402,847,256.28
Salem	2,252,914.62	$15,920,228,343.87
Grand Total	**17,371,055.06**	**$43,705,523,407.17**

Top Commodities Originating in Region by Weight

Rank	Commodity	Truck Tons
1	Nonmetallic minerals	4,990,803.70
2	Clay, concrete, glass, or stone	3,011,385.65
3	Secondary Traffic	2,764,281.44
4	Lumber or wood products	2,145,267.26
5	Pulp, paper, or allied products	1,091,868.75
6	Machinery	539,963.91
7	Chemicals or allied products	491,475.94
8	Food or kindred products	489,348.60
9	Rubber or misc. plastics	437,106.16
10	Farm products	309,012.12
	Total Tons of Top Commodities	**16,270,513.53**

Top Commodities Originating in Region by Value

Rank	Commodity	Value
1	Secondary Traffic	$18,041,567,726.72
2	Machinery	$9,773,224,266.88
3	Chemicals or allied products	$3,167,200,459.95
4	Electrical equipment	$2,053,565,119.66
5	Rubber or misc. plastics	$1,749,460,660.55
6	Apparel or related products	$1,506,969,555.79
7	Pulp, paper, or allied products	$1,420,078,487.14
8	Fabricated metal products	$1,258,146,436.61
9	Transportation equipment	$1,040,471,141.20
10	Lumber or wood products	$736,763,630.12
	Total Value of Top Commodities	**$40,747,447,484.62**

Freight Traffic

Freight, or truck, traffic data for Interstates, U.S. Highways, and State Highways in the Roanoke Valley Area Metropolitan Planning Organization region is presented on the following two pages. The data used to produce the maps was taken from 2007 Virginia Department of Transportation Daily Traffic Volume Estimates reports.

The first map, "Truck Traffic as Percentage of AADT," shows truck traffic as a percentage of the total traffic (Average Annual Daily Traffic or AADT) traveling on the roads each day. Truck traffic includes buses and the four truck categories provided on the Traffic Volume Estimates: 2 Axel, 3+ Axel, 1 Trailer, and 2 Trailers.

The second map, "Estimated Number of Trucks Per Day," shows the approximate number of trucks that travel on the roads each day. In each section of roadway, this number is the product of the AADT multiplied by the Truck Traffic Percentage discussed previously.

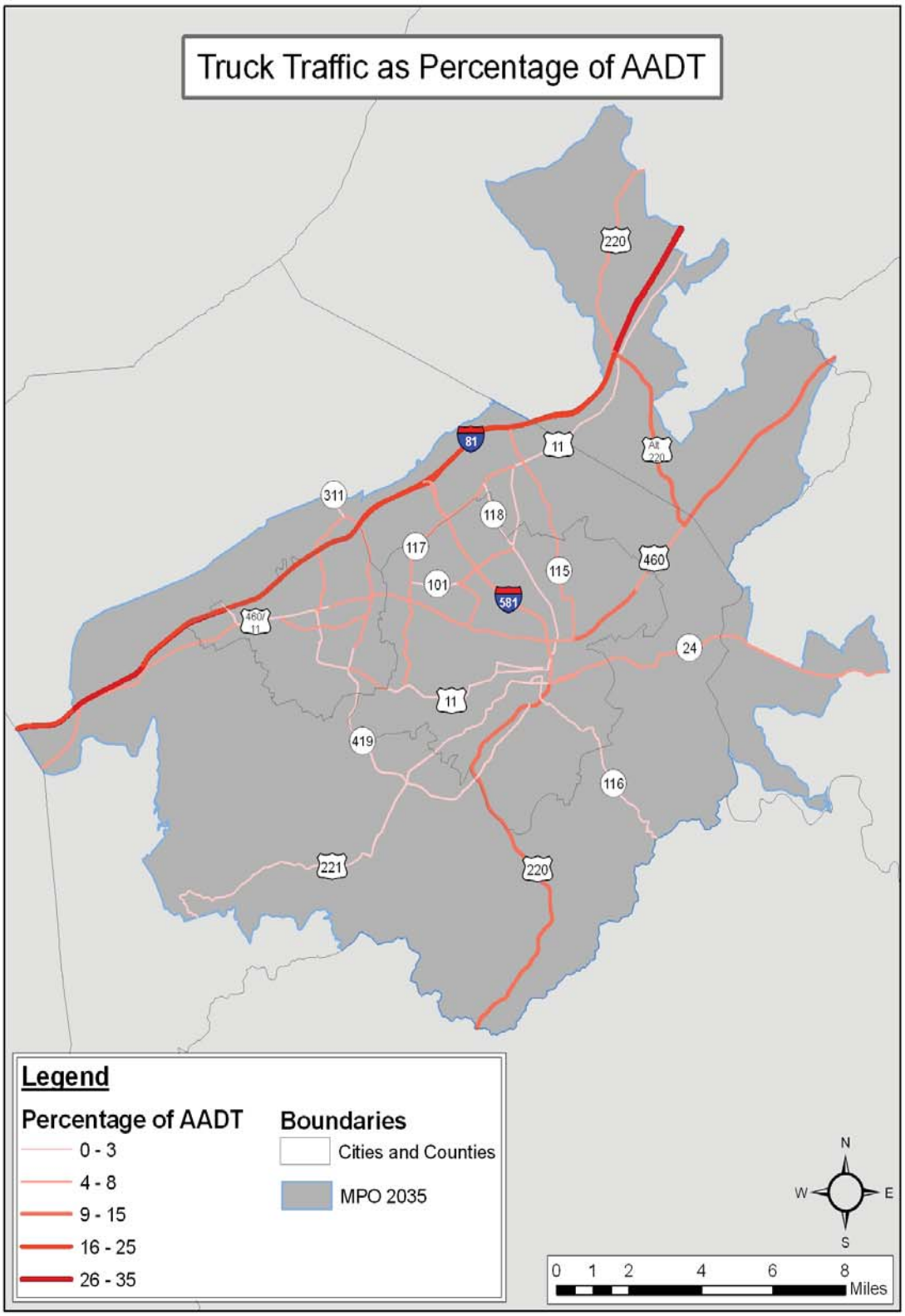
Between 5,000 and 9,000 trucks travel on each direction of I-81 each day, making it the busiest truck corridor in the region. It handles more than 15% of the total traffic in every section. In some sections in the northern part of the region, the truck traffic is responsible for 26-35% of the total traffic.

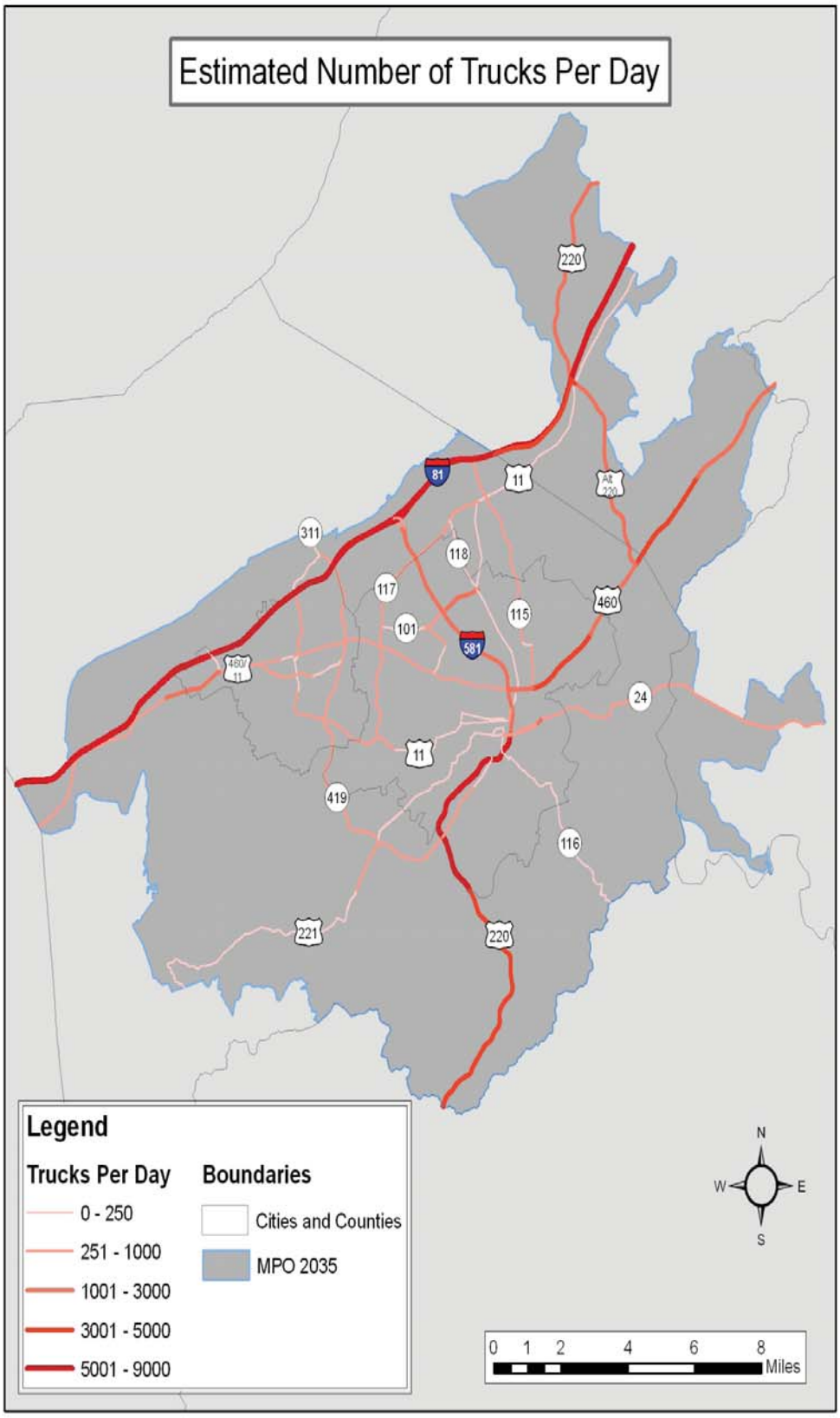
U.S. 220 Alternate, U.S. 460, U.S. 220, and I-581 are the other major truck corridors in the region. I-581 (defined by terminals at I-81 in the north and the City of Roanoke's Elm Avenue in the south) appears on the maps to have significantly less truck traffic than U.S. 220. This is true for the percentage of truck traffic. Trucks comprise 6-7% of the total traffic on I-581. In terms of the total number of trucks, however, it's a different story. The numbers shown for U.S. 220 include the number of trucks traveling both north and south along the corridor. For I-581, these numbers are divided between the directions of travel. Approximately 2,000 trucks per day travel each direction of the corridor, meaning that over 4,000 trucks travel on the corridor as a whole each day.

U.S. 460 is a major truck corridor to the east of I-581. In most sections, truck traffic constitutes 9-15% of the total traffic. Some sections receive between 3,000-5,000 trucks per day, while the rest receive 1,000-3,000 per day. West of I-581, truck traffic on U.S. 460 is still significant, but it is noticeably diminished.

U.S. 220 Alt serves as the primary connecting corridor between I-81 and U.S. 460. 1,000-3,000 trucks travel this corridor each day, which accounts for 9-15% of the total traffic.

U.S. 220 carries between 3,000-9,000 trucks per day between Franklin County and Elm Avenue in the City of Roanoke, with the numbers steadily increasing as the road approaches downtown Roanoke City. These vehicles comprise slightly under 15% of the total traffic on this section of the road. U.S. 220 then shares roadway designation with I-581 and I-81 until it reaches I-81 Exit 150 in Botetourt County. After it separates from I-81, the truck traffic diminishes greatly. These sections receive between 1,000-2,000 trucks per day.


Truck Traffic as Percentage of AADT
220
81
11
Alt 220
311
118
117
115
460
101
581
460/ 11
24
11
419
116
221
220
Legend
Percentage of AADT
0 - 3
4 - 8
9 - 15
16 - 25
26 - 35
Boundaries
Cities and Counties
MPO 2035
N
W
E
S
0 1 2 4 6 8
Miles


Estimated Number of Trucks Per Day
220
81
11
Alt 220
311
118
117
115
460
101
581
460/ 11
24
11
419
116
221
220
Legend
Trucks Per Day
0 - 250
251 - 1000
1001 - 3000
3001 - 5000
5001 - 9000
Boundaries
Cities and Counties
MPO 2035
N
W
E
S
0 1 2 4 6 8
Miles

Freight Design Deficiencies

In the 2002-03 Regional Freight Study, shippers and motor carriers in the region identified a number of traffic and roadway design deficiencies in the study area. Those that were identified as in most need of improvements were:

- Traffic signalization – timing and spacing
- Intersection Design – specifically making right turns
- Sufficient turning radii into delivery points such as shopping centers, retail establishments, restaurants, etc. along roadways
- Freight access and staging for commercial/business establishments

Traffic design issues often contribute to a less reliable freight network. By developing a defined network and understanding the specific freight roles played by the region's highways, roadway improvement strategies are likely to be more successful. There are several common areas of need for roadway design standards for truck activities:

- Intersection Design
- Cross-Section and Geometric Design
- Signalization
- Separation.

Computer illustration of right hand access lanes (i.e. "jug handle") to accommodate left hand turns - highlighted in orange

Computer illustration of right hand access lanes (i.e. "jug handle") to accommodate left hand turns - highlighted in yellow

Design Standards for Freight Transportation

Intersection Design affects accessibility through delayed right turns due to oncoming traffic. To avoid oncoming traffic, trucks may be forced to "cut corners" onto curbs, while in other instances "curb hopping" may be attributed to lane-dividing medians. In either case, when forced onto curbs or medians while negotiating a right turn, trucks run the risk of load shifts and damage to the goods they carry. Impediments, such as telephone poles, signs, or landscaping can also affect maneuverability. While the beautification of intersections has its benefits, in many instances such beautification projects fail to take into consideration the potential impact on freight mobility. Landscaping, when combined with either oncoming traffic or center medians, can place a tremendous burden on truck drivers in terms of maneuverability. Further, natural and artificial impediments, when not placed properly taking into consideration freight transport interests, can affect sight lines. Such an effect can directly impact intersection safety for freight and passenger traffic alike.

Cross-Section and Geometric Design including the turning radii, lane widths, and other cross-sectional factors should be based upon the intended use or role of the facility. Regional truck routes tend to accommodate large, as well as smaller, trucks (WB50 and WB70) and, therefore, should be designed to accommodate those vehicles without creating significant traffic impacts. Local truck routes also need to accommodate larger and smaller truck sizes, and hence would have to be designed accordingly.

Signalization has improved dramatically over the past several decades; however, the development of better timing plans is limited by the availability of good traffic data on a continuing basis. Signal timing "optimization" activity today is often performed using data collected on only one or two days and typically does not include information regarding truck volumes. Several studies have taken place recently to develop better signal plans for heavily traveled truck corridors.

The spacing of traffic signals and the individual timing patterns, while accounting for light-vehicle mobility, in many instances fails to account for the time it takes heavy truck traffic to attain a reasonable speed or to stop. Abrupt starting and stopping by large commercial freight vehicles is very fuel inefficient and indirectly increases the cost of product transport, while at the same time diminishing air quality in the region.

Truck Separation where it makes sense may be especially important in areas of high traffic density and where good alternatives are available. The most fundamental form of separation is to design roadways with sufficient lane widths, providing traffic sufficient maneuverability. Another form of separation is to restrict specific types of traffic along specific corridors.

Design Guidelines for Roadway Elements

Truck traffic, particularly heavy-truck traffic, causes a disproportionate amount of roadway wear in comparison to passenger vehicle traffic. RVAMPO roadways intended to be used as freight transport corridors should be designed to common physical standards more durable than conventional roadways. For example, freight network roadways should be designed to higher lane and curb lane widths, as well as shoulder widths. Pavement Condition Rating (PCR) values, as well as intersection radii should also be designed for a significantly higher volume of freight traffic than other roadway facilities.

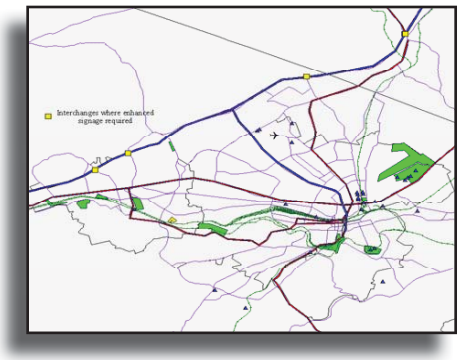
Signalization Guidelines: Special traffic signalization considerations should be made along freight network facilities. Signal timing plans along freight corridors should be adjusted to account for the larger size and slower acceleration of trucks. As metropolitan truck corridors often span multiple jurisdictions across a region, it is essential that there exist inter-jurisdictional cooperation with respect to coordination of signal timing so that the maximum benefit of this strategy may be realized.

Signage: The development of sign design and placement guidelines can facilitate the efficient movement of freight and goods. Drivers not familiar with a particular metropolitan area can be forced to backtrack if roadway signs are unclear, missing, or placed in hard to see locations. This applies to roadway identification signs, as well as directional signs along a roadway. Metropolitan areas generally do not specify guidelines as to the placement of address signs. Consequently, many businesses and residences either lack address signs altogether, or have them placed in a location hard to see from the street, making it difficult for unfamiliar delivery drivers to locate individual stops.

Fast action projects

Below are the original fast action projects recommendations from the 2002-03 Regional Freight Study. These projects will be considered as a part of the Constrained and Vision list planning processes. These project suggestions were generated through the stakeholder outreach process.

Project #1 Improve Highway Signs on I-81 and I-581

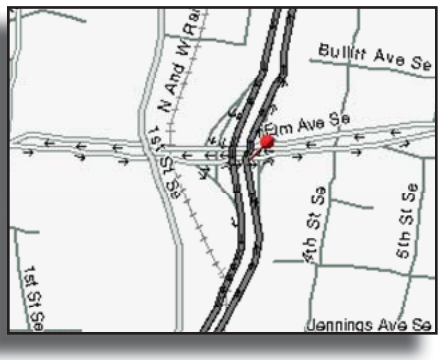


Source: Shipper Interviews
Jurisdiction: VDOT
Problem: Current traffic signs at major exits do not provide adequate information to truck drivers attempting to locate industrial centers.
Proposal: Install signs indicating exits to the City of Salem and Town of Vinton. List major industrial facilities.

Project #2 Orange Ave & I-581

Source: Motor Carrier Survey
Jurisdiction: VDOT
Problem: Inadequate acceleration/deceleration lanes at interchange
Proposal: Redesign and extend entrance/exit ramps to accommodate large trucks. (note: current TIP references ramp acceleration projects)

Project #3 Elm Avenue & I-581

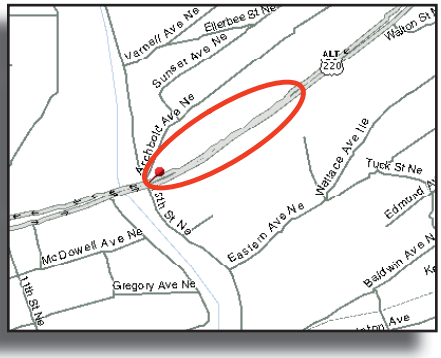


Source: Motor Carrier Survey
Jurisdiction: VDOT
Problem: Inadequate acceleration/deceleration lanes at interchange
Proposal: Redesign and extend entrance / exit ramps to accommodate large trucks. (note: current TIP references ramp acceleration projects)

Project #4 Elm Avenue & Williamson

Source: Motor Carrier Survey
Jurisdiction: City of Roanoke
Problem: Congested intersection – difficult to turn through with a truck
Proposal: Study traffic patterns to determine if an alternate route could be used by trucks, and/or conduct an operational analysis of the intersection.

Project #5 Orange Av. & 13th St. NE



Source: Motor Carrier Survey
Jurisdiction: City of Roanoke
Problem: Traffic merges from 3 to 2 lanes creating a dangerous area as people attempt to beat trucks to the merge point.
Proposal: Conduct preliminary engineering analysis for possible road widening project.

Project #6 Salem Turnpike & Melrose Ave

Source: Motor Carrier Survey
Jurisdiction: VDOT
Problem: Dangerous intersection due to off-setting lanes, and just prior to the intersection Melrose has a narrow curve where many trucks go over the center line and encroach on east bound traffic lanes.
Proposal: Conduct an operational analysis

Project #7 Salem Turnpike & Peters Creek Road

Source: Motor Carrier Interviews
Jurisdiction: City of Roanoke
Problem: Signal functions poorly – "west bound is always green – east bound waiting to turn have to wait until next light cycle."
Proposal: Conduct an operational analysis of the intersection.

Project #8 Lynchburg Turnpike & Electric Road

Source: Motor Carrier Interviews
Jurisdiction: City of Salem
Problem: Inadequate overhead clear ance: bridge height is 13'9" and many loads require 14".
Proposal: Consider lowering the road bed 3".

Project #9 US 460 and Granby Road

Source: Motor Carrier Survey
Jurisdiction: City of Roanoke
Problem: Very difficult for trucks to make a right hand turn off US 460 (Orange Av) onto Granby Rd. to access to Statesman Industrial Center.
Proposal: Conduct an operational analysis of the intersection.

Project #10 US 460 and Challenger Ave

Source: Motor Carrier Interviews
Jurisdiction: County of Roanoke
Problem: Turn lanes constructed for the Bonsack Wal-Mart are not wide enough to store trucks side by side in the two lanes.
Proposal: Widen turn lanes.

Urban Signage Study

In fiscal year 2006, RVAMPO staff completed the *Urban Signage Study*. The following excerpt from the study includes a recommendation for signage clarification on Hershberger Road leading to Interstate 581. This section of roadway is very important for freight transportation as it connects the Roanoke Regional Airport and surrounding commercial land uses to Interstate 581 near its terminus with Interstate 81.[15]

Exit Only Lane-Hershberger Road

A common complaint amoung area residents is that the right lane in Figure 38 is an on-ramp to I-581. Local traffic often has to merge left at the last minute when they realize the lane ends. This situation could be improved by an "EXIT ONLY" sign on the overhead, or by pavement markings with a similar message.

Figure 38-Hershberger Road exit only lane to I-581 north could benefit by better marking on an overhead sign or on the pavement

5. Roanoke Urban Area Signage Study-August 2006-Page 33 http://www.rvarc.org/work/signage.pdf

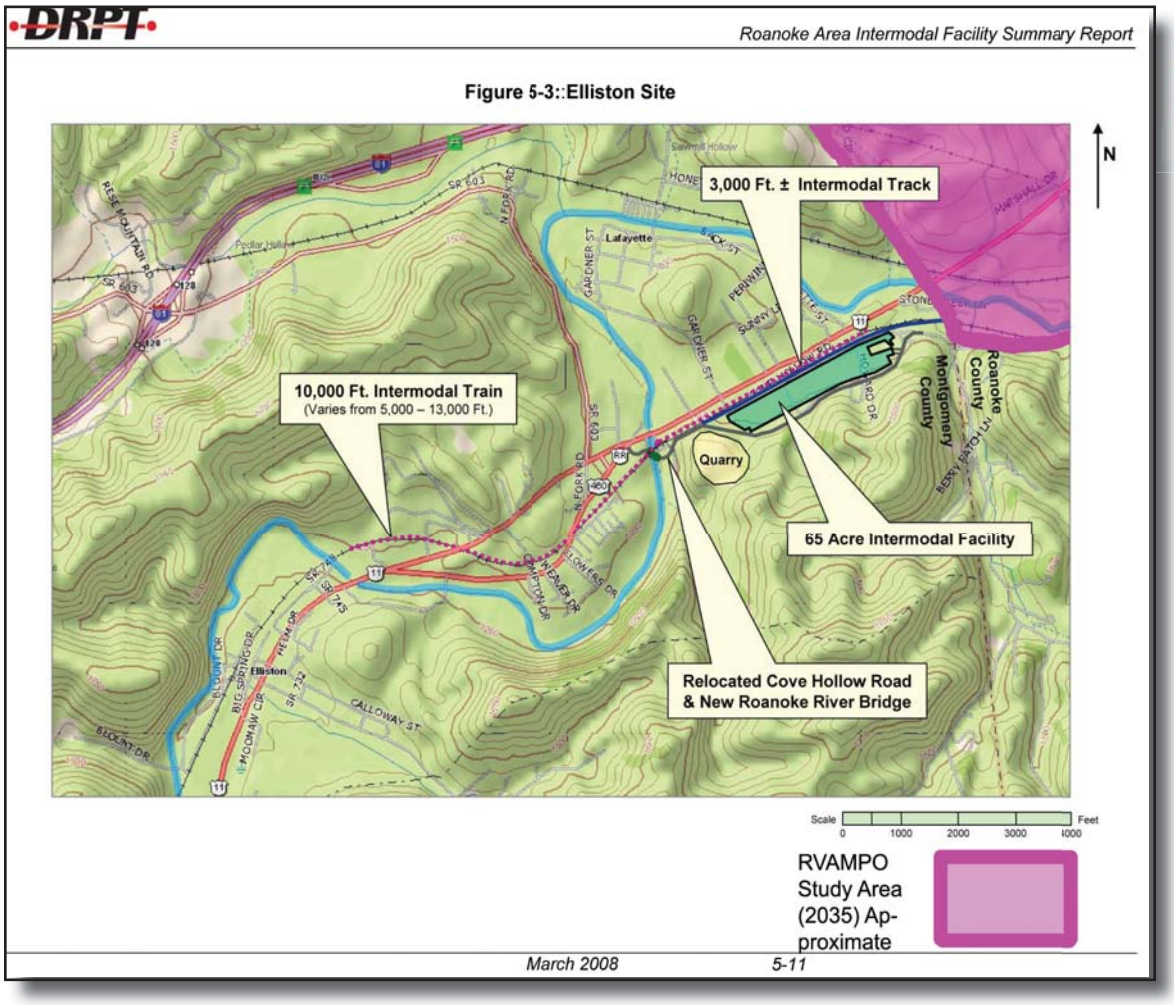
Roundabout Design

Roundabouts can be designed with truck aprons to accommodate vehicles with wheel bases of 50 to 67 feet (WB-50 or WB-67). The aprons are distinct, both visually and surface texturally, from the surrounding roundabout. However, trucks and emergency vehicles are able to drive on the aprons to negotiate the roundabout safely and without delay. The following image shows a roundabout with a properly designed truck apron.

Properly Designed Roundabout with truck/emergency vehicle apron. Roundabout location West Haven, CT designed by William Britnell, original image (without illustration and callout box) provided by VDOT central office, Richmond VA.

Intermodal Center in Elliston (Montgomery County)

In 2008, the Virginia Department of Rail and Public Transportation (VDRPT) selected a site in Elliston, Virginia for the regional Intermodal Freight Transfer facility for the multi-state Heartland Corridor Project with Norfolk Southern (NS). The Elliston location is just outside the RVAMPO 2035 study area for this plan. The graphic on the next page illustrates the proximity of the selected site to the 2035 study area (shown in purple).



Altered image depicting approximate location of RVAMPO 2035 study area boundary compared with nearby Elliston Site. Original Image "Roanoke Area Intermodal Facility Summary Report," VDRPT - March 27, 2008 - Page 41 - http://www.drpt.virginia.gov/special/files/Main Report 03-27-08.pdf

Future Expansion of RVAMPO Study Area Boundary

Since the proposed intermodal facility site is just outside the RVAMPO 2035 study area, any federal funds spent on site will not be part of the RVAMPO planning process. However, development sparked by the intermodal facility will likely expand RVAMPO study area boundaries to include Montgomery County in future Long-Range Transportation Plan updates, based on census population density results. Portions of Franklin County will also likely come into the RVAMPO planning process due to development induced by a water and sewer line extension into Franklin County along the US 220 Corridor.

Spill Back Development into RVAMPO

The Elliston intermodal site is likely to induce spill back development into western Roanoke County and the City of Salem.

A team of Virginia Tech Students investigated the concept of spill back development in a FY 2008 report. The report was a second semester follow-on to the group's third place award-winning entry in the 2008 RVAMPO Student Paper Competition. Team members included Race Kangas, Eric Hundley, Lindsey Ingalls and Shaun Lehman. The team used the projected induced employment range reported in "*An Economic Assessment of a Roanoke Region Intermodal Facility*"[61] as a control total range. The team then used a commercial type indicator from California to estimate the percentage of future employment that could be sited on the original 65 acre site. Subsequently the team used local government online GIS records to identify unused and under-utilized parcels near the intermodal site. They used the same place type indicator to allocate remaining projected employment into nearby parcels that would likely become available and were located in zoning classifications that allowed for commercial or industrial development.

Place Type Menu relates building type to estimated number of employees per acre. Provided by Sacramento Area Council of Governments www.sacog.org - Students used the place type menu to estimate commercial and industrial employment potential for properly zoned parcels close to the Ellistion intermodal site in Western Roanoke County and the City of Salem.

6. http://www.drpt.virginia.gov/special/files/Economic Assessment of Roanoke Intermodal Facility Final Report 1-07-08.pdf

The students reported that the following parcels would the most likely to develop or develop more intensely over a 20 year period.

City of Salem

Sites (TAX ID)	Zoning	Acres	Notes
163-1-1	Heavy Mfg.	12.041	Vacant Land
56-1-1	Light Mfg.	8.42	Vacant Land, located along train tracks
155-2-3	Heavy Mfg.	20.6784	Vacant Land
142-1-2	N/A	7.3	Old Tannery, could be potentially bought
116-1-2	Heavy Mfg.	13.26	Under utilized
150-3-1 and 155-2-2	Heavy Mfg.	8.47	Potential development already began

Roanoke County

Sites (TAX ID)	Zoning	Acres	Notes
055.03-01-26.00-0000	Heavy Industrial	3.06	Current owner 'Bolling Steel Co.'designated as 'not in land use'
055.03-02-01.00-0000	Heavy Industrial	10.97	Large, open parcel located next to tracks
055.03-02-08.00-0000	Heavy Industrial	3.33	Undeveloped land, may need to be cleared for future use
054.04-01-12.00-0000	Commercial	3.27	Located directly next to I-81

City of Roanoke

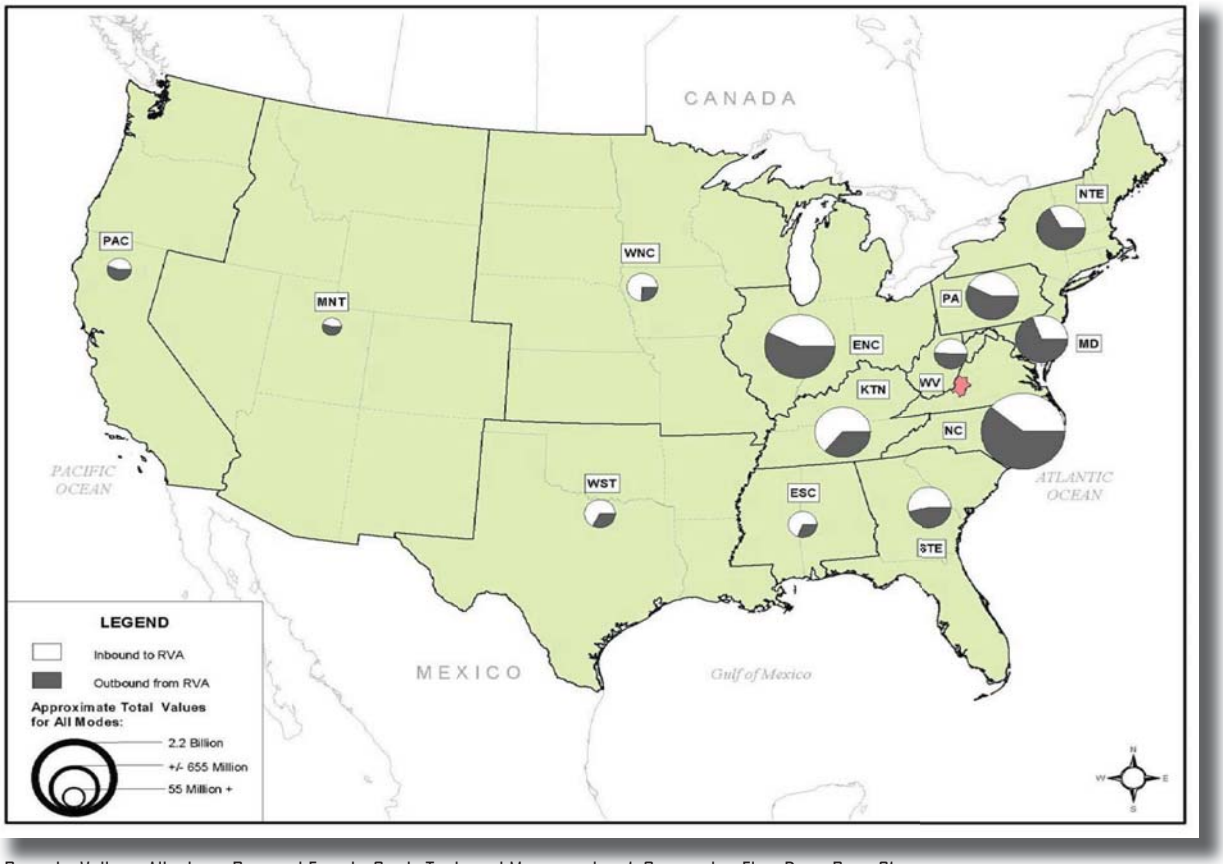
Sites (TAX ID)	Zoning	Acres	Notes
5090201	400-Commercial/Industrial	5.69	Owned by SW Improvements; older plaza that could be used for multiple businesses
5090207	400-Commercial/Industrial	1.89	Owned by SW Improvements; older plaza that could be used for multiple businesses
5210103	400-Commercial/Industrial	3.1304	Building owned by investment co.; appears vacant; next to tracks
5210711	400-Commercial/Industrial	3.9963	Appear to be older buildings, photos show storage units, located near tracks

Preliminary plans for the Elliston Intermodal Center include a connection to Interstate 81 located outside of the RVAMPO 2035 study area. However, the spill back/infill development induced by the Intermodal Center will likely put increased truck traffic on Route 11/460 as containers are drayed between manufacturing and warehousing facilities and the intermodal center itself. Any expansion or redesign of the affected sections of Route 11/460 should keep the following in mind:

- Designs should be compatible with large wheel base vehicles
- Designs should consider traffic signal timing and variable message sign placement
- Designs should consider "jug handles" or other designs to limit left turn conflicts
- Designs should designate corridor as "no idling" zone to limit air pollution

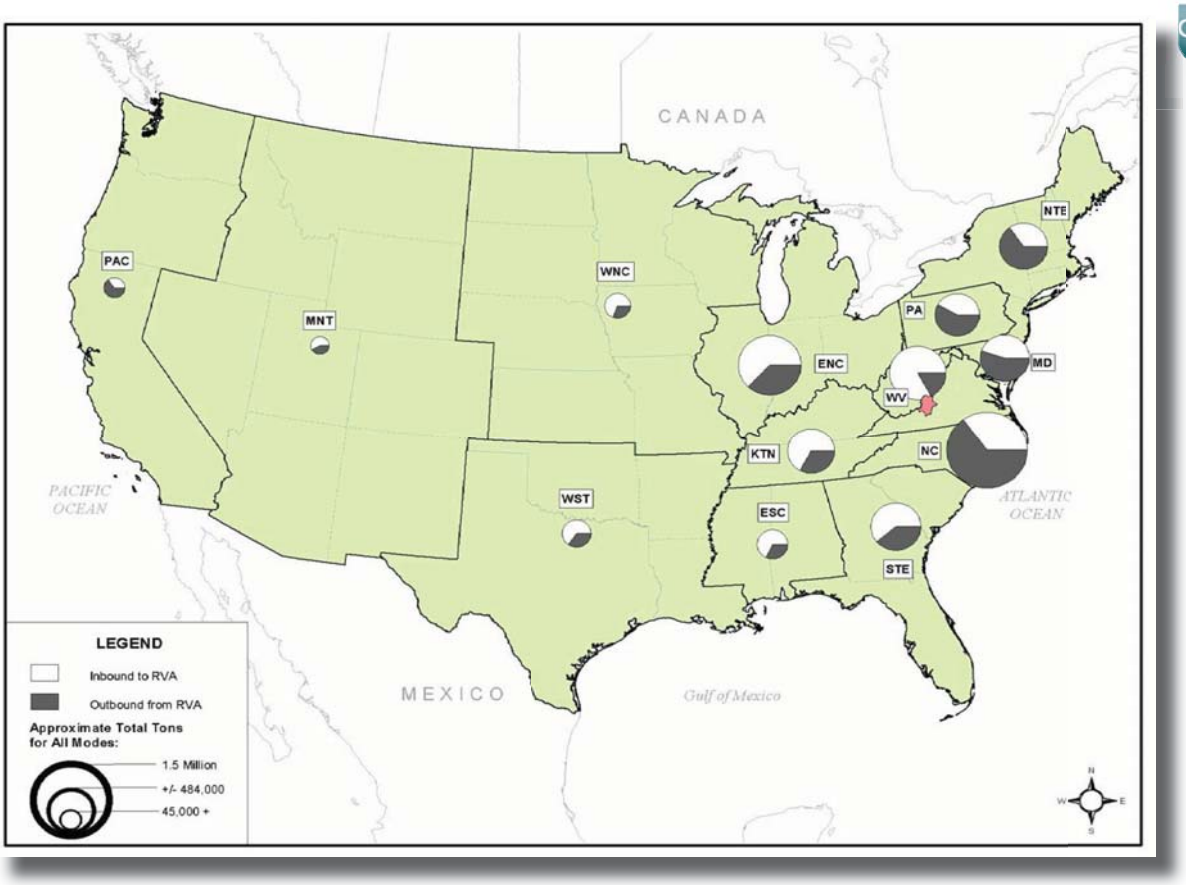
2002-03 Freight Study

The 2002-03 Regional Freight study was completed with the assistance of Wilbur Smith Associates, a Virginia engineering consulting firm. That study used 1998 Reebie Associate's Transearch Freight Data, which was the predecessor of the 2004 Global Transearch Freight Data. Below is a representation of total flows into and out of the region by value.



