Central Virginia Metropolitan Planning Organization
Virginia's Region 2000 Local Government Council

CENTRAL VIRGINIA LONG-RANGE TRANSPORTATION PLAN YEAR 2030

TECHNICAL REPORT

Developed by
the Central Virginia Metropolitan Planning Organization

in cooperation with
the Virginia Department of Transportation,
the Virginia Department of Rail and Public Transportation,
the Federal Highway Administration,
and the Federal Transit Administration

December 2005

Central Virginia Metropolitan Planning Organization
Virginia's Region 2000 Local Government Council

CENTRAL VIRGINIA LONG-RANGE TRANSPORTATION PLAN – YEAR 2030

TECHNICAL REPORT

Developed by the
Central Virginia Metropolitan Planning Organization

in cooperation with
the Virginia Department of Transportation,
the Virginia Department of Rail and Public Transportation,
the Federal Highway Administration,
and the Federal Transit Administration

December 2005

The contents of this report reflect the views of the author(s), who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Federal Highway Administration (FHWA) or the Commonwealth Transportation Board. This report does not constitute a standard, specification, or regulation. FHWA acceptance of this report as evidence of fulfillment of the objectives of this planning study does not constitute approval of location and design or a commitment to fund any such improvements. Additional, project-level environmental impact assessments and/or studies of alternatives will generally be necessary.

Table of Contents

List of Exhibits

Executive Summary

The Central Virginia Long-Range Transportation Plan – Year 2030 (the Plan) provides a blueprint for a transportation system that is a vital part of Central Virginia's economic growth and high quality of life. The Plan describes transportation policies and projects that are coordinated across all modes of travel within the region. These policies and projects were derived from a process that first identified transportation needs and then identified regional transportation goals and objectives based on these needs and future directions for the transportation system. The process of identifying needs and developing goals and objectives was carried out through extensive stakeholder workshops, public meetings, and meetings with the region's inter-governmental Transportation Technical Committee.

The Plan includes regional multi-modal transportation strategies and policies as well as a set of transportation projects that serve to implement those policies. The Plan meets all federal requirements for metropolitan area transportation plans, including an extensive public involvement effort, consideration of financial constraints, environmental, socio-economic, and economic impacts, and consideration of the transportation and land use concerns of local, state, and federal governments. The Plan was developed in cooperation with the following agencies:

- City of Lynchburg
- Amherst County
- Bedford County
- Campbell County
- Town of Amherst
- Central Virginia Metropolitan Planning Organization (MPO)
- Virginia Department of Transportation
- Virginia Department of Rail and Public Transportation
- Federal Highway Administration
- Federal Transit Administration
- Federal Aviation Administration
- Greater Lynchburg Transit Company

The area covered in the Plan is that portion of Central Virginia covered by the Central Virginia MPO. This region includes the City of Lynchburg, along with the adjacent "urbanized" portions of Amherst, Bedford, and Campbell counties, and the Town of Amherst. These urbanized areas are defined by the U.S. Census based on total population, as well as contiguous areas that meet population density thresholds.

E.1 Regional Transportation Concerns

Through a public and stakeholder involvement process, key regional transportation concerns were identified. These concerns include:

- The regional traffic impacts resulting from only the northern part of the Lynchburg area's bypass being constructed. Specifically, the traffic impacts that are expected to result from both the Route 29 Madison Heights Bypass and Route 460 feeding onto the section of Route 29 (in Campbell County) that has uncontrolled access extending south from the Lynchburg Regional Airport.
- Traffic and safety concerns on the Route 29 Lynchburg Expressway (now Route 29 Business), specifically in the vicinity of Candlers Mountain Road.
- Traffic and safety concerns on Route 221 Lakeside Drive and Forest Road.
- Safely serving traffic (including commercial traffic) coming to and through the region on the Route 501 Corridor.
- Promoting safe travel by bicycle and walking within the region.
- The continuing viability of transit within the region.
- Serving the needs of persons with disabilities, the elderly, and those who cannot drive for various reasons.
- Supporting continued economic development in the region through improved highways, air service, and rail passenger and freight service.

E.2 Regional Transportation Strategies

As part of the development of the Plan, five key regional transportation strategies were identified. These strategies provide a focus for transportation planning in the region, and set clear directions for transportation changes and improvements that will lead to a more balanced, efficient, and safe transportation system. The strategies are:

Strategy 1: Increase management of key regional transportation corridors.
Strategy 2: Increase coordination between land use and transportation planning.
Strategy 3: Focus improvements on projects that enhance intra-regional accessibility.
Strategy 4: Construct key linkages in the regional Greenway/Blueway Plan.
Strategy 5: Improve the region's transportation system to accommodate special needs and changing demographics.

E.3 Transportation Funding

The Plan is required to be financially constrained, meaning that all of the projects that are included should be capable of being funded based on a reasonable estimate of available transportation funding. Because the bulk of the projects are roadway or roadway-related, the focus of this financial constraint process is on the roadway system. VDOT provides estimates of available funding for purposes of financially constraining the Plan. These estimates are by roadway program: primary, urban, and secondary. The current VDOT Six-Year Program covers the years 2006 through 2011, and the Plan assumes that these projects and this funding will remain as they currently stand. Estimated funding (as provided by VDOT) for projects beyond the timeframe of the current plan are for 2012 through 2030 and are as follows:

- Primary and National Highway System (both Lynchburg and Salem Districts): $17.99 million
- Urban System (City of Lynchburg): $15.95 million

- Secondary System in Amherst County: $4.46 million
- Secondary System in Bedford County: $6.49 million
- Secondary System in Campbell County: $6.52 million

E.4 Project Prioritization

The list of projects identified to address existing and future transportation needs for the region far exceeded estimates of available funding. It was, therefore, necessary to prioritize projects using parameters that were identified in public and stakeholder meetings early in the plan development process, as well as standard variables related to traffic volumes and estimated project costs. The prioritization model served to guide decision-making by regional planners, the Transportation Technical Committee, and the MPO Board. The prioritization model incorporated the following parameters:

- Traffic served by proposed facility
- Estimated project
- Safety, based on recent crash experience in particular corridors
- Degree to which a project:
  - Promotes intra-regional connectivity
  - Promotes travel by transit and other non-automotive modes
  - Promotes overall transportation efficiency
  - Promotes economic development and transportation connections to outside the region

E.5 Financially Constrained Transportation Plan Projects

The Financially Constrained Transportation Plan includes two elements: (1) projects that are included in the Virginia Department of Transportation's Six-Year Improvement Program covering fiscal years 2006 through 2011, and (2) projects that can be funded with the estimated funds for the years 2012 through 2030. Projects in the current VDOT Six-Year Improvement Program are shown in Exhibit E-1. It is important to note that the Six-Year Improvement Program is a capital funding plan: it serves to allocate funds to projects on a year-by-year basis. Construction on some projects begins prior to allocation of full funding; in these instances, funding continues to be allocated to projects even if they have been completed.

The projects shown in Exhibit E-1 represent approximately $81.4 million in funding for the period from fiscal year 2006 through and including fiscal year 2011. Transportation funding for the Central Virginia region also includes projects that are designated to address broad categories of transportation needs and are allocated to specific projects based on identified need. These funds are allocated at the VDOT construction district level – the Central Virginia MPO crosses into both the Lynchburg and Salem VDOT construction districts. Exhibit E-1 also includes estimates of funding for the broad categories of roadway needs for the MPO portion of each of these two construction districts.

Exhibit E-1

Roadway Projects in the Current VDOT Six-Year Improvement Program (Fiscal Years 2006 through 2011)

Project Location	Description	Estimated Project Cost	Funding for FY 2006 through FY 2011
City of Lynchburg			
Route 29/460 (Richmond Highway) -- Route 501 (Campbell Avenue) to Route 29 Bypass North	Improve to 4-6 lane limited access roadway (funded amount is for preliminary engineering, right-of-way, and accrual towards construction)	$40,000,000 to $60,000,000	$15,948,000
Midtown Connector (Phase I) -- Route 29 Expressway (29 Business) to Old Forest Road	Widen to 4 lanes; additional funding will be required beyond six-year horizon (this additional funding is included in the Constrained Plan projects in Exhibit E-2)	$30,000,000	$10,723,000
Midtown Connector (Phase II)/Route 221 (Lakeside Drive) -- Old Forest Road to Route 501 Expressway	Widen to 4 lanes; additional funding will be required beyond six-year horizon (this additional funding is included in the Constrained Plan projects in Exhibit E-2)	$23,181,000	$10,638,000
Breezewood Drive -- Route 501 to Route 221 (Lakeside Drive)	Extend to Lakeside Drive	$2,847,000	$439,000
Traffic safety improvements – various locations	Signal improvements, pavement markings, other safety improvements	$538,000	$538,000
Amherst County			
Riverwalk Trail Extension	Extend bicycle and pedestrian trail from current terminus	$1,739,000	$496,000
Route 29 (Madison Heights Bypass) – Lynchburg Corporate Limits to the northern MPO boundary	Construct 4 lanes on new alignment. Project complete, additional funding allocated in Six-Year Program.	$135,327,000	$41,297,000
Route 210 Connector – Route 29 Business to Route 29 Bypass (including Route 622 Connector)	Construct 4 lanes on new alignment. Project complete, additional funding allocated in Six-Year Program.	$12,728,000	$5,321,000
Route 652 (Cedar Gate Road) -- Route 675 to Route 130	Replace bridge at Graham Creek	$345,000	$345,000
Route 657 (Cedar Gate Road) -- Route 652 to Route 636	Widen pavement to 20 feet	$581,000	$581,000
Route 659 (Union Hill Road) -- bridge over Rutledge Creek	Bridge replacement	$670,000	$670,000
Route 652 (Cedar Gate Road) -- Route 657 to Route 675	Widen pavement to 24 feet	$1,881,000	$1,881,000
Route 659 (Union Hill Road) -- west of Norfolk Southern railroad crossing to Route T-606	Reconstruct 2 lane roadway	$2,912,000	$2,912,000

Exhibit E-1

Roadway Projects in the Current VDOT Six-Year Improvement Program (Fiscal Years 2006 through 2011)