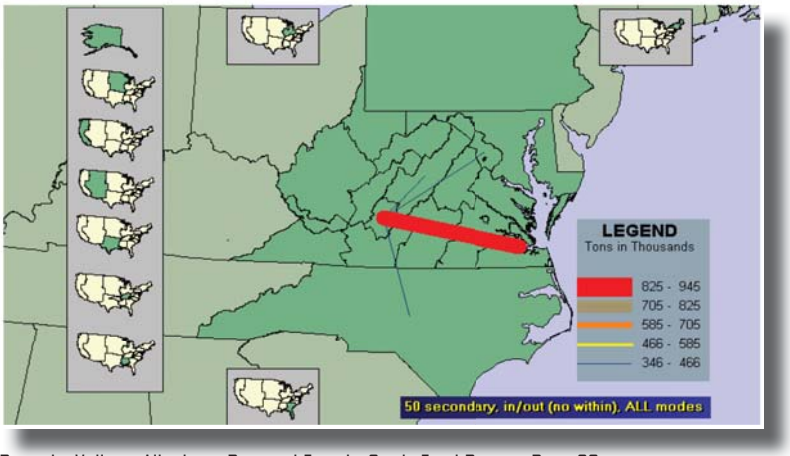
Roanoke Valley - Alleghany Regional Freight Study Technical Memorandum I: Commodity Flow Data, Page 21

The following is a similar representation of inbound and outbound freight flows (all modes) expressed in tons.



Roanoke Valley - Alleghany Regional Freight Study Technical Memorandum I: Commodity Flow Data, Page 28

These maps show relatively large inbound and outbound freight movements from the Roanoke region to and from the Port of Virginia terminals in the Hampton Roads area. The following depicts the flows of secondary traffic between the Roanoke Region and the Port of Virginia. Secondary traffic includes items that are staged, warehoused, or in general intermodal.



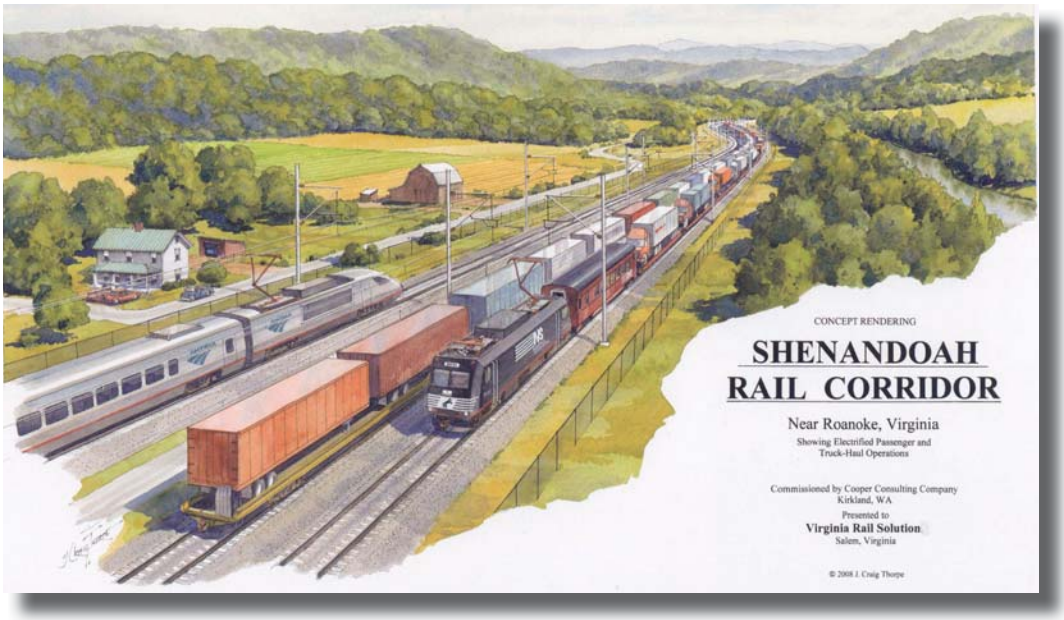
Roanoke Valley - Alleghany Regional Freight Study Final Report, Page 23

These East-West freight movements are the primary targets of the future Heartland Corridor Intermodal Center in Elliston, Virginia. The Heartland Corridor is designed to connect the Ports of Virginia to Chicago, Illinois through West Virginia and Ohio primarily using "double stacked" intermodal containers transferred to and from trucks at intermodal centers.

The Heartland Corridor may even address some East - West freight movements that are masquerading as North-South movements along Interstate 81. During stakeholder interviews for the 2002-03 Regional Freight Study Wilbur Smith Associates found the following:

> Virginia Route 460 – Overall, shippers who operated their own fleets and had frequent shipments to and from the Hampton Roads / Newport News area said that Route 460 was "not good" as it was seen as rough and slow. Most shippers send their drivers on the more circuitous route of I-81 north to I-64 to access the ports. Several shippers commented that improvements to Route 460, and construction of the proposed I-73 corridor, would take much of the congestion off I-81.[17]

There is citizen interest in diverting some of the interstate freight away from the I-81 corridor. RAIL Solution (www.railsolution.org), a grass roots citizens organization, advocates for a rail freight component to North-South freight movements. The rail would run parallel to the Interstate 81 corridor, which is often labeled a NAFTA corridor. An artist's conception of the RAIL Solution proposal is featured below (image used with permission).



Inclusion of the RAIL Solution concept and image does not imply RVAMPO endorsement of the technology advocated by RAIL Solution. RAIL Solution's roll-on-roll-off intermodal technology, conventional container double stack technology, or another intermodal freight technology may prove to be best for the rail lines in the Interstate 81 corridor.

7. Roanoke Valley - Alleghany Regional Freight Study - Technical Memorandum #2, Page 21.

ITS, Operations Management, Safety, and Security Planning 10

Construction Costs have been increasing faster than inflation rates due to global demand for construction inputs such as steel, concrete, and asphalt. Meanwhile, projected transportation revenues have either been holding steady or declining over time due to increasingly fuel efficient vehicles which affect revenues from the fixed cents/gallon federal and state gas taxes. This situation means that fewer construction transportation projects can be accommodated in the Financially Constrained List of Projects as compared with past long-range transportation plans.

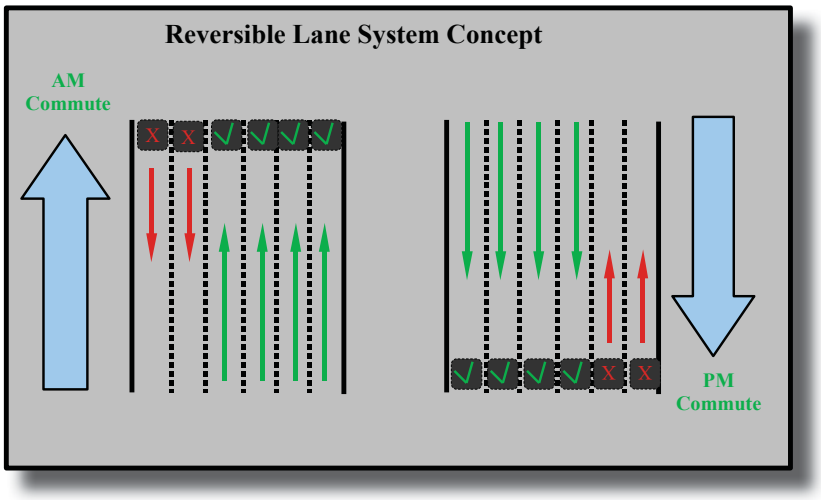
Photo simulation of possible Reversible Lane system for US 220 South

This creates both a challenge and an opportunity. It creates an opportunity for non-construction approaches (such as Intelligent Transportation Systems (ITS) and operations management) to play greater roles in long-range transportation planning. These approaches typically use existing infrastructure which is then "managed" using technology to observe, assess, and communicate messages to drivers.

Intelligent Transportation Systems

Reversible Lane Systems

While many technologies fall into the realm of ITS, a reversible lane system is one of the most elaborate. This system allows for reconfiguration of travel lanes on an existing roadway system in response to changing conditions, such as rush hour traffic or accidents.



In the diagram above 4 of 6 lanes are dedicated to the in going commute into the urban area in the morning, and 4 of 6 lanes are dedicated to outgoing commute in the evening. A reversible lane system is an excellent way to better manage the infrastructure already paid for by public funds, thereby reducing the need for costly facility expansion.

Photo-Simulation of Conceptual Reversible Lane system on US 460 (Orange Avenue) - Actual Conditions Depicted in Box Labeled "Current"

Interstate Reversible Lane Systems

Interstate reversible lane systems are similar to conventional reversible lane systems except that the center reversible lanes have limited access and are separated from the conventional interstate lanes. Vehicles enter and exit the reversible lanes through access gates at predetermined locations. A reversible lane could be used as an express lane from Roanoke to the New River Valley, as HOV lanes, as car only lanes, or as truck only. In fact, the reversible lanes could accommodate several functions -- HOV lanes for commute times, express lanes during the day, truck lanes at night. Fiber optics, sensors, and other technology can be installed to facilitate future technology advances.

Photo-Simulation of Conceptual Interstate Reversible Lane system on Interstate 581 - Actual Conditions Depicted in Box Labeled "Current"

Variable Speed Limit Zones

Variable speed limit zones allow speed limit adjustments in response to traffic flow conditions. The speed limit changes are communicated to drivers through a series of variable message signs (VMS) placed at regular intervals throughout the variable speed limit zone. The system can be used to reduce the speed limit for approaching traffic miles ahead of an incident, bottleneck, or severe congestion. It allows upstream traffic to clear before oncoming traffic amplifies the bottleneck by approaching too quickly. Likewise, safety is enhanced by reducing approach speeds and the likelihood of rear-end collisions.

Variable speed limit zones have been successfully deployed in larger urban areas such as Orlando, Florida. They are also used in Virginia at approaches to structural bottlenecks such as the bridge tunnels in the Hampton Roads area. Variable speed limit zones are not usually considered for smaller/medium urban areas such as Roanoke. However, increasing congestion on I-81 may warrant this approach as a mid-term measure while awaiting funds for a design or construction upgrade.

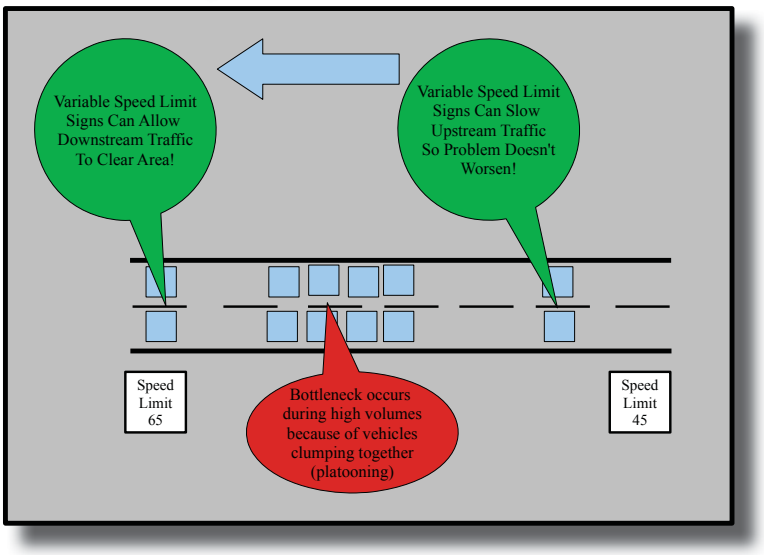


Photo-Simulation of Conceptual Interstate Variable Speed Limit Zone on Interstate 81 - Actual Conditions Depicted in Box Labeled "Current"

Parking Management Systems

Parking Management Systems incorporate a series of sensors and VMS that inform drivers which parking garages are full and direct drivers to parking garages with available space. This system could be combined with a common parking pass or common parking payment system to facilitate parking management. Parking Management Systems can not only reduce vehicle traffic, but can also potentially improve safety due to a reduction in cruising for parking spaces and fewer distracted drivers scanning side streets for open spaces.

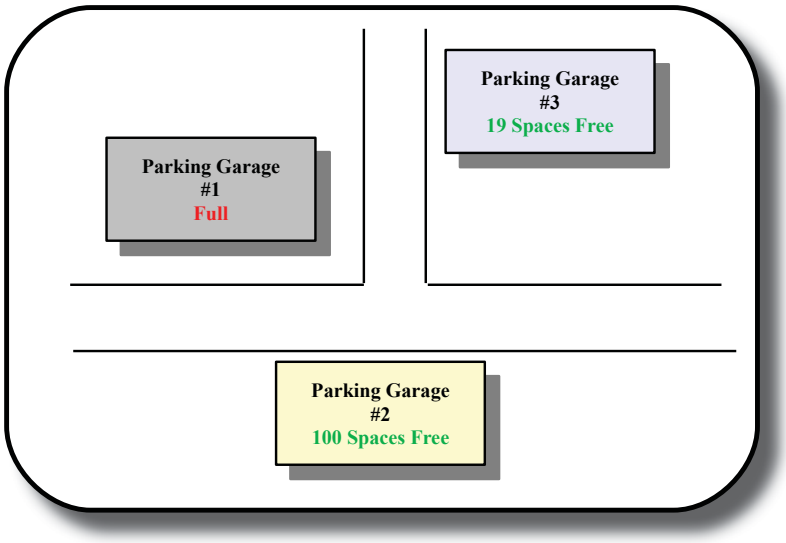


Photo-Simulation of Conceptual Parking Management Variable Message Signs in Downtown Roanoke - Actual Conditions Depicted in Box Labeled "Current"

Public Transportation Systems

The goal of this strategy is to get information into the hands of the transit user or potential user. In order to provide up-to-date information, transit vehicles, such as buses, would be outfitted with an Automatic Vehicle Location (AVL) system. This would allow operations managers to display up-to-date bus arrival times at bus stops and to display current vehicle locations on websites or through compatible mobile and hand held devices. This technology could open up additional ridership markets to transit systems. For example, a downtown employee could park a car once and take transit (using arrival time information) in order to avoid "in-and-out" parking charges. It would also benefit traditional transit customers.

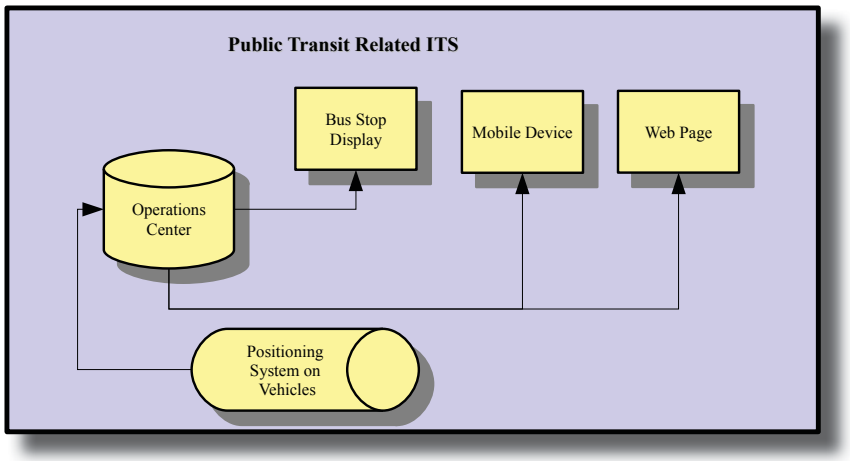
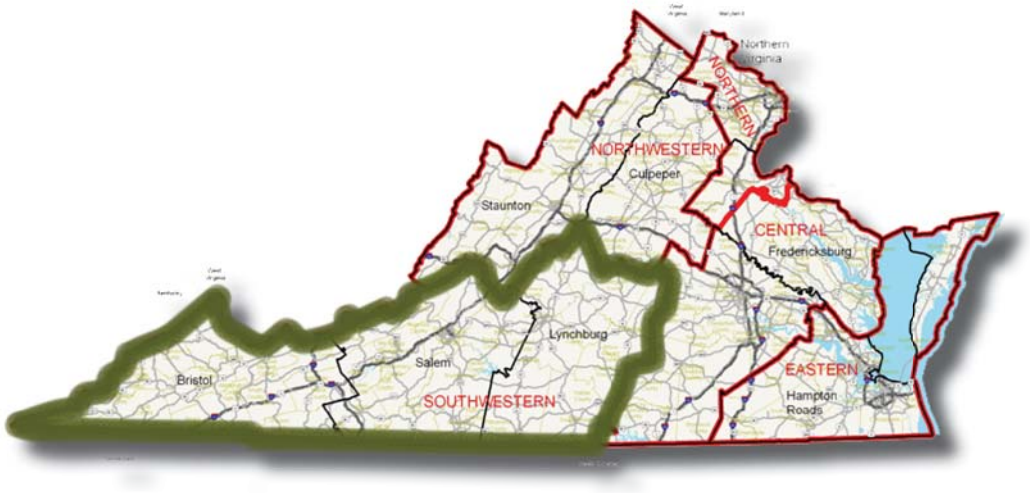


Photo-Simulation of Bus Arrival Time Message Sign - Actual Conditions Depicted in Box Labeled "Current"

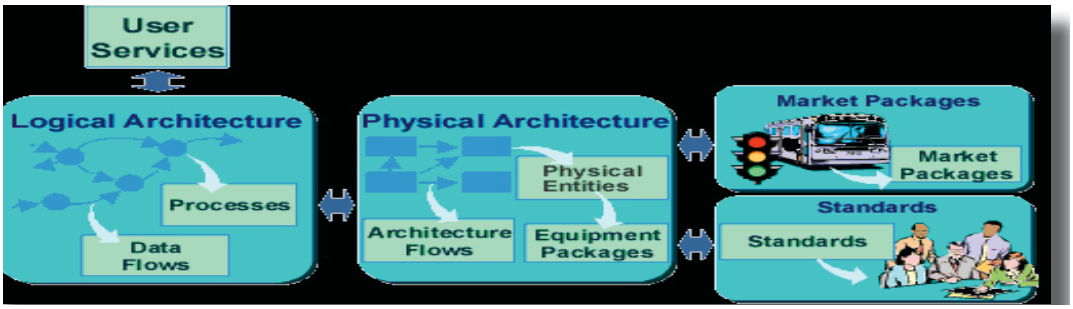


Proposed Virginia Southwest Region ITS Architecture geographic extent highlighted in green.

Regional ITS Architecture

Rapid advances in technology have created "new opportunities for transportation professionals to deliver safer and more efficient transportation services, and to respond proactively to increasing demand for transportation services." However, in order to effectively manage these opportunities, coordination between organizations is essential. To encourage and enable this coordination, the USDOT developed the National ITS Architecture as a cornerstone of planning for effective interagency coordination of technology-based projects. Further legislation encouraged "regional ITS architecture" that can be tailored to address local situations and ITS investment needs.

VDOT, along with a private consultant, ITERIS, is updating the Virginia Statewide ITS Architecture and the Regional ITS Architectures. The proposed updated ITS Architectures would apply to VDOT's Transportation Operations Center. RVAMPO recognizes the current VDOT ITS architecture, which conforms to the VDOT Salem Construction District geographic boundaries. The proposed updates would apply to VDOT's Transportation Operations Center (TOC) geography, which is larger than the previous "VDOT Construction District" geographical extent. The proposed geographical extent for the updated Regional ITS architecture is depicted in the map above. This geographical extent will include RVAMPO and MPOs in the Lynchburg Area, New River Valley, Danville, and portions of two multi-state MPOs near Bristol. It is anticipated that the RVAMPO will accept the final "Virginia Southwest Region ITS Architecture" as RVAMPO ITS Architecture.



Operations Management

Interstate 81 - Managed Travel Lanes System

The United States Department of Transportation's Federal Highway Administrations reports that traffic congestion has "reached unprecedented levels despite our heroic but, ultimately, failed efforts to build more highways in response to the nation's insatiable demand for travel."

Photo-Simulation of managed lanes in current I-81 median configured for Virginia Tech game days and other special events. Manage lanes could be coupled with a Variable Message Sign (right).

Managed travel lanes are one of the most effective tools for dealing with congestion. Managed travel lanes combine new construction of two or more lanes with ITS elements such as variable message signs (VMS), cameras and other sensors to actively manage the lanes to adapt to accidents, special events or peak travel times. (Note: These photo simulations are for illustration purposes only and are not drawn to scale.)

Managed travel lanes can be reversible and/or dedicated to trucks at specific times of the day. Non-recurring congestion, such as accidents, can play a major role in overall traffic delays. The figure to the right illustrates how repeatable temporary access points can allow traffic to shift around a major accident and allow emergency access to the scene.

Managed lanes are excellent for accommodating morning peak hour congestion. In this role the lanes could allow for peak hour directional traffic from Botetourt County to Roanoke, Salem, and the New River Valley. The managed lanes could consistently operate in the peak hour direction from 7:00 until 9:30 each morning.

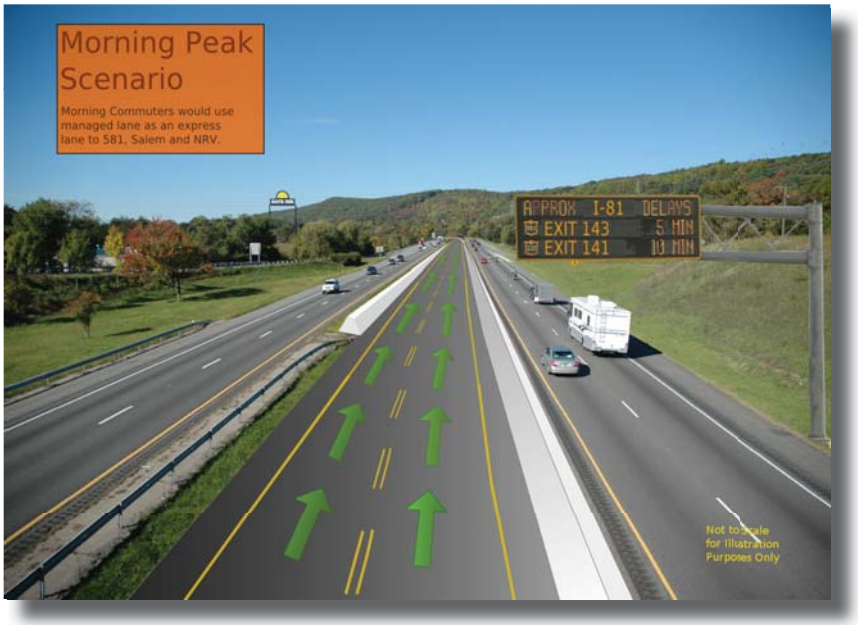


Photo-Simulation of managed lanes in current I-81 median configured for morning peak commute into Roanoke Metropolitan Area. Managed lanes could be coupled with a Variable Message Sign (right).

Likewise, managed lanes are excellent for accommodating afternoon peak hour congestion. In this role the lanes could allow for peak hour directional traffic from the Cities of Roanoke and Salem to Botetourt County. The managed lanes could consistently operate in the peak hour direction from 4:00 until 6:30 each afternoon.

Managed lanes can also be configured as truck only lanes, where the center lanes are restricted to through tractor trailers during the hours of highest tractor trailer demand.

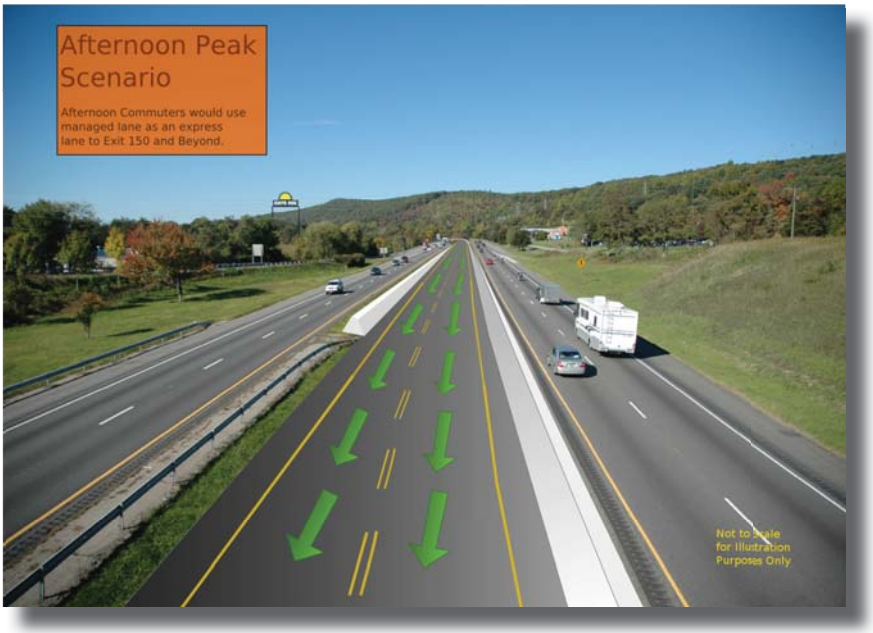


Photo-Simulation of managed lanes in current I-81 median configured for afternoon peak commute out of Roanoke Metropolitan Area.

The concept of truck only lanes was originally proposed by a consortium of companies referred to as "Star Solutions" under Virginia's Public Private Transportation Act (PPTA).

The figure below shows managed lanes that serve as truck lanes on a temporary or peak demand basis. The original PPTA concept would have permanently dedicated lanes to tractor trailer traffic twenty-four hours a day and seven days a week.

Another idea gaining acceptance is converting HOV (High Occupancy Vehicle) lanes to High Occupancy Toll (HOT) lanes. Free access to the HOV lanes is restricted to vehicles with two or more passengers, but by paying a toll Single Occupancy Vehicles (SOV) could gain access to the HOV lane.

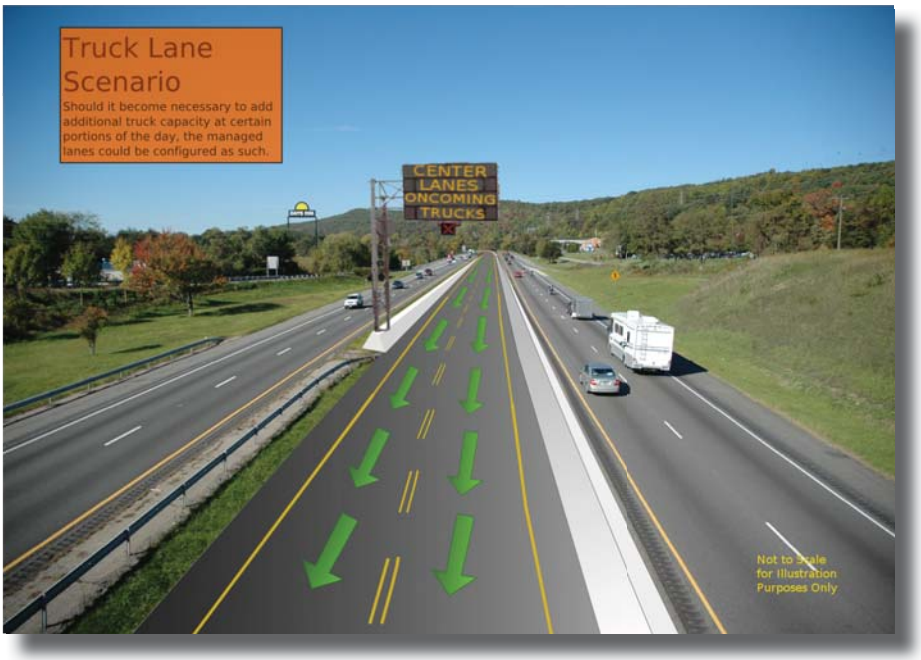


Photo-Simulation of managed lanes in current I-81 median configured for peak truck demand. Managed lanes could be coupled with a Variable Message Sign (center).

The fee could vary by the time of day and could be communicated using variable message signs. The fee would be collected using transponders and wireless technology.

Photo-Simulation of managed lanes in current I-81 median configured for morning High Occupancy Toll (HOT) peak commute. Managed lanes could be coupled with a Variable Message Sign (center), and additional High Occupancy Vehicle (HOV) outside lanes.

Safety Planning

Safe Routes To School Program

RVAMPO has been working with the Roanoke City, Roanoke County, and Salem City Schools systems since 2006 to develop Safe Routes to School (SRTS) programs in elementary and middle schools. With RVAMPO's assistance, these systems have successfully applied for SRTS grant funding through VDOT. The goal is to have SRTS programs at all appropriate schools in the region by 2015.

The SRTS programs enable and encourage students to walk and bicycle to school by assessing conditions around schools and conducting projects and activities that improve safety and reduce traffic and air pollution in the vicinity of schools. As a result, these programs make bicycling and walking to school safer and more appealing transportation choices while encouraging a healthy and active lifestyle from an early age.

The implications of SRTS can be far-reaching. Safe Routes programs can improve safety not just for children, but for all pedestrians and bicyclists. They provide opportunities for people to become more physically active and to rely less on their cars. SRTS programs benefit the environment and enhance the community's quality of life by reducing traffic congestion and motor vehicle emissions.

The SRTS initiative was given a tremendous uplift when funding for programs and infrastructure was included in the 2005 federal transportation legislation, SAFETEA-LU. Based on this legislation, the Virginia Department of Transportation developed a Safe Routes to School Program that provides grant funding to interested localities and schools to develop plans, activities, and infrastructure improvements for students in kindergarten through eighth grade.

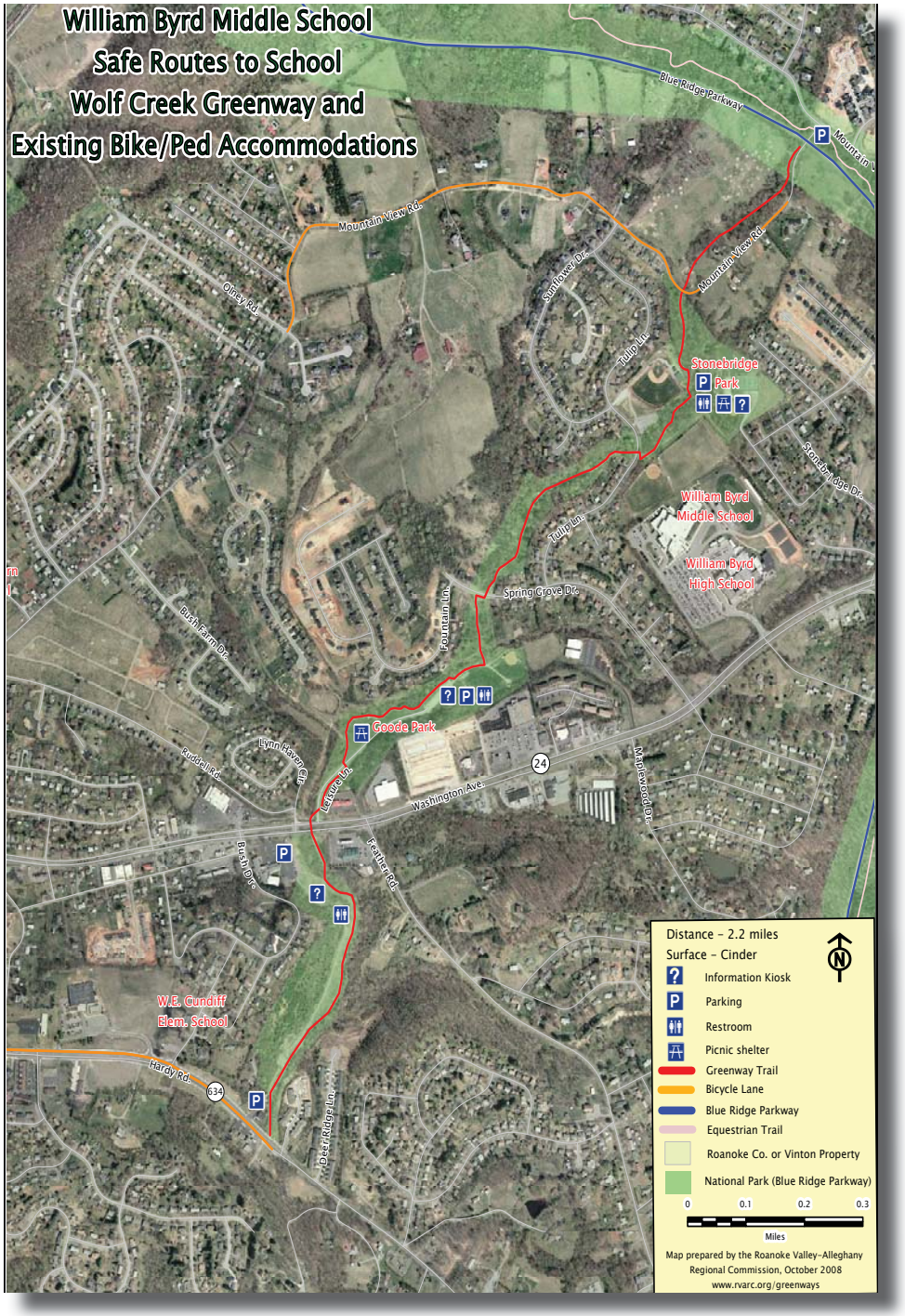
Safe Routes To School Travel Plans

When schools and communities are ready to move ahead, they develop Safe Routes to School Travel Plans. These are developed for an individual school, a group of schools, or an entire school system. Generally these plans include the following elements:

- Safe Routes to School Team
- Public Involvement
- Existing School Travel Environment
- Barriers to Active Transportation
- Recommendations

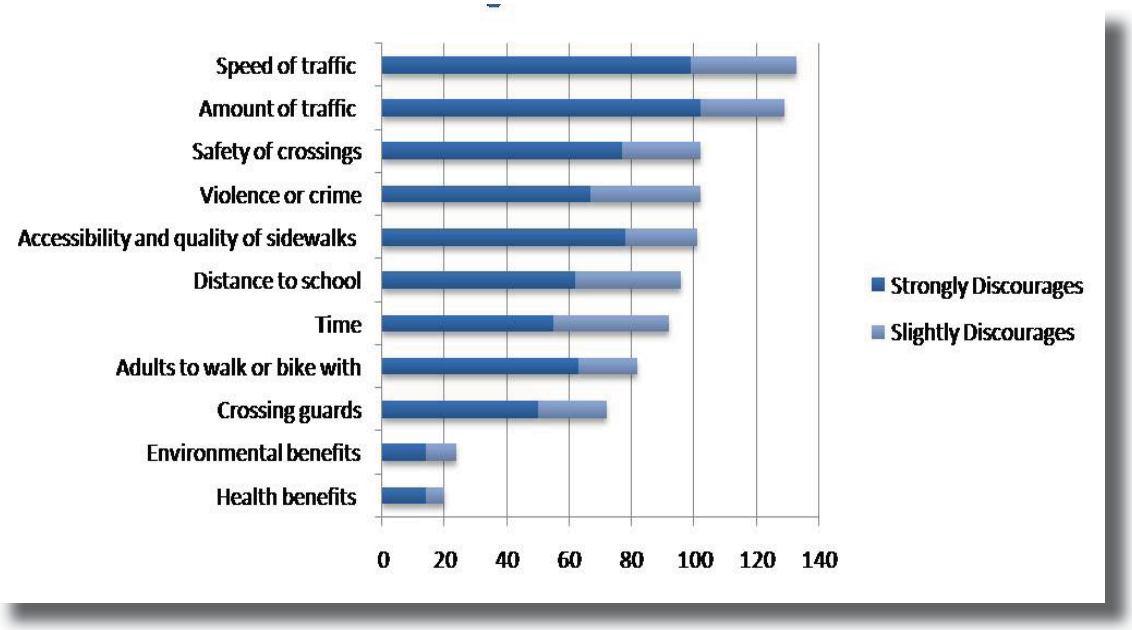
William Byrd Middle School students bicycling on the Wolf Creek Greenway.

A significant aspect of Safe Routes Travel Plans is identifying existing bicycle and pedestrian accommodations as well as potential connections. Below is a map from the William Byrd Middle School Plan that shows the existing accommodations near the school campus.



Map of existing bicycle and pedestrian facilities of the William Byrd Safe Routes to School Traval Plan.

SRTS Travel Plans also include extensive evaluation of existing modes of travel, barriers to active transportation, and potential solutions or recommendations. Below is a chart from the William Byrd school plan based on the results of a survey circulated to all William Byrd parents to assess their perceptions of accessibility and safety.



Roanoke County bicycle safety training program participants and mobile bike storage bus.

Strategic Highway Safety Plan

As required by SAFETEA-LU, the Commonwealth of Virginia has developed a Strategic Highway Safety Plan with the mission of saving lives and reducing injuries related to motor vehicle crashes. The plan calls for a multi-perspective approach to identifying problems in three emphasis areas: human factors, environmental, and fundamental. Elements of the plans include:

- Driver Behavior
- Special Users
- Roadway Departures
- Intersection Safety
- Pedestrian and Bicycle Safety
- Work Zone Safety
- Traffic Records
- Transportation Safety Planning

HIGHWAY SAFETY CHALLENGE

RVAMPO will coordinate with the Commonwealth to implement the recommendations of the plan, improve the level of transportation safety planning in the region, and fund projects through the Transportation Improvement Program (TIP).

Blue Ridge Transportation Safety Board

A staff representative of RVAMPO serves on the Blue Ridge Transportation Safety Board (BRTSB) and coordinates on projects of mutual interest. BRTSB's purpose is to coordinate and promote traffic safety programs, projects, and initiatives within the Roanoke DMV District and provide a professional network through which jurisdictions in the district can receive guidance and support for their individual traffic safety efforts. Several ongoing programs associated with the BRTSB include: the Roanoke Crash Investigation Team (RCIT), REACH (Responsible Educated Adolescents Can Help), and YOVASO (Youth of Virginia Speak Out About Traffic Safety).

BLUE RIDGE TRANSPORTATION SAFETY BOARD

Members of the Roanoke Crash Investigation Team (RCIT) at the scene of an accident.

Security Planning

Evacuation Planning

RVAMPO recently developed an evacuation guide to assist local governments with the plan for an evacuation. It was developed as a tool for emergency managers charged with assessing how best to protect citizens in the path of a threat. This guide is not an all-inclusive evacuation plan instruction manual as each community has unique features and many already have plans to deal with specific threats.

The guide suggests procedures that should be followed to order and implement an evacuation due to an emergency or event, so as to mitigate potential damage to the health, safety, and general welfare of impacted citizens.

Two types of evacuation types are defined in the guide, as follows:

- Emergency Evacuation – An incident or disaster that has no advanced notice and requires immediate evacuation, such as a fire or hazardous materials incident.

- Event Evacuation - A predicted hazard that has advanced notice and allows time for a planned response and evacuation authorization process, such as a flood or snow storm.

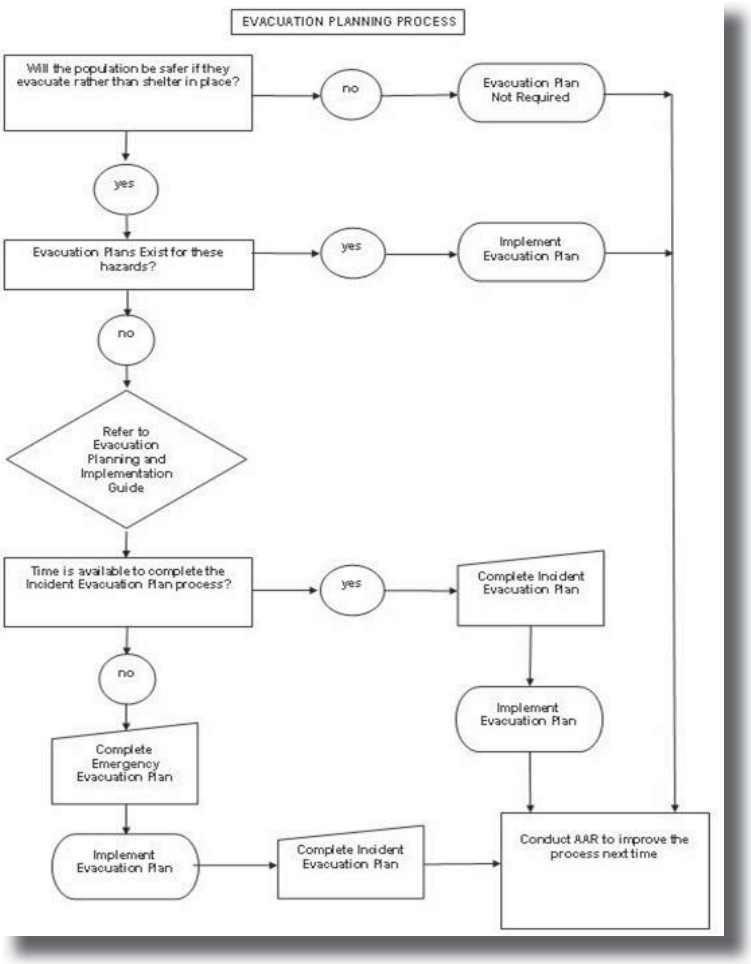
The guide contains both instructions and forms to respond to either evacuation type. For an emergency evacuation, it provides a very brief evacuation plan and evacuation order forms. For an event evacuation, it contains procedures and forms describing the complete evacuation planning and implementation process. The guide includes:

1. A fill-in-the-blank field checklist for managers charged with the evacuation effort;

2. A form for collecting data needed for planning and executing an evacuation; and,

3. A form to record the emergency evacuation response efforts.

RVAMPO recently helped the City of Roanoke integrate aspects of the guide into the City's Emergency Operations Procedure.



Financially Constrained List of Projects 11

SAFETEA-LU's planning regulation specifies that all Constrained Long-Range Transportation Plans show how the projects or project phases will be funded from available public and private revenues. Looking at funding that is available or can be reasonably assumed to be available, VDOT, VDRPT, Valley Metro, RADAR, and RVAMPO have cooperatively selected projects for the financially constrained project list and have developed financial forecasts based on the latest official planning assumptions and estimates of revenues and costs.

In addition to construction projects, financial projections have also been made to show revenues for maintaining and operating the region's highway and transit systems during the CLRTP 2035 time horizon. Funded CLRTP actions can include, but are not limited to:

- Additional in-depth transportation studies
- Ground transportation system improvement projects (fixed-guide, highway, bicycle, pedestrian, commuter lots, etc)
- Public transit systems and services, including the components of coordinated human service mobility plans
- System maintenance (monitoring, repair and/or replacement of system facilities and support sites, snow removal, mowing, painting, rest area or weigh station sites, etc.)
- System operations (ITS-TSM applications; traffic operations such as signalization, signal coordination, ramp meters, or message signs; roadside assistance; incident management; for the urbanized TMAs, their Congestion Management Process activities; VDOT traffic management centers; bridge-tunnel management; toll road or congestion pricing management; etc.)

Funding Programs

Highway Funding Programs:

BR/BROS - Bridge Rehabilitation and Replacement program provides funding for bridge improvements. Eligibility for funding is based on a rating of bridge condition by VDOT as a candidate for upgrading.

DEMO - The federal transportation acts include demonstration, priority, pilot, or special interest projects in various Federal-aid highway and appropriations acts. These projects are generically referred to as "demonstration" or "demo" projects, because Congress initiated this practice of providing special funding for these projects to demonstrate some new or innovative construction, financing, or other techniques on specific projects.

EB/MG - The Equity Bonus (formerly known as Minimum Guarantee) ensures that each State receives a specific share of the aggregate funding for major highway programs (Interstate Maintenance, National Highway System, Bridge, Surface Transportation Program, Highway Safety Improvement Program, Congestion Mitigation and Air Quality Improvement, Metropolitan Planning, Appalachian Development Highway System, Recreational Trails, Safe Routes to School, Rail-Highway Grade Crossing, Coordinated Border Infrastructure programs, and Equity Bonus itself, along with High Priority Projects), with every State guaranteed at least a specified percentage of that State's share of contributions to the Highway Account of the Highway Trust Fund.

IM - Interstate Maintenance (IM) program provides reconstruction, maintenance, and improvements to the National System of Interstate and Defense Highways. The Commonwealth Transportation Board (CTB) administers these programs.

NHS - National Highway System (NHS) projects can be funded only if they are on the National Highway System, which is established by Congress.

SAFETEA-LU - The Safe Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) is the federal transportation bill that provides federal transportation funding to each state. The SAFETEA-LU funding category refers to funding earmarks that Congress included in the legislation for specific projects. This funding can only be used for the project(s) for which it is earmarked. [if applicable]

STP - Surface Transportation Program (STP) can be utilized on any project located on a roadway that is classified higher than a minor collector. Projects eligible for funding under this program include construction, reconstruction and rehabilitation, and bridge projects on any public road. Local STP funds are designated as L-STP.

Highway Funding Programs (Continued):

Non-Federal - Any funding that does not come from federal sources is grouped into the non-federal funding category.

EN - Transportation Enhancement funds have been made available for bicycle and pedestrian facilities through the Surface Transportation Program of the TEA-21. A 10% set aside from each state's allocation of STP funds must be used for Transportation Enhancement activities. Projects are available for funding on a statewide competition basis for enhancement grants. The Enhancement program includes a set aside for the Roadscapes Program, which provides funding for local jurisdictions to apply for landscaping projects on state and federally maintained rights-of-way.

SRS - Safe Routes to School is a competitive grant program to enable and encourage children to walk and bicycle to school safely. Funds can be used for infrastructure improvements and educational programs.

Transit Funding Programs:

Section 5307 - Federal Transit Administration formula grants for transit capital and operating assistance in urbanized areas.

Section 3037 - Federal Transit Administration funds for Job Access and Reverse Commute grants to provide low-income individuals job access transportation.

Section 5309 - Federal Transit Administration discretionary grant funding for capital assistance for major bus related construction or equipment projects.

Section 5310 - Federal Transit Administration funds for private and non-profit organizations providing mass transportation services for the elderly and disabled.

Non-Federal - Any funding that does not come from federal sources is grouped into the non-federal funding category.

Financial Assumptions

The CLRTP financial plan is federally required to include only committed and/or reasonably available transportation funding sources. The estimates on funding sources and costs are based on reasonable financial principles and recent information. The financial estimates for both revenues and costs are given in year of expenditure dollars and reflect both growth and inflation factors. VDOT cost estimates are from the VDOT Project Cost Estimating System. For projects not administered by the state, cost estimates are developed cooperatively through the MPO, responsible transit agency, or responsible local government.

Financial assumptions include:

1. Maintenance allocations will increase 4% annually.
2. Federal revenue annual growth is forecast at the rate of increase in taxable gallons of gas as estimated by the Virginia Department of Taxation, which is 2.05%.
3. After the HB3202 bond issuance period has ended, it is assumed that there will be $300 million of new bond revenue, with its associated debt, each year beyond 2017 that will be distributed in the same manner as the previous bond proceeds.
4. It is assumed that future federal reauthorizations will follow the current funding scheme and base levels.
5. Revenue figures are based on VDOT's FY 2008 – 2013 Six-Year Financial Plan.

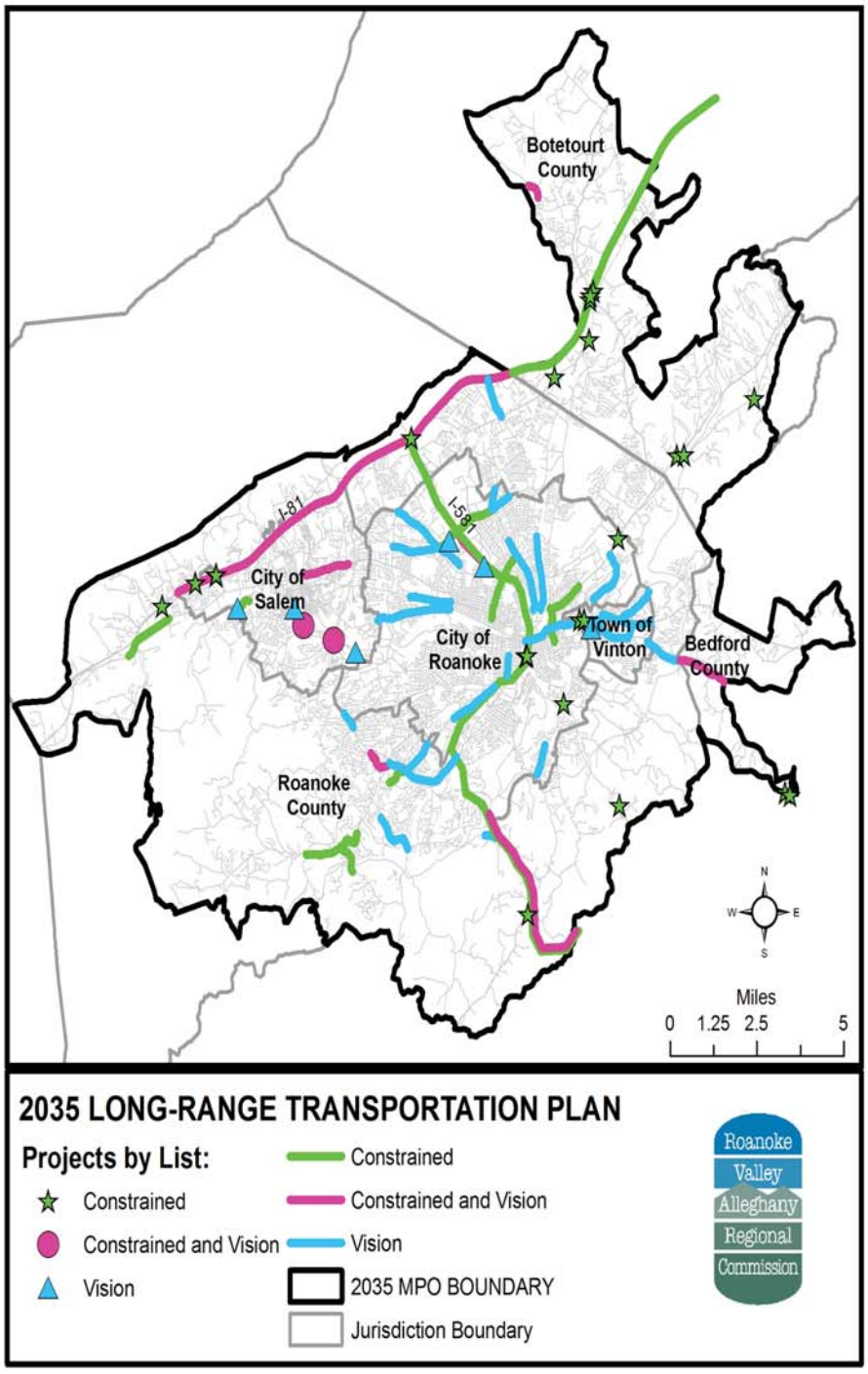
Project Programming - Next Steps

In metropolitan planning areas, transportation projects selected for federal funding in the Transportation Improvement Program (TIP) must be consistent with the approved CLRTP 2035. In addition, the State Transportation Improvement Program (STIP) submitted by the Commonwealth to FTA and FHWA must be consistent with all metropolitan TIPs.

Within this regulatory framework of metropolitan cooperation, the Commonwealth Transportation Board (CTB) has primary responsibility for selecting and programming federally funded Interstate Maintenance, Bridge, National Highway System, Statewide (non-metropolitan) STIP, Safety, Enhancement, and certain FTA Section 5310 projects. Local governments have primary responsibility for selecting projects within the urban and secondary roadway systems. The CTB adopts the Six-Year Program (SYP) on an annual basis which includes the Six-Year Improvement Program (SYIP) and the Secondary Six-Year Program (SSYP). These programs are developed by evaluation of existing and future needs based upon statewide and regional plans and projections, priorities for implementation of the transportation plan, and public comment on transportation priorities. Projects listed in the Six-Year Program are updated to reflect the latest revenue estimates, project costs, changes in priorities, and federal and state laws. Criteria used in selecting proposed projects and in developing project priorities include:

- Conformance to the MPO adopted transportation plan and study area local governments/agencies plans and programs;
- SAFETEA-LU planning factors;
- Provision of funding for previously programmed projects in need of additional funds.

Financially Constrained and Vision List Maps:



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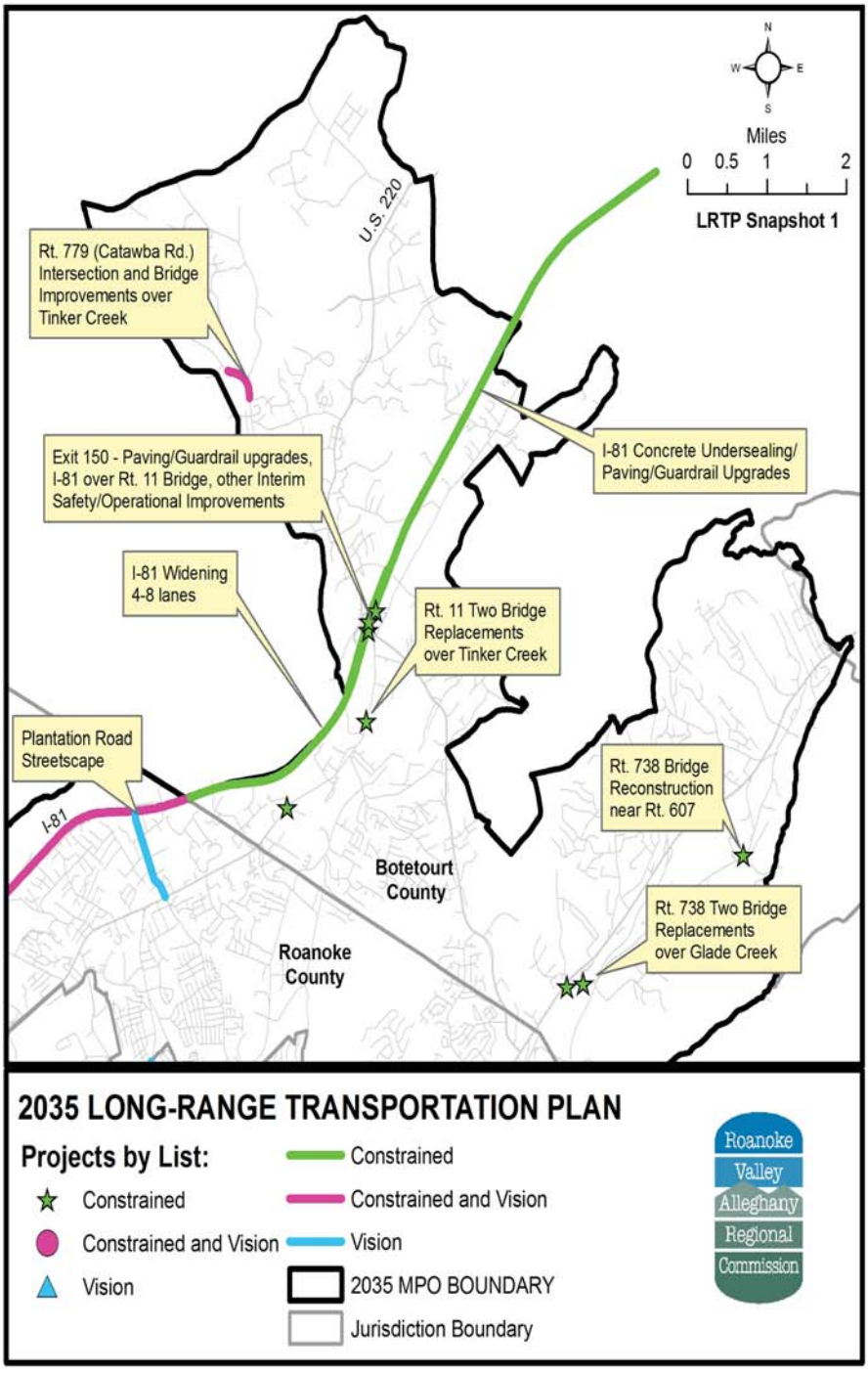

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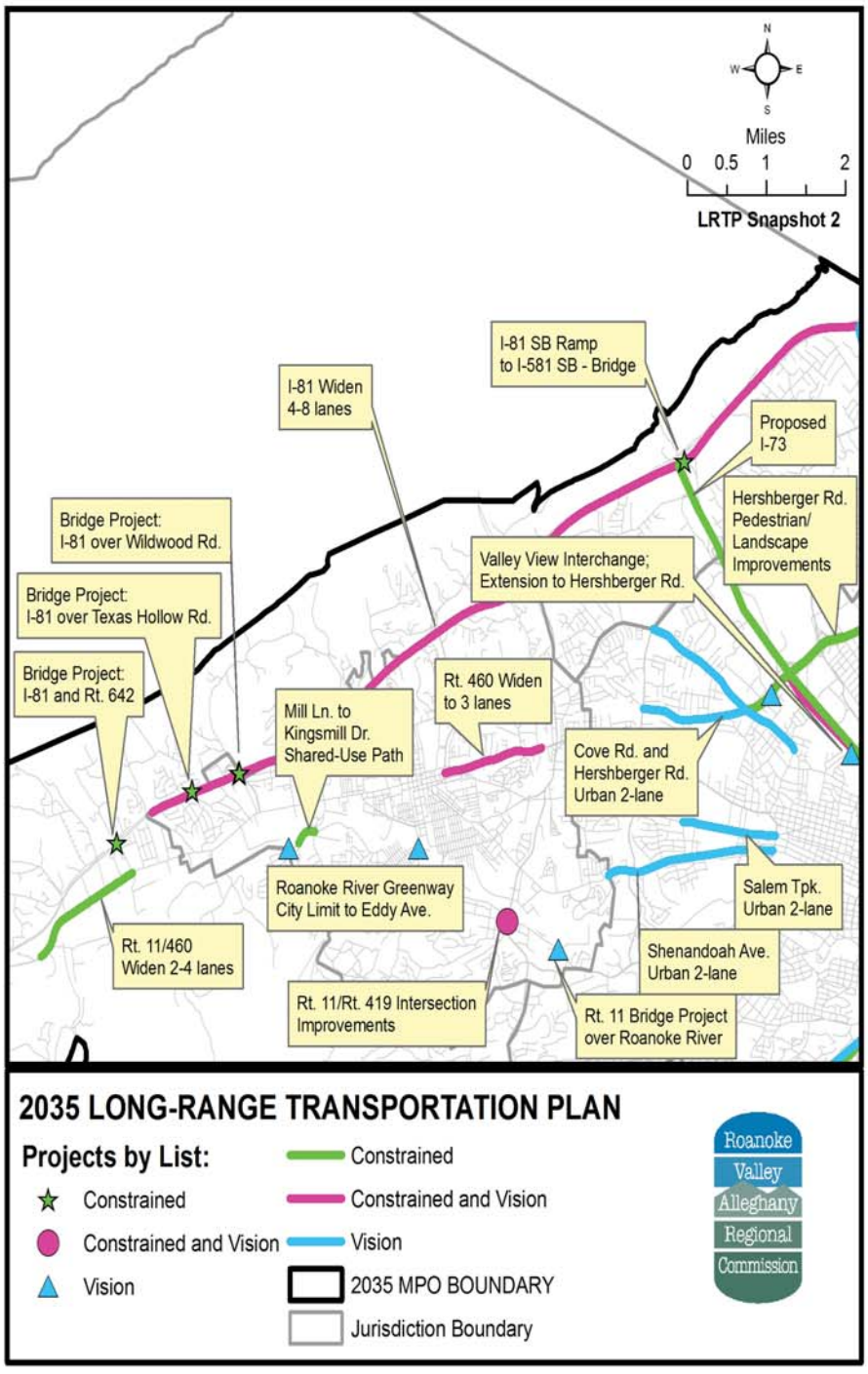

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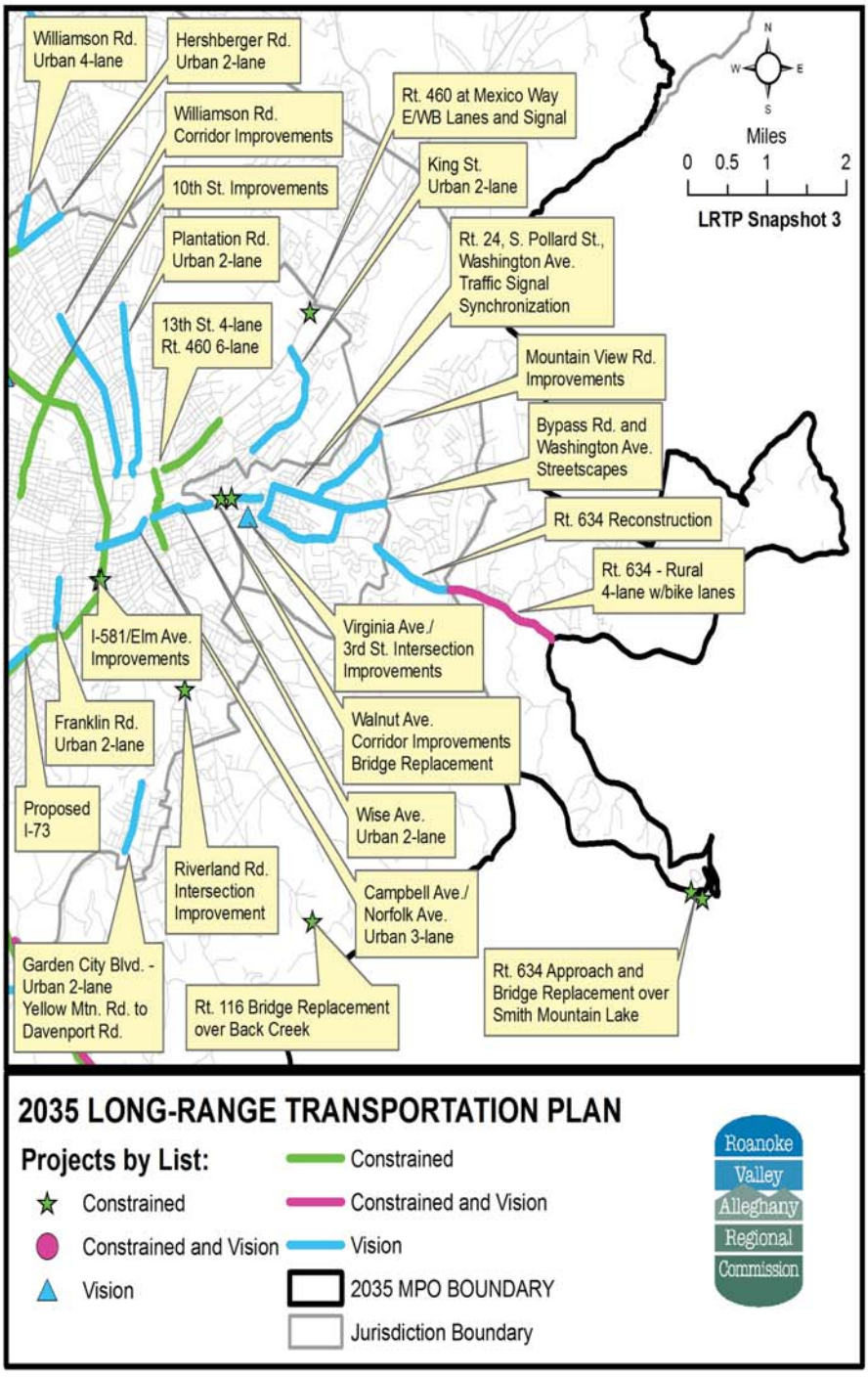