Project Location	Description	Estimated Project Cost	Funding for FY 2006 through FY 2011
Bedford County			
Route 221 (Forest Road) -- 0.15 miles east of Route 663 to 0.5 miles west of NS Railroad	Widen to 4 lanes	$12,370,000	$11,464,000
Route 644 (Coffee Road) -- Route 665 North to Route 665 South	Improve bridges and approaches	$1,533,000	$1,533,000
Route 811 (Thomas Jefferson Road) -- Route 622 to Route 661	Upgrade for safety and traffic operations	$3,524,000	$3,524,000
Route 668 (Goode Road) at NS Railroad tracks	Reconstruct bridge and approaches	$1,512,000	$1,512,000
Route 621 (Cottontown Road) -- Route 660 to Route 1201	Reconstruction	$1,666,000	$1,666,000
Route 660 (Hawkins Mill Road) at Ivy Creek	Replace bridge and approaches	$3,535,000	$3,535,000
Route 621 (Cottontown Road) -- Route 662 to Route 660	Reconstruction, including replacement of bridge over Ivy Creek	$6,977,000	$6,977,000
Campbell County			
Route 622 (Lynbrook Road) -- Route 683 to Route 29	Reconstruct 2 lane roadway	$5,808,000	$5,808,000
Route 622 (Lynbrook Road) at Flat Creek	Bridge replacement	$225,000	$225,000
Other MPO-Wide Non-Specific Funding Categories			
Safety/traffic operations/ transportation system management	Covers general improvements to traffic safety and operations; the individual projects are each generally low-cost improvements	--	Determined on an annual basis [1]
Transportation enhancements	Improvements to expand transportation choices through such activities as safe bicycle and pedestrian facilities, scenic routes, and beautification	--	Determined on an annual basis [1]
Rail crossing safety	Improvements to increase safety at locations where roads and railroads cross	--	Determined on an annual basis [1]
General system maintenance	Roadway maintenance funds on an MPO-wide basis	--	Determined on an annual basis [2]

Notes:

[1] – Funding for these categories is allocated statewide and awarded to individual projects on a competitive basis.

{2} – Funding for this category is allocated to each of the VDOT Construction Districts by roadway system. Further distribution within the MPO area is based on need.

The second set of projects in the Financially Constrained Plan are those for which funding is anticipated to be available between 2012 and 2030. These projects are shown in Exhibit E-2. The total funding for these projects for the period 2012 to 2030 is $49.96 million.

Exhibit E-2

Projects in the Financially Constrained Transportation Plan (Anticipated to be Funded Between 2012 and 2030)

Project Location	Description	Estimated Project Cost	Funding for FY 2012 through FY 2030
Primary Funds			
Route 29 Bypass South -- Route 460 East to Route 29 at Yellow Branch [Campbell County]	Study for new 4-lane roadway	$3,000,000	$3,000,000
Route 501 (Candlers Mountain Road) -- Woodall Road to Mayflower Drive [City of Lynchburg]	Widen to 6 lanes, including bridge over railroad and interchange; accrual towards total estimated cost	$22,348,000	$14,990,000
City of Lynchburg (Urban Funds)			
Midtown Connector (Phase I) -- Route 29 Expressway (29 Business) to Old Forest Road	Widen to 4 lanes; represents additional funding required beyond VDOT six-year horizon	$30,000,000	$2,807,000
Midtown Connector (Phase II)/Route 221 (Lakeside Drive) -- Old Forest Road to Route 501 Expressway	Widen to 4 lanes; represents additional funding required beyond VDOT six-year horizon	$23,181,000	$6,564,000
Route 501 (Lynchburg Expressway) Interchange at Route 221 (Lakeside Drive)	Construct interchange; preliminary engineering and accrual towards construction	$42,000,000	$6,580,000
Amherst County			
Route 682 (Woodys Lake Road) -- Route 29 Business to dead end	Reconstruct 2 lane roadway	$3,007,000	$3,007,000
Bedford County			
Route 622 (Waterlick Road) -- Route 811 to Campbell County line	Widen to 4 lanes	$4,192,000	$4,192,000
Route 811 (Thomas Jefferson Road) -- Route 460 to Route 221	Widen to 4 lanes (funding included for preliminary engineering only)	$23,288,000	$2,300,000
Campbell County			
Route 622 (Waterlick Road) -- Bedford County Corporate Limits to Route 1520 (Rainbow Forest)	Widen to 4 lanes	$5,123,000	$5,123,000
Route 738 (English Tavern Road) at Routes 677 (Sunnymeade Road) and Route 680 (Suburban Road)	Reconfigure to single intersection	$1,400,000	$1,400,000

Exhibit E-2

Projects in the Financially Constrained Transportation Plan (Anticipated to be Funded Between 2012 and 2030)

Project Location	Description	Estimated Project Cost	Funding for FY 2012 through FY 2030
MPO-Wide System Maintenance			
General system maintenance: City road system	Roadway maintenance funds within the City of Lynchburg	--	Determined on an annual basis [1]
General system maintenance: State road system	Roadway maintenance funds on state-maintained roads in Amherst, Bedford, and Campbell Counties	--	Determined on an annual basis [2]

Notes:
[1] – Funding for this category is allocated to each urban locality based on state formula.
{2} – Funding for this category is allocated to each of the VDOT Construction Districts by roadway system. Further distribution within the MPO area is based on need.

Regional transportation projects also include those funded locally by the City of Lynchburg. These local projects are those that are included in the City's Capital Improvement Program (Fiscal Years 2006-2010). These are summarized in Chapter 7 of this report.

Repairs to the Rivermont bridge over Blackwater Creek are included in the City's Capital Improvement Program, but federal funding in the amount of $1.76 million (of the total estimated cost of $4.1 million) was included in the recent federal transportation legislation signed by President Bush on August 10, 2005.

E.6 Improvements for Other Modes of Transportation

Transit service in the region is anticipated to grow at a modest rate of 2 percent per year. Planned transit improvements in the Financially Constrained Plan include modest growth in route-miles, as well as limited expansion into adjacent Amherst, Bedford, and Campbell Counties. An increased emphasis in smaller "minibus" vehicles will provide additional flexibility in transit service. Additional transit flexibility will also be provided through increases in demand-response service as well as deviations from fixed-routes for the region's existing fixed-route service.

The Plan also incorporates recommendations from the Region 2000 Greenways and Blueways Plan (published in 2003), which includes a substantially increased emphasis within the region on transportation facilities to serve walking and bicycling. The Greenways/Blueways Plan addresses safety, connectivity, and an increase in facilities that promote the quality of life in the region by providing healthy transportation choices. The key project in the Financially Constrained Plan is the extension of the James River Heritage Trail in Amherst County,

Lynchburg Regional Airport will be updating its Master Plan beginning in Fiscal Year 2006. In addition to the development of the Master Plan, regional improvements with respect to air travel include the extension of the main runway to 7,000 feet to allow for larger aircraft (for both passengers and freight) to serve the Central Virginia region.

E.7 Transportation Vision Plan for Roadway Projects

As indicated previously, the total estimated costs for the transportation improvement projects that were identified as part of the transportation plan development process exceeded the estimated funding to the year 2030. Those projects with a lesser priority that could not be funded based on the limited funding stream estimates are proposed for inclusion in the region's Transportation Vision Plan. It is anticipated that some projects may be able to be advanced within the next few years should additional funding become available. For this reason, the Transportation Technical Committee has established two tiers for Vision Plan projects. Tier 1 Vision Plan projects (shown in Exhibit E-3) are those that were judged to be of a higher priority and should be advanced first should additional funding become available. Tier 2 Vision Plan projects are those that were judged to be longer-term and of a lesser priority. These lower priority projects are listed in Chapter 5 of this report.

It is important to note that several projects included in the Financially Constrained Plan would not be able to be completely funded within the estimated fiscal constraints. These include the widening of Candlers Mountain Road between Woodall Road and Mayflower Drive, the construction of the interchange of Route 501 at Route 221 (Lakeside Drive), and the widening of Route 811 (Thomas Jefferson Road) between Route 460 and Route 221 in Bedford County. It is anticipated that these projects would be completed prior to advancing the projects in the Tier 1 Vision Plan shown in Exhibit E-3.

Exhibit E-3

Roadway Projects in the Transportation Vision Plan (Tier 1)

Project Location	Description	Length of Project
City of Lynchburg		
Route 29/460 Interchange at Odd Fellows Road Extension	New grade-separated interchange	NA
Route 670 (Old Candlers Moutain Road) -- Mayflower Drive to Route 460	Widen to 4 lanes	0.7
Odd Fellows Road -- Lynchburg Expressway to End	Widen to 4 lanes	1.3
5th Street (Route 163) -- Langhorne Road to Main Street	Improvements for multi-modal corridor	1.2
Memorial Avenue -- Fort Avenue to Langhorne Road	Improvements for multi-modal corridor	1.3
Oakley Avenue -- Lakeside Drive to Memorial Avenue	Improvements for multi-modal corridor	0.9
Langhorne Road (Route 501 Business) -- Fort Avenue to Cranehill Drive	Improvements for multi-modal corridor	2.3

Exhibit E-3

Roadway Projects in the Transportation Vision Plan (Tier 1)