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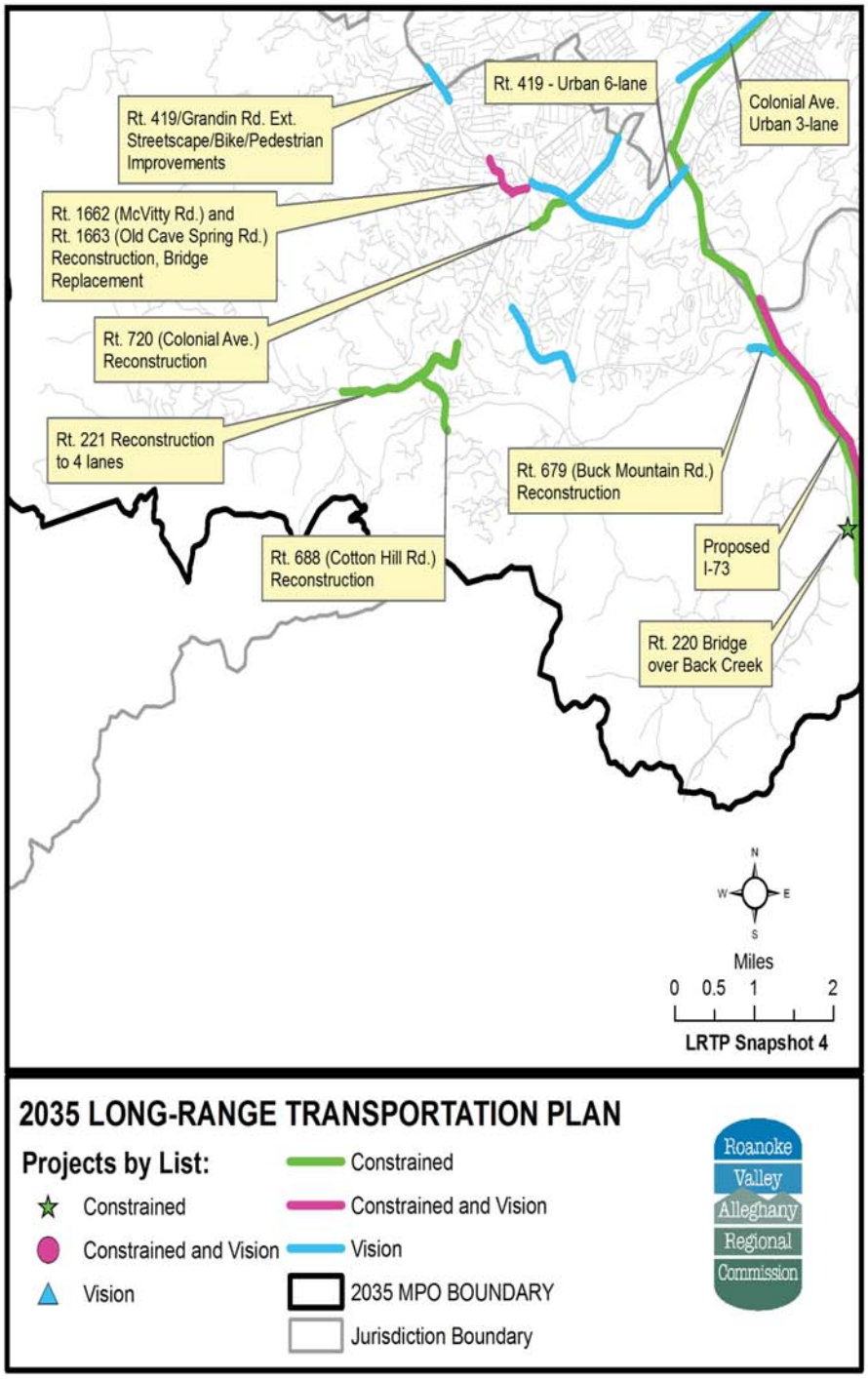

Interstate System - DRAFT CLRTP 2035 April 2011

UPC	Jurisdiction	Facility Route # and Name	From:	To:	Length	Recommended Improvement	Projected Cost	Previous Funding	FY 2011-2016 Timeframe Cost Estimate	FY 2017-2022 Timeframe Cost Estimate	FY 2023-2028 Timeframe Cost Estimate	FY 2029-2034 Timeframe Cost Estimate	FY 2035 Timeframe Cost Estimate	Bicycle, Pedestrian, and Greenway Comments	Transportation Demand Management (TDM) Comments
97577	Botetourt	Interstate 81 / Route 11	Route 11 Corridor	Route 11 Corridor	N/A	New Bridge Structure # 3212	$4,622,664	$0	$4,622,664	$0	$0	$0	$0	None.	
16596	Various	Interstate 73	N/A	N/A	N/A	Interstate 73 - Preliminary Engineering - Corridor Alignment	$11,000,000	$12,621,000	$0	$0	$0	$0	$0	None.	
80056	Roanoke Co.	Interstate 73	N/A	N/A	N/A	Interstate 73	$408,326,339	$2,463,000	$0	$0	$0	$0	$0	None.	
16591	Roanoke Co.	Interstate 81	Mile Post 135.9	Mile Post 138.6	2.7 miles	Interstate 81 - widen from 4 to 8 Lanes	$120,340,779	$2,558,000	$0	$0	$0	$0	$0	None.	
16593	Roanoke Co.	Interstate 81	Mile Post 144.5	Mile Post 147.45	2.95 miles	Interstate 81 - widen from 4 to 8 lanes	$105,536,017	$1,589,000	$0	$0	$0	$0	$0	None.	
53094	Roanoke Co.	Interstate 81	Mile Post 138.6	Mile Post 140.9	2.3 miles	Interstate 81 - widen from 4 to 8 lanes	$150,490,399	$1,358,000	$0	$0	$0	$0	$0	None.	
53095	Roanoke Co.	Interstate 81	Mile Post 140	Mile Post 143.1	3.1 miles	Interstate 81 - widen from 4 to 8 lanes	$196,442,639	$2,099,000	$0	$0	$0	$0	$0	None.	
53096	Roanoke Co.	Interstate 81	Mile Post 143.1	Mile Post 144.5	1.4 miles	Interstate 81 - widen from 4 to 8 lanes	$259,668,602	$2,546,000	$0	$0	$0	$0	$0	None.	
53097	Botetourt	Interstate 81	Mile Post 147.45	Mile Post 152.4	4.95 miles	Interstate 81 - widen from 4 to 8 lanes	$9,378,934	$9,429,000	$0	$0	$0	$0	$0	None.	
68718	Various	Interstate 81 - Public Private Transportation Act (PPTA)	N/A	N/A	N/A	Interstate 81 - PPTA Project Development and Management	$645,966	$700,000	$0	$0	$0	$0	$0	None.	
75910	Botetourt	Interstate 81 - Exit 150	0.15 mile North Route 1039	Route 653	1.65 miles	Interstate 81 - Improvements for Safety and Congestion at Exit 150	$24,858,010	$22,883,000	$10,375,000	$0	$0	$0	$0	Provide Bike and Pedestrian accommodation under I-81.	
79039	Botetourt	Interstate 81 - Exit 150	Exit 150	Exit 150	N/A	Interstate 81 - Interim Safety/Operational Improvements at Exit 150	$1,544,951	$2,040,000	$0	$0	$0	$0	$0	None.	
92691	Botetourt	Interstate 81	Route 779 Bridge	Route 640 Bridge	9.64 miles	AARA - Interstate 81 Undersealing, Paving and Guardrail Upgrades	$19,457,862	$19,458,000	$0	$0	$0	$0	$0	None.	
93082	Botetourt	Interstate 81 - Exit 150	Exit 150	Exit 150	N/A	Interstate 81 - Paving and Guardrail Upgrades at Exit 150	$1,819,628	$1,325,000	$0	$590,612	$0	$0	$0	None.	
97560	Roanoke Co.	Interstate 81 - Bridge	Interstate 81 South Bound Ramp to Interstate 581	Interstate 81 South Bound Ramp to Interstate 581	N/A	New Bridge	$10,497,749	$0	$10,497,749	$0	$0	$0	$0	None.	
97576	Roanoke Co.	Interstate 81 - Bridge at Wildwood Road	Route 112	Route 112	N/A	New Bridge - Structure # 14865	$5,960,012	$0	$3,278,000	$3,202,463	$0	$0	$0	None.	
97580	Roanoke Co.	Interstate 81 - Bridge Northbound Lane at Wildwood Road	Route 112 I-81 NBL	Route 112 I-81 NBL	N/A	New Bridge - Structure # 14863	$5,960,012	$0	$5,960,012	$0	$0	$0	$0	None.	
16595	City of Roanoke	Interstate 581 - Valley View Interchange Phase II	Mile Post 144.5	Hershberger Road (Exit 3)	1.09 miles	New Construction	$70,960,919	$3,871,000	$67,090,000	$0	$0	$0	$0	Provide Bike, Pedestrian, and Greenway connection on Valley View Blvd. across I-581.	
80518	City of Roanoke	Interstate 581 - Elm Avenue Interchange	Exit Ramps	Williamson Road	0.244 mile	Interim Safety and Operation Improvement - PE Only	$12,664,661	$1,701,000	$0	$13,091,185	$0	$0	$0	Provide Bike and Pedestrian accommodation on Elm Avenue across I-581.	
94089	City of Roanoke	Interstate 581 - Elm Avenue Interchange - AARA (Design - Build)	Exit Ramps	Williamson Road	0.244 mile	Safety - Traffic Operations - Transportation Systems Management - ARRA project	$19,446,796	$14,143,000	$0	$6,333,010	$0	$0	$0	Provide Bike and Pedestrian accommodation on Elm Avenue across I-581.	
97581	Roanoke Co.	Interstate 81- Route 641 Bridge	Route 641	Route 641	N/A	New Bridge - Structure # 14861	$3,569,127	$0	$3,569,127					None.	
97578	Roanoke Co.	Interstate 81 - Route 642 Bridge	Route 642	Route 642	N/A	New Bridge - Structure # 14867	$3,505,000	$0	$3,505,000	$0				None.	
						Total Estimated Project Costs:			$108,897,552	$23,217,269	$0	$0	$0		
						Projected Funding Available:			$108,897,552	$31,945,583	$7,693,119	$0	$0		

Primary System -DRAFT CLRTP 2035 April 2011

UPC	Jurisdiction	Facility Route # and Name	From:	To:	Length	Recommended Improvement	Projected Cost	Previous Funding	FY 2011-2016 Timeframe Cost Estimate	FY 2017-2022 Timeframe Cost Estimate	FY 2023-2028 Timeframe Cost Estimate	FY 2029-2034 Timeframe Cost Estimate	FY 2035 Timeframe Cost Estimate	Bicycle, Greenway and Other Comments	Transportation Demand Management (TDM) Comments
17698	Roanoke Co.	Route 11/460	0.055 mile East of Salem (West City Limit)	0.10 mile West Route 830	2.19 miles	Widen to 4-lane with Curb, Gutter and Raised Median	$45,375,326	$24,281,000	$21,166,000					RVAMPO Bikeway Plan Corridor	
77300	Botetourt	Route 11 - Structure # 1012	0.15 mile East of Route 1039	0.15 mile East of Route 1039	0.09 mile	Replace Structure over Tinker Creek - Structure# 1012	$3,023,583	$471,000	$2,831,000					RVAMPO Bikeway Plan Corridor	
77302	Botetourt	Route 11 - Structure # 1013	0.38 mile East of Route 822	0.38 mile East of Route 822	0.09 mile	Replace Structure over Tinker Creek - Structure# 1013	$2,149,224	$194,000	$2,017,000					RVAMPO Bikeway Plan Corridor	
77305	Roanoke Co.	Route 116	0.10 mile North Route 939	0.10 mile North Route 939	0.24 mile	Bridge Replacement over Back Creek	$3,216,358	$644,000	$2,572,358						
82193	Roanoke Co.	Route 220 - Structure # 1039	4.45 mile from Route 419	3.68 mile from Franklin County Line	N/A	Minor Bridge Rehab - Bridge over Back Creek - Structure# 1039	$4,888,980	$1,494,000	$3,395,000						
717	Roanoke Co.	Route 221	0.026 kilometer South Route 752	3.1 kilometers South Route 419	3.52 kilometers	Reconctruction to 4 lanes - Preliminary Engineering Only	$4,614,000	$4,614,000	$0					RVAMPO Bikeway Plan Corridor	
50006	Roanoke Co.	Route 221	0.035 kilometer South Route 688	1.478 kilometers North Route 688	1.512 kilometers	Reconstruction to 4 lanes - Right of Way (RW)	$2,965,707	$3,069,000	$0					RVAMPO Bikeway Plan Corridor	
95812	Roanoke Co.	Route 221 - ARRA Project	0.035 kilometer South Route 688	1.478 kilometers North Route 688	1.512 kilometers	Reconstruction to 4 lanes - Construction Phase (CN)	$25,364,476	$28,176,000	$1,883,000					RVAMPO Bikeway Plan Corridor	
								Total Estimated Project Costs:	$33,864,358						
								Projected Funding Available:	$33,864,358	$0.00	$0.00	$0.00	$0.00		

Roanoke County Secondary - DRAFT CLRTP 2035 April 2011

UPC	Facility Route # and Name	From:	To:	Length	Recommended Improvement	Projected Cost	Previous Funding	FY 2011-16 Timeframe Cost Estimate	FY 2017-22 Timeframe Cost Estimate	FY 2023-2028 Timeframe Cost Estimate	FY 2029-2034 Timeframe Cost Estimate	FY 2035 Timeframe Cost Estimate	Bicycle, Pedestrian, Greenway Comments	Transportation Demand Management (TDM) Comments
15189	Route 720 (Colonial Avenue) - Reconstruction	0.05 Mile West Route 687	Route 419	0.58 mile	Reconstruction	$7,124,000	$6,807,000	$317,000					RVAMPO Bikeway Plan Corridor	
15190	Route 688 (Cotton Hill Road)	0.09 mile South Rt 221	0.15 mile South Rt 934	0.6 mile	Reconstruction	$5,493,157	$4,202,892	$1,225,930	$76,819				RVAMPO Bikeway Plan Corridor	
15187	Route 1662 (McVitty Road)	Int. of Rt 1663	Int. of Rt 419	0.5 mile	Reconstruction & Bridge Replacement Over Mud Lick Creek	$10,315,603	$4,824,268	$0	$770,031	$808,441	$808,441	$134,740	RVAMPO Bikeway Plan Corridor	
15188	Route 1663 (Old Cave Spring Lane)	South Int. Rt 221	Int. of Rt 1662	0.3 mile	Reconstruction, Drainage Structure on Branch of Mud Lick Creek	$2,898,649	$973,765	$0	$770,031	$808,441	$808,441	$134,740	RVAMPO Bikeway Plan Corridor	
							Total Estimated Project Costs:							
							Projected Funding Available:	$1,542,930	$1,616,881.00	$1,616,881.00	$1,616,881.00	$269,480.00		

Bedford County Secondary - DRAFT CLRTP 2035 April 2011

UPC	Facility Route # and Name	From:	To:	Length	Recommended Improvement	Projected Cost	Previous Funding	FY 2011-16 Timeframe Cost Estimate	FY 2017-22 Timeframe Cost Estimate	FY 2023-2028 Timeframe Cost Estimate	FY 2029-2034 Timeframe Cost Estimate	FY 2035 Timeframe Cost Estimate	Bicycle, Pedestrian, and Greenway Comments	Transportation Demand Management (TDM) Comments
58885	Route 634 - Bedford Approach to Hardy Ford Bridge	Approach to Structure # 6904	Structure # 6904	0.1 mile	Bridge Replacement	$2,584,110	$0	$2,584,000	$215,583				Consider a sidewalk on the marina side of the bridge.	
62650	Route 634 (Hardy Road) Bridge Replacement	Over Smith Mountain Lake at the Bedford/ Franklin County line				$2,296,420	$0	$3,453,000					Consider a sidewalk on the marina side of the bridge.	
	Route 634 (Hardy Road)	Roanoke Co. CL	Route 619 (Turner Branch Road)	1.4 mile	Rural 4 Lane Divided - with Bicycle Lanes to match Roanoke County Component	$6,696,777	$0		$87,462	$290,232	$225,166	$40,360	Compare benefits of on-street bike accommodation vs. on a shared-use path on one side of the street .	
					Total Estimated Project Costs:			$6,037,000	$303,045	$290,232	$225,166	$40,360		
					Projected Funding Available:			$6,037,000	$303,044.92	$290,232.04	$225,166.10	$40,359.86		

Note - no updated financial constraint given for Bedford County
Original October 2009 - Financial Constraint Used Instead

Botetourt County Secondary - DRAFT CLRTP 2035 April 2011

UPC	Facility Route # and Name	From:	To:	Length	Recommended Improvement	Projected Cost	Previous Funding	FY 2011-2016 Timeframe Cost Estimate	FY 2017-2022 Timeframe Cost Estimate	FY 2023-2028 Timeframe Cost Estimate	FY 2029-2034 Timeframe Cost Estimate	FY 2035 Timeframe Cost Estimate	Bicycle, Greenway and Other Comments	Transportation Demand Management (TDM) Comments
17993	Route 738 (Webster Brick Road)	0.043 Miles South of Route 607 North	0.069 Miles North of Route 607 North	0.112 mile	Bridge Reconstruction Str. ID 6141	$1,809,339	$1,773,399	$35,940					RVAMPO Bikeway Plan Corridor	
90086	Route 738 (Webster Brick Road)	Over Glade Creek		NA	Bridge Replacement on Structures 6142 and 6143	$3,539,751	$206,000	$3,333,751					RVAMPO Bikeway Plan Corridor	
52803	Route 779 (Catawba Road)	0.19 Miles East of Route 672 East	0.24 Miles West of Route 672 East	NA	Intersection Improvements at Int. with Rt 672 and Bridge Reconstruction (#6264) over Tinker Creek	$6,543,715	$2,853,443	$3,690,000	$356,780	$356,780	$356,780	$59,463	RVAMPO Bikeway Plan Corridor	
					Total Estimated Project Costs:			$7,059,691	$356,780	$356,780	$356,780	$59,463		
					Projected Funding Available:			$7,059,691	$356,780	$356,780	$356,780	$59,463		

City of Roanoke Urban - Draft Financially Constrained List - April 2011

UPC	Facility Route # and Name	From:	To:	Length	Recommended Improvement	VDOT 6-Year Plan Projected Cost	Projected Cost Provided By Locality	Previous Funding	FY 2011-16 Timeframe Cost Estimate	FY 2017-2022 Timeframe Cost Estimate	FY 2023-2028 Timeframe Cost Estimate	FY 2022-2034 Timeframe Cost Estimate	FY 2035 Timeframe Cost Estimate	Bicycle, Greenway and Other Comments	Transportation Demand Management (TDM) Comments
688	13TH STREET AND HOLLINS ROAD	Jamison Avenue	.05 Mile North Intersection with Orange Avenue	0.979 Mile	Reconstruction with added capacity	$39,756,000		$22,855,000	$1,000	$0	$0	$0	$0	City of Roanoke has a Complete Streets Policy	
709	10TH STREET - RECONSTRUCTION	Gilmer Avenue	0.042 Mile North Andrews Road (Staunton Avenue)	0.783 mile	Reconstruction and New Construction	$12,476,000		$12,536,000	$1,593,000	$0	$0	$0	$0	City of Roanoke has a Complete Streets Policy	
80558	HERSHBERGER ROAD	Cove Road	Rutgers Street	N/A	Safety, Traffic Operations and Transportation Systems Management	$1,121,000		$1,125,000	$0	$0	$0	$0	$0	City of Roanoke has a Complete Streets Policy	
11908	10TH STREET	0.042 Mile North Andrews Road	Williamson Road	1.5 Kilometers	Major Widening - 2 Lanes, Bike Lanes, Curb, Gutter and Sidewalk	$8,367,000		$8,368,000	$0	$0	$0	$0	$0	City of Roanoke has a Complete Streets Policy	
95178	US 460/ BLUE HILLS E/WB LT LANES AND SIGNAL	US 460 at Blue Hills Drive	Mexico Way	0.25 Mile	Safety, Traffic Operations and Transportation Systems Management	$300,000		$300,000	$0	$0	$0	$0	$0	City of Roanoke has a Complete Streets Policy	
71741	RIVERLAND ROAD - INTERSECTION IMPROVEMENT	0.021 Mile West of Intersection with Garden City Blvd.	0.161 Mile East of Intersection with Bennington Street	0.332 mile	Safety, Traffic Operations and Transportation Systems Management	$7,714,000		$7,720,000	$193,000	$0	$0	$0	$0	City of Roanoke has a Complete Streets Policy	
80561	Orange Avenue - Route 460	11th Stree N.E.	0.5 Miles East of Gus W. Nicks Blvd.	1.55 miles	Reconstruction to Urban 6 Lanes	$23,007,000		$5,084,000	$0	$0	$0	$0	$0	City of Roanoke has a Complete Streets Policy	
86672	HSIP PROACTIVE SAFETY PROJECTS CITY OF ROANOKE	N/A	N/A	N/A	Safety, Traffic Operations and Transportation Systems Management	N/A		$87,000	$0	$0	$0	$0	$0	City of Roanoke has a Complete Streets Policy	
93116	HERSHBERGER ROAD LANDSCAPING	Cove Road	Rutgers Street	N/A	Environmentally Related - Landscaping	$1,000,000		$1,000,000	$0	$0	$0	$0	$0	City of Roanoke has a Complete Streets Policy	
					Total Estimated Project Costs:				$1,787,000						
					Projected Funding Available:				$1,787,000	$0.00	$0.00	$0.00	$0.00		

City of Salem Urban System - Draft CLRTP 2035 - Constrained List - April 2011

UPC	Facility Route # and Name	From:	To:	Length	Recommended Improvement	Projected Cost	Previous Funding	FY 2011-2016 Timeframe Cost Estimate	FY 2017-2022 Timeframe Cost Estimate	FY 2023-2028 Timeframe Cost Estimate	FY 2029-2034Timeframe Cost Estimate	FY 2035 Timeframe Cost Estimate	Bicycle, Greenway and Other Comments	Transportation Demand Management (TDM) Comments
52076	RTE 11 - APPERSON DRIVE - INTERSECTION IMPROVEMENTS	at Route 419	at Route 419	0.300 Mile	RECONSTRUCTION	$36,996,000	$3,943,000	$0	$0	$0	$0	$0	RVAMPO Bikeway Plan Corridor	
78751	RTE 11 (COLORADO ST) BRIDGE REPLACEMENT OVER ROANOKE SIVER	Colorado Street over Roanoke River	Colorado Street over Roanoke River	N/A	Bridge Replacement	$4,666,000	$4,875,000	$0	$0	$0	$0	$0	RVAMPO Bikeway Plan Corridor	
8753	RTE 460 - WIDEN TO 3 LANES WITH CURBS & SIDEWALKS	Route 311 - Thompson Memorial Blvd.	0.05 Miles East Intersection Kessler Mill Road	1.23 Miles	Minor Widening	$10,777,000	$10,241,000	$0	$0	$0	$0	$0	RVAMPO Bikeway Plan Corridor	
86530	Shared Use Path	Mill Lane	Kingsmill Drive	N/A	Construct Shared Use Pathway	$181,000	$181,000	$0	$0	$0	$0	$0		
					Total Estimated Project Costs:									
					Projected Funding Available:			$0	$0.00	$0.00	$0.00	$0.00		

Town of Vinton Urban System - Draft Constrained List - LRTP 2035 - April 2011

UPC	Facility Route # and Name	From:	To:	Length	Recommended Improvement	Projected Cost	Previous Funding	FY 2011-2016 Timeframe Cost Estimate	FY 2017-2022Timeframe Cost Estimate	FY 2023-2028 Timeframe Cost Estimate	FY 2029-2034 Timeframe Cost Estimate	FY 2035 Timeframe Cost Estimate	Bicycle, Greenway and Other Comments	Transportation Demand Management (TDM) Comments
76677	REPLACE BRIDGE AND APPROACHES OVER GLADE CREEK	0.136 Miles West of 5th Street	0.044 Miles East of 5th Street.	0.11 mi.	Replace bridge, urban 2-lane, curb, gutter, and add pedestrian & bicycle accomodation.	$1,518,000	$1,571,000	$0	$0	$0	$0	$0	RVAMPO Bikeway Plan Corridor	
93160	RTE U0000 - WALNUT AVE. INT. IMPROVEMENT AT 8TH ST.	West Town Line	0.20 mi. east Walnut	0.40 mi.	New traffic signal, urban 2-lane, curb, gutter, and add pedestrian & bicycle accomodation.	$1,072,000	$443,000	$0	$0	$0	$0	$0	RVAMPO Bikeway Plan Corridor	
					Total Estimated Project Costs:									
					Projected Funding Available:			$0	$0	$0	$0	$0		

Financially Constrained List of Projects - Public Transportation - FY 2012

Greater Roanoke Transit Company

Operating Budget

Expenses	Amount
Operating Expenses	7,957,876

Income	Amount	Fund Source
Operating Revenues	1,898,796	Fares and Other
Federal Funds	2,505,536	FTA Section 5307
State Funds	1,215,774	Operating Assistance
Local Funds	2,337,770	Local General Funds
Total	7,957,876	

Operating Budget (Rural)

Expenses	Amount
Operating Expenses	933,456

Income	Amount	Fund Source
Operating Revenues	250,686	Fares and Other
Federal Funds	341,385	FTA Section 5311
State Funds	78,632	Operating Assistance
Local Funds	262,753	Local General Funds
Total	933,456	

Capital Budget

Capital Items	Cost	State Funds	Federal Funds	Fund Source
Purchase Fare Collection Equipment (Fareboxes)	705,016	73,322	564,013	Flexible STP

Total Expense	705,016
Total Federal Funds	564,013
Total State Funds	73,322
Local Assistance	67,682

RADAR / Roanoke

Operating Budget

Expenses	Amount
Operating Expenses	453,500

Income	Amount	Fund Source
Operating Revenues	16,200	Fares and Other
Federal Funds	218,650	FTA Section 5311
State Funds	56,966	Operating Assistance
State Funds	27,500	Lifeline Grant
Local Funds	134,184	Local General Funds
Total	453,500	

FTA5310 Capital Budget

Capital Items	Cost	State Funds	Federal Funds	Fund Source
15 Pass. body on chassis w/ wheelchair lift	150,000	0	120,000	FTA 5310 / 2012

Total Expense	150,000
Total Federal Funds	120,000
Total State Funds	0
Local Assistance	30,000

JARC Assistance Program

Budget Items	Amount	Fund Source
UHSTS, Inc. - RADAR ADA Service	420,000	

Revenues	5,000
Federal Funds	207,500
Local Assistance	207,500

New Freedom Assistance Program

Budget Items	Amount	Fund Source
UHSTS, Inc. - RADAR ADA Service	174,900	
Federal Funds	87,450	Federal Operating
State Funds	83,078	State Paratransit
Local Assistance	4,372	

Financially Constrained List of Projects - Public Transportation - FY 2012 to 2015 Page 1

VIRGINIA DEPARTMENT OF RAIL AND PUBLIC TRANSPORTATION **FY2012 - 2015**
STATEWIDE TRANSPORTATION IMPROVEMENT PROGRAM
TRANSIT COSTS (in $1,000)

	Previous Funding	FY 2012	FY 2013	FY 2014	FY 2015	Total FY 2012-2015	
STIP ID:	**GRT0001**	Title: Operating Assistance		Recipient:	**Greater Roanoke Transit Company**		GROUP1
FTA 5307		2,506	2,506	2,506	2,506	FTA 5307	**10,024**
FTA 5311		341	341	341	341	FTA 5311	**1,364**
State		1,294	1,294	1,294	1,294	State	**5,176**
Local		2,601	2,601	2,601	2,601	Local	**10,404**
Revenues		2,149	2,149	2,149	2,149	Revenues	**8,596**
Year Total:	**-**	**8,891**	**8,891**	**8,891**	**8,891**	***Total Funds:***	**35,564**
Description:							
STIP ID:	**GRT0003**	Title: Replacement Bus		Recipient:	**Greater Roanoke Transit Company**		GROUP3
FTA 5309	640					FTA 5309	-
Flexible STP			2,880	440	160	Flexible STP	**3,480**
State	160		360	55	20	State	**435**
Local	-		360	55	20	Local	**435**
Year Total:	**800**	**-**	**3,600**	**550**	**200**	***Total Funds:***	**4,350**
Description:							
STIP ID:	**GRT0025**	Title: Replacement Vans		Recipient:	**Greater Roanoke Transit Company**		GROUP3
Federal Stimulus	360					Federal Stimulus	-
State	-					State	-
Local	-					Local	-
Year Total:	**360**	**-**	**-**	**-**	**-**	***Total Funds:***	**-**
Description:	Paratransit Vans						
STIP ID:	**GRT0026**	Title: Support Vehicles		Recipient:	**Greater Roanoke Transit Company**		GROUP3
Federal Stimulus	30					Federal Stimulus	-
Flexible STP	-			144	24	Flexible STP	**168**
State	-			18	3	State	**21**
Local	-			18	3	Local	**21**
Year Total:	**30**	**-**	**-**	**180**	**30**	***Total Funds:***	**210**
Description:							
STIP ID:	**GRT0027**	Title: Fareboxes		Recipient:	**Greater Roanoke Transit Company**		GROUP3
Federal Stimulus	60					Federal Stimulus	-
Flexible STP		564				Flexible STP	**564**
State	-	73				State	**73**
Local	-	68				Local	**68**
Year Total:	**60**	**705**	**-**	**-**	**-**	***Total Funds:***	**705**
Description:							
STIP ID:	**GRT0028**	Title: Misc. Equipment		Recipient:	**Greater Roanoke Transit Company**		GROUP1
Flexible STP	43		8			Flexible STP	**8**
Federal Stimulus	6					Federal Stimulus	-
State	9		1			State	**1**
Local	2		1			Local	**1**
Year Total:	**60**	**-**	**10**	**-**	**-**	***Total Funds:***	**10**
Description:							
STIP ID:	**GRT0029**	Title: Rehab/Renovation of Admin Buil		Recipient:	**Greater Roanoke Transit Company**		
Flexible STP	40		120	80		Flexible STP	**200**
State	8		15	10		State	**25**
Local	2		15	10		Local	**25**
Year Total:	**50**	**-**	**150**	**100**	**-**	***Total Funds:***	**250**
Description:							
STIP ID:	**GRT0030**	Title: Surveillance/Security Equipment		Recipient:	**Greater Roanoke Transit Company**		
Federal Stimulus	71					Federal Stimulus	-
State	-					State	-
Local	-					Local	-
Year Total:	**71**	**-**	**-**	**-**	**-**	***Total Funds:***	**-**
Description:							
STIP ID:	**GRT0031**	Title: ADP Hardware		Recipient:	**Greater Roanoke Transit Company**		GROUP1
Federal Stimulus	30					Federal Stimulus	-
Flexible STP	30		72		10	Flexible STP	**82**
State	-		9		1	State	**10**
Local	-		9		1	Local	**10**
Year Total:	**60**	**-**	**90**	**-**	**12**	***Total Funds:***	**102**
Description:							
STIP ID:	**GRT0033**	Title: ADP Software		Recipient:	**Greater Roanoke Transit Company**		GROUP1

Financially Constrained List of Projects - Public Transportation - FY 2012 to 2015 Page 2

VIRGINIA DEPARTMENT OF RAIL AND PUBLIC TRANSPORTATION **FY2012 - 2015**
STATEWIDE TRANSPORTATION IMPROVEMENT PROGRAM
TRANSIT COSTS (in $1,000)

	Previous Funding	FY 2012	FY 2013	FY 2014	FY 2015	Total FY 2012-2015	
Federal Stimulus	-					Federal Stimulus	-
Flexible STP	-		16		4	Flexible STP	**20**
State	-		2		1	State	**3**
Local	-		2			Local	**2**
Year Total:	**-**	**-**	**20**	**-**	**5**	***Total Funds:***	**25**
Description:							
STIP ID:	**GRT0034**	Title: Shop Equipment			Recipient: **Greater Roanoke Transit Company**		GROUP1
Federal Stimulus	-					Federal Stimulus	-
Flexible STP	-		16	16	10	Flexible STP	**42**
State	-		2	2	1	State	**5**
Local	-		2	2	1	Local	**5**
Year Total:	**-**	**-**	**20**	**20**	**12**	***Total Funds:***	**52**
Description:							
STIP ID:	**GRT0035**	Title: Communications Systems			Recipient: **Greater Roanoke Transit Company**		GROUP3
Federal Stimulus	-					Federal Stimulus	-
Flexible STP	-				360	Flexible STP	**360**
State	-				45	State	**45**
Local	-				45	Local	**45**
Year Total:	**-**	**-**	**-**	**-**	**450**	***Total Funds:***	**450**
Description:							
STIP ID:	**GRT0036**	Title: Expansion Rolling Stock			Recipient: **Greater Roanoke Transit Company**		GROUP3
Federal Stimulus	-					Federal Stimulus	-
Flexible STP	-				288	Flexible STP	**288**
State	-				36	State	**36**
Local	-				36	Local	**36**
Year Total:	**-**	**-**	**-**	**-**	**360**	***Total Funds:***	**360**
Description:							
STIP ID:	**RAD0001**	Title: Operating Assistance - JARC			Recipient: **RADAR - UHSTS, Inc. Roanoke Coun**		GROUP1
JARC	424	208				JARC	**208**
State	-					State	**-**
Local	424	207				Local	**207**
Revenues	10	5				Revenues	**5**
Year Total:	**858**	**420**	**-**	**-**	**-**	***Total Funds:***	**420**
Description:							
STIP ID:	**RAD0005**	Title: New Freedom Program			Recipient: **RADAR - UHSTS, Inc. Roanoke Coun**		GROUP1
New Freedom	238	88				New Freedom	**88**
State	225	83				State	**83**
Local	12	4				Local	**4**
Year Total:	**475**	**175**	**-**	**-**	**-**	***Total Funds:***	**175**
Description:							
STIP ID:	**RAD0006**	Title: Paratransit Vehicles			Recipient: **RADAR - UHSTS, Inc. Roanoke Coun**		GROUP3
FTA 5310	236	120	176	264	176	FTA 5310	**736**
State	-					State	**-**
Local	59	30	44	66	44	Local	**184**
Year Total:	**295**	**150**	**220**	**330**	**220**	***Total Funds:***	**920**
Description:							

Greater Roanoke Transit Company	Previous Funding	FY 2012	FY 2013	FY 2014	FY 2015	Total FY 2012-2015	
FTA 5307	-	2,506	2,506	2,506	2,506	FTA 5307	10,024
FTA 5309	640	-	-	-	-	FTA 5309	-
FTA 5310	-	-	-	-	-	FTA 5310	-
FTA 5311	-	341	341	341	341	FTA 5311	1,364
FTA 5314	-	-	-	-	-	FTA 5314	-
JARC	-	-	-	-	-	JARC	-
Federal Stimulus	557	-	-	-	-	Federal Stimulus	-
TIGGER	-	-	-	-	-	TIGGER	-
Other Federal	-	-	-	-	-	Other Federal	-
State	177	1,367	1,683	1,379	1,401	State	5,830
Local	4	2,669	2,990	2,686	2,707	Local	11,052

Financially Constrained List of Projects - Public Transportation - FY 2012 to 2015 Page 3

VIRGINIA DEPARTMENT OF RAIL AND PUBLIC TRANSPORTATION **FY2012 - 2015**
STATEWIDE TRANSPORTATION IMPROVEMENT PROGRAM
TRANSIT COSTS (in $1,000)

	Previous Funding	FY 2012	FY 2013	FY 2014	FY 2015	Total FY 2012-2015	
Revenues	-	2,149	2,149	2,149	2,149	Revenues	8,596
Equity Bonus	-	-	-	-	-	Equity Bonus	-
Flexible STP	113	564	3,112	680	856	Flexible STP	5,212
New Freedom	-	-	-	-	-	New Freedom	-
Totals	1,491	9,596	12,781	9,741	9,960		42,078

RADAR - UHSTS, Inc. Roanoke County	Previous Funding	FY 2012	FY 2013	FY 2014	FY 2015	Total FY 2012-2015	
FTA 5307	-	-	-	-	-	FTA 5307	-
FTA 5309	-	-	-	-	-	FTA 5309	-
FTA 5310	236	120	176	264	176	FTA 5310	736
FTA 5311	-	-	-	-	-	FTA 5311	-
FTA 5314	-	-	-	-	-	FTA 5314	-
JARC	424	208	-	-	-	JARC	208
Federal Stimulus	-	-	-	-	-	Federal Stimulus	-
TIGGER	-	-	-	-	-	TIGGER	-
Other Federal	-	-	-	-	-	Other Federal	-
State	225	83	-	-	-	State	83
Local	495	241	44	66	44	Local	395
Revenues	10	5	-	-	-	Revenues	5
Equity Bonus	-	-	-	-	-	Equity Bonus	-
Flexible STP	-	-	-	-	-	Flexible STP	-
New Freedom	238	88	-	-	-	New Freedom	88
Totals	1,628	745	220	330	220		1,515

Roanoke Valley MPO	Previous Funding	FY 2012	FY 2013	FY 2014	FY 2015	Total FY 2012-2015	
FTA 5307	-	2,506	2,506	2,506	2,506	FTA 5307	10,024
FTA 5309	640	-	-	-	-	FTA 5309	-
FTA 5310	236	120	176	264	176	FTA 5310	736
FTA 5311	-	341	341	341	341	FTA 5311	1,364
FTA 5314	-	-	-	-	-	FTA 5314	-
JARC	424	208	-	-	-	JARC	208
Federal Stimulus	557	-	-	-	-	Federal Stimulus	-
TIGGER	-	-	-	-	-	TIGGER	-
Other Federal	-	-	-	-	-	Other Federal	-
State	402	1,450	1,683	1,379	1,401	State	5,913
Local	499	2,910	3,034	2,752	2,751	Local	11,447
Revenues	10	2,154	2,149	2,149	2,149	Revenues	8,601
Equity Bonus	-	-	-	-	-	Equity Bonus	-
Flexible STP	113	564	3,112	680	856	Flexible STP	5,212
New Freedom	238	88	-	-	-	New Freedom	88
Totals	3,119	10,341	13,001	10,071	10,180		43,593

Financially Constrained List of Projects - Public Transportation GROUPS - FY 2012 to 2015 Page 1

VIRGINIA DEPARTMENT OF RAIL AND PUBLIC TRANSPORTATION **FY2012 - 2015**
STATEWIDE TRANSPORTATION IMPROVEMENT PROGRAM
TRANSIT COSTS (in $1,000's)

	Previous Funding	FY 2012	FY 2013	FY 2014	FY 2015	Total FY 2012-2015	
STIP ID:	**GRT0001**	Title: Operating Assistance			Recipient: **Greater Roanoke Transit Company**		GROUP1
STIP ID:	**GRT0028**	Title: Misc. Equipment			Recipient: **Greater Roanoke Transit Company**		GROUP1
STIP ID:	**GRT0031**	Title: ADP Hardware			Recipient: **Greater Roanoke Transit Company**		GROUP1
STIP ID:	**GRT0033**	Title: ADP Software			Recipient: **Greater Roanoke Transit Company**		GROUP1
STIP ID:	**GRT0034**	Title: Shop Equipment			Recipient: **Greater Roanoke Transit Company**		GROUP1
STIP ID:	**GRT0003**	Title: Replacement Bus			Recipient: **Greater Roanoke Transit Company**		GROUP3
STIP ID:	**GRT0025**	Title: Replacement Vans			Recipient: **Greater Roanoke Transit Company**		GROUP3
STIP ID:	**GRT0026**	Title: Support Vehicles			Recipient: **Greater Roanoke Transit Company**		GROUP3
STIP ID:	**GRT0027**	Title: Fareboxes			Recipient: **Greater Roanoke Transit Company**		GROUP3
STIP ID:	**GRT0035**	Title: Communications Systems			Recipient: **Greater Roanoke Transit Company**		GROUP3
STIP ID:	**GRT0036**	Title: Expansion Rolling Stock			Recipient: **Greater Roanoke Transit Company**		GROUP3
STIP ID:	**RAD0001**	Title: Operating Assistance - JARC			Recipient: **RADAR - UHSTS, Inc. Roanoke Cou**		GROUP1
STIP ID:	**RAD0005**	Title: New Freedom Program			Recipient: **RADAR - UHSTS, Inc. Roanoke Cou**		GROUP1
STIP ID:	**RAD0006**	Title: Paratransit Vehicles			Recipient: **RADAR - UHSTS, Inc. Roanoke Cou**		GROUP3
TOTALS	Previous Funding	FY 2012	FY 2013	FY 2014	FY 2015	Total FY 2012-2015	
STIP ID:	**GROUP1**	Title: Transit System Preservation					
FTA 5307		2,506	2,506	2,506	2,506	FTA 5307	10,024
FTA 5309		-	-	-	-	FTA 5309	-
FTA 5310		-	-	-	-	FTA 5310	-
FTA 5311		341	341	341	341	FTA 5311	1,364
FTA 5314		-	-	-	-	FTA 5314	-
JARC		208	-	-	-	JARC	208
Federal Stimulus		-	-	-	-	Federal Stimulus	-
TIGGER		-	-	-	-	TIGGER	-
Other Federal		-	-	-	-	Other Federal	-
State		1,377	1,308	1,296	1,297	State	5,278
Local		2,812	2,615	2,603	2,603	Local	10,633
Revenues		2,154	2,149	2,149	2,149	Revenues	8,601
Equity Bonus		-	-	-	-	Equity Bonus	-
Flexible STP		-	112	16	24	Flexible STP	152
New Freedom		88	-	-	-	New Freedom	88
Totals		9,486	9,031	8,911	8,920		36,348
Description:	Operating Assistance, office, shop, and operating equipment for existing facilities. Includes preventive maintenance and non-fixed route ADA service.						
STIP ID:	**GROUP2**	Title: Transit Rail ROW Improvements					
FTA 5307		-	-	-	-	FTA 5307	-
FTA 5309		-	-	-	-	FTA 5309	-
FTA 5311		-	-	-	-	FTA 5311	-
JARC		-	-	-	-	JARC	-
Federal Stimulus		-	-	-	-	Federal Stimulus	-
Other Federal		-	-	-	-	Other Federal	-
State		-	-	-	-	State	-
Local		-	-	-	-	Local	-
Revenues		-	-	-	-	Revenues	-
Equity Bonus		-	-	-	-	Equity Bonus	-
Flexible STP		-	-	-	-	Flexible STP	-
New Freedom		-	-	-	-	New Freedom	-
Totals		-	-	-	-		-
Description:	Construction or renovation of power, signal, and communications systems, rehab of track structures, track, trackbed in existing rights of way, and railroad/highway crossing projects						

Financially Constrained List of Projects - Public Transportation GROUPS - FY 2012 to 2015 Page 2

VIRGINIA DEPARTMENT OF RAIL AND PUBLIC TRANSPORTATION
STATEWIDE TRANSPORTATION IMPROVEMENT PROGRAM
TRANSIT COSTS (in $1,000's)

FY2012 - 2015

	Previous Funding	FY 2012	FY 2013	FY 2014	FY 2015	Total FY 2012-2015	
STIP ID:	**GROUP3**	Title: Transit Vehicles					
FTA 5307		-	-	-	-	FTA 5307	-
FTA 5309		-	-	-	-	FTA 5309	-
FTA 5310		120	176	264	176	FTA 5310	736
FTA 5311		-	-	-	-	FTA 5311	-
FTA 5314		-	-	-	-	FTA 5314	-
JARC		-	-	-	-	JARC	-
Federal Stimulus		-	-	-	-	Federal Stimulus	-
TIGGER		-	-	-	-	TIGGER	-
Other Federal		-	-	-	-	Other Federal	-
State		73	360	73	104	State	610
Local		98	404	139	148	Local	789
Revenues		-	-	-	-	Revenues	-
Equity Bonus		-	-	-	-	Equity Bonus	-
Flexible STP		564	2,880	584	832	Flexible STP	4,860
New Freedom		-	-	-	-	New Freedom	-
Totals		855	3,820	1,060	1,260		6,995
Description:	Purchase/lease of new buses and rail cars to replace existing vehicles or for minor expansions of fleet; rehabilitation of transit vehicles; and the purchase of support vehicles. Also includes the purchase of operating equipment for vehicles (radios, far						
STIP ID:	**GROUP4**	Title: Transit Amenities					
FTA 5307		-	-	-	-	FTA 5307	-
FTA 5309		-	-	-	-	FTA 5309	-
FTA 5310		-	-	-	-	FTA 5310	-
FTA 5311		-	-	-	-	FTA 5311	-
FTA 5314		-	-	-	-	FTA 5314	-
JARC		-	-	-	-	JARC	-
Federal Stimulus		-	-	-	-	Federal Stimulus	-
TIGGER		-	-	-	-	TIGGER	-
Other Federal		-	-	-	-	Other Federal	-
State		-	-	-	-	State	-
Local		-	-	-	-	Local	-
Revenues		-	-	-	-	Revenues	-
Equity Bonus		-	-	-	-	Equity Bonus	-
Flexible STP		-	-	-	-	Flexible STP	-
New Freedom		-	-	-	-	New Freedom	-
Totals		-	-	-	-		-
Description:	Construction of small passenger shelters and information kiosks; plantings, landscaping, fencing, lighting improvements, signage, etc.						

Financially Constrained List of Projects - Public Transportation Funding Trends Current to 2035

GRTC (Valley Metro) Budget Projections through 2035				
(Assumes 3% Yearly Increase, Actual Budget Amounts will vary, Funding amounts vary depending on 5307 funding allocated by DRPT and state funding available.)				
Year	**Amount**			
2012	$9,596,000.00	Includes the new Roanoke/Lynchburg bus service.		
2013	$12,781,000.00			
2014	$9,741,000.00			
2015	$9,960,000.00			
2016	$10,835,085.00	This projection is an average of the FY12-15 total costs.		
2017	$11,160,137.55	FY2017- FY 2035 are projections assuming a 3% yearly increase.		
2018	$11,494,941.68			
2019	$11,839,789.93			
2020	$12,194,983.62			
2021	$12,560,833.13			
2022	$12,937,658.13			
2023	$13,325,787.87			
2024	$13,725,561.51			
2025	$14,137,328.35			
2026	$14,561,448.20			
2027	$14,998,291.65			
2028	$15,448,240.40			
2029	$15,911,687.61			
2030	$16,389,038.24			
2031	$16,880,709.39			
2032	$17,387,130.67			
2033	$17,908,744.59			
2034	$18,446,006.93			
2035	$18,999,387.13			
RADAR - UHSTS, Inc.				
2012	$745,000.00			
2013	$220,000.00			
2014	$330,000.00			
2015	$220,000.00			
2016	$390,112.50	This projection is an average of the FY12-15 total costs.		
2017	$401,815.88	FY2017- FY 2035 are projections assuming a 3% yearly increase.		
2018	$413,870.35			
2019	$426,286.46			
2020	$439,075.06			
2021	$452,247.31			
2022	$465,814.73			
2023	$479,789.17			
2024	$494,182.84			
2025	$509,008.33			
2026	$524,278.58			
2027	$540,006.94			
2028	$556,207.14			
2029	$572,893.36			
2030	$590,080.16			
2031	$607,782.56			
2032	$626,016.04			
2033	$644,796.52			
2034	$664,140.42			
2035	$684,064.63			

Financially Constrained - Maintenance Funds

Program	Name	locality name	Sum of 2010	Sum of 2011	Sum of 2012	Sum of 2013	Sum of 2014	Sum of 2015	Sum of 2016	Sum of 2017	Sum of 2018
Financial Assistance to Localitie:	Financial Assistance to Localitie:	MPO	$ 10,692,955	$ 11,120,674	$ 11,565,501	$ 12,028,121	$ 12,509,246	$ 13,009,615	$ 13,530,000	$ 14,071,200	$ 14,634,048
Maintenance	Maintenance	MPO	$ 46,437,701	$ 48,005,522	$ 49,879,552	$ 51,828,422	$ 53,855,121	$ 55,948,709	$ 58,102,613	$ 60,341,417	$ 62,668,480
			$ 72,019,535	***$ 67,504,221***	***$ 71,986,795***	***$ 78,713,351***	***$ 77,239,262***	***$ 85,043,554***	***$ 86,528,327***	***$ 88,039,831***	***$ 89,616,466***
603 - Access	Bond Match	MPO	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,681,983	$ 1,638,693	$ 1,593,013
	Bridge	MPO	$ -	$ -	$ -	$ -	$ -	$ -	$ 597,812	$ 532,814	$ 464,698
	BROS	MPO	$ -	$ -	$ -	$ -	$ -	$ -	$ 980,235	$ 986,263	$ 992,327
	HPP-F	MPO	$ 56,780	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	HPP-R	MPO	$ 4,914	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	HRRR	MPO	$ 106,625	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	HRRR Match	MPO	$ 11,847	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Safe Routes to Schools	MPO	$ 166,602	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	SAFETEA-LU Bond Match	MPO	$ 123,232	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	SAFETEA-LU State Match	MPO	$ 51,741	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Safety	MPO	$ 1,041,641	$ 536,799	$ 540,332	$ 543,887	$ 547,464	$ 551,062	$ 554,683	$ 558,326	$ 561,992
	Safety Bike Ped	MPO	$ 218,571	$ -	$ -	$ -	$ -	$ -			
	Safety Match	MPO	$ 140,023	$ 59,644	$ 60,037	$ 60,432	$ 60,829	$ 61,229	$ 61,631	$ 62,036	$ 62,444
	STP Enhancement	MPO	$ 579,243	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	STP Under 200,000	MPO	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,193,370	$ 1,200,709	$ 1,208,092

Sum of 2019	Sum of 2020	Sum of 2021	Sum of 2022	Sum of 2023	Sum of 2024	Sum of 2025	Sum of 2026	Sum of 2027	Sum of 2028	Sum of 2029	Sum of 2030	Sum of 2031	Sum of 2032	Sum of 2033	Sum of 2034	Sum of 2035
$ 15,219,410	$ 15,828,186	$ 16,461,314	$ 17,033,573	$ 17,462,439	$ 17,910,795	$ 18,391,604	$ 19,063,655	$ 19,709,524	$ 20,223,564	$ 20,760,659	$ 21,060,647	$ 21,645,563	$ 22,258,631	$ 22,897,765	$ 23,567,880	$ 24,264,987
$ 65,087,293	$ 67,601,488	$ 70,214,840	$ 72,595,096	$ 74,420,515	$ 76,326,518	$ 78,363,799	$ 81,151,825	$ 83,842,724	$ 86,024,596	$ 88,301,689	$ 89,659,451	$ 92,134,128	$ 94,724,394	$ 97,422,284	$ 100,247,144	$ 103,183,609
$ 91,321,040	***$ 93,449,887***	***$ 94,908,665***	***$ 96,674,388***	***$ 98,853,567***	***$ 101,126,491***	***$ 103,451,112***	***$ 105,917,190***	***$ 108,168,528***	***$ 110,891,063***	***$ 113,732,037***	***$ 115,416,736***	***$ 118,503,445***	***$ 121,734,062***	***$ 125,098,538***	***$ 128,621,130***	***$ 132,282,492***
$ 1,544,845	$ 1,494,085	$ 1,440,628	$ 1,393,945	$ 1,363,207	$ 1,330,304	$ 1,293,789	$ 1,291,921	$ 1,299,866	$ 1,307,859	$ 1,315,901	$ 1,323,993	$ 1,332,134	$ 1,340,326	$ 1,348,568	$ 1,356,860	$ 1,365,204
$ 393,337	$ 318,598	$ 240,345	$ 170,705	$ 121,421	$ 69,304	$ 12,502	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ 998,429	$ 1,004,569	$ 1,010,746	$ 1,016,961	$ 1,023,215	$ 1,029,507	$ 1,035,838	$ 1,042,207	$ 1,048,616	$ 1,055,064	$ 1,061,552	$ 1,068,080	$ 1,074,647	$ 1,081,255	$ 1,087,904	$ 1,094,594	$ 1,101,325
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
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$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ 565,680	$ 569,391	$ 573,124	$ 576,881	$ 580,661	$ 584,463	$ 588,290	$ 592,139	$ 596,013	$ 599,910	$ 603,831	$ 607,777	$ 611,746	$ 615,740	$ 619,759	$ 623,802	$ 627,871
$ 62,853	$ 63,266	$ 63,680	$ 64,098	$ 64,518	$ 64,940	$ 65,366	$ 65,793	$ 66,224	$ 66,657	$ 67,092	$ 67,531	$ 67,972	$ 68,416	$ 68,862	$ 69,311	$ 69,763
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ 1,215,521	$ 1,222,995	$ 1,230,516	$ 1,238,082	$ 1,245,696	$ 1,253,356	$ 1,261,063	$ 1,268,817	$ 1,276,619	$ 1,284,470	$ 1,292,368	$ 1,300,315	$ 1,308,311	$ 1,316,356	$ 1,324,451	$ 1,332,595	$ 1,340,789

Environmental Planning and Pre-Environmental Screening 12

This chapter is divided into two main parts: Environmental Planning and Pre-Environmental Screening. The environmental planning section will deal with air quality planning as it relates to transportation planning and will have the following three emphasis areas:

- Air Quality Standards for Ozone
- Air Quality Standards for Fine Particulate Matter (PM 2.5)
- Global Warming/Greenhouse Gases

Specific pollutants and greenhouse gases (GHG) are related but discrete environmental issues. This chapter will deal with specific pollutants, and it will then examine GHG and global warming separately.

The Pre-Environmental Screening section will focus on applying pre-NEPA style environmental assessments to selected candidate projects from the financially constrained list of projects.

NEPA is the National Environmental Policy Act (NEPA) which is used by FHWA and the Federal Transit Administration to evaluate the environmental impacts associated with each individual transportation project. NEPA requires federal agencies to consider the environmental impacts of their proposed actions and reasonable alternatives to those actions.

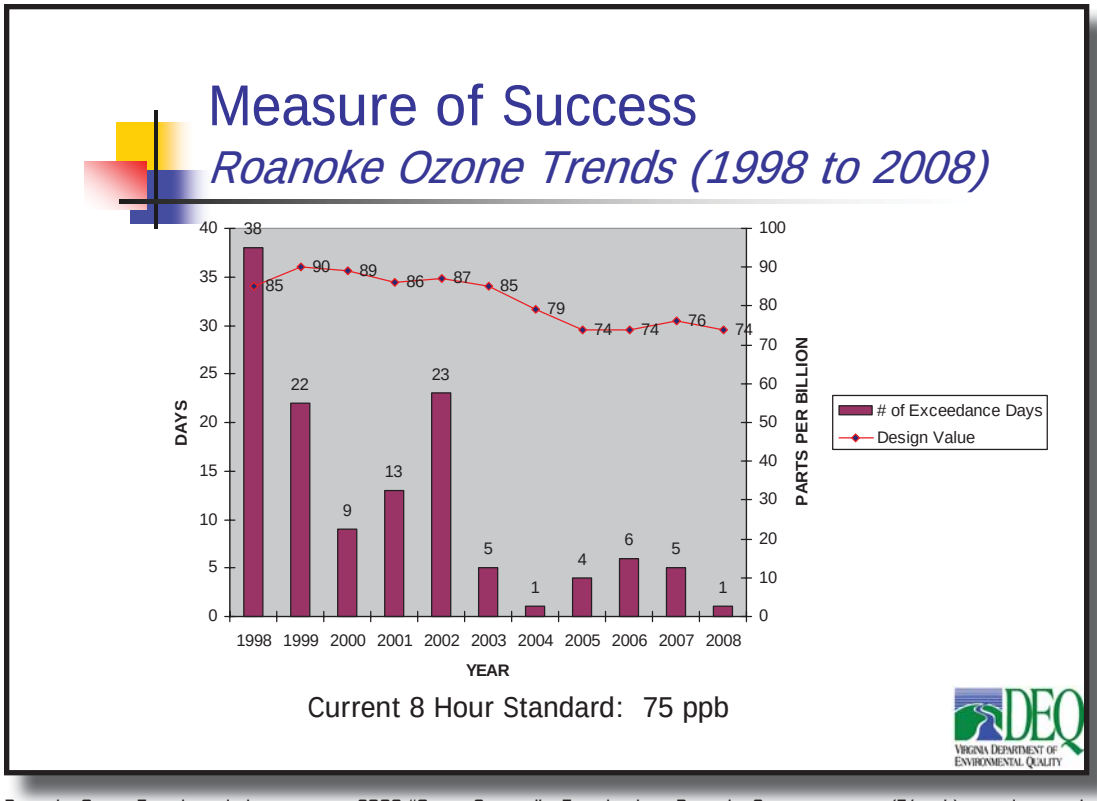
The purpose of pre-environmental screening in this plan is to help determine which projects advance to the programming stage by starting to catalogue available environmental data for those projects.

Environmental Planning

In describing environmental planning, it is useful to make a distinction between pollutants that affect air quality and the larger issue of global climate change. Pollutants such as ozone and fine particulate matter (PM 2.5) affect public health directly, especially in children and the elderly. The GHG that contribute to global warming do not achieve concentrations that affect public health and safety directly in the short run, but they have a host of long-term consequences.

Sometimes, pollutants and GHG come from the same source, and modifying or mitigating the source provides a double benefit. This is the case with energy conservation in regions where coal fired generators produce electricity. A reduction in the coal combustion reduces both GHG and pollutants.

Unfortunately, in other cases pollutant mitigation strategies do not reduce GHG emmissions. For example, when diesel engines are retrofit with equipment to reduce nitrous oxides (NOX), volatile organic compounds (VOC), or PM 2.5, the resultant reductions in pollutants do not mean less diesel is combusted or that fewer molecules of carbon dioxide are released. In fact, the retrofit engine may be slightly less efficient from a fuel combustion perspective. Likewise, the ozone reduction strategy of refueling in the morning or after 5:00 p.m. in summer months does not mean that less gasoline is eventually burned to produce carbon dioxide. This strategy is meant to postpone the release of the VOCs resulting from the pumping process so that they are not released in the heat of the day to react and form ozone.



Roanoke Ozone Trends including summer 2008 "Ozone Season" - Trends show Roanoke 3-year average (74 ppb) compliant with new federal 8 hour standard of 75 ppb.

Ozone Early Action Plan (EAP)

In 1997, the EPA acted to reduce ozone in the atmosphere by changing the national ozone standard from a 1-hour peak of 125 parts per billion (ppb) to an 8-hour average concentration of 80 ppb, with an effective "design value" of 85 ppb. The design value allows for the possibility of rounding errors in the data. The new 8-hour standard was in litigation for a number of years, but early in the new millennium the EPA implemented the new standard. In 1998, the Roanoke Region's ozone levels were above the allowable concentration. In 2002, RVAMPO learned through the Virginia Department of Environmental Quality (VDEQ) that Roanoke was eligibility to participate in the Ozone Early Action Compact/Early Action Plan (EAC/EAP) process, which was open to areas that were compliant with the older 1-hour peak standard but became non-compliant due to the lower 8-hour average standard. In exchange for a three-year deferral of an ozone "nonattainment" (not meeting) designation, regions participating in the EAC/EAP process agreed to immediately develop an air quality plan. At the end of the three year period, air quality data would be analyzed and a conformity determination made on the newer three year period. This allowed RVAMPO's CLRTP and TIP to proceed without having to perform the "air-quality conformity analysis" required of areas under the traditional nonattainment designation. However, a photo-chemical model analysis would be performed of the entire EAP to demonstrate its potential to bring the region into attainment for the new standard.

The EAC was signed at the end of 2002 and the EAP was developed by 2004. Most of the RVAMPO 2035 study area was covered under the regional EAP, which contained strategies ranging from transportation to lawn care equipment. A summary of the transportation related strategies follow:

- Reduce Locomotive Idling
- Limit Idling Times for School Buses
- Retrofit Roanoke County School Buses
- City of Roanoke - Purchase more efficient, Biodiesel compatible alternative fuel solid waste trucks
- City of Roanoke - Purchase/Use of ethanol compatible alternative fuel vehicles
- City of Roanoke – Purchase new cleaner fleet trucks that will operate using biodiesel as an alternative fuel to diesel
- City of Roanoke - Purchase/Use of hybrid vehicles
- Roanoke County - Purchase of more efficient, low-emission and alternative fuel vehicles
- Air Quality Action Days - Carpool Message and Refueling
- Workplace and Student Transit Pass Program
- Bicycle Infrastructure and Amenities
- New Bus Service between Roanoke, Salem, Blacksburg, and Christiansburg

The process succeeded. Based on 2005-2007 air quality data, the Roanoke Region was in compliance with the 85 ppb design value. In early March 2008, the EPA established a new nationwide 8-hour Ozone standard at 75 ppb with no design value. The Roanoke Region was reevaluated using 2006-2008 data and found to be in compliance with the new stricter. However, with a 3-year average of 74 ppb, the region is close to the upper limit. Although the CLRTP 2035 is not subject to an air quality conformity analysis, one goal of the plan is to help ensure that the region stays in compliance with the newest ozone standard.

Fine Particulate Matter - PM 2.5

Particulate matter pollution, or soot, is formed of very small particles from a variety of sources such as smoke from fires, dust kicked up from construction sites, vehicle emissions, and related sources. These particles do not always pose significant health risks, but in the case of very small particles of 2.5 microns or less, known as fine particulate matter or PM 2.5, the particles can become lodged in the lungs, contributing to or causing a variety of health problems. In the Roanoke Region, PM 2.5 is second only to ozone as our major air quality challenge.

In some cases, PM 2.5 sources overlap with GHG emissions and with those of ozone pollution. For example, vehicle emissions contain particles of soot, carbon dioxide (CO2), and volatile organic compounds, all of which are by-products of the internal combustion process and are components in PM 2.5, climate change, and ozone respectively. Reducing vehicle emissions – through the reduction in vehicle trips, moving to biodiesel and gas-electric hybrid vehicles, or increasing vehicle efficiency – can be an effective strategy for addressing each of these important issues.

However, even when one source affects multiple environmental and air quality challenges, care should be taken to address these sources individually as well as effectively. For example, strategies associated with ozone pollution, such as filling up your gas tank in the cool hours of the evening, are a function of heat being a necessary catalyst for the formation of ozone, and therefore would have no impact on climate change or PM 2.5. Another example would be the installation of scrubbing mechanisms on vehicle tailpipes, which would significantly reduce soot but would have zero impact on CO2.

As of February 2008, the primary local sources of PM 2.5 in the Roanoke area were wood stoves, fireplaces, unpaved roads (dust), construction (dust), and small boilers, in order of importance. Line haul and yard locomotives were also noted as significant sources, as was Roanoke Cement.

However, even high-producing local sources were relatively small in total pollutant output compared to sources outside the region. VDEQ analysis reveals that coal-burning power plants in far southwest Virginia, West Virginia, Tennessee and beyond constitute a major source of PM 2.5 pollution for the Roanoke region.

Emissions from mobile sources such as diesel trucks traveling the I-81, 220, and 460 corridors are also significant contributors as those emissions become trapped in the valley. Unfortunately, even though these out-of-region and mobile sources of pollution pose significant local air quality challenges, they are removed from the direct impact of local action. The dynamic of particulate matter pollution, therefore, can be described as "local source and small contributor" versus "outside source and large contributor."

Under current regulations, the Roanoke region is in compliance with EPA's annual standards of 15 micrograms of PM 2.5 per cubic meter (ug/m3), having exceeded this standard only in 2005 in both Roanoke and Salem. In 2006, the Salem monitor was discontinued due to interference from local construction and was moved to Round Hill Montessori School in Roanoke. Prior to 2006, both the Roanoke and Salem monitors showed a steady increase in PM 2.5 readings. While there was a drop in the 2006 Roanoke monitor readings, the overall trend for the last four years has been upward.

Indeed, VDEQ predicts a 10% increase in PM 2.5 levels by 2018, even as other air pollutants are expected to decrease from 20% to 40% from 2002 levels. With current PM 2.5 levels hovering just under the 15 ug/m3 standard, this projected increase would pull the region out of compliance. Furthermore, the current standards are under review by the EPA and may drop even lower.

In 2007-08, RVAMPO staff developed a voluntary plan to address PM 2.5 levels modeled on the Ozone EAP process. As of the writing of the CLRTP 2035 the EPA does not have an EAP framework for PM 2.5; therefore, the recently developed plan will remain voluntary and regionally driven.

The recommendations from the PM 2.5 plan were not limited to the transportation related recommendations as was done in the Ozone EAP. The recommendations are as follows:

- Broaden Air Quality Action Day e-mail list message to include PM 2.5
- Expand Air Quality Action Day e-mail list membership
- Compact Fluorescent Light Bulb (CFL) Giveaway and Education Program
- Voluntary Anti-idling Campaign
- Regional Education Campaign
- Training Opportunities for Local Business Leaders
- Implement Regional Ban on all Open Burning
- Implement Mandatory Wetting at Construction Sites
- Local/Regional Incentives or Mandates for Biodiesel

Global Climate Change and Greenhouse Gases

Air quality is defined by the level of various types of pollutants in our atmosphere which have a negative impact on human health and are primarily local in origin and impact. Ozone and PM 2.5 both fall into this category. Climate change is defined as instability in the global climate driven primarily by the build-up of carbon dioxide and other GHG in the atmosphere. The effects are long term and far-reaching, local in origin but global in impact. In other words, air quality is primarily a local challenge that can be addressed through local strategies, while climate change is a generalized challenge that requires global strategies (even if those strategies require cooperation and coordination at the local level).

There are three basic approaches to reducing GHG in the context of regional long-range transportation planning.

- Behavior change approaches
- Urban design and/or land-use approaches
- Carbon footprint oriented approaches

Behavior Change Approaches

Behavior change approaches use education, communication, and marketing to change behavior that will result in a reduction in GHG emissions. This approach is featured in the first goal listed in chapter 2, "Goal One: Improve transportation system performance, air quality and reduce growth in energy use related to transportation by reducing the growth rate of Vehicle Miles Traveled (VMT)." The challenge in behavior change marketing is to identify the target markets that will be most receptive to the message because of personal, ideological, or financial characteristics. Typical marketing strategies seek to market a financial transaction for a good or service. Behavior change approaches seek to market a beneficial behavior such as recycling, saying no to drugs, staying in school, or in our case reducing individual GHG emissions.

Urban Design And/Or Land Use Approaches

Urban design and land use approaches to global climate change usually focus on urban or rural activity centers in which development is compact and can be served by transit, walking, or biking in addition to passenger cars. The idea is both to reduce the distance traveled for some trips and to substitute alternative transportation modes for other trips. This can be accomplished by simultaneously encouraging greater development density with mixed residential, retail, and small commercial uses and by encouraging a "complete streets" concept that seeks to reorganize traditional rights-of-way to accommodate motorized vehicles, bicycles, and pedestrians.

Carbon Footprint Oriented Approaches

The National Environmental Policy Act of 1969 (NEPA) established a national environmental policy and provided a framework for environmental planning and decision-making by federal agencies. When federal agencies are planning, funding, or issuing permits for projects, NEPA directs them to conduct environmental reviews to consider the potential impacts on the human and natural environment by their proposed actions. The Council on Environmental Quality (CEQ) was created to oversee the administration of NEPA.

The NEPA process is now strongly embedded in the federal project development process and continues to have broad-based legislative support. Concerns about its effect on the timely completion of projects, however, led lawmakers to establish an emphasis on expedited transportation project delivery within the NEPA process. Executive Order 13274 in 2002 and language in the 2005 federal transportation legislation "Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users" (SAFETEA-LU) both addressed these concerns.

As a result, the FHWA has worked with states to implement an environmental streamlined process that uses inter-agency efforts to establish realistic time frames for the environmental review of transportation projects. FHWA has also encouraged transportation planning agencies (State DOT's, MPO's, and RPO's) to link planning and environmental review in order to streamline both processes. This section attempts to provide such a linkage by identifying human and natural resources that could be affected by future transportation projects along roadways in the Roanoke Metropolitan Service Area.