Project Location	Description	Length of Project
Route 501 Business (Boonsboro Road) -- Lynchburg Expressway (Route 501) to Langhorne Road	Improvements for multi-modal corridor	3.1
Greenview Drive -- Lynchburg Corporate Limits to Leesville Road	Widen to 4 lanes	1.3
Route 460 Business (Fort Avenue) -- Memorial Avenue to 12th Street	Improvements for multi-modal corridor	1
Fort Avenue -- 12th Street to Park Avenue	Improvements for multi-modal corridor	0.4
Rivermont Avenue -- Langhorne Road to 5th Street	Improvements for multi-modal corridor	2.9
Wards Ferry Road -- Wards Road to Timberlake Road	Widen to 4 lanes	2.3
Amherst County		
Route 675 (Winesap Road) -- Route 652 to Route 795	Widen pavement to 22 feet	3.1
Route 29 Business at Route 163	Reconstruct interchange to allow all movements	NA
Route 210 (Colony Road) -- Route 163 to Route 1034	Widen to 4 lanes	0.3
Route 163 (South Amherst Highway) -- Route 685 (River Road) to interchange at Route 29 Expressway (29 Business)	Widen to 4 lanes with bike lane	1.6
Connector Road running parallel to and east of Route 29 Business -- Route 163 to Lakeview Drive	Construct new 2-lane connector road running parallel to Route 29 Business	0.62
Route 130 (Elon Road) -- NS railroad track to Route 29 Business	Widen to 4 lanes	1.9
Bedford County		
Route 460 -- Study Area Boundary (Goode Road) to Route 811	Construct paved shoulder lane and implement access management recommendations	2.9
Route 501 (Boonsboro Road) at Route 647	Relocate intersection, construct turn lane	0.3
Route 501 (Boonsboro Road) -- at Judith Creek Road	Bridge improvements	NA
Route 501 (Boonsboro Road) -- Lynchburg Corporate Limits to Study Area Boundary	Reconstruct portions, add climbing lanes (spot locations)	4.8
Route 659 (Hawkins Mill Road) -- Route 660 to Lynchburg Corporate Limits	Reconstruct 2 lane roadway	1.5
Route 644 (Coffee Road) -- Route 665 North to Lynchburg Corporate Limits	Reconstruct 2 lane roadway	3.6
Route 622 (Everett Road) -- Kensington Parkway to NS railroad tracks	Reconstruct 2-lane roadway	2.2
Route 663 (Perrowville Road) -- Route 1431 to Route 644	Reconstruct 2 lane roadway	2.1

Exhibit E-3

Roadway Projects in the Transportation Vision Plan (Tier 1)

Project Location	Description	Length of Project
Route 623 (Turkey Foot Road) -- Route 811 to Campbell County Corporate Limits	Widen pavement to 24 feet	1.2
Route 621 (Cotton Town Road) -- Route 644 (Coffee Road) to Route 662	Reconstruct 2 lane roadway	4.9
Campbell County		
Route 29 (Wards Road) -- South Route 738 to Lynchburg City Corporate Limits	Access management, traffic operations and safety improvements	3.5
Route 501 (Campbell Highway) -- Route 24 to Route 680 (Suburban Road)	Widen to 4 lanes	2.2
Route 682 (Leesville Road) -- Lynchburg Corporate Limits to Route 460	Widen to 4 lanes	0.9
Route 738 (English Tavern Road) -- Route 680 (Suburban Road) to Route 29 (north intersection)	Widen to 24 feet	1.5
Route 738 (English Tavern Road) -- Route 29 (south intersection) to Route 680 (Suburban Road)	Widen to 24 feet	1.2
Route 681 (Sunburst Road) -- Route 460 to Route 622	Reconstruct 2-lane roadway	2.7

E.8 Transportation Vision Plan for Non-Roadway Projects

The Plan incorporates policies to expand the role that non-automotive travel plays in the region. Specific projects to expand the role of transit in the region are included in the Vision Plan. Tier 1 Vision Plan projects include major expansions of the transit system in the region, both within the City of Lynchburg and surrounding counties. Service to major existing and planned employment centers would serve to make transit a more viable mode of transportation for a larger percentage of the region's population. Within the 2030 horizon, expansion of the system's route-miles would grow by a factor of three. New transportation technologies such as real-time bus routing information that would be provided to patrons via cell-phone, other personal data devices, or via small-scale variable message signs at bus stops would make transit a much more attractive system for a wide range of users. Tier 2 Vision Plan projects for transit include consideration of Bus Rapid Transit line on the Route 29 Corridor between Amherst and Altavista, as well as the Route 460 Corridor between Appomattox and Bedford City, with a major hub near the Lynchburg Airport. A system of park-and-ride facilities and extensive feeder bus service would serve to make this type of service more attractive to riders.

The Vision Plan also includes projects for walkways and bicycle facilities trails along Route 29 in Amherst County as well as additional connections to the James River Heritage Trail, Poplar Forest Connector to the City of Bedford in Bedford County, the Buffalo Creek Greenway in Campbell County, and the Tomahawk Creek Trail in the City

of Lynchburg. The Greenways and Blueways Plan incorporates additional projects within the MPO area, including connections between the various facilities described above.

Chapter 1 – Study Background

The Central Virginia Long-Range Transportation Plan – Year 2030 (the Plan) provides a blueprint for a transportation system that is a vital part of Central Virginia's quality of life and economic growth. This Plan addresses the complete transportation system; covering all modes of travel within the region including roadway (single occupant vehicle, rideshare, taxi, truck, etc.), transit, walking, bicycle, rail, and air. The Plan serves an important function by ensuring that improvements across travel modes are coordinated and work towards common goals.

1.1 Development of the Transportation Plan

The 2030 Transportation Plan was developed using a comprehensive methodology that included:

1. **Identification of existing transportation needs:** The identification of transportation needs included quantitative analysis through such procedures as roadway capacity analysis and review of safety data, as well as more qualitative methods such as interviews with transportation providers and users (such as the local transit agency, trucking groups, industry, etc.), other transportation stakeholders, and members of the general public.
2. **Forecasting of future (2030) travel demands using a regional computerized transportation model:** A regional model was developed using the industry-standard TP+ computer modeling software package. The model was validated against existing year 2000 traffic volumes; the forecast year traffic is a function of expected changes in population and employment between 2000 and 2030.
3. **Assessment of future transportation needs based on these projected travel demands:** Based on the year 2030 traffic forecasts produced by the regional transportation model, potential capacity deficiencies were identified based on the ratio of projected traffic volumes to roadway capacity.
4. **Development of regional transportation goals and objectives:** Regional transportation goals and objectives were developed through a cooperative process with stakeholders and regional planners. These goals and objectives, along with a set of complementary federal transportation planning factors (described in Chapter 2), form the framework for identifying, testing, and ranking projects for inclusion in the Plan.
5. **Development and refinement of transportation solutions in cooperation with local governments and the general public:** Input from stakeholders, as well as analysis of existing conditions and future deficiencies, was used to develop improvement recommendations. These recommendations were reviewed and refined through a series of meetings with the regional Transportation Technical Committee, individual jurisdictions, and the general public.
6. **Cost estimates and environmental overview:** Cost estimates were developed for proposed recommendations. In addition, projects were reviewed against known environmental constraints such as floodplains and wetlands, minority communities, historic sites, community resources, etc.

The Plan was developed in cooperation with the following agencies:

- City of Lynchburg
- Amherst County
- Bedford County
- Campbell County
- Town of Amherst
- Central Virginia Metropolitan Planning Organization (MPO)
- Virginia Department of Transportation
- Virginia Department of Rail and Public Transportation
- Federal Highway Administration
- Federal Transit Administration
- Federal Aviation Administration
- Greater Lynchburg Transit Company

1.2 Transportation Plan Requirements

The 2030 Transportation Plan was developed to meet federal requirements for metropolitan area transportation planning. While individual jurisdictions often prepare local transportation plans, projects that receive any federal transportation funds must be included in a regionally adopted Transportation Plan that meets federal regulations. These regulations apply to both the content of the Plan and the way in which it is developed. Key requirements include:

- Early, proactive, and ongoing public involvement process
- Coordinated planning across local, state, and federal agencies
- Reflect local transportation, land use, and economic goals and objectives
- Assess needs and develop improvements that address transportation needs for a minimum horizon of 20 years
- Consideration of the social, environmental, and economic impacts of transportation recommendations
- Recommended projects must be able to be funded based on reasonable estimates of transportation funding between today and 2030 (financially constrained)

Federal regulations also require that the Transportation Plan and the recommendations contained within the Plan address seven planning factors. These factors are listed below and specifically addressed in Appendix A. The Transportation Plan should:

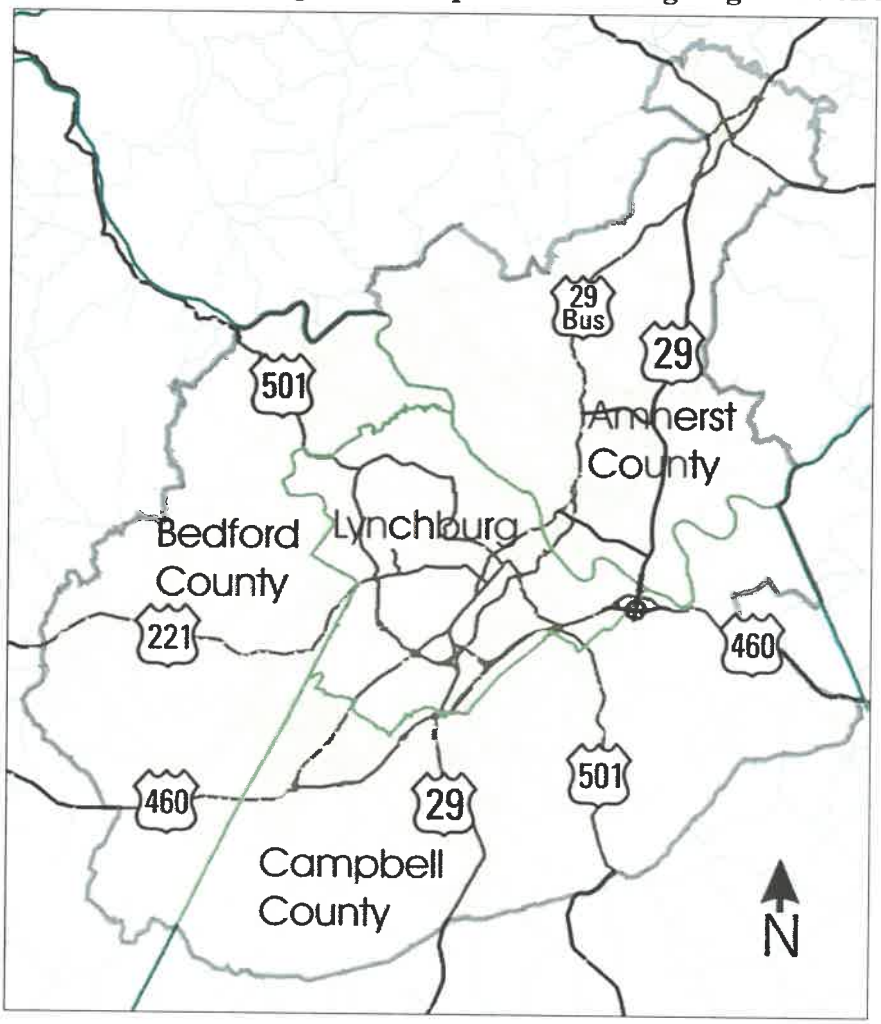
- Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency;
- Increase the safety and security of the transportation system for motorized and non-motorized users;
- Increase the accessibility and mobility options available to people and for freight;
- Protect and enhance the environment, promote energy conservation, and improve quality of life;

- Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight; Promote efficient system management and operation; and
- Emphasize the preservation of the existing transportation system.