Linking Transportation Planning and NEPA

The Virginia Department of Transportation was awarded a grant from the FHWA to conduct a study to identify ways to support an efficient transition from long-range transportation planning to the NEPA process. The study, *Linking Transportation Planning and NEPA*, was published in March of 2006 and provided six high-priority recommendations for linking planning and NEPA:

1. Ensure that planning documents record purpose and need information at an appropriate and useful level of detail, both for planning level decisions and for future use in NEPA studies.
2. Ensure that planning documents include relevant reasonable alternatives at an appropriate and useful level of detail, both for planning level decisions and for future use in NEPA studies.
3. Ensure that planning documents include relevant environmental data (not just "window dressing") at an appropriate and useful level of detail for planning level decisions, recognizing that they likely will be updated and developed in greater detail for future NEPA studies.
4. Ensure that planning staff are invited to participate in NEPA studies at the earliest stages, and that environmental staff are invited to participate in planning studies.
5. Ensure that planning documents are available to NEPA practitioners, that NEPA practitioners are aware of the existence of such documents and that NEPA practitioners actually use the pertinent information from such documents.
6. For new-location projects in planning documents, give more careful consideration to the locations of conceptual alignments and how they are depicted on graphics or plan maps.

These recommendations are intended to provide a foundation for satisfying NEPA requirements during the planning process. The first three points in this list are discussed in greater detail below.

Purpose and Need

A project's purpose and need statement is used to frame the issue at hand so that project staff and stakeholders can effectively develop and evaluate alternatives. It should clearly demonstrate that a need exists and should explain how the proposed enhancements will correct the problem.

All transportation plans developed by VDOT and/or consultants must include a "Linking Planning and NEPA" Matrix to aid NEPA practitioners in the identification and documentation of purpose and needs.

A listing of the elements of this matrix and a completed sample are provided below:

Project Description

- **Route Number and/or Route Name**
- **Project Description:** Brief written statement that describes the recommended improvement, impacted local governments, additional project features, etc.
- **Termini:** Intersecting routes, boundaries, or land features that describe the limits of the proposed improvement
- **Proposed Typical Section:** Code that indicates whether the improvement is rural vs. urban, number of lanes and the median type (divided vs. undivided)
- **Length:** the length of the proposed improvement in miles
- **Cost**: The planning level cost estimate for the proposed improvement (Please indicate year of expenditure date of estimate). Planning level cost estimates should be shown as a range

Project Purpose

Briefly describe the key purpose of the proposed improvement that identifies the performance measures and/or goals to be achieved with the improvement

Needs

- **Existing Level of Service:** Existing peak hour level of service (Please indicate base year date)
- **Forecasted Level of Service:** Forecasted future peak hour level of service for both build and no build (indicate forecast year)
- **Current and Future AADT:** The current and forecasted average daily traffic volume in both directions
- **Existing Volume to Capacity Ratio:** Existing peak hour volume to capacity ratio
- **General Needs:** Capacity, Roadway, Safety, Route Continuity, Transportation Demand, or Modal Connectivity

Environmental Concerns

Document potential environmental concerns which may include wetlands, streams, agricultural/forest districts, cultural resources, conservation lands, Virginia Outdoor Foundation easements, and threatened & endangered species. Also, document any potential community impacts (environmental justice) using the Virginia Block Group Level Demographic Maps (maps located on VDOT's Civil Rights Division website) or similar map.

Alternatives Considered

Document reasonable alternatives (mode, scope, alignment) that were considered or eliminated during plan development and the reasons for elimination. Show planning level cost estimates for each alternative that was considered.

Project History

Briefly describe the origin of recommended improvement.

"Linking Planning and NEPA" Matrix Route I-95

Project Description	**Route**	I-95
	Project Description	Widen from 6 to 8 lanes from Route 3 to Route 17 in Spotsylvania and Stafford Counties. Reconstruct interchanges at x,y,z and bridge over Rappahannock River
	From	Route 3
	To	Route 17
	Proposed Typical Section	R10D
	Length (miles)	12.00
	Cost	200,000 (15)
Purpose	**Summary of Project Purpose**	Provide improved level of service C, facilitate movement of people and goods, and address high accident rates in corridor, existing LOS F and high V/C ratio. Project supports SHP Goal #1 and #3.
Needs	**Existing LOS / show base year**	F (05)
	Forecasted LOS -Build and No build / show years	C, F
	Existing year AADT	140000 (05)
	Future Year AADT	225000 (25)
	Existing Volume to Capacity Ratio	0.97 (05)
	Capacity (C), Roadway (R) or Safety Deficiency (S), Route Continuity (RC), Transportation Demand (TD), Modal Connectivity (MC)	C, S
Environmental Issues	**Environmental Concerns**	Endangered Species, Cultural Resources, Wetlands
Alternatives	**Alternatives Considered**	Expansion of HOV lanes from Prince William County Line to Route 3, construction of CD lanes and slip ramps at major intersections.
History	**Project History**	Identified in I-95 Corridor Study

"Linking Planning and NEPA" Matrix Route I-581/ Valley View Blvd. Interchange

Project Description	**Route**	I-581/ Valley View Blvd. Interchange
	Project Description	Completion of interchange at Valley View Blvd. and associated improvements
	From	Hershberger Road Interchange
	To	10th Street Overpass
	Proposed Typical Section	Partial Diamond/Cloverleaf Intersection
	Length (miles)	2.30
	Cost	$69,165,000
Purpose	**Summary of Project Purpose**	Provide full movement access to both sides of I-581; extend Valley View Blvd. to the west as a local connector
Needs	**Existing LOS / show base year**	
	Forecasted LOS -Build and No build / show years	
	Existing year AADT	
	Future Year AADT	
	Existing Volume to Capacity Ratio	
	Capacity (C), Roadway (R) or Safety Deficiency (S), Route Continuity (RC), Transportation Demand (TD), Modal Connectivity (MC)	C, TD
Environmental Issues	**Environmental Concerns**	Streams, Impaired Streams, Historic Resources, Greenway
Alternatives	**Alternatives Considered**	Single Point Urban Interchange, Diamond Interchange, Partial Interchange, several Partial Diamond/Cloverleaf designs
History	**Project History**	

"Linking Planning and NEPA" Matrix Route I-581/Elm Ave. interchange

Project Description	Route	I-581/ Elm Ave. interchange
	Project Description	Safety and operational improvements at Elm Ave interchange
	From	Elm Ave interchange area
	To	
	Proposed Typical Section	
	Length (miles)	
	Cost	$10,850,000
Purpose	Summary of Project Purpose	Improve LOS, reduce traffic backup on I-581
Needs	Existing LOS / show base year	
	Forecasted LOS -Build and No build / show years	
	Existing year AADT	
	Future Year AADT	
	Existing Volume to Capacity Ratio	
	Capacity (C), Roadway (R) or Safety Deficiency (S), Route Continuity (RC), Transportation Demand (TD), Modal Connectivity (MC)	C, TD
Environmental Issues	Environmental Concerns	Historic Resources, Parks, Endangered Species
Alternatives	Alternatives Considered	Additional lanes on bridge and exit ramps, rerouting of NB ramp to 4th St., Single point urban intersection, SB exit flyover ramps
History	Project History	

"Linking Planning and NEPA" Matrix Route Elm Avenue

Project Description	**Route**	Elm Ave.
	Project Description	Widen Roadway
	From	Jefferson St
	To	6th St
	Proposed Typical Section	U6L
	Length (miles)	0.25
	Cost	$4,762,000
Purpose	**Summary of Project Purpose**	Increase roadway capacity, operational efficiency of I-581 interchange
Needs	**Existing LOS / show base year**	
	Forecasted LOS -Build and No build / show years	
	Existing year AADT	
	Future Year AADT	
	Existing Volume to Capacity Ratio	
	Capacity (C), Roadway (R) or Safety Deficiency (S), Route Continuity (RC), Transportation Demand (TD), Modal Connectivity (MC)	C
Environmental Issues	**Environmental Concerns**	Historic Resources, Parks, Greenway, Endangered Species
Alternatives	**Alternatives Considered**	
History	**Project History**	

Alternatives Analysis

It is important to document any alternatives considered formally or informally during the development of transportation plans and corridor studies. A preliminary alternatives analysis must be completed for major corridor studies (not including spot improvement projects or operational plans). During the creation of long range transportation plans, alternatives analysis must be completed for any projects whose facilities will be placed on currently undeveloped locations that have not been reviewed by previous project or corridor studies. Improvements to existing facilities are not required to include an alternatives analysis, but a list of the considered alternatives should be included in the planning matrix.

The alternatives analysis should include a full listing of the alternatives considered for the project, the types of professional and technical inputs that were used to analyze them, a listing of the judging criteria used during the selection process, and an explanation for why each alternative was not selected.

Appropriate Environmental Data in Plans and Studies

The amount and type of environmental data that needs to be reviewed in a transportation plan is dependent on the nature of the plan itself. Plans will fall in one of three categories:

Environmental Study Level 1: ***Constrained Long-Range Plans, VTrans***
These reviews provide a general overview of environmental issues facing the commonwealth and summarize the big picture/ policy level strategies that have been created to address them.

Environmental Study Level 2: ***Small Urban Area Transportation Studies, Regional Long-Range Plans, State Highway Plans***
These reviews contain a more comprehensive overview of the environmental resources that might be impacted by the planned transportation improvement projects. The Transportation Mobility Planning division will request that these reviews be made by their Environmental Division.

Environmental Study Level 3: ***Corridor Studies***
Similar to level two studies, a level three study is distinguished by the fact that an Environmental Staff member should be the chief member of the team conducting the environmental review.

Environmental Justice Screening 13

Environmental justice entered governmental parlance with the signing of Executive Order 12898 in 1994. Executive Order 12898 requires that federal agencies and other entities making use of federal funding avoid "disproportionately high and adverse" effects on minority and low-income populations and seek involvement of the public with a goal of ensuring environmental justice in governmental operations. The United States Environmental Protection Agency defines environmental justice as "…the fair treatment of all people, regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic groups should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies."

Environmental justice does more than simply ban intentional discrimination. It requires that all organizations/agencies receiving federal funds evaluate the consequences of their activities for any disparate impacts upon special protected groups, which include racial minorities, Hispanics, low-income groups, those with Limited English Proficiency (LEP), the elderly, and the disabled.

The role of environmental justice in the CLRTP 2035 planning process revolves primarily around creating demographic profiles for the study area and overlaying potential "Financially Constrained List" projects to see which projects have the potential to negatively impact protected areas or groups. Projects with a potential impact will be further evaluated to list potential benefits or burdens to the community involved should the project proceed to engineering or construction.

Demographic Profiles

After an extensive review of existing evaluation methods for environmental justice in regional transportation programs, staff identified the Delaware Valley Regional Planning Commission's (DVRPC) as a national best practice. DVRPC serves the greater Philadelphia area including parts of Pennsylvania and New Jersey and is one of the few regional planning bodies that attempts to evaluate environmental justice using a quantitative method based on regional demographic information.[18]

DVRPC's quantitative evaluation method is based on US Census Bureau data at the tract level. Census data for racial minorities, Hispanics, Limited English Proficiency, disabled populations, elderly populations, and populations without access to vehicles is collected and a regional average for each of these variables is computed. Each tract is then given a score based on whether or not it exceeds this regional average or threshold. For each instance in which a tract exceeds the regional average, the tract is given one point or degree of disadvantage (DOD). The DODs are then totaled for each tract for its total DOD score, which can be made into a single layer for an environmental justice evaluation map base.

However, when DVRPC's DOD method was first attempted with local data, numerous issues were identified. Most importantly, since Roanoke is a much smaller urban area than the Greater Philadelphia Area, low regional averages of both Hispanic and Limited English Proficiency populations skewed the results and lessened the disparity in index scores between affluent areas and many low-income, minority areas.

At first, it was suggested that a system of weights or priorities might be utilized to place more emphasis on certain variables such as race and poverty to avoid this issue. It was understood, of course, that an arbitrary assignment of weights would be dangerous; therefore, the idea was abandoned. Instead, staff adopted the approach of measuring not only whether a block group exceeded the regional average, but also by how much a block group exceeded a regional average. All variables are given the same weight in this approach, but areas that are characterized overwhelmingly (i.e. two or three times the regional average) by low-income and minority residents are given a much higher score by virtue of their high concentrations, thereby solving the original problem. Overwhelming concentrations of any other variable would also function in this manner. However, it was observed that in Census 2000 data, individual sub-regions were more likely to have high concentrations of low-income populations or minority populations than they were to have high concentrations of any other environmental justice variable.

Indeed, many modifications were made to the DVRPC method before application to the RVAMPO region. When measuring elderly populations, for instance, RVAMPO staff measured concentrations of those who were 65 and over in 2000, as opposed to measuring those who were 85 or over (as did DVRPC). Also, more categories of the disabled population were considered in the RVAMPO analysis than in DVRPC's.

8. The DVRPC first applied this methodology in the 2001 document entitled "…and Justice for All" and has modified its approach on an annual basis as new issues arise and as new data becomes available.

The scoring structure was also changed. In the RVAMPO analysis, a block group received a zero only if it is below the regional average of all variables. However, if the block group exceeds the regional average of any given variable the score was based upon the percentage by which it exceeds the average (Index score = Percent Above Regional Average / 100). For example, a block group that has a disabled population 500% above the regional average received a score of 5.0 for the disabled component of the index score. Each component or score for each variable was then totaled into a composite index. This change was implemented after comment from stakeholders indicated that a more sensitive sliding scale was in order. Because of the aforementioned changes, RVAMPO staff labeled its quantitative measure of environmental justice sensitive areas as the environmental justice index or EJ index as opposed to DVRPC's degrees of disadvantage.

Data on racial minorities was originally derived from the census data at the block group level. Minority, as defined in this report, includes all racial categories other than 'White.' The regional average of racial minorities was computed at 16.6%. All block groups with higher minority concentrations were assigned points in the EJ index according to the percent by which the block group averages exceeded the MPO study area average. Please note that the racial minority variable does not contain data on Hispanics, as Hispanics do not represent a racial group. Hispanics represent a cultural group, whose members may belong to numerous races. Hispanic ethnicity is the second variable included in this methodology. The regional average of Hispanics was computed at 1.13%. Block groups found to have higher concentrations of Hispanic populations were assigned points in the EJ index according to the percent by which they exceeded the MPO study area average.

Limited English Proficiency populations were considered next in the methodology. Federal guidance on the subject of Limited English Proficiency states that an LEP individual is someone who has a primary language other than English and must communicate in this language due to a limited proficiency in English. When completing the census survey form question on English proficiency, the respondent is asked whether he/she speaks English 'Very Well', 'Well', 'Not Well', or 'Not at All'. An LEP individual is defined here (for statistical purposes) as someone who stated that he or she speaks English 'Not Well' or 'Not at All'. The regional average of LEP individuals was found to be 0.71%. All block groups with higher LEP concentrations were assigned points in the EJ index according to the percent by which the block group average exceeded the MPO study area average.

Poverty is the fourth variable considered in this methodology. Census poverty data is based on whether an individual's household income is at or below the Department of Health and Human Services (HHS) federal poverty guidelines. Census 2000 poverty data was based on the 1999 poverty guidelines, which are listed in the table below for reference.

Size of Family Unit	1999 Household Income
1	$8,240
2	$11,060
3	$13,880
4	$16,700
5	$19,520
6	$22,340
7	$25,160
8	$27,980
Each Additional Person	Add $2,820

Source: Department of Health and Human Services, 1999.

The regional average of individuals with poverty status was found to be 9.7%. All block groups with higher concentrations of individuals in poverty were assigned points in the EJ index according to the percent by which the block group averages exceeded the MPO study area average.

An additional variable considered in this methodology was that of the household without access to a motor vehicle. Given the nature of the CLRTP 2035 planning process, this variable is a good environmental justice indicator for transportation plans. The regional average of carless households was found to be 8.11%. Each block group with a higher concentration of households without motor vehicle availability was assigned points in the EJ index according to the percent by which the block group exceeded the MPO study area average.

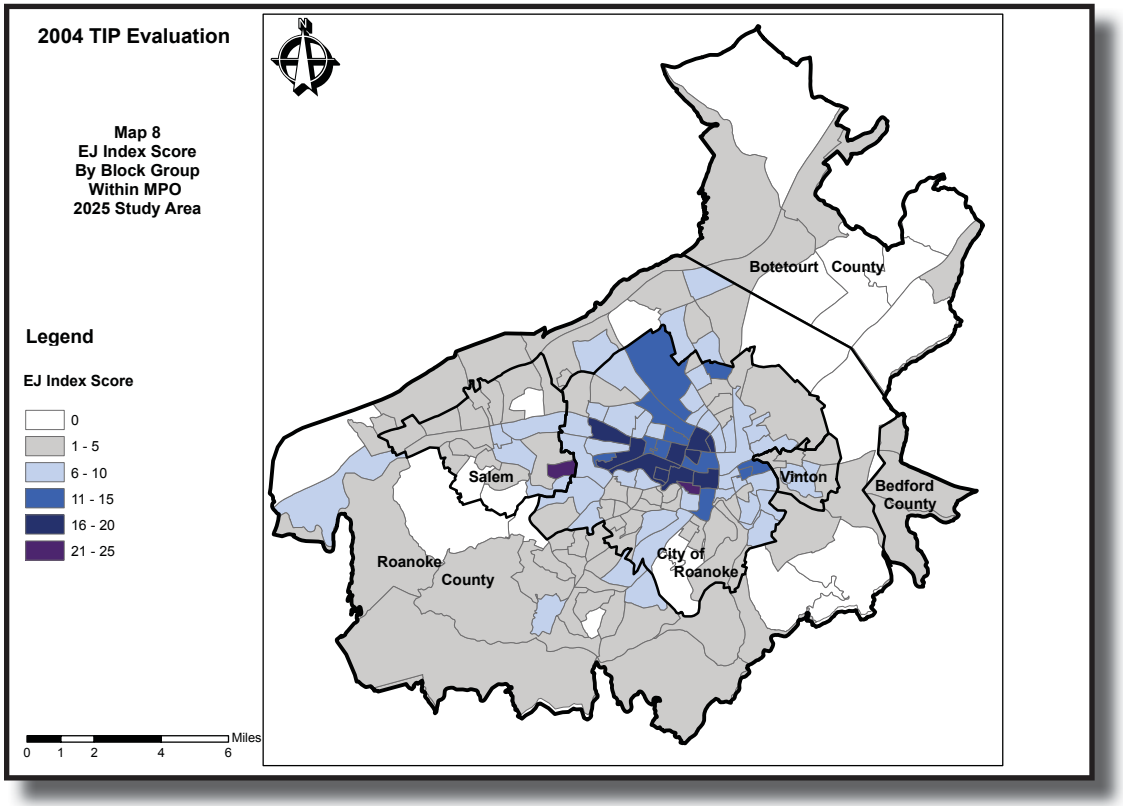
Next staff considered disability in constructing this methodology.[91] The regional average of the disabled is 20.8%. All block groups with higher disabled concentrations were assigned points in the EJ index according to the percent by which the block group averages exceeded the MPO study area average.

The final variable considered in this methodology is that of the region's elderly. The regional average of those over 65 was found to be 15.9%. All block groups with higher concentrations of the elderly were assigned points in the EJ index according to the percent by which the block group averages exceeded the MPO study area average.

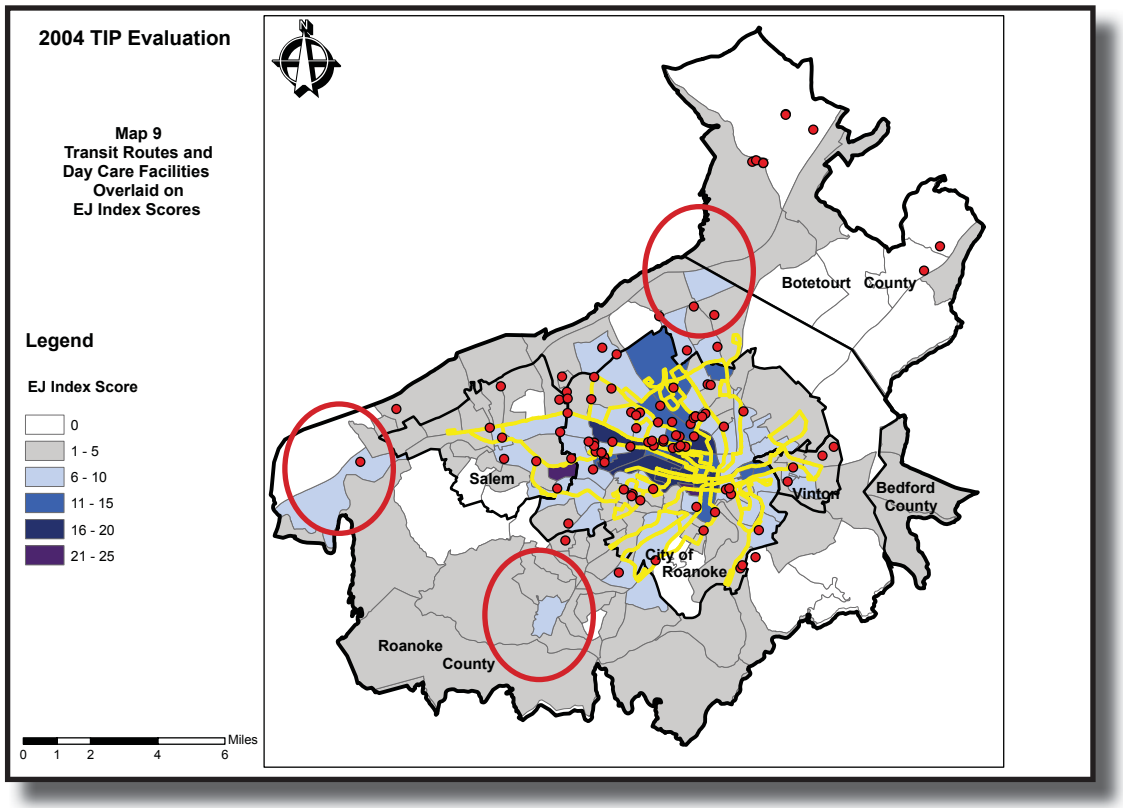
The following census block group level map of RVAMPO EJ index scores is from a 2004 evaluation of RVAMPO Transportation Improvement Program (TIP) projects. The map uses the then current 2025 study area boundary. Components of the EJ index score methodology will be shown on subsequent pages with maps updated to the 2035 study area boundary used in this plan.

9. Previous public involvement demographic analyses of the region have noted an unusually high percentage of disabled individuals. No explanation exists for this phenomenon presently, but it should be noted nonetheless. Please also note that disability defined here includes physical, mental, go-outside-home disability, self-care disability, sensory disability, and employment disability.

RVAMPO EJ index Scores

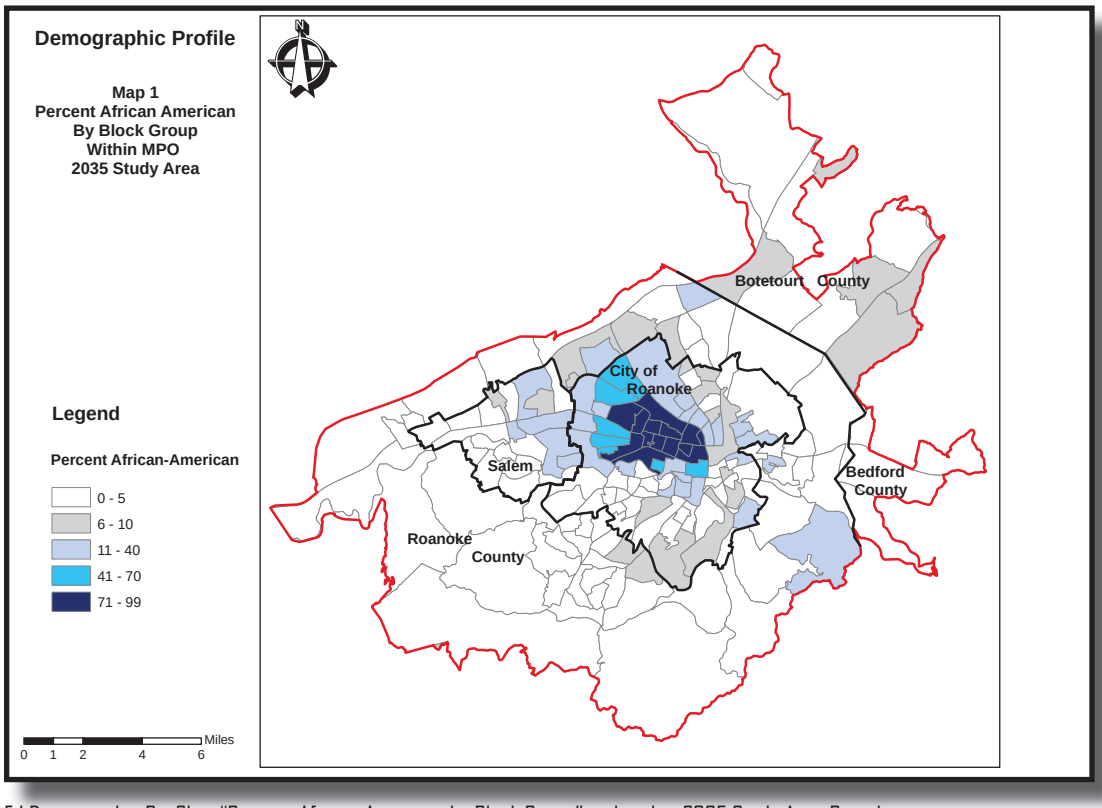


Environmental Justice Index Scores from 2004 evaluation using then current 2025 RVAMPO Study Area Boundary

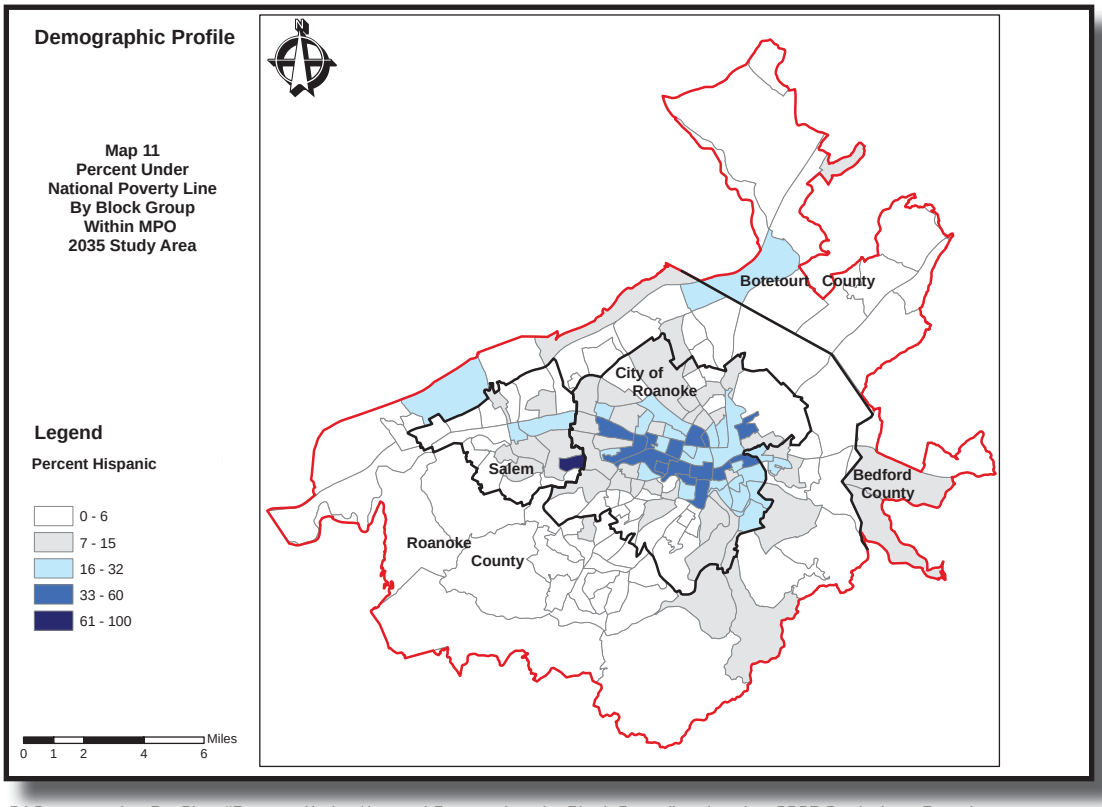


Fixed Route Transit System (yellow lines) and Day Care facilities (as of 2004) compared with EJ Index Scores. Most areas with high EJ index Scores are served by both fixed route transit and day care facilities. However, the areas that are not served (red circle) are similar to the areas cited in chapter 3, "Scenario Planning," under the Baby Boom Retirement scenario, indicating both current and future need for possible transit expansion or other transportation services.

2035 Boundary Profiles

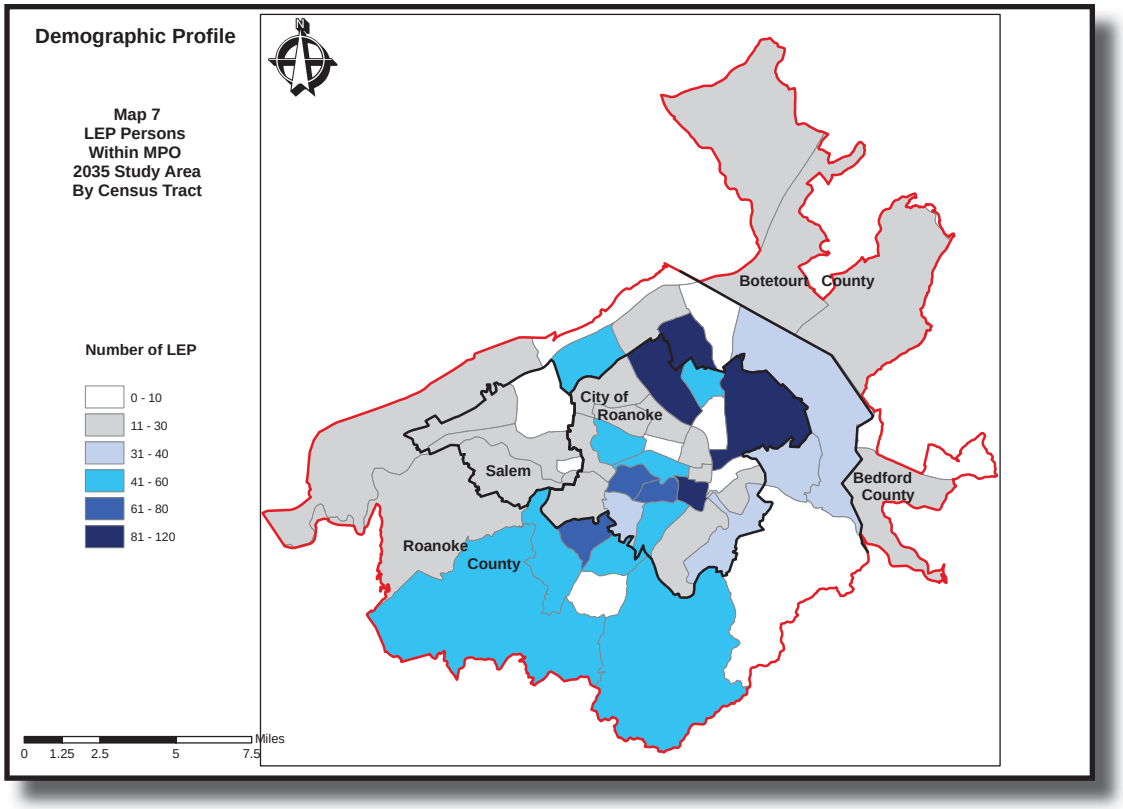


EJ Demographic Profile - "Percent African American by Block Group" updated to 2035 Study Area Boundary

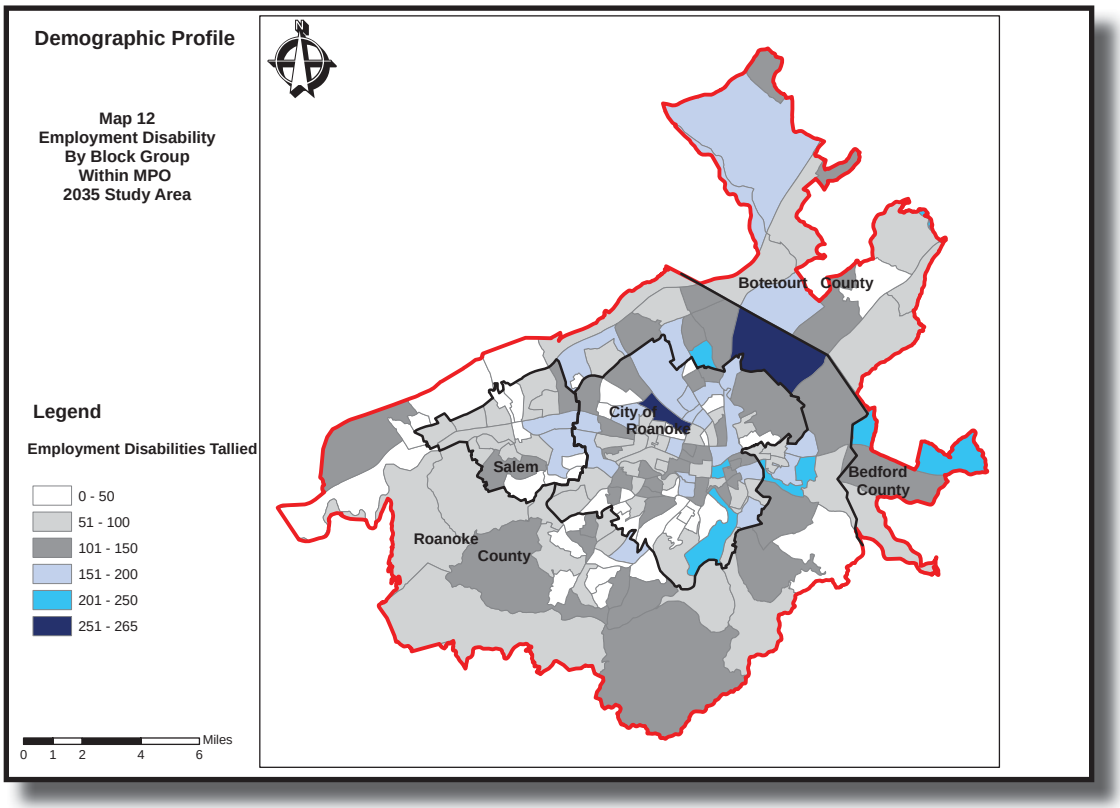


EJ Demographic Profile - "Percent Under National Poverty Line by Block Group" updated to 2035 Study Area Boundary

2035 Boundary Profiles



EJ Demographic Profile - "Limited English Proficiency (LEP)" updated to 2035 Study Area Boundary



EJ Demographic Profile - "Employment Disability" updated to 2035 Study Area Boundary

Economic Development Analysis 14

Economic development has been a key consideration in metropolitan transportation planning from the beginning. In the most basic sense, a region's transportation system and its economy are intrinsically linked, as it is the transportation system that shapes a region's ability to move goods from producer to consumer and all steps in between. Regional transportation networks also shape and influence local land use, influencing the value of properties and sometimes opening properties to more profitable uses. There is ample evidence of a strong relationship between the design and function of a region's transportation network and its overall competitiveness in the economy.

The SAFETEA-LU Reauthorization Bill, which authorizes the federal surface transportation programs for highways, highway safety, and transit for the 5-year period 2005-2009, further emphasized the importance of economic development as a key planning factor to consider in metropolitan planning. SAFETEA-LU continues the Transportation Equity Act for the 21st Century requirement of supporting economic vitality as one of the factors in metropolitan transportation planning, but it also expands the requirement to assert that transportation plans must refer to efforts to promote consistency with state and local land use plans or economic development plans. Furthermore, SAFETEA-LU requires that planners add "economic development" as a criterion for application and selection of New Starts transit-related capital investments.

This chapter will focus primarily on analyzing the 11 projects selected for Pre-Environmental Screening for indirect and induced economic impacts based on the initial project investment. This analysis will utilize a regional economic impact model built on data provided by the Minnesota IMPLAN Group in Stillwater Minnesota.

Economic Impact Modeling

IMPLAN, a regional economic input-output model for regional economies and economic impacts, was created in the 1970's through a joint partnership between the US Forest Service and the University of Minnesota. The Forest Service needed a tool to effectively describe the impacts of its operations on local and regional economies. IMPLAN version 2.0 was developed in 1999 by the Minnesota IMPLAN Group. The data was improved through the late 1980s and eventually made accessible to a wider number of users and data applications by the Minnesota IMPLAN Group in the mid-1990s.

IMPLAN models include a complete set of social accounting matrices to provide economic impact estimates of new firms moving into a region, ensuring increased accuracy of results over traditional Type II multipliers. The IMPLAN software reads database data provided by the Minnesota IMPLAN Group to determine the economic impacts, and data is updated frequently to ensure greater accuracy. The model used by RVARC staff in estimating impacts for CLRTP 2035 uses 2007 data for the localities represented in the MPO area (the Counties of Bedford, Botetourt, and Roanoke, and the Cities of Roanoke and Salem).

The IMPLAN model is an economic input-output model used to estimate the volume of supporting economic activity that might be expected to result from a certain direct impact. This supporting activity might also be referred to as the multiplier effect. Whenever a positive impact is made on a regional economy, supporting activity is spurred on by those organizations that have benefited when those recipient organizations (organizations or businesses receiving the bulk of the initial impact) purchase goods and services. There is also re-spending of wages and income received by individuals paid in providing this economic activity. These supporting economic activities or multipliers occurs in two different ways: indirect spending and induced spending. Indirect activity is activity related to suppliers (both those suppliers directly serving recipient organizations and those serving other more immediate suppliers to the initial recipient organizations) purchasing goods (in several rounds of purchases) within the regional economy to provide services and goods to recipient organizations. Induced activity represents the re-spending of wages and salaries paid to workers who are employed directly by recipient organizations and by suppliers providing goods and services to recipient organizations.

In the case of most transportation projects, funding comes primarily from two sources: federal transportation funding from the US DOT and state transportation funding from the State Transportation Trust Fund. Both sources originate from outside the MPO area and represent new money being infused and invested in the region.

However, not all project money goes directly to construction activities. RVARC staff controlled for the expenditure of Right-of-Way acquisition, which represents a transfer of capital investment and not necessarily new money that will circulate in the regional economy. Staff used a VDOT planning cost estimate worksheet to estimate the Right-of-Way costs for each project. The table below illustrates the assumed costs for various land uses.

Right of Way & Utilities Cost % of Cost Estimate

	Remainder of State	NOVA/Hampton Roads
Rural	25%	30%
Residential/Suburban low density	50%	55%
Outlying business/Suburban high density	60%	75%
Central business district	100%	125%

Staff also formulated an estimated proportion of project leakage as there is a great deal of potential for leakage of the project funds. Leakage is essentially the proportion of the initial economic impact that leaves the project area through the substitution of imported goods or labor, primarily the utilization of construction and construction management firms that are based outside the MPO area to build projects.

The model's regional purchase coefficient estimated leakage in transportation construction at around 5%. This estimate was based on the structure of the regional economy. Staff realized that this assumption was untenable and that many of the largest projects of the type listed in the LRTP go to vendors outside the project area. When outside contractors are chosen, an impact is still made to the RVAMPO regional economy -- albeit a lesser one. For instance, while the bulk of the funds would leak out of the study area to managers and laborers who live outside the region, many materials would be sourced locally, and local contractors may still get work through subcontracts. A quick poll of local transportation construction firms led staff to an assumed leakage value of 60% for projects of the type in the LRTP.

An important assumption made is that most of the projects in the LRTP will be multi-year projects. The assumption is that disbursements will take place over a minimum of two years for each project. This is an important assumption because the IMPLAN model assumes that all impacts occur during a single year. Since construction projects are a one-time impact, this does not have any effect on output estimates but it does affect employment. If, for instance, a project requires two years to complete the employment, impact is effectively halved.

The table below illustrates the model's results.

Project Name	Cost	Direct Effect	Indirect Effect	Induced Effect	Total Output	Direct Jobs Supported Each Project Year	Total Jobs Supported Each Project Year
I-581/Valley View Interchange	$69,165,000	$17,291,250	$8,788,907	$8,369,740	$34,449,897	78	126
I-581/Elm Ave. Interchange	$10,850,000	$4,340,000	$1,378,727	$1,312,972	$7,031,698	20	32
Elm Avenue	$4,762,000	$1,190,500	$605,115	$576,255	$2,371,870	5	9
US 460/Orange Avenue	$28,764,000	$7,191,000	$3,655,088	$3,480,766	$14,326,854	33	53
Plantation Road	$14,072,000	$3,518,000	$1,788,152	$1,702,870	$7,009,021	16	26
Route 11 - Apperson Dr.	$17,114,000	$4,278,500	$2,174,703	$2,070,986	$8,524,189	19	31
Roanoke River Crossing	$11,672,000	$3,112,533	$1,483,180	$1,412,443	$6,008,156	14	23
Route 634 - Hardy Road	$5,950,000	$1,586,667	$756,076	$720,017	$3,062,759	7	12
Route 634 - Hardy Road	$750,012	$300,005	$95,305	$90,760	$486,070	1	2
Route 613 - Merriman Road	$14,333,030	$3,822,141	$1,821,321	$1,734,457	$7,377,920	17	28
Route 11/460	$42,719,000	$11,391,733	$5,428,372	$5,169,477	$21,989,582	52	83

Description of Results

Please note that the direct economic effect felt in the RVAMPO region is significantly lower than the project cost. This is because the estimated proportion of project costs going to Right-of-Way acquisition have been removed and the assumed leakage has been removed to arrive at a direct regional impact.

The indirect effect represents the impact resulting from spending by suppliers to supply construction firms with needed goods and services. The indirect spending category includes several rounds of spending going down the supply chain within the study region until all activity is accounted for through leakage.

The induced effect category represents activity related to the spending of wages by those individuals (households) employed by firms in both the direct spending and indirect spending categories.

The table includes estimates of jobs supported through the public expenditures made on the LRTP projects within the region. These are not necessarily new jobs and include both full and part time positions. The LRTP projects will support these jobs only as long as expenditures are being made on the project. The total number of jobs includes jobs supported through direct, indirect, and induced expenditures.

Limitations

Examining economic impact of projects is both useful and interesting, but a number of limitations hamper further analysis of impact. It should be noted that the analysis above does not include any notion of increased development or commercial activity that may be induced through increased transportation efficiency or increased traffic demand on the regional network. The impact estimate is based solely on estimations of project cost and the proportion of which one might expect to be spent through firms located in the Roanoke Valley Metropolitan Area.

Vision List of Projects 15

A “Vision List”- not just a “Wish List”

Fiscally constrained transportation planning was integrated into the MPO transportation planning process with the adoption of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. Prior to ISTEA, MPO long-range plans began to increasingly resemble long “Wish Lists” of desired projects that had little actual funding. However, a new concern quickly took hold: “If project lists were to be strictly financially constrained, how would planning be visionary and relevant to a future that could have more funding available than originally anticipated?” This question led to the practice of developing an accompanying Vision List of projects to supplement the adopted fiscally constrained list of projects.

Vision lists vary depending on MPO and planning process. Some vision lists resemble the wish lists of old, while others are simply extensions of the respective fiscally constrained lists, assuming 20%, 50% or 100% additional funding than the fiscally constrained list. Both approaches have their pros and cons. The CLRTP 2035 uses a hybrid approach that is a combination of the two styles.

As of the writing of this plan, the budgets of all levels of government and the private sector economy are in a downturn. The fiscally constrained list of projects reflects these realities with a very conservative financial constraint. However, a federal infrastructure investment package may be forthcoming within a year of the adoption of this plan. A federal package could make more resources available than originally anticipated using the financial constraint. Therefore, the purpose of the CLRTP 2035 Vision List will be to contain worthwhile, progressive, and feasible projects that cannot fit under the CLRTP financial constraint. In other words, the Vision List contains projects that are ready to be amended into the fiscally constrained list of projects if the funds become available within the next few years.

Interstate System - DRAFT Vision List - April 2011

UPC	Jurisdiction	Facility Route # and Name	From:	To:	Length	Recommended Improvement	Projected Cost (2011 $$)	Previous Funding (before 2011)	Notes	Remaining project cost (2035 $$)	Bicycle, Pedestrian, and Greenway Comments	Transportation Demand Management (TDM) Comments
80056	Roanoke County	Interstate 73 - Roanoke County - Preliminary Engineering	N/A	N/A	N/A	Interstate 73 - Preliminary Engineering - General	$408,326,339	$2,463,000	Project carried over from 2011 constrained list.	$825,036,604	None.	
16591	Roanoke Co.	Interstate 81	Mile Post 135.9	Mile Post 138.6	2.7 miles	Interstate 81 - widen from 4 to 8 Lanes	$120,340,779	$2,558,000	Project carried over from 2011 constrained list.	$239,428,139	None.	
16593	Roanoke Co.	Interstate 81	Mile Post 144.5	Mile Post 147.45	2.95 miles	Interstate 81 - widen from 4 to 8 lanes	$105,536,017	$1,589,000	Project carried over from 2011 constrained list.	$211,302,884	None.	
53094	Roanoke Co.	Interstate 81	Mile Post 138.6	Mile Post 140.9	2.3 miles	Interstate 81 - widen from 4 to 8 lanes	$150,490,399	$1,358,000	Project carried over from 2011 constrained list.	$303,155,462	None.	
53095	Roanoke Co.	Interstate 81	Mile Post 140	Mile Post 143.1	3.1 miles	Interstate 81 - widen from 4 to 8 lanes	$196,442,639	$2,099,000	Project carried over from 2011 constrained list.	$395,060,604	None.	
53096	Roanoke Co.	Interstate 81	Mile Post 143.1	Mile Post 144.5	1.4 miles	Interstate 81 - widen from 4 to 8 lanes	$259,668,602	$2,546,000	Project carried over from 2011 constrained list.	$522,677,310	None.	
16595	City of Roanoke	Interstate 581 - Valley View Interchange Phase II	Mile Post 144.5	Hershberger Road (Exit 3)	1.09 miles	New Construction	$70,960,919	$3,871,000	Project carried over from 2011 constrained list.	$105,791,265	Provide Bike, Pedestrian, and Greenway connection on Valley View Blvd. across I-581.	

Primary System - DRAFT VISION LIST - CLRTP 2035 - April 2011

UPC	Jurisdiction	Facility Route # and Name	From:	To:	Length	Recommended Improvement	Projected Cost (2011 $$)	Previous Funding (before 2011)	Notes	Remaining project cost (2035 $$)	Bicycle, Pedestrian, and Greenway Comments	Transportation Demand Management (TDM) Comments
	Roanoke Co.	Route 419 Improvements Phase I	U.S. 220	Bernard Drive	1.1 mi.	Interchange improvements at U.S. 220, widen Rt. 419 to six lanes, add pedestrian and bicycling accommodations.	$36,805,740	$0			RVAMPO Bikeway Plan Corridor	
	Roanoke Co.	Route 419 Improvements Phase II	Bernard Drive	U.S. 221, Brambleton Avenue	1.2 mi.	Widen Rt. 419 to six lanes including pedestrian and bicycling accommodations.	$30,440,145	$0			RVAMPO Bikeway Plan Corridor	
	Roanoke Co.	Rt. 419, Electric Road - Southwest Activity Center Improvements	Bower Road	Grandin Rd. Ext.	0.4 mi.	Streetscape with pedestrian, bicycling accommodations.	$1,321,030	$0			RVAMPO Bikeway Plan Corridor	
	Roanoke Co.	Plantation Road	I-81	Williamson Road	1.0 mi.	Streetscape, pedestrian, bicycling, access management improvements.	$2,652,250	$0			RVAMPO Bikeway Plan Corridor	
	Various	Bicycling Improvements per Regional Bikeway Plan	Misc.				$2,000,000	$0				

Roanoke County Secondary - DRAFT Vision List - CLRTP 2035 - April 2011

UPC	Facility Route # and Name	From:	To:	Length	Recommended Improvement	Projected Cost (2011 $$)	Previous Funding (before 2011)	Notes	Remaining project cost (2035 $$)	Bicycle, Pedestrian, and Greenway Comments	Transportation Demand Management (TDM) Comments
15187	Route 1662 (McVitty Road)	Int. of Rt 1663	Int. of Rt 419	0.5 mile	Reconstruction & Bridge Replacement Over Mud Lick Creek	$10,315,603	$4,824,268	Project carried over from 2011 Constrained List	$7,599,124.41	Bike/Ped Accom. Recommended	
15188	Route 1663 (Old Cave Spring Lane)	South Int. Rt 221	Int. of Rt 1662	0.3 mile	Reconstruction, Drainage Structure on Branch of Mud Lick Creek	$2,898,649	$1,452,073	Project carried over from 2011 Constrained List	$349,263.84	Bike/Ped Accom. Recommended	
	Route 720 (Colonial Avenue)	Route 419	Ogden Road	0.9 mile	2 lanes with turn lanes	$8,219,475	$973,765	New Project	N/A	RVAMPO Bikeway Plan Corridor, evaluate options: a shared-use path on one side vs. sidewalks and on-street bike accom. Estimate reflects s-u path option.	
	Route 679 (Buck Mountain Road)	Route 766	0.04 Mi E. Rte 678	0.4 mile	Reconstruct 2 lanes and intersection with 220	$8,070,911	$1,647,000	Originally listed in 2007 YOE Amendment Constrained	N/A	RVAMPO Bikeway Plan Corridor	0 origins, 0 destinations within .5 mi.
	Route 634 (Hardy Road)	Vinton CL	0.01 Mi E Route 654	0.9	Reconstruction	$844,145	$0	Originally listed in 2007 YOE Amendment Constrained	N/A	Vinton section has bicycle lanes; Industrial park in area; some ROW being acquired for industrial park; BR Parkway passes over section. RVAMPO Bikeway Plan Corridor	3 origins, 0 destination within .5 mi.
	Route 613 (Merriman Road)	0.1 Mi. S. Rte 904 (Starkey Road)	Rte 1640 (Pine Acres Lane)	1.3	Reconstruct and Widen	$16,131,952	$450,311	Originally listed in 2007 YOE Amendment Constrained	N/A	RVAMPO Bikeway Plan Corridor	0 origins, 0 destinations within .5 mi.

Bedford County Secondary - DRAFT Vision List - CLRTP 2035 - April 2011

UPC	Facility Route # and Name	From:	To:	Length	Recommended Improvement	Projected Cost (2011 $$)	Previous Funding (before 2011)	Notes	Remaining project cost (2035 $$)	Bicycle, Pedestrian, and Greenway Comments	Transportation Demand Management (TDM) Comments
	Route 634 (Hardy Road)	Roanoke Co. CL	Route 619 (Turner Branch Road)	1.4 mile	Rural 4 Lane Divided - with Bicycle Lanes to match Roanoke County Component	$6,696,777	$0	Project Carried over from 2011 Constrained List	$12,741,250.16	Compare benefits of on-street bike accommodation vs. on a shared-use path on one side of the street .	

Botetourt County Secondary - DRAFT Vision List - CLRTP 2035 - April 2011

UPC	Facility Route # and Name	From:	To:	Length	Recommended Improvement	Projected Cost (2011 $$)	Previous Funding (before 2011)	Notes	Remaining project cost (2035 $$)	Bicycle, Pedestrian, and Greenway Comments	Transportation Demand Management (TDM) Comments
52803	Route 779 (Catawba Road)	0.19 Miles East of Route 672 East	0.24 Miles West of Route 672 East	NA	Intersection Improvements and Bridge Reconstruction (#6264) over Tinker Creek	$6,543,715	$2,853,443	Remaining project cost takes into account available anticipated money spent in timeframes between 2011 and 2035.	$5,462,996	RVAMPO Bikeway Plan Corridor	

City of Roanoke Urban System - Draft Vision List - April 2011

UPC	Facility Route # and Name	From:	To:	Length	Recommended Improvement	Projected Cost *	Bicycle, Pedestrian, and Greenway Comments	Transportation Demand Management (TDM) Comments
	Campbell Avenue	Williamson Road	Norfolk Avenue	0.58 mile	Urban 3 Lane**	$4,449,415	City of Roanoke has a Complete Streets Policy	
	Colonial Avenue	Brandon Avenue	Winding Way	1.40 miles	Urban 3 Lane**	$19,069,678	City of Roanoke has a Complete Streets Policy	
	Norfolk Avenue	Campbell Avenue	Wise Avenue	0.11 mile	Urban 3 Lane**	$720,351	City of Roanoke has a Complete Streets Policy	
	Williamson Road Project #1	Orange Avenue	Angell Avenue	1.85 miles	Urban 3 Lane or an Urban 4 Lane section to be determined in design stage.	$41,944,803	Cost estimate includes bicycle lanes for entire length for cost estimating purposes. Actual bicycle accomodation may be other accomodation other than bicycle lane including but not limited to Sharrow or wide outside travel lane.	
	Wise	13th Street	East City Limit	0.70 mile	Urban 2 Lane**	$7,714,865	Same comment as above	
	Cove Road Project #1	Peter's Creek Road	Hershberger Road	1.48 mile	Urban 2 Lane**	$14,275,470	Turn lanes at selected locations and same bicycle comment as first item.	
	Cove Road Project #2	Hershberger Road	Lafayette Boulevard	0.75 mile	Urban 2 Lane**	$4,575,662	See bicycle comment from first item.	
	King Street	Gus Nicks Boulevard	Orange Avenue	1.44 miles	Urban 2 Lane**	$15,846,663	See bicycle comment from first item.	
	Shenandoah Avenue	West City Limit	24th Street	2.08 miles	Urban 2 Lane**	$22,935,597	See bicycle comment from first item.	
	Plantation Road	Orange Avenue	Hollins Road	1.77 miles	Urban 2 Lane**	$19,495,098	See bicycle comment from first item.	
	Salem Turnpike	36th Street	24th Street	1.19 miles	Urban 2 Lane**	$11,529,861	See bicycle comment from first item.	
	Hershberger Road Project #1	Williamson Road	East City Limits	0.59 mile	Urban 2 Lane**	$5,673,693	See bicycle comment from first item.	
	Hershberger Road Project #2	Peter's Creek Road	Cove Road	1.34 miles	Urban 2 Lane**	$12,902,666	See bicycle comment from first item.	
	Williamson Road Project #2	Hershberger Road	North City Limits	0.55 mile	Urban 4 Lane***	$12,476,184	See bicycle comment from first item.	
	Garden City Boulevard	Yellow Mountain Road	Davenport Road	0.74 mile	Urban 2 Lane**	$7,137,735	See bicycle comment from first item.	
	Valley View Western Connector	Valley View Extension	Hershberger Road	1.31 miles	Urban 4 Lane Divided - New Terrain	$27,754,205	Existing Greenway in vicinity and see bicycle comment from first item.	
	Transit and Transit Accessibility Improvements				Surface transportation funds to be flexed over to support bus shelters, bus pullouts, bus stop accessibility and other transit enchancements.	To be determined	City of Roanoke has a Complete Streets Policy	
	Mobility and Accessibility Improvements				Bike lanes, shared use paths (greenways), sidewalks, curb and gutter, and other pedestrian and bicycle enhancements.	To be determined	City of Roanoke has a Complete Streets Policy	
	Signal and ITS Improvements				Interconnection and coordinated signal systems and miscellaneous ITS improvements.	To be determined	City of Roanoke has a Complete Streets Policy	
	Intersection and Miscellaneous Spot Improvements				Isolated improvements, additional turn lanes, geometric imprivements, and other minor physical improvements.	To be determined	City of Roanoke has a Complete Streets Policy	
	Franklin Road Reconstruction	King George Street	Elm Avenue	0.48 mile	Urban 2 Lane**	$4,274,366	See bicycle comment from first item.	

* Originial 2009 cost estimate provided by the City of Roanoke recalculated at 3% interest for 2 years from 2009 to 2011 Current Dollars.
** Urban 2 and 3 lane cost estimates assume sidewalk or other pedestrian accomodation, curb and gutter and bicycle accomodations - see Bicycle comment for first item for more details.
*** Urban 4 lane cost estimates also assume pedestrian and bicycle accomodations in cost estimate.

City of Salem Urban System - Draft CLRTP 2035 - Vision List - April 2011

UPC	Facility Route # and Name	From:	To:	Length	Recommended Improvement	Projected Cost (2011 $$)	Previous Funding (before 2011)	Notes	Remaining project cost (2035 $$)	Bicycle, Pedestrian, and Greenway Comments	Transportation Demand Management (TDM) Comments
52076	Route 11 - Apperson Drive	at Route 419	at Route 419	0.300 Mile	Reconstruction and Intersection Improvements	$36,996,000	$3,943,000			RVAMPO Bikeway Plan Corridor	
78751	Route 11 - Colorado Street	Colorado Street over Roanoke River	Colorado Street over Roanoke River	N/A	Bridge Replacement	$4,666,000	$4,875,000			RVAMPO Bikeway Plan Corridor	
	City of Salem	Apperson Drive Bridge #1800 over Roanoke River	Near Cook Dr.		Bridge Replacement	$3,116,340				RVAMPO Bikeway Plan Corridor	
8753	Route 460 - (Main Street)	Route 311 - Thompson Memorial Blvd.	0.05 Miles East Intersection Kessler Mill Road	1.23 Miles	Minor Widening to 3 Lanes with Curbs & Sidewalks	$10,777,000	$10,241,000			RVAMPO Bikeway Plan Corridor	
	Roanoke River Crossing	4th Street or West Main	West Riverside Drive	N/A	Potential Bridge connecting roadway	$13,136,939	$0				

Town of Vinton Urban System - Draft Vision List - April 2011

UPC	Facility Route # and Name	From:	To:	Length	Recommended Improvement	Projected Cost	Bicycle, Pedestrian, and Greenway Comments	Transportation Demand Management (TDM) Comments
	WALNUT AVE. IMPROVEMENT	0.02 mi. east 5th Street	First Street	0.33 mi.	Urban 2-lane, curb, gutter, and add pedestrian & bicycle accomodation.	$1,838,100	RVAMPO Bikeway Plan Corridor	
	MOUNTAIN VIEW ROAD IMPROVEMENT, Phase 1	North Town Line	0.08 mi. south Ramada Road	0.44 mi.	Urban 2-lane, curb, gutter, and add pedestrian & bicycle accomodation.	$3,948,000	RVAMPO Bikeway Plan Corridor	
	MOUNTAIN VIEW ROAD IMPROVEMENT, Phase 2	Washington Ave.	0.08 mi. south Ramada Road	0.72 mi.	Urban 2-lane, curb, gutter, and add pedestrian & bicycle accomodation.	$5,702,000	RVAMPO Bikeway Plan Corridor	
	TRAFFIC SIGNAL SYNCHRONIZATION, Route 24, S. Pollard St., & Washington Ave. Corridors	West Town Line	East Town Line	2.52 mi.	Synchronize 11 traffic signals to improve phasing as system. Replace loop detectors with video detection.	$1,265,000		
	S. POLLARD ST. ENTRANCE CORRIDOR IMPROVEMENT	Virginia Ave.	Cedar Ave.	0.09 mi.	Acquire ROW, add right turn lane from westbound Virginia Ave. replace traffic signal, install curb, gutter, sidewalk, and landscaping.	$2,400,000	RVAMPO Bikeway Plan Corridor	
	WASHINGTON AVE. PEDESTRIAN & BICYCLE ACCESS IMPROVEMENTS, AND STREETSCAPING ENHANCEMENTS	Bypass Road	East Town Line	0.54	Install new sidewalks, bike lanes, and landscaping.	$1,100,000	RVAMPO Bikeway Plan Corridor	
	WASHINGTON AVE. PEDESTRIAN & BICYCLE ACCESS IMPROVEMENTS, AND STREETSCAPING ENHANCEMENTS	Mountain View Road	Bypass Road	0.25	Install new sidewalks, bike lanes, and landscaping.	$425,000	RVAMPO Bikeway Plan Corridor	
	BYPASS ROAD, PEDESTRIAN & BICYCLE ACCESS IMPROVEMENTS, AND STREETSCAPING ENHANCEMENTS	Hardy Road	Washington Ave.	0.31	Install new sidewalks, bike lanes, and landscaping.	$580,000	RVAMPO Bikeway Plan Corridor	
	VIRGINIA AVE. & THIRD STREET, INTERSECTION IMPROVEMENT	Virginia Ave.	Virginia Ave.	0.08	Acquire ROW, add right turn lanes, replace traffic signal, install curb, gutter, sidewalk, and landscaping.	$6,250,000	RVAMPO Bikeway Plan Corridor	

Transportation Demand Management Projects

TDM projects are often excellent candidates for amendment into the fiscally constrained list of projects. Park and Ride lot expansion or construction projects are typically focused on a limited number of parcels and can be engineered and constructed relatively quickly. A recent Park and Ride utilization report (separate document) finds that the region's Park and Ride lots are successful, and some are overcapacity with patrons parking on shoulders or grassy areas.

Project	Project Description	Improvement	Estimated Cost	Notes
Exit 150 (Interstate 81) Park and Ride Relocation	The existing park and ride lot currently serves an average of 20 users with a capacity of 14 spaces.	Create a new lot of 50 spaces.	**$240,000** (Based on 2007 VDOT Cost Estimate Worksheet.)	$3,000 per Space plus 60% ROW estimate based on land-use.
Exit 140 (Interstate 81) Park and Ride Expansion	The existing park and ride lot has 58 spaces; bus serves an average of 74 vehicles with vehicles overflowing spaces and parking on grass.	Expand from 58 to 100 spaces and add bus shelter for Smart Way.	**$213,600** (Based on 2007 VDOT Cost Estimate Worksheet.)	42 new spaces, 60% ROW estimate and $12,000 for bus shelter.
New Exit 141 (Interstate 81) Park and Ride	Add a 30 space park and ride lot at Exit 141 (I-81 and Route 419) with bus shelter to accommodate possible future route 419 transit service.	New 30 space lot with bus shelter.	**$156,000** (Based on 2007 VDOT Cost Estimate Worksheet.)	30 spaces, 60% ROW estimate and $12,000 for bus shelter.
New Route 220 Park and Ride	Add a 30 space park and ride lot in Southern Roanoke County to serve commuters along Route 220 North of Boones Mill.	New 30 space lot with bus shelter.	**$156,000** (Based on 2007 VDOT Cost Estimate Worksheet.)	30 spaces, 60% ROW estimate and $12,000 for bus shelter.

Passenger Rail Projects

Passenger rail is often cited as a needed project in Focus Group discussions. The concept of passenger rail has also received extensive support in Touch Screen Kiosks results (see chapter 3). The following planning level cost estimates are in current dollars and come from VDRPT sources:[10]

Project	Project Description	Estimated Cost	Notes
Rolling Stock	Rehabilitation of Equipment	$8,000,000	
Roanoke/O. Winston Link Station	Station and Platform Improvements	$37,500,000	
Roanoke Area Track	Track and support/storage facilities	$6,700,000	
Mail Line Track	Lynchburg to Roanoke main line track upgrades	$53,700,000	It is difficult to separate main- line upgrades that fall within CLRTP 2035 boundary.
Bus Connector Service	Amtrak Thru-way bus service	$661,000 total ($310,000 estimated subsidy)	Estimated yearly cost and subsidy for entire Lynchburg to Bristol Segment

10. Cost estimates provided in 01/15/2009 e-mail from Kevin Page VDRPT, Chief of Rail Transportation. For more information see "2008 Statewide Rail Resource Allocation Plan, December 15, 2008" www.drpt.virginia.gov/studies/default.aspx

Bus Connector Service would be a temporary connection to the existing Amtrak service in Lynchburg, Virginia. Thru-way service is a quick way to get a basic level of service. Items 1-4 would supersede thruway service once operational.

Public Transportation Projects

Public Transportation projects can include service improvements on existing public transit routes, service expansion to new areas, or new types of service altogether.

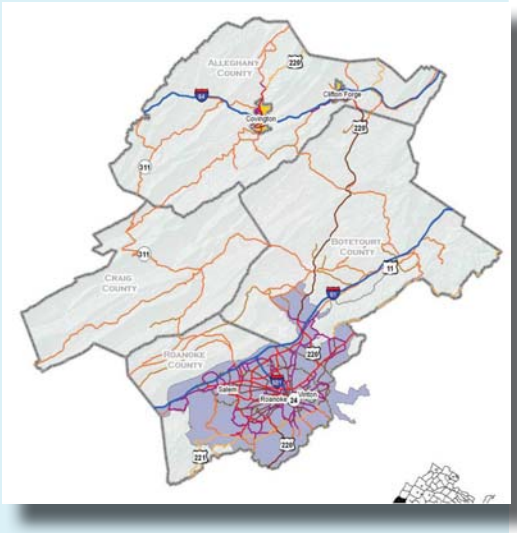
Project	Project Description	Estimated Cost	Notes
Roanoke to Franklin County Commuter Service	Two (2) over-the-road coaches	$600,000	Estimated cost in current year $
Roanoke to Franklin County Commuter Service	Yearly operating support for commuter service	$300,000/year	Estimated yearly cost in current year $
Downtown Streetcar	Steel wheel on steel rail streetcar to connect Downtown with Biomedical Park on Reserve Avenue	$25,000,000	

Rural Planning Process 16

The Roanoke Valley-Alleghany Rural 2035 Transportation Plan is being developed as a joint effort between the Virginia Department of Transportation (VDOT) and Roanoke Valley-Alleghany Regional Commission. The purpose of this plan is to evaluate the existing transportation system and future demand in the Roanoke Valley-Alleghany region and to recommend transportation improvements to best meet existing and future transportation infrastructure needs. The study area for the 2035 Plan is the non-metropolitan area (rural) within the boundary line of the planning district.

Improved transportation systems are vital to Virginia's and the local area's economic growth and development. Providing for the effective, safe, and efficient movement of people and goods is a basic goal of all transportation programs in the Commonwealth of Virginia. This guiding principle, together with consideration of environmental issues and local mobility needs, was the basis for the development of this transportation plan. Local benefits of the rural transportation plan include:

- Identification of transportation deficiencies and recommendations of remedies,
- Assistance with comprehensive plan updates,
- Traffic impact studies-Ch.527,
- Programming of transportation improvements, and
- Identifying effects of land use and development. Once completed, the regional transportation plans will be incorporated into Virginia's 2035 State Highway Plan.

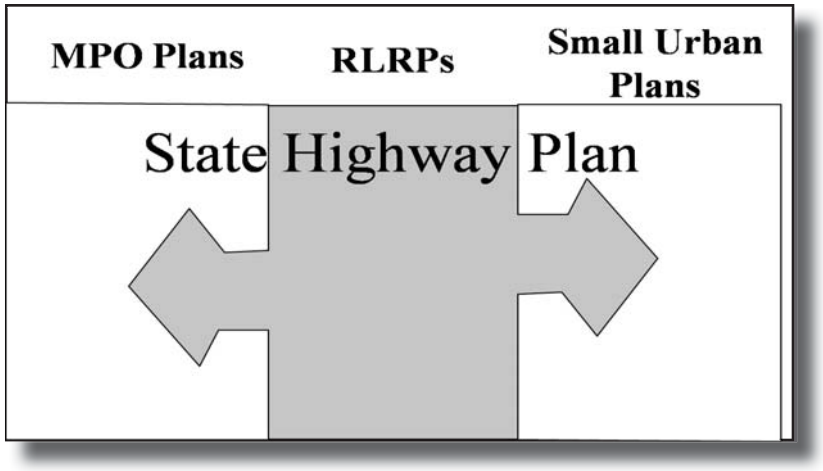


VDOT will use this plan when evaluating requests from local governments for specific transportation projects and/or implementing projects that VDOT initiates. This list of recommendations will also be used in the statewide transportation planning process so that the magnitude of transportation needs statewide can be more accurately quantified.

Introduction

The Transportation and Mobility Planning Division (TMPD) of the Virginia Department of Transportation (VDOT) is working with other modal agencies to develop VTrans 2035, the Commonwealth's multi-modal long range plan and a more detailed subset report known as the 2035 Surface Transportation Plan. The highway element of the 2035 Surface Transportation Plan will include proposed improvements on Virginia's federal functionally classified roadways. This Rural Long Range Transportation Plan is one piece of the 2035 Plan. VDOT, Virginia's Planning District Commissions (PDCs), and the local governments they represent are partners in the development of this new initiative to create regional transportation plans in rural and small urban areas that complement those in Virginia's metropolitan areas.