1.3 Metropolitan Area Boundary

The area covered in the Plan is that portion of Central Virginia covered by the Central Virginia Metropolitan Planning Organization (MPO). A metropolitan area is defined as a "core area containing a substantial population nucleus, together with adjacent communities having a high degree of economic and social integration with that core" (http://www.census.gov/population/www/estimates/aboutmetro.html). The Central Virginia MPO includes the City of Lynchburg, along with the adjacent urbanized portions of Amherst, Bedford, and Campbell counties. These urbanized areas are defined by the U.S. Census based on total population; encompassing at least one population center with at least 50,000 persons, and encompass contiguous areas that meet population density thresholds. The Central Virginia/Lynchburg metropolitan area is shown below.

Exhibit 1
Study Area (Central Virginia Metropolitan Planning Organization Region)



Chapter 2 – Regional Transportation System and Identified Needs

The 2030 Transportation Plan addresses all modes of travel within the Lynchburg region's urbanized area. For roadways, the focus of the Transportation Plan is Lynchburg's thoroughfare network. This thoroughfare network consists of primary routes and major secondary routes, as well as other principal streets in the study area. U.S. primary routes through the study area include: Route 29 and Business Route 29; Route 221; Route 460 and Business Route 460; and Route 501 and Business Route 501. Virginia Primary Route 130 also passes through the study area. The thoroughfare system also includes numerous Virginia secondary routes as well as principal arterial roads within the City of Lynchburg.

Travel into and through the Lynchburg region can also be made by local transit, rail, and air; as well as on a network of sidewalks and paths for walking and/or bicycling. Goods movement takes place by truck, rail, and air.

- The Greater Lynchburg Transit Company (GLTC) provides local transit within Lynchburg and Madison Heights. GLTC also operates a van service for the disabled.
- Greyhound Lines provides inter-city transit throughout Central Virginia with connections throughout the United States. Eleven Greyhound buses per day currently serve Lynchburg.
- Passenger rail service in the region is provided by AMTRAK. The Southern Crescent stops at the Kemper Street Station in downtown Lynchburg twice daily en route to New York and New Orleans.
- Regional air service is provided at the Lynchburg Regional Airport, located in Campbell County, just south of the Lynchburg city limits. Delta Connection and US Airways Express operate out of the airport. These commercial airline services provide connecting flights to national hubs at Atlanta and Charlotte.
- Charter flight service is provided at Falwell Airport, located east of the interchange of Routes 460 and 501 in Campbell County. This airport serves Virginia Aviation, which provides landing and fuel services at the airport.
- Pedestrian and bicycle travel is facilitated by sidewalks that are located within the Lynchburg downtown, Madison Heights, and other commercial and neighborhood areas. Recreational travel is provided on trails that are part of the James River Heritage Trail system.
- Two rail lines, Norfolk Southern and CSX, use Lynchburg as a freight interchange and junction point. The rail lines pass through downtown Lynchburg and follow through northern and northeastern Lynchburg into Amherst and Appomattox Counties.

2.1 Existing Roadway System

The backbone of the regional roadway system is the functionally classified thoroughfare system. This thoroughfare system is designated by the Virginia Department of Transportation, the Federal Highway Administration, and local governments. This system

includes roads that are functionally classified as primaries, arterials, and collectors. US primary roads in the Central Virginia metropolitan area include: Routes 29, 29 Business, 501, and 460. In addition, urban roadways in the City of Lynchburg designated as collector or above were included as part of the analysis network for the Transportation Plan.

2.1.1 Roadway Operations

Roadway operations were analyzed at key locations in the network that were identified in cooperation with officials at the City of Lynchburg, Campbell County, Amherst County, Bedford County and the Virginia Department of Transportation (VDOT). To support this analysis, traffic counts were performed between August and October of 2004 at 10 roadway junctions (either intersections or interchanges), as well as on 10 roadway segments. Intersections and interchanges were counted on weekdays (excluding Mondays and Fridays) for a total of four hours (two hours in the morning between 7:00 and 9:00, and two hours in the afternoon between 4:00 and 6:00 p.m.). Roadway segments were counted for either 48 consecutive hours or for a full week. The full-week counts were performed at those locations where it was desirable to quantify weekend retail traffic. The locations for the intersection and segment counts are listed below. Exhibit 2 shows the summary of machine counts that were performed in the City of Lynchburg. The count data is included in Appendix E.

Locations for intersection counts:

1. Route 29 at Route 60 interchange (both ramp termini) – Amherst County/Town
2. Route 221 at Enterprise Drive – Bedford County
3. Waterlick Road at Thomas Jefferson Road – Bedford County
4. Route 29 at Calohan Road – Campbell County
5. Route 29 at Route 683 (Lawyers Road) – Campbell County
6. Timberlake Road at Waterlick Road – Campbell County
7. Timberlake Road at Laxton Road – Lynchburg/Campbell County
8. Route 221 at Route 501 (Expressway) – Lynchburg
9. Wards Road (Route 163) at Candlers Mountain Road (Route 128) – Lynchburg
10. Wards Road at Harvard Street (including entrance to Liberty University) – Lynchburg

Locations for segment counts:

1. Route 130 (Amelon Road) west of Route 29 Business – Amherst County
2. Route 60 west of Route 29 – Town of Amherst
3. Coffee Road west of Lynchburg Corporate Limits – Bedford County
4. Route 221 south of Cotton Town Road – Bedford County
5. Route 29 south of Airport Road – Campbell County
6. Route 501 North of Rustburg – Campbell County
7. Wise Carver Road south of Route 24 -- Campbell County
8. Wards Ferry Road north of Harvard Street – Lynchburg
9. Langhorne Road east of Tate Springs Road – Lynchburg
10. Wards Road in the vicinity of Atlanta Avenue – Lynchburg

Exhibit 2

Summary of Machine Counts (Performed September 2004)

Location	Daily Traffic				AM Peak		Mid-Day Peak		PM Peak	
	Volume	% Cars	% Single-Unit Truck	% Multi-Unit Truck	Vol-ume	Peak Hour Start Time	Vol-ume	Peak Hour Start Time	Vol-ume	Peak Hour Start Time
Route 130 (Elon Road) at Route 706 (Crennel Drive)	5,240	85%	6%	9%	339	7:30	316	14:00	462	17:30
Route 60 between Washington Street (1102) and Route 29	10,238	91%	6%	3%	899	7:45	640	12:45	885	17:00
Route 644 (Coffee Road) east of Route 621 (Cottontown Road)	609	93%	6%	0%	87	8:00	32	13:00	69	17:45
Route 221 between Graves Mill Road and Cottontown Road	21,534	88%	4%	8%	1584	8:15	1498	12:30	1620	16:45
Route 29 at railroad bridge south of Lynchburg Airport	26,735	82%	6%	13%	1671	7:45	1593	14:00	1948	17:15
Route 501 North of Rustburg	9,260	93%	4%	4%	848	7:45	502	14:00	842	17:30
Route 685 South of Route 24	3,736	84%	8%	8%	300	8:00	181	13:30	336	17:30
Wards Ferry Road north of Harvard Street	11,581	100%	0%	0%	582	8:15	857	12:45	1045	17:30
Langhorne Road east of Tate Springs Road	15,321	92%	4%	4%	1137	8:30	1176	14:00	1226	15:00
Wards Road (Route 163) south of Atlanta Avenue	25,334	84%	4%	11%	1350	8:15	1672	13:30	1764	17:15

Traffic operations are quantified for roadway segments, intersections and interchanges using level of service methodologies from the *Highway Capacity Manual* (HCM). The HCM provides standards used throughout the traffic engineering profession that allow for "grading" the operations of roads using a scale from A to F, with A representing excellent traffic flow with minimal delays and F representing failure in traffic operations and very high levels of delay. For most areas in Virginia, VDOT rates levels of service A, B, or C as acceptable and levels of service D, E, or F represent deficient operations. Exhibit 3 shows the level of service for each intersection that was counted.

Exhibit 3

Summary of Intersection Level of Service (Existing Conditions-2004)

Intersection Description	AM Peak Hour	PM Peak Hour
Route 29 at Route 60	B	B
Route 221 at Enterprise Drive	D	D
Waterlick Road at Thomas Jefferson Road	C	B
Route 29 at Calohan Road	B	B
Route 29 at Route 683 (Lawyers Road)	C	D
Timberlake Road at Waterlick Road	D	D
Timberlake Road at Laxton Road	C	D
Route 221 at Route 501	D	D
Wards Road at Candlers Mountain Road	D	D
Wards Road at Harvard Street	B	B

2.1.2 Roadway Safety

Data on motor vehicle crashes was collected for this study from the Lynchburg Police Department for all crashes within the city limits and from the Virginia Department of Transportation for crashes in Campbell County, Amherst County, and Bedford County. The analysis was performed for a three-year period from 2001 to 2003. Because this transportation plan covers such a wide geographic area, it was only possible to analyze and summarize this data at a broad level. For the urbanized portions of the Central Virginia metropolitan area, crashes were tabulated by major corridor as defined by route number. The corridors were identified by tabulating the crash data sets for each jurisdiction, and then identifying those corridors that experienced the highest number of crashes.

Exhibit 4 shows a tabulation of motor vehicle crashes by jurisdiction and by major roadway corridor. The data shown represents all crashes along the entire length of the listed route within the noted jurisdiction.

Exhibit 4

Tabulation of Crash Data by Jurisdiction and Major Corridor

Corridor Route Number	Total Crashes (2001 to 2003)	Tabulation By Year			Tabulation by Type of Crash					
		2001	2002	2003	Rear End	Angle	Head On	Side Swipe	Fixed Object	Other
City of Lynchburg										
128	25	7	5	13	6	6	1	4	7	1
221	282	100	88	94	94	113	8	23	26	18
29 Business	441	128	199	114	234	25	2	61	103	16
163 (previously Route 29 Business)	854	286	235	333	391	318	5	81	44	15
460	111	37	31	43	30	10	1	10	42	18

Exhibit 4

Tabulation of Crash Data by Jurisdiction and Major Corridor

Corridor Route Number	Total Crashes (2001 to 2003)	Tabulation By Year			Tabulation by Type of Crash					
		2001	2002	2003	Rear End	Angle	Head On	Side Swipe	Fixed Object	Other
460 Bus	227	61	69	97	121	65	1	13	16	11
501	970	344	338	288	399	271	10	89	119	82
501 Bus	151	22	26	103	48	48	1	20	22	12
Amherst County										
29 Business	770	251	246	273	313	178	6	64	120	89
163 (previously Route 29 Business)	120	29	42	49	28	31	1	21	20	19
60	150	52	38	60	16	20	1	6	60	47
130	150	50	42	58	25	11	2	12	38	62
151	33	17	7	9	3	4	1	3	11	11
604	24	7	9	8	3	4	0	1	12	4
610	20	7	5	8	0	0	2	0	12	6
622	61	20	19	22	13	11	0	3	20	14
663	25	8	7	10	2	3	1	3	13	3
669	28	13	7	8	7	5	2	2	7	5
677	25	8	8	9	1	7	0	2	10	5
681	24	5	9	10	7	3	0	0	7	7
Bedford County										
24	336	97	135	104	63	52	6	12	99	104
43	80	27	21	32	2	18	1	2	21	36
122	273	78	106	89	64	41	1	10	55	102
221	393	135	137	121	152	113	2	18	34	74
460	440	153	154	133	63	69	1	22	132	153
460 Business	5	2	2	1	3	1	0	0	1	0
501	73	31	20	22	4	13	3	6	23	24
608	54	18	14	22	1	9	2	1	26	15
619	66	24	20	22	6	8	0	5	35	12
622	39	12	15	12	11	6	0	1	12	9
626	57	14	25	18	2	8	1	1	31	14
634	48	12	16	20	9	2	3	2	20	12
635	29	9	7	13	2	2	2	1	20	2
643	22	6	8	8	2	0	0	1	10	9
644	35	10	11	14	3	1	1	3	20	7
654	25	4	12	9	3	3	1	1	10	7
655	40	13	17	10	5	8	0	1	20	6
661	25	11	6	8	10	5	0	1	4	5
663	35	11	12	12	7	11	0	1	5	11

Exhibit 4

Tabulation of Crash Data by Jurisdiction and Major Corridor

Corridor Route Number	Total Crashes (2001 to 2003)	Tabulation By Year			Tabulation by Type of Crash					
		2001	2002	2003	Rear End	Angle	Head On	Side Swipe	Fixed Object	Other
691	22	9	7	6	0	2	0	3	12	5
746	31	8	7	16	0	3	0	0	16	12
747	36	13	9	14	2	9	0	0	14	11
755	30	8	11	11	1	0	2	4	17	6
757	67	27	19	21	11	9	1	6	28	12
801	26	11	7	8	4	3	0	1	13	5
811	68	26	25	17	12	10	1	2	23	20
1425	36	13	8	15	20	10	1	1	2	2
Campbell County										
24	139	51	44	44	25	27	3	12	37	35
29	305	109	88	108	90	62	2	34	76	41
43	34	8	13	13	3	8	0	1	14	8
460	247	89	70	88	51	55	0	20	68	53
460 Business	261	79	86	96	117	94	2	23	15	10
501	197	73	68	56	47	42	4	11	46	47
615	52	21	16	15	4	7	1	6	23	11
622	159	67	40	52	62	46	3	10	33	5
646	30	8	7	15	0	4	1	0	17	8
670	31	7	9	15	2	3	0	2	20	4
680	34	6	13	15	4	4	1	1	20	4
682	105	41	27	37	22	18	2	6	38	19
683	43	18	20	5	0	7	0	3	23	10
685	36	14	9	13	9	2	0	3	17	5
696	32	10	15	7	0	4	0	2	21	5
699	28	9	10	9	1	4	0	4	9	10
738	35	9	6	20	5	7	1	0	16	6

A ranking of major corridors by crash rates is shown in Exhibit 5. Crash rates show the number of crashes per million vehicle-miles (one vehicle-mile is a single vehicle traveling one mile; vehicle-miles are calculated by multiplying the length of the corridor by the traffic volume on the corridor). Comparisons of crash rates across multiple corridors allow for the length of the corridor and the amount of traffic on the corridor to be taken into consideration. It is important to note, however, that the specifics of the corridor also need to be considered when comparing crash rates across corridors. For example, the second-highest ranked corridor in the region is Route 1425 in Bedford County. The high crash rate on this corridor is due to the fact that it is a relatively short corridor carrying relatively low traffic volumes but a significant proportion of the crashes occur at the intersection of Route 1425 (Graves Mill Road) with Route 221 (Forest Road).

Exhibit 5

Ranking of Regional Corridors by Motor Vehicle Crash Experience

Jurisdiction	Corridor Route Number	Length of Corridor	Annual Vehicle-Miles	Total Crashes (3 Years)	Crashes per Million Vehicle-Miles	Rank in Region
Lynchburg	163	5	85700	854	9.1	1
Bedford	1425	1.1	5200	36	6.29	2
Campbell	680	6.22	5800	34	5.31	3
*Bedford	644	19.87	7100	35	4.53	4
Campbell	622	11.15	37500	159	3.87	5
*Campbell	696	17	8300	32	3.51	6
Lynchburg	221	5.21	73500	282	3.5	7
*Amherst	610	28.98	5500	20	3.31	8
Campbell	670	4.82	8800	31	3.22	9
Amherst	681	1.75	7000	24	3.14	10
Campbell	738	4.68	10800	35	2.97	11
Amherst	60	14.46	48900	150	2.8	12
*Bedford	643	21.24	7200	22	2.8	13
Lynchburg	501	13.84	317400	970	2.79	14
*Amherst	622	20.05	20500	61	2.72	15
Amherst	663	13.02	8500	25	2.67	16
Campbell	683	8.96	14700	43	2.66	17
Amherst	669	4.51	9700	28	2.63	18
Bedford	622	7.12	14500	39	2.46	19
*Campbell	682	20.38	39200	105	2.44	20
*Bedford	626	20.27	21400	58	2.43	21
Bedford	661	2.13	10600	25	2.36	22
Campbell	646	17.08	12900	30	2.13	23
*Campbell	685	3.5	15600	36	2.11	24
*Amherst	151	6.34	15200	33	1.98	25
Amherst	677	3.9	11600	25	1.97	26
Bedford	501	14.29	34100	73	1.95	27
*Amherst	130	23.43	70500	150	1.94	28
Bedford	663	4.4	16500	35	1.94	29
Campbell	24	23.63	66500	139	1.91	30
Bedford	811	7.99	37300	68	1.67	31
Campbell	615	18.27	30200	52	1.57	32
Amherst	29 Business	21.67	460800	770	1.53	33
Lynchburg	29 Business	6.15	265600	441	1.52	34
Amherst	604	9.39	14800	24	1.48	35
Lynchburg	460 Bus	7.98	165300	227	1.25	36
Lynchburg	501 Bus	9.41	126800	151	1.09	37
Campbell	501	28.26	186800	197	0.96	38
Bedford	460	30.67	486700	440	0.83	39
Bedford	221	35.23	453700	393	0.79	40
Campbell	460	13.95	303400	247	0.74	41

Exhibit 5

Ranking of Regional Corridors by Motor Vehicle Crash Experience

Jurisdiction	Corridor Route Number	Length of Corridor	Annual Vehicle-Miles	Total Crashes (3 Years)	Crashes per Million Vehicle-Miles	Rank in Region
Campbell	29	20.32	382000	305	0.73	42
Lynchburg	128	3.47	33500	25	0.68	43
Lynchburg	460	6.51	162300	111	0.62	44

* -- Indicates that portions of this corridor occur outside of the metropolitan area.

2.2 Public Transit

The Greater Lynchburg Transit Company (GLTC) operates 15 weekday bus routes located primarily within the City of Lynchburg and portions of Madison Heights (a current GLTC route map is shown in Exhibit 6). Current service hours for these routes are Monday through Friday, from 6:00 a.m. to 9:30 p.m. GLTC also operates 13 routes on Saturdays, running from 6:00 a.m. to 9:30 p.m. On Sundays, GLTC operates 9 routes from 10:00 a.m. to 5:30 p.m. The main transfer point for the GLTC fleet is The Plaza shopping center on Memorial Avenue. The majority of routes operate entirely within the City of Lynchburg. GLTC routes make use of short portions of Forest Road (Route 221), Graves Mill Road (Route 1425), and Enterprise Drive (Route 1415) in Bedford County; as well as Laxton Road and incidental sections of Enterprise Drive and Timberlake Road in Campbell County. Two bus routes (5G and 5H) operate primarily in the Madison Heights area of Amherst County with connections to downtown Lynchburg.

GLTC also operates paratransit service to serve patrons with disabilities that prevent them from utilizing the regular fixed route bus service. The paratransit service operates four mini-buses and provides "curb to curb" service, whereby the transit driver provides assistance to patrons in boarding and disembarking the vehicle.

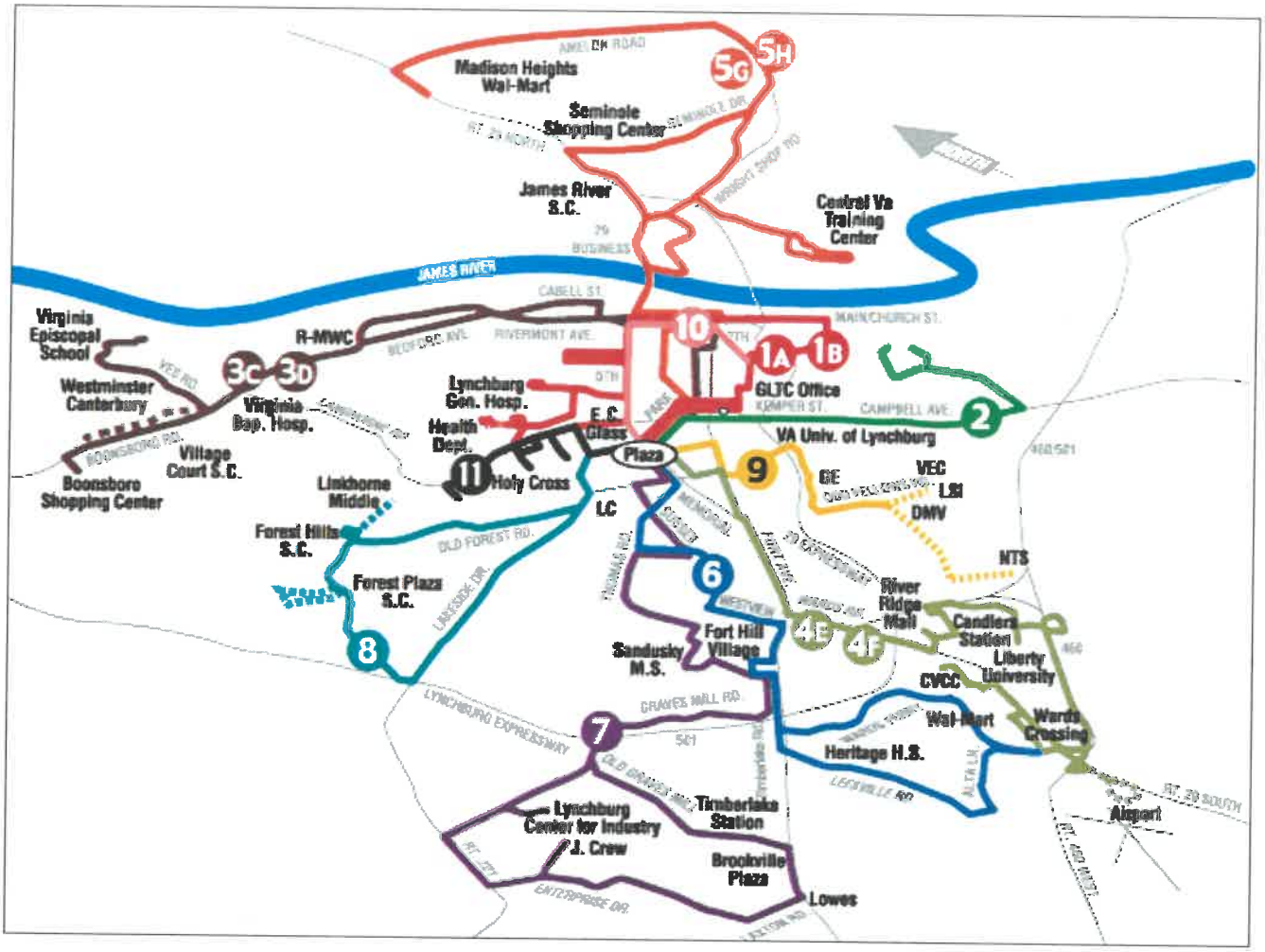
In Fiscal Year 2004, GLTC's active fleet of 25 buses and 4 mini-buses had 1.07 million operating miles and served 1.13 million passengers (988,227 revenue passengers).

2.3 Air Travel

The Lynchburg Regional Airport is located at the intersection of US 29 and US 460 just south of the City of Lynchburg corporate limits in Campbell County. This airport, operated by the City of Lynchburg, has two runways (5800' and 3390'). As of the end of 2004, the airport had nine daily departures provided by two airlines: US Airways Express and Delta Connection/Atlantic Southeast Airlines. US Airways Express provides six daily round-trip flights to Charlotte Douglas International Airport, while Delta Connection provides three daily round-trip flights to Atlanta's Hartsfield-Jackson International Airport. Both airlines combined provide a daily total seat capacity of 355 departure seats. The airport served 120,174 passengers in 2004, a 25 percent increase over 2003.

Exhibit 6

Greater Lynchburg Transit Company Bus Route Map



Source: Greater Lynchburg Transit Company Web Site: www.GLTConline.com; March 2005

There are also two private airports within the MPO area: Falwell Airport which is located in the northeast quadrant of the interchange of US Routes 460 and 501 within the City of Lynchburg, and the New London Airport in Bedford County is located off Route 709 in the southwest portion of the MPO area.

2.4 Rail Service

Passenger rail transit service in Lynchburg is provided at the Kemper Street Station by Amtrak. Amtrak's Crescent Line stops in Lynchburg daily, going northbound from New Orleans to New York via Washington DC at 5:51 a.m. and stops going southbound from New York to New Orleans at 10:50 p.m. Annual Amtrak ridership at the Kemper Street

Station was 12,703 in fiscal year 2004. This represented a 12.7 percent increase in ridership over 2003.

Lynchburg is also a major freight interchange and junction point for two rail lines. CSX operates between Newport News, Louuisville, Cincinnati, Columbus and Chicago, while Norfolk Southern operates between Norfolk and Omaha, St. Louis, Detroit, Buffalo, Washington ad Atlanta.

2.5 Intercity Bus Service

Intercity bus services are provided by Greyhound. In August 2005, there were major cutbacks in Greyhound service. There are 10 arrivals and departures at Kemper Street Station in Lynchburg, with service hours from 8:00 a.m. to 11:00 a.m., 1:00 p.m. to 3:00 p.m., and 5:00 p.m. to 11:00 p.m. Intercity bus service to the region was recently cut dramatically, resulting in increased travel times to many locations, particularly to Farmville and Danville and other points south. Service that was provided to the City of Bedford (located west of the MPO boundaries in Bedford County) was eliminated entirely.

2.6 Taxi Service

There are currently 11 taxi companies in the Central Virginia metropolitan area. The majority are located within the City of Lynchburg.

2.7 Bicycle and Pedestrian Facilities

The primary pedestrian and bicycle trail in the study area is the set of trails that are collectively referred to as the James River Heritage Trail. This facility consists of the Blackwater Creek Bikeway, the Point of Honor Trail, RiverWalk, and the Ivy Creek Greenway. The Blackwater Creek Bikeway is a 12-mile facility extending from Langhorne Road to the Downtown waterfront. The Point of Honor Trail extends 1.7 miles from milepost 2 of the Blackwater Creek Bikeway to the Downtown waterfront. A recently complete bridge connects the Point of Honor Trail to the Blackwater Creek Bikeway at its eastern end, allowing for a 3-mile loop to be made on both facilities. RiverWalk starts in the Downtown near the terminus of the Blackwater Creek Bikeway and extends for 3.5 miles along the waterfront and crosses the James River to Percivals Island and then into Amherst County. There are currently plans to extend this trail further into Amherst County. The Ivy Creek Greenway is a 1.75-mile trail in Peaks View Park.

In 2003, the region developed an extensive Greenways and Blueways Plan that proposes an extensive system of interconnected bicycle and pedestrian facilities. The Greenways and Blueways Plan will be incorporated into the region's 2030 Long-Range Transportation Plan.

2.8 Stakeholder-Identified Transportation Needs

Input on transportation concerns and needed transportation improvements was gained through a series of stakeholder forums that were held with various interest groups in the region as well as with the general public. Six workshops were held in May 2004 with an additional workshop in September 2004. Stakeholders representing a broad range of interests were identified by staff from the City of Lynchburg, Campbell County, Amherst County, and Bedford County. The groups represented included:

- Local business and industry
- Government agencies
- Community associations
- Historic preservation
- Environmental protection
- Bicycling and walking advocacy groups
- Minority groups

The workshops covered all modes of travel and other topics related to transportation such as land use. Participants were encouraged to discuss the condition of the transportation system, what they perceived to be its strengths and weaknesses, as well as any opportunities and/or trends that they believed the transportation planning process should capitalize on or be aware of. Detailed descriptions of the workshops are included in Appendix B, while a summary of the discussions is included below. Generalized topic areas are indicated in bold type.

Most workshop participants believed that roadway **conditions and maintenance** are more of a concern in the region on secondary roads rather than major thoroughfares. Many of the maintenance concerns relate to the lack of funding. The entrance ramps on the Route 29 (Business) Expressway were noted as a problem, specifically the short or non-existent merge areas. Also, many of the median crossovers in the region are difficult to see and have insufficient deceleration lanes. A need for better design of median crossovers was noted as a concern. Participants expressed concern about funding levels for roadway maintenance keeping up with needs, and noted that maintenance issues in the region have been more acute over the past few years. In terms of geographic areas, Route 29 Business in Madison Heights was noted as a particular problem location. The aesthetics and upkeep of this roadway's median was cited as a problem. For the system as a whole, the lack of a direct connection to the interstate system was also cited as a problem. Overall, however, most agreed that the condition of roadways in the region is generally good.

Workshop participants believed that **traffic congestion** in the region as a whole is not a major concern; however there are localized areas where congestion is a concern. Areas cited included: Route 29 Business in Madison Heights, Wards Road, Route 221 Forest, Route 221 at Route 501, Route 29 South of the airport, and Lakeside Drive in the City of Lynchburg. Many participants believed that congestion could be mitigated in many areas with better traffic signal coordination and operations. Areas that were noted as having off-peak congestion issues were generally similar to those that were mentioned as having

rush-hour traffic jams. Areas cited as having off-peak and/or weekend congestion issues were generally the retail centers of the region, including Candlers Mountain Road, Wards Road, and Wards Ferry Road. Traffic congestion on Langhorne Road was also noted as a concern: one that affects access to Lynchburg General Hospital.

Traffic signals and signs were cited as a problem on Lakeside Drive, particularly in the evening rush hour. It was noted that there is an overall need in the region for advance signs at traffic signals ("Signal Ahead"). Overall directional signage in the region was cited as an area of concern. Many believed that signal operations in many corridors (with particular concerns on Route 29 Business in Madison Heights) provide too much priority to side streets at the expense of the much higher traffic volumes on the main street. Most participants believe that the region's road system is particularly confusing, noting that it is quite difficult to provide directions to non-residents. Issues that create this confusion include streets that change names, routes with multiple and overlapping numbers, and signs with confusing multiple route designations. Participants noted a need to update the current signage system because the current system is based on old travel patterns. Inconsistent placement of signs was noted as a problem, and the application of standards on the design and placement of signs was suggested as a solution.

Commercial trucks, and truck and traffic noise were cited as a concern on the following roads: Route 29 Business in Madison Heights, Route 501 through the region from Rustburg north to Big Island (including Route 501 Boonsboro Road). A need for enforcement of sound ordinances was noted as it relates to the use of engine compression brakes ("jake" brakes), vehicles with loud mufflers, and car stereo systems. Participants believed that the region's confusing roadway system and signage results in many lost trucks, and suggested the need for a truck route system.

Tourist traffic was not cited as a major regional issue, but several concerns were noted. These include signage and congestion related to special events (such as Liberty University events). The overall lack of good signage to the region's educational institutions and major activity centers (such as Lynchburg General Hospital, City Stadium) was cited as a concern.

Workshop participants had conflicting viewpoints on **parking**, particularly in Downtown Lynchburg. Some participants believed that there was not enough parking while others believed that it was sufficient. Most agreed that, due to the topography of the Downtown, sufficient parking is needed for each of the various street levels of the Downtown. Parking access for patrons to the Courthouse was cited as a problem, particularly for those in wheelchairs or with other physical handicaps. Problems cited include the distance between parking and the Courthouse, the condition of sidewalks between parking areas and the Courthouse, and the lack of traffic lights with a pedestrian signal for those walking across the street to the Courthouse. Topographic issues make such concerns prevalent throughout the Downtown.

The overall lack of **sidewalks** in region was noted as a particular concern. Sidewalks in industrial parks were cited as a need so that workers could take walks during lunch

breaks. The lack of connectivity and continuity in the region's sidewalks and hiking/biking trails was also cited as a major area that needs to be addressed. Participants noted the need for improved landscaping for both roadside areas and for sidewalks, as well as visible, identifiable, and attractive signage to bike and pedestrian trails. Narrow roads and the lack of a grid system that provides parallel routes were cited as major deterrents to **bicycle travel**. Increased overall emphases on safe bicycle travel; including the addition of warning signs about bicycles was suggested.

Participant opinions with respect to local **bus transit service** ranged from those who believed that the existing system is adequate but in need of attention to ensure that it remains viable to those who believe that the system needs to expand into surrounding jurisdictions to serve major activity centers outside of the City of Lynchburg. The financial threats to the system were cited by most participants as a major concern with lack of funding perhaps leading to reduced service. Maintaining at least the existing level of transit service was cited as a need by almost all participants. Many believed that there was a need for additional flexibility in transit services with perhaps smaller buses and more demand-responsive service. Moving the transit hub from the Plaza or re-designing the existing hub and reinvigorating the area were suggested as needs. Major safety concerns at the current bus hub at the Plaza were noted with the way that buses line up, creating safety issues for pedestrians who cross the street by walking between the buses and therefore have difficulty seeing traffic. There are also both real and perceived crime issues at this location. Finally, many also believed that a regional bus service covering all of the jurisdictions in the Central Virginia metropolitan area would be beneficial and desirable.

While they share the same terminal facility in Lynchburg, participants had different views on the importance of **intercity bus** (Greyhound) and **intercity rail** (Amtrak) service. Rail service was seen as a factor in the economy of the region, while bus service was not. Bus service concerns related to the limited number of hours that the bus counter was staffed, on-time arrivals and departures, and the circuitous routes that buses took in getting to all but the very close (i.e., Charlottesville and Roanoke) destinations. Intercity rail service was seen as a more viable alternative for most people to driving for intercity travel. Participants indicated that there should be a focus on synergy between modes; using bus service as feeder to rail intercity, and rail service as feeder to air service. The passenger rail subsidy that North Carolina provides in order to obtain additional service was cited as an example of a program that Virginia should seek to emulate. The service hours (5:50 a.m. northbound departure and 10:50 p.m. southbound arrival) were seen as a hindrance to additional ridership. As with the intercity bus service, the limited number of office hours at the Amtrak ticket window was noted as a problem. For both types of transportation, the improvements at the Kemper Street station were seen as a major step forward. There are continuing concerns about security at this location, however. This is particularly true since train service is late at night and early in the morning.

Concerns related to **freight rail service** include the intermodal facilities (the closest facility is in Greensboro), and lack of responsiveness and competitiveness from railroads

for freight service. The trend towards taking up railroad track and thereby removing rail system capacity was cited as a major concern with respect to future use of railroads.

Air travel concerns include cost, level of service (number of flights), and flexibility. The availability of air travel was noted by workshop participants as a key economic development issue for the region. A specific concern about the existing air service is the limited amount of service and the high fares. Workshop participants noted that jet service at the airport is definitely a positive development. Many participants supported jointly developing a regional airport with Roanoke in the long term.

Other concerns cited by workshop participants include the need for a shift in focus towards moving people without necessarily building more roads. This included major emphases on bicycle and pedestrian travel, increased travel efficiency through operations and signage, improved safety, and an emphasis on quality of life and the natural environment. Intra-regional access was cited as a major concern. Participants indicated that difficulties in getting to and from major regional activity centers (hospitals, schools, the Downtown, etc.) need to be addressed through improved roadway connections, re-considering turn prohibitions, and better signage.

2.9 Future Transportation Demands and Needs

The 225,000 acres that are encompassed by the MPO is projected to experience an increase in population from 135,000 in 2000 to 161,000 in 2030, an increase of 19.3 percent or 26,000 persons. Employment over the same period is expected to increase from 79,000 jobs to 97,000 jobs, an increase of just under 23 percent. These increases in population and employment are 19 and 23 percent, respectively. Based on the regional transportation model, the total number of daily trips made in the MPO region is expected to increase by approximately 25 percent between 2000 and 2030. The regional transportation model provides an assessment of deficient roadways at a generalized level based on the ratio of volume to capacity (vc ratio). A vc ratio of less than 0.8 is rated as under capacity, a vc ratio between 0.8 and 1.1 is rated as near capacity, while a vc ratio greater than 1.1 is rated as over capacity. The capacities are those that are coded in the transportation model and are based on standard modeling procedures (the model development is described in Appendix C). It is important to note that, while the vc methodology provides a very useful planning-level assessment of potential deficiencies in the roadway network, it does not account for specifics that are used in more detailed analyses such as traffic peaking characteristics and corridor specifics such as lane widths, turn lanes, traffic signal densities, and more. The methodology also does not specifically account for capacity deficiencies at intersections. Exhibits 7 and 8 show the roadway network in 2000 and 2030, respectively, and indicate which roadways are anticipated to be operating at over-capacity conditions at a planning level.

As Exhibit 8 illustrates, a number of key regional roadways are anticipated to be operationally deficient by the year 2030. These include Routes 811 (Thomas Jefferson Road), 643 (Bellevue Road), and 221 in Bedford County; Routes 622 (Waterlick Road)

Exhibit 7

Planning-Level Volume to Capacity Ratios – Year 2000

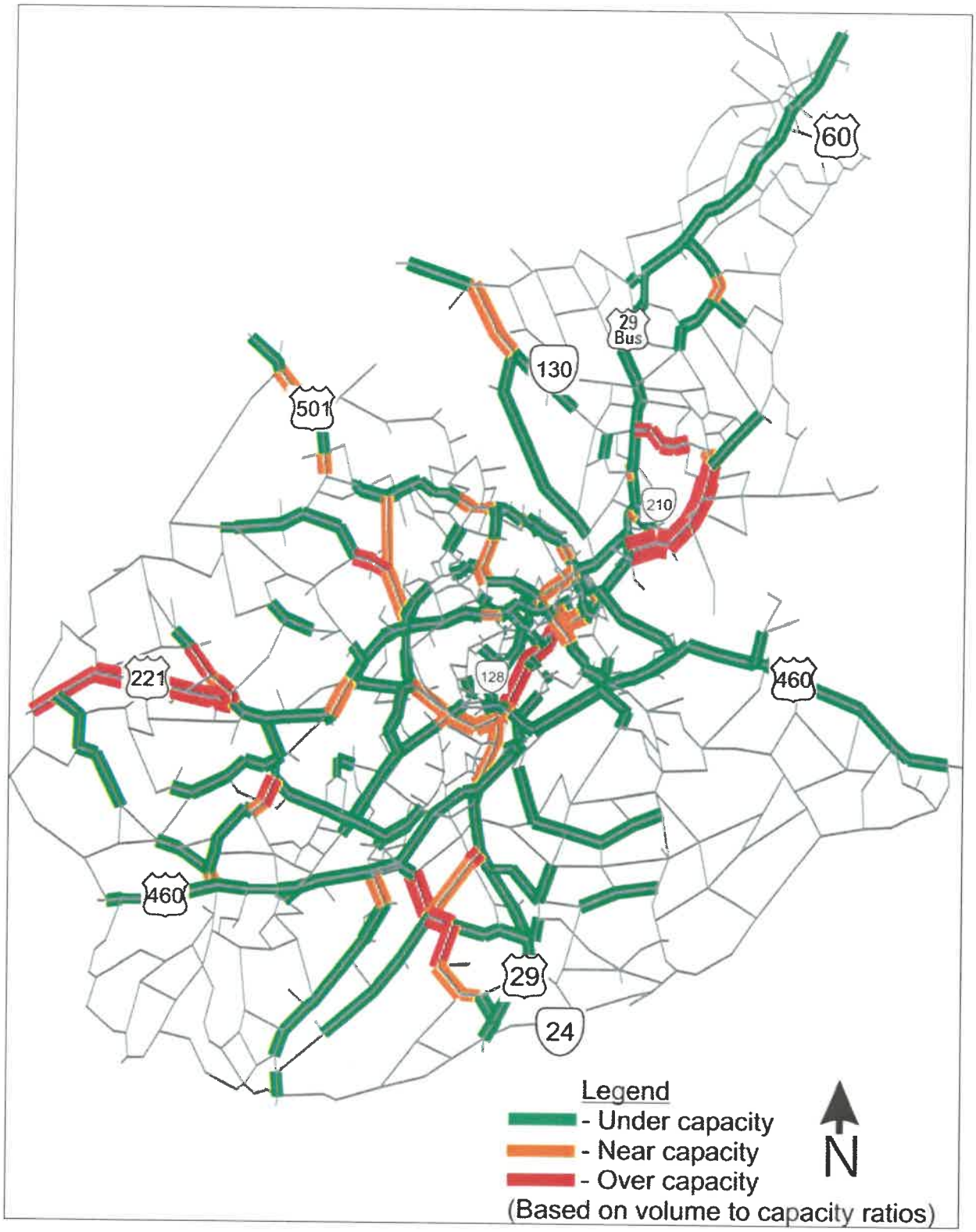
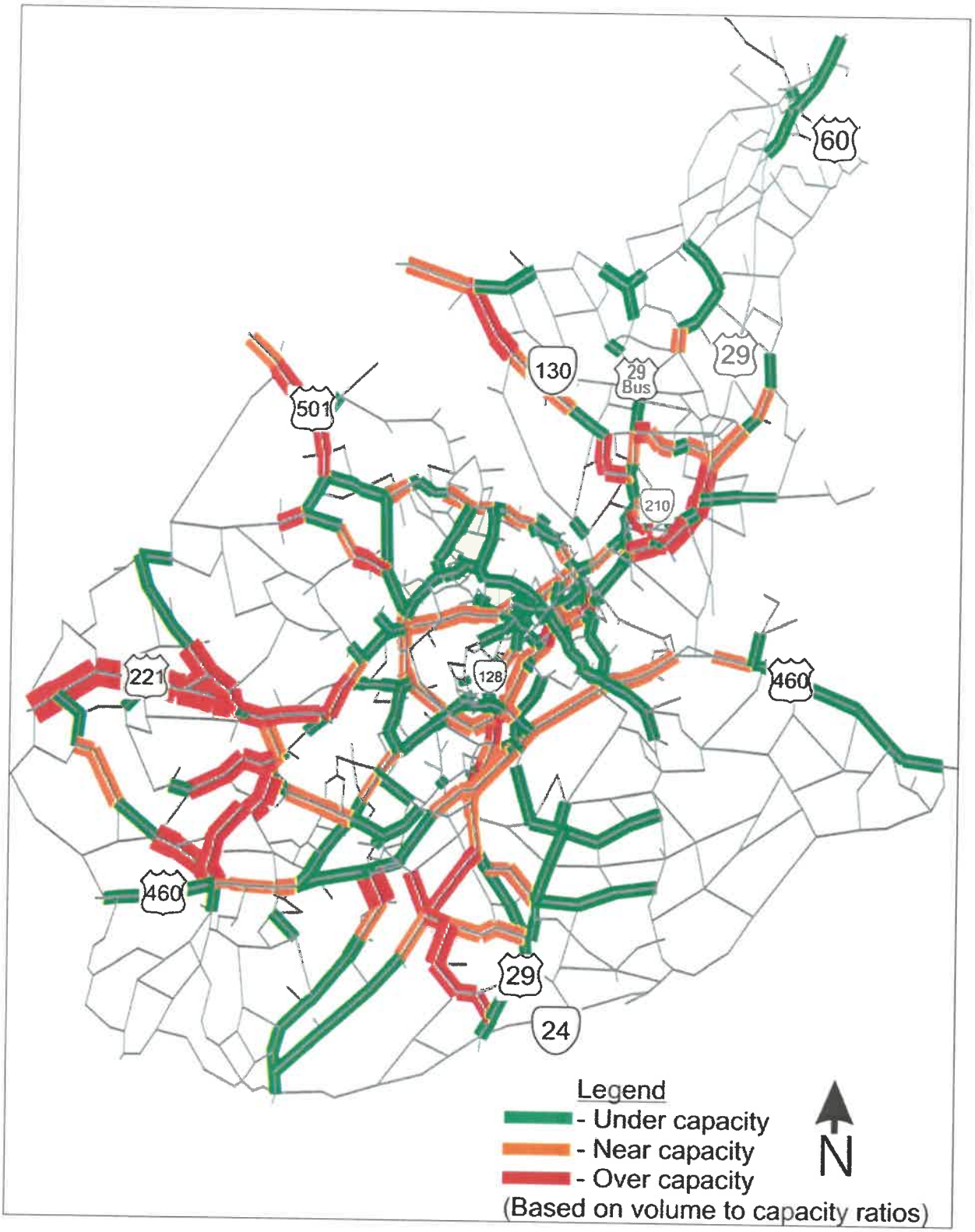


Exhibit 8

Planning-Level Volume to Capacity Ratios – Year 2030



682 (Leesville Road), 683 (Lawyers Road), and Routes 29 and 460 in Campbell County; and Routes 130 (Elon Road) and 677 (Airport Road) in Amherst County. Potential roadway segment deficiencies within the City of Lynchburg include Candlers Mountain Road, Wiggington Road, and portions of the Route 29 Expressway.

Exhibit 9 shows the level of service in 2030 at the key intersections that were also analyzed in the base year. As this table indicates, all of the intersections that were studied would require improvements to operate at adequate levels of service (level of service D or better).

The identification of future transportation needs in the region for other modes of travel relies less on capacity analyses and is based more on local desires and goals as determined from the stakeholder workshops that were held as part of the development of the Plan. These were described earlier in this chapter. Local transportation goals are described in the next chapter.

Exhibit 9
Anticipated Intersection Levels of Service in 2030
(As Compared to Year 2004)

Intersection Location	Peak Hour Level of Service			
	2004		2030	
	AM Peak	PM Peak	AM Peak	PM Peak
1. Route 221 at Enterprise Drive – Bedford County	D	D	D	D
2. Waterlick Road at Thomas Jefferson Road – Bedford County	C	B	F	D
3. Route 29 at Calohan Road – Campbell County	B	B	E	C
4. Route 29 at Route 683 (Lawyers Road) – Campbell County	C	D	F	F
5. Timberlake Road at Waterlick Road – Campbell County	D	D	F	F
6. Timberlake Road at Laxton Road – City of Lynchburg/Campbell County	C	D	E	E
7. Route 221 at Route 501 (Expressway) – City of Lynchburg	D	D	F	F
8. Wards Road (Route 163) at Candlers Mountain Road (Route 128) – City of Lynchburg	D	D	F	F
9. Wards Road (Route 163) at Harvard Street (including entrance to Liberty University) -- City of Lynchburg	B	B	F	D

Chapter 3 – Central Virginia's Transportation System: Moving Forward in New Directions

A major, recurring theme that became evident as the Central Virginia Long-Range Transportation Plan – Year 2030 (the Plan) was being developed was the need to set new and clear policy directions for transportation in the region. Wide-ranging discussions at public meetings, stakeholder workshops, and MPO policy and technical committee meetings illustrated the need for this new direction. Examples of some of these discussion areas include:

- Participants in stakeholder meetings highlighted the need to shift our emphasis away from over-reliance on the personal automobile towards a more balanced and healthy transportation system.
- Severe constraints on available transportation funding highlighted the need to address existing and future transportation in increasingly efficient and cost-effective ways, including improved coordination between land use and transportation planning.
- Discussions made clear the need to better manage existing transportation corridors to both extend their functional lives and to better serve a variety of travel modes was highlighted.

The key outcome of these discussions was the synthesis of five strategies for transportation policy and planning in Central Virginia. These five strategies set clear directions for transportation changes and improvements in the region that will lead to a more balanced, efficient, and safe transportation system. They address transportation corridor management, better integration of transportation and land use planning and new ways to look at transportation, better intra-regional accessibility, a more comprehensive system of bicycle and pedestrian facilities, and an increased emphasis on accommodating the transportation needs of the disabled. The region is already moving in the directions described in the five strategies through corridor studies and detailed land use/ transportation planning studies. A set of regionally developed and approved transportation goals and policies (described in Section 3.2) will serve to further implement the five key transportation strategies.

3.1 Five Key Transportation Strategies for the Region

Strategy 1: Increase Management of Key Regional Transportation Corridors

The backbone of the Central Virginia transportation system is a network of regional transportation corridors that provide access to and from the region to the rest of Virginia and the country as well as providing for local access. These corridors serve a variety of travel modes including cars, trucks, intercity bus, and, within the urban areas, local transit, bicycles, and pedestrians. These corridors include all of the primary routes (US highways such as Routes 29, 60, 221, 460, and 501), state primary highways (Virginia Routes 24, 128, 130, 210, as well as key urban and secondary roads such as 12th Street, Rivermont Avenue, and Boonsboro Road in the City of Lynchburg, Thomas Jefferson Road in Bedford County (Route 811), and Waterlick Road (Route 622) in Bedford and

Campbell Counties. Managing this network of corridors to provide for their optimum use across multiple modes of travel, safety, and sensitivity to their surrounding areas is of key importance. Where appropriate, these corridors should be improved to allow for safe travel by non-automotive modes of transportation. These regional corridors fall into three broad categories:

- Urban Multi-Modal Corridors: These corridors are generally located within the parts of the region that are fully developed, have a relatively high density of surrounding land uses, and are served by transit. Examples of these corridors include:
  - Rivermont Avenue and Boonsboro Road in the City of Lynchburg
  - Fort Avenue
  - Memorial Avenue
  - 5th Street
  - Langhorne Road

  Improvements proposed for these corridors should focus on enhancing the ability of the corridor to accommodate transit (bus shelters, improved stops, etc.), improved pedestrian accommodations and safety, and bicycle lanes.
- Mid-Density (Suburban) Corridors: These corridors are generally located in the three counties encompassed by the Metropolitan Planning Organization. These corridors have moderate to low densities, but are situated within growth areas or are otherwise key elements of the region's transportation system. Examples of these corridors include:
  - Route 221 Lakeside Drive and Forest Road
  - Route 29 South Amherst Highway
  - Route 622 Waterlick Road
  - Route 811 Thomas Jefferson Road

  Improvements proposed for these corridors generally include adding travel lanes to accommodate anticipated growth in travel demand, as well as the provision of one or more of the following: multi-use trails, bicycle lanes, sidewalks. Where appropriate, transit bus pull-offs and bus shelters should be provided.
- Highway Corridors: These are typically limited access facilities such as portions of Route 460 and the Lynchburg Expressway. These facilities provide for higher-speed travel and provide substantial capacity for local, regional, and out-of-region mobility. Improvements proposed for these corridors include the addition of travel lanes to accommodate anticipated growth in travel demand.

Strategy 2: Increase Coordination between Land Use and Transportation Planning

For centuries, the patterns of man's settlement were driven in large part by transportation. Cities were located along major rivers, railroad lines, or highways; villages also tended