The transportation system within the rural areas for each region was evaluated,and a range of transportation improvements - roadway, rail, transit, air, bicycle, and pedestrian - are recommended that can best satisfy existing and future needs. Some of the PDCs contain urbanized areas whose transportation needs are coordinated by a metropolitan planning organization (MPO). In the case of the Roanoke Valley Alleghany Regional Commission (RVARC),there is an urbanized area whose transportation needs are coordinated by an MPO. The Roanoke Valley Area Metropolitan Planning Organization (RVAMPO) conducts the transportation planning for the Cities of Roanoke and Salem, the Town of Vinton, and the urbanized areas of Bedford, Botetourt, and Roanoke Counties. The transportation needs of this area are analyzed in its 2035 Long Range Transportation Plan, which is a separate component of the 2035 Surface Transportation Plan. .



Rural Long-Range Plan Goals and Objectives

Needs for each regional plan were developed based on regional and statewide goals and objectives. Similar concepts within the goals of the PDCs were found and used to shape common regional long range plan goals (at right) to address rural transportation planning across the Commonwealth. A basic goal for all transportation programs in Virginia is the provision for the effective, safe, and efficient movement of people and goods. The plan for the Roanoke Valley-Alleghany region was developed with this primary goal in mind, along with other goals including consideration for environmental issues and local travel desires. Each PDC developed transportation goals and objectives that were used to guide the development of the Rural Long Range Transportation Plan for their area. Rural transportation planning in the RVARC is guided by the Rural Transportation Technical Committee. This

committee reviewed the needs of the region and formulated the following goals.

- Reduce congestion and impact of incidents on I-81 and I-64.
  – Improve alignment and capacity on specified sections of the interstates.
  – Redesign key interstate interchanges.

- Strengthen transportation linkages between the Roanoke Valley and the surrounding regions (Alleghany Highlands, New River Valley, West Piedmont, and Region 2000).
  – Improve the alignment and capacity of US 220 from Eagle Rock to I-64.
  – Improve the alignment and safety of Route 311 from I-81 to New Castle.
  – Improve operations and safety of US 220 from Roanoke to Martinsville.
  – Construct I-73 from Roanoke to the NC state line.
  – Extend the Roanoke River Greenway System and other bicycle facilities.

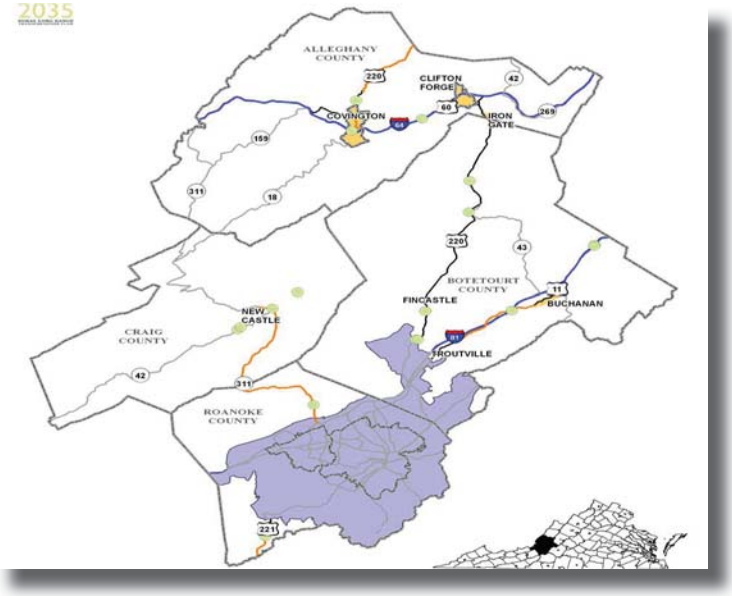
- Preserve and maintain the existing transportation system and encourage efficient system management and operations.
  – Maintain all existing transportation infrastructure in good condition.
  – Promote access and transportation demand management policies.
  – Expand operations management and intelligent transportation systems.
  – Reduce reliance on single-occupant-vehicles.

- Promote recreational travel and tourism within the region.
  – Develop the Alleghany Highlands Tourism Trail in Alleghany and Craig Counties.
  – Designate additional Scenic Byways on rural scenic corridors.
- Expand public transit and passenger rail service.
- Provide a safe and secure transportation system.
- Consider freight needs in transportation facility re/design.
  – Upgrade interstate exit and entrance ramps and add truck climbing lanes.
  – Improve roadway and intersection geometry on key trucking corridors.
  - Improve access to intermodal facilities.
- Provide on-road and off-road bicycle and pedestrian accommodations.
  – Implement recommendations of the RVARC Rural Bikeway Plan.

Downtown Clifton Forge in the Alleghany Highlands.

Rural Long-Range Plan Recommendations

Roadway analysis focused on safety, geometry and structure, and congestion. Through the review of available data, input at public meetings, and information provided by local and regional officials, the RVARC, in conjunction with the local jurisdictions, prepared a list of priority locations. The priority study location list is based on roadway performance measures, safety considerations, or a combination of the two. Some priority locations had current improvement recommendations from recent studies and required no further analysis. Other priority locations required a new or updated analysis. Within the RVARC, 21 priority locations were analyzed and recommended actions were developed for each. Eight of these locations were identified for assessment of safety and congestion concerns, while the remaining 13 were analyzed only for safety. The safety assessment locations were identified using safety and crash database information, along with input from local officials and the public.



The Rural Long-Range Plan will likely be adopted in the Summer of 2010. The Regional Commission and the MPO are considering updating the Urban Constrained Long-Range Transportation and the Rural Plan cooperatively during the next update in 2015.

RADAR bus that provided deviated route transit service in the Roanoke Valley and Alleghany Highlands.

APPENDIX: TAZ DATA A

TAZ	2005 Population	2005 Employment	2005Vehicles Available	2005Households
1	76	1121	44	34
2	87	8689	50	39
3	868	3351	503	393
4	1	283	1	0
5	2789	848	1615	1262
6	418	754	242	189
7	1617	377	937	732
8	711	424	412	322
9	24	275	14	11
10	4774	1145	2765	2160
11	2044	104	1184	925
12	1915	301	1109	867
13	514	264	298	233
14	2387	350	1383	1080
15	1639	400	949	742
16	0	760	0	0
17	89	641	52	40
18	1067	339	618	483
19	333	212	193	151
20	994	283	576	450
21	1033	641	598	467
22	1330	1036	770	602
23	916	104	531	414
24	1149	2685	665	520
25	1984	330	1149	898
26	312	47	181	141
27	1653	490	957	748
28	154	1036	89	70
29	1952	217	1131	883
30	1441	709	835	652
31	588	168	341	266
32	1790	508	1037	810
33	1948	790	1128	881
34	35	612	20	16
35	11	1743	6	5
36	237	603	137	107
37	702	207	407	318
38	706	28	409	319
39	647	260	375	293
40	680	546	394	308
41	714	405	414	323
42	1406	433	814	636
43	1543	529	894	698
44	355	1055	206	161
45	583	1140	338	264
46	692	3724	401	313
47	565	170	327	256
48	1097	396	635	496
49	971	141	562	439
50	506	198	293	229
51	283	405	164	128
52	269	113	156	122
53	1741	38	1008	788
54	1807	593	1047	818
55	774	330	448	350
56	897	104	520	406
57	1437	85	832	650
58	1998	98	1157	904
59	1196	1168	693	541
60	1677	565	971	759
61	1484	367	860	671
62	136	305	79	62

TAZ	2005 Population	2005 Employment	2005Vehicles Available	2005Households
63	1745	490	1011	790
64	3216	490	1863	1455
65	668	141	387	302
66	1132	452	656	512
67	3507	981	2031	1587
68	315	28	182	143
69	84	452	49	38
70	774	122	448	350
71	1775	716	1028	803
72	579	301	335	262
73	499	1225	289	226
74	226	141	131	102
75	1209	914	700	547
76	1021	612	591	462
77	1228	187	711	556
78	2361	405	1367	1068
79	1313	367	760	594
80	1337	1413	774	605
81	100	3316	58	45
82	10	1941	6	5
83	2081	66	1205	942
84	436	4004	253	197
85	1632	754	945	738
86	9	0	5	4
87	805	848	466	364
88	933	1036	540	422
89	187	57	108	85
90	528	2779	306	239
91	130	24	75	59
100	37	469	28	16
101	112	294	87	48
102	2267	1021	1759	977
103	239	248	185	103
104	141	322	110	61
105	469	432	364	202
106	199	230	155	86
107	1520	1656	1179	655
108	1304	561	1011	562
109	759	396	589	327
110	1144	1389	888	493
111	400	810	311	173
112	709	2677	550	306
113	134	718	104	58
114	305	469	236	131
115	770	3685	598	332
116	1372	446	1064	591
117	1994	152	1547	860
118	782	1490	607	337
119	795	147	616	342
120	420	662	326	181
121	813	483	631	350
122	153	225	119	66
123	574	87	445	247
124	282	78	219	122
125	639	658	496	275
126	330	147	256	142
127	1036	175	804	447
128	27	814	21	12
129	1780	386	1381	767
130	2350	207	1823	1013
131	509	87	395	219
132	629	179	488	271
133	69	23	54	30

TAZ	2005 Population	2005 Employment	2005Vehicles Available	2005Households
134	54	14	42	23
135	25	0	20	11
200	699	227	373	291
201	7	189	6	3
202	711	729	587	296
203	674	455	556	281
204	1291	515	1065	538
205	1723	126	1421	718
206	307	214	253	128
207	797	663	657	332
208	1722	465	1421	718
300	947	303	781	395
301	1051	429	867	438
302	1345	212	1110	560
303	1073	51	885	447
304	566	5	467	236
305	410	152	338	171
306	1113	40	918	464
307	2901	1237	2393	1209
308	309	1434	255	129
309	0	999	0	0
310	454	389	374	189
311	3162	970	2608	1317
312	4545	960	3750	1894
313	2266	1111	1869	944
314	1378	323	1137	574
315	4405	1202	3634	1835
316	3558	303	2936	1483
317	2504	1364	2066	1043
318	928	57	766	387
319	647	51	534	270
320	1128	51	930	470
321	96	960	79	40
322	1163	1131	960	485
323	344	303	284	144
324	1280	96	1056	533
325	622	30	513	259
326	54	0	44	22
327	470	10	388	196
328	104	0	86	43
329	541	111	446	225
330	14	96	11	6
331	133	116	110	56
332	1227	15	1013	511
333	3450	1970	2846	1438
334	1567	1323	1292	653
335	108	20	89	45
336	2155	859	1778	898
337	752	2677	620	313
338	277	515	229	116
339	921	426	760	384
340	1278	343	1054	532
341	1842	384	1519	767
342	1758	879	1450	732
343	3487	687	2877	1453
344	842	626	695	351
345	833	384	687	347
346	3219	278	2656	1341
347	179	545	147	74
348	720	51	594	300
349	191	5	158	80
350	6	0	5	3
351	32	42	26	13

TAZ	2005 Population	2005 Employment	2005Vehicles Available	2005Households
352	454	10	374	189
353	330	20	272	137
354	1022	22	843	426
355	624	111	515	260
356	696	126	574	290
357	253	5	209	105
358	719	61	593	300
359	720	288	594	300
360	741	35	612	309
361	287	2	236	119
362	520	57	429	217
363	1272	187	1049	530
364	440	56	363	183
365	1201	197	991	501
366	438	25	361	182
367	627	35	517	261
368	343	5	283	143
369	1072	111	884	447
370	96	0	79	40
371	248	10	204	103
372	197	10	163	82
373	92	25	76	39
401	154	82	134	60
402	640	1100	558	249
403	2644	346	2305	1029
404	1449	788	1263	564
405	491	120	428	191
406	122	180	106	48
407	548	170	477	213
408	1810	68	1577	704
409	1150	26	1002	447
410	2104	27	1834	819
411	216	85	188	84
412	779	422	679	303
413	820	468	714	319
414	449	245	391	175
415	1599	259	1394	622
416	428	89	373	166
417	173	243	151	67
418	586	250	511	228
419	912	245	795	355
420	276	0	241	107
500	201	5	173	80
501	598	50	515	237
502	865	45	745	343
503	241	5	207	95
504	322	25	277	128
505	750	65	646	298
506	14	2	12	5

TAZ	2035 Population	2035 Employment	2035Vehicles Available	2035Households
1	175	1250	101	79
2	585	9685	339	265
3	769	3735	445	348
4	1	2500	1	0
5	2744	945	1589	1242
6	411	840	238	186
7	1591	420	921	720
8	699	472	405	316
9	0	307	0	0
10	4697	1276	2720	2125
11	2011	116	1165	910
12	2400	336	1390	1086
13	505	294	292	229
14	2348	391	1360	1062
15	1612	446	934	729
16	0	847	0	0
17	87	714	50	39
18	1050	378	608	475
19	328	236	190	148
20	1178	315	682	533
21	1017	714	589	460
22	1309	1155	758	592
23	901	116	522	408
24	1130	3200	654	511
25	2147	368	1244	971
26	307	52	178	139
27	1626	546	942	736
28	151	1155	87	68
29	1921	242	1113	869
30	1417	591	821	641
31	578	187	335	262
32	1761	566	1020	797
33	1917	881	1110	867
34	0	1200	0	0
35	11	2000	6	5
36	233	672	135	105
37	711	231	412	322
38	715	32	414	324
39	656	290	380	297
40	669	609	387	303
41	702	452	407	318
42	1383	483	801	626
43	1518	590	879	687
44	349	1350	202	158
45	573	1450	332	259
46	981	4151	568	444
47	556	189	322	252
48	1080	441	626	489
49	955	158	553	432
50	498	220	288	225
51	278	452	161	126
52	465	500	269	210
53	1713	42	992	775
54	1778	662	1030	805
55	761	368	441	344
56	883	116	511	400
57	1413	200	818	639
58	1965	109	1138	889
59	1177	1302	682	533
60	1650	630	956	747
61	1460	410	846	661
62	134	340	78	61

TAZ	2035 Population	2035 Employment	2035Vehicles Available	2035Households
63	1717	546	994	777
64	3164	546	1833	1432
65	657	158	381	297
66	1114	504	645	504
67	3450	1093	1998	1561
68	309	32	179	140
69	82	504	47	37
70	761	136	441	344
71	1921	798	1113	869
72	869	336	503	393
73	491	1365	284	222
74	233	158	135	105
75	1089	1118	631	493
76	1054	1000	610	477
77	1208	209	700	547
78	2323	452	1345	1051
79	1292	410	748	585
80	2115	2500	1225	957
81	98	3850	57	44
82	10	2163	6	5
83	2848	250	1650	1289
84	429	4800	248	194
85	1766	840	1023	799
86	0	0	0	0
87	1042	945	604	471
88	918	1155	532	415
89	184	63	107	83
90	520	3448	301	235
91	128	26	74	58
100	39	536	30	17
101	118	336	92	51
102	2398	1166	1861	1034
103	253	284	196	109
104	149	368	116	64
105	497	494	385	214
106	211	263	163	91
107	1608	1890	1248	693
108	1379	641	1070	594
109	803	452	623	346
110	1210	1586	939	522
111	424	924	329	183
112	750	3056	582	323
113	142	819	110	61
114	323	1530	250	139
115	815	4205	632	351
116	1451	509	1126	626
117	2110	173	1637	910
118	828	1701	642	357
119	841	168	652	362
120	444	756	344	191
121	860	551	667	371
122	162	257	126	70
123	607	100	471	262
124	299	89	232	129
125	676	751	525	291
126	349	168	271	151
127	1097	200	851	473
128	29	929	23	13
129	1883	441	1461	812
130	2486	236	1929	1072
131	539	100	418	232
132	665	205	516	287
133	73	26	57	32

TAZ	2035 Population	2035 Employment	2035Vehicles Available	2035Households
134	57	16	44	25
135	27	0	21	12
200	720	236	384	300
201	15	196	12	6
202	732	758	604	305
203	694	473	573	289
204	1330	536	1097	554
205	1774	131	1464	739
206	317	223	262	132
207	821	689	677	342
208	1780	483	1469	742
300	1068	360	881	445
301	1185	510	978	494
302	1517	252	1251	632
303	1210	560	998	504
304	638	6	526	266
305	462	180	381	192
306	1255	48	1035	523
307	3271	1470	2699	1363
308	348	1704	287	145
309	0	1187	0	0
310	511	462	422	213
311	3565	1152	2941	1485
312	5126	1140	4229	2136
313	2555	1320	2108	1065
314	1553	384	1282	647
315	4967	1428	4098	2070
316	4013	360	3310	1672
317	2824	1620	2330	1177
318	1047	67	863	436
319	729	60	602	304
320	1272	60	1049	530
321	108	1140	89	45
322	1312	1344	1082	547
323	388	360	320	162
324	1443	114	1191	601
325	701	36	578	292
326	60	0	50	25
327	530	12	438	221
328	117	0	97	49
329	610	132	503	254
330	15	114	13	6
331	150	138	124	63
332	1384	18	1142	577
333	3891	2340	3210	1621
334	1767	2000	1457	736
335	122	24	101	51
336	2430	1020	2004	1012
337	848	3180	699	353
338	313	612	258	130
339	1038	506	857	433
340	1441	408	1189	600
341	2077	710	1713	865
342	1982	1044	1635	826
343	3932	816	3244	1638
344	950	744	783	396
345	939	750	775	391
346	3630	330	2995	1513
347	201	648	166	84
348	812	60	670	338
349	215	6	178	90
350	7	0	6	3
351	36	50	29	15

TAZ	2035 Population	2035 Employment	2035Vehicles Available	2035Households
352	511	12	422	213
353	372	24	307	155
354	1152	26	950	480
355	703	132	580	293
356	785	150	648	327
357	285	6	235	119
358	811	72	669	338
359	812	342	670	338
360	836	42	690	348
361	323	2	267	135
362	586	67	484	244
363	1434	222	1183	597
364	496	66	409	207
365	1354	234	1117	564
366	494	30	407	206
367	707	42	583	295
368	387	6	319	161
369	1209	800	997	504
370	108	0	89	45
371	279	12	231	116
372	223	12	184	93
373	104	30	86	43
401	224	148	195	87
402	931	1980	812	362
403	3846	623	3353	1497
404	2107	1418	1837	820
405	714	216	622	278
406	178	324	155	69
407	797	306	694	310
408	2632	122	2294	1024
409	1672	47	1457	651
410	3061	49	2668	1191
411	314	153	273	122
412	1133	760	987	441
413	1192	842	1039	464
414	653	441	569	254
415	2326	466	2028	905
416	622	160	542	242
417	251	437	219	98
418	853	450	743	332
419	1326	441	1156	516
420	402	0	350	156
500	304	8	262	121
501	902	75	777	358
502	1306	68	1124	518
503	363	8	313	144
504	486	38	419	193
505	1133	98	975	450
506	21	3	18	8

APPENDIX: KIOSK RESULTS B

Kiosk Results Combined From All Locations

Question 1 Do you agree with the following statement? "Traffic congestion is a problem in the Roanoke Valley."

Strongly Agree	755
Agree	754
Neither Agree nor Disagree	521
Disagree	471
Strongly Disagree	196

Question 2 Do you agree with the following statement? "Public transportation (bus) availability is sufficient in the Roanoke Valley.

Strongly Agree	257
Agree	527
Neither Agree nor Disagree	775
Disagree	664
Strongly Disagree	392

Question 3 How would you rate highway safety in the Roanoke Valley?

Excellent	118
Very Good	242
Good	913
Fair	881
Poor	430

Question 4 Do you agree with the following statement? "The availability of sidewalks in the Roanoke Valley is sufficient."

Strongly Agree	166
Agree	581
Neither Agree nor Disagree	666
Disagree	724
Strongly Disagree	402

Question 5 How would you rate the availability of off-road bicycle paths and greenways in the Roanoke Valley?

Excellent	104
Very Good	163
Good	610
Fair	853
Poor	774

Kiosk Results Combined From All Locations

Question 6 How would you rate the availability of on-road bicycle lanes in the Roanoke Valley:

Excellent	105
Very Good	91
Good	437
Fair	748
Poor	1105

Question 7 Do you agree with the following statement? "Adding lanes to I-81 will help relieve traffic congestion."

Strongly Agree	983
Agree	687
Neither Agree nor Disagree	354
Disagree	243
Strongly Disagree	202

Question 8 Do you agree with the following statement? "I-581 interchanges should be improved."

Strongly Agree	1026
Agree	748
Neither Agree nor Disagree	406
Disagree	153
Strongly Disagree	116

Question 9 How important is building I-73 to you and/or your business?

Very Important	414
Important	343
Somewhat Important	624
Not Important	1050

Question 10 Do you agree with the following statement? "The Roanoke Valley should expand its bus system."

Strongly Agree	730
Agree	771
Neither Agree nor Disagree	613
Disagree	162
Strongly Disagree	131

Question 11 How would you rate current maintenance of existing roads?

Excellent	91
Very Good	208
Good	794
Fair	826
Poor	475

Kiosk Results Combined From All Locations

Question 12 How important is providing sidewalks in the Roanoke Valley?

Very Important	704
Important	728
Somewhat Important	660
Not Important	289

Question 13 How important is providing on-road bicycle lanes to the Roanoke Valley?

Very Important	579
Important	584
Somewhat Important	733
Not Important	469

Question 14 Do you agree with the following statement? "The Roanoke Valley should expand its Greenway network."

Strongly Agree	648
Agree	736
Neither Agree nor Disagree	640
Disagree	114
Strongly Disagree	209

Question 15 How important is it to improve the rideshare/carpool program?

Very Important	391
Important	599
Somewhat Important	894
Not Important	450

Question 16 Do you agree with the following statement? "The Roanoke Valley should plan and develop passenger rail service to Richmond/ Washington D.C.."

Strongly Agree	1082
Agree	639
Neither Agree nor Disagree	313
Disagree	126
Strongly Disagree	161

Question 17 How important is using technology to improve traffic congestion?

Very Important	872
Important	724
Somewhat Important	520
Not Important	195

Kiosk Results Combined From All Locations

Question 18 An increase to the gas tax in order to improve the highway and/or the bus system is:

Very Acceptable	282
Acceptable	426
Somewhat Acceptable	538
Unacceptable	1055

Question 19 Adding toll lanes to I-81 in order to reduce congestion is:

Very Acceptable	277
Acceptable	406
Somewhat Acceptable	466
Unacceptable	1142

Question 20 Do you agree with the following statement? "The Roanoke Valley should establish a regional transportation authority."

Strongly Agree	577
Agree	768
Neither Agree nor Disagree	586
Disagree	146
Strongly Disagree	193

Question 21 Do you agree with the following statement? "Higher density development should be encouraged in order to reduce the traffic effects of sprawl."

Strongly Agree	421
Agree	620
Neither Agree nor Disagree	761
Disagree	242
Strongly Disagree	194

APPENDIX: RVAMPO PUBLIC PARTICIPATION PLAN C

APPENDIX: SAFETEA-LU Stakeholder List Feedback

D

SAFETEA-LU Stakeholder List
Feedback on "Goals and Objectives" of CLRTP 2035
Feedback from Virginia Department of Environmental Quality

ROANOKE VALLEY-ALLEGHANY REGIONAL COMMISSION
Date Received 8/25/08
Referred To MC

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
Street address: 629 East Main Street, Richmond, Virginia 23219
Mailing address: P.O. Box 1105, Richmond, Virginia 23218
TDD (804) 698-4021
www.deq.virginia.gov

L. Preston Bryant, Jr.
Secretary of Natural Resources

David K. Paylor
Director

(804) 698-4000
1-800-592-5482

August 15, 2008

Mr. Mark McCaskill
Roanoke Valley Area Metropolitan Planning Organization
313 Luck Ave SW
P. O. Box 2569
Roanoke, VA 24010

Dear Mr. McCaskill:

The Virginia Department of Environmental Quality has reviewed the May 2008 draft *Guiding Principles* chapter of the Roanoke Valley Area Metropolitan Planning Organization *Constrained Long-Range Transportation Plan for 2035*. We are pleased the RVAMPO plans to set a policy tone that emphasizes the air quality impacts of transportation projects planned for the region.

As you know, EPA recently lowered the National Ambient Air Quality Standards (NAAQS) for both 8-hour ozone and fine particulate matter. Final area designations for the 2006 fine particulate matter standard are expected from EPA by December 2008 and for the 2008 8-hour ozone standard by March 2010. As the Roanoke region design values for both pollutants approximate the standards, we are pleased the area intends to seek transportation projects that maximize air quality benefits.

The Virginia Department of Environmental Quality offers the following comments on the *Air Quality* portion of the May 2008 draft *Guiding Principles* chapter of the Roanoke Valley Area Metropolitan Planning Organization *Constrained Long-Range Transportation Plan for 2035*:

- For clarity, instead of using the term "previous federal standard," we suggest specifying "the 1997 National Ambient Air Quality Standard for 8-hour ozone" as appropriate.
- For section heading, we suggest changing the title from "Air Quality, Global Warming, and Climate Change" to "Air Quality and Climate Change" since the term climate change encompasses global warming issues.
- To ensure that the last section is clearly factual, we suggest these revisions: "*On a similar note, global warming is occurring and recent indications are that it may be happening faster than projected and its consequences may be more widespread and*

SAFETEA-LU Stakeholder List
Feedback on "Goals and Objectives" of CLRTP 2035
Feedback from Virginia Department of Environmental Quality -

more severe than forecasted. Will the potential changes (heat, drought, floods, and sea level rise) cause major agricultural, economic, social and geo-political changes as well? Could the results be catastrophic?"

Thank you for the opportunity to comment on the draft constrained long-range transportation plan. We look forward to working closely with you on making further improvements to the region's air quality.

Sincerely,

David K. Paylor

SAFETEA-LU Stakeholder List
Feedback on "Goals and Objectives" of CLRTP 2035
Feedback from Virginia Department of Conservation and Recreation

L. Preston Bryant, Jr.
Secretary of Natural Resources

Joseph H. Maroon
Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

203 Governor Street
Richmond, Virginia 23219-2010
(804) 786-6124

August 14, 2008

Mark McCaskill
Roanoke valley Metropolitan Planning Organization
313 Luck Avenue SW
Roanoke, VA
24010

RE: DCR 08-091: Roanoke Valley Area Metropolitan Planning Organization Transportation Plan

Dear Mr. McCaskill:

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

Attached is a list of natural heritage resources that have been documented within two miles of the transportation plan boundary. DCR can provide more accurate comments once project details become more precisely defined. Please allow DCR an additional opportunity for review and comment as details become available.

Under a Memorandum of Agreement established between the Virginia Department of Agricul ture and Consumer Services (VDACS) and the Virginia Department of Conservation and Recreation (DCR), DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

New and updated information is continually added to Biotics. Please contact DCR for an update on this natural heritage information if a significant amount of time passes before it is utilized.

The Virginia Department of Game and Inland Fisheries maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters, that may contain information not documented in this letter. Their database may be accessed from www.dgif.virginia.gov/wildlife/info map/index.html, or contact Shirl Dressler at (804) 367-6913.

State Parks • Soil and Water Conservation • Natural Heritage • Outdoor Recreation Planning
Chesapeake Bay Local Assistance • Dam Safety and Floodplain Management • Land Conservation

SAFETEA-LU Stakeholder List
Feedback on "Goals and Objectives" of CLRTP 2035
Feedback from Virginia Department of Conservation and Recreation

The remaining DCR divisions have no comments regarding the scope of this project. Thank you for the opportunity to comment.

Sincerely,

Robert S. Munson,
Planning Bureau Manager
DCR-DPRR

APPENDIX: Pre-NEPA Screening E

Project Description	**Route**	US 460/ Orange Ave
	Project Description	Widen Roadway
	From	11th St
	To	King Street
	Proposed Typical Section	U6L
	Length (miles)	2.03 miles
	Cost	$28,764,000
Purpose	**Summary of Project Purpose**	Increase roadway capacity
Needs	**Existing LOS / show base year**	
	Forecasted LOS -Build and No build / show years	
	Existing year AADT	
	Future Year AADT	
	Existing Volume to Capacity Ratio	
	Capacity (C), Roadway (R) or Safety Deficiency (S), Route Continuity (RC), Transportation Demand (TD), Modal Connectivity (MC)	C
Environmental Issues	**Environmental Concerns**	Streams, Impaired Streams, Historic Resources, Parks, Endangered Species
Alternatives	**Alternatives Considered**	
History	**Project History**	

Project Description	Route	Plantation Rd
	Project Description	Widen roadway
	From	Indiana Ave
	To	Wingfield
	Proposed Typical Section	U4L
	Length (miles)	1.24 Miles
	Cost	$14,072,000
Purpose	Summary of Project Purpose	Increase roadway capacity
Needs	Existing LOS / show base year	
	Forecasted LOS -Build and No build / show years	
	Existing year AADT	
	Future Year AADT	
	Existing Volume to Capacity Ratio	
	Capacity (C), Roadway (R) or Safety Deficiency (S), Route Continuity (RC), Transportation Demand (TD), Modal Connectivity (MC)	C
Environmental Issues	Environmental Concerns	Endangered Species
Alternatives	Alternatives Considered	
History	Project History	

Project Description	Route	Route 11- Apperson Dr.
	Project Description	Widen roadway
	From	Colorado
	To	WCL Roanoke
	Proposed Typical Section	U4L
	Length (miles)	2.0 miles
	Cost	$17,114,000
Purpose	Summary of Project Purpose	Increase roadway capacity
Needs	Existing LOS / show base year	
	Forecasted LOS -Build and No build / show years	
	Existing year AADT	
	Future Year AADT	
	Existing Volume to Capacity Ratio	
	Capacity (C), Roadway (R) or Safety Deficiency (S), Route Continuity (RC), Transportation Demand (TD), Modal Connectivity (MC)	C
Environmental Issues	Environmental Concerns	Streams, Impaired Streams, Historic Resources, Parks, Endangered Species
Alternatives	Alternatives Considered	
History	Project History	

Project Description	Route	Roanoke River Crossing
	Project Description	Construction of two bridges and a connecting roadway
	From	4th St
	To	W. Riverside Dr
	Proposed Typical Section	
	Length (miles)	
	Cost	$11,672,000
Purpose	Summary of Project Purpose	Create a direct connection between two minor arterial roads
Needs	Existing LOS / show base year	
	Forecasted LOS -Build and No build / show years	
	Existing year AADT	
	Future Year AADT	
	Existing Volume to Capacity Ratio	
	Capacity (C), Roadway (R) or Safety Deficiency (S), Route Continuity (RC), Transportation Demand (TD), Modal Connectivity (MC)	C, RC
Environmental Issues	Environmental Concerns	Streams, Impaired Streams, Endangered Species
Alternatives	Alternatives Considered	
History	Project History	

Project Description	**Route**	Route 634- Hardy Rd
	Project Description	Widen and divide roadway
	From	Roanoke Co. CL
	To	Route 619 (MPO Boundary)
	Proposed Typical Section	Rural divided 4L
	Length (miles)	1.4 Miles
	Cost	$5,950,000
Purpose	**Summary of Project Purpose**	Increase capacity of road
Needs	**Existing LOS / show base year**	
	Forecasted LOS -Build and No build / show years	
	Existing year AADT	
	Future Year AADT	
	Existing Volume to Capacity Ratio	
	Capacity (C), Roadway (R) or Safety Deficiency (S), Route Continuity (RC), Transportation Demand (TD), Modal Connectivity (MC)	C
Environmental Issues	**Environmental Concerns**	Streams, Private Preserves, Parks
Alternatives	**Alternatives Considered**	
History	**Project History**	

Project Description	Route	Rt 634- Hardy Rd
	Project Description	Reconstruction
	From	Vinton CL
	To	.01 mi east Rt 654
	Proposed Typical Section	
	Length (miles)	0.9 miles
	Cost	$750,012
Purpose	Summary of Project Purpose	Increase capacity
Needs	Existing LOS / show base year	
	Forecasted LOS -Build and No build / show years	
	Existing year AADT	
	Future Year AADT	
	Existing Volume to Capacity Ratio	
	Capacity (C), Roadway (R) or Safety Deficiency (S), Route Continuity (RC), Transportation Demand (TD), Modal Connectivity (MC)	C
Environmental Issues	Environmental Concerns	Streams, Historic Resources, Parks, Greenway
Alternatives	Alternatives Considered	
History	Project History	

Project Description	**Route**	Rt 613- Merriman Rd
	Project Description	Reconstruct and widen
	From	0.1 mi south Rt 904
	To	Rt 1640
	Proposed Typical Section	
	Length (miles)	1.3 miles
	Cost	$14,333,030
Purpose	**Summary of Project Purpose**	Increase capacity
Needs	**Existing LOS / show base year**	
	Forecasted LOS -Build and No build / show years	
	Existing year AADT	
	Future Year AADT	
	Existing Volume to Capacity Ratio	
	Capacity (C), Roadway (R) or Safety Deficiency (S), Route Continuity (RC), Transportation Demand (TD), Modal Connectivity (MC)	C
Environmental Issues	**Environmental Concerns**	Streams, Historic Resources, Endangered Species
Alternatives	**Alternatives Considered**	
History	**Project History**	

Project Description	Route	Rt 11/ 460
	Project Description	Reconstruction- 4 lane w/ curb, gutter, and raised median
	From	WCL Salem
	To	0.1 mi west Rt 830
	Proposed Typical Section	U4L
	Length (miles)	2.2 miles
	Cost	$42,719,000
Purpose	Summary of Project Purpose	Increase capacity
Needs	Existing LOS / show base year	
	Forecasted LOS -Build and No build / show years	
	Existing year AADT	
	Future Year AADT	
	Existing Volume to Capacity Ratio	
	Capacity (C), Roadway (R) or Safety Deficiency (S), Route Continuity (RC), Transportation Demand (TD), Modal Connectivity (MC)	C
Environmental Issues	Environmental Concerns	Streams, Historic Resources, Streams, Endangered Species
Alternatives	Alternatives Considered	
History	Project History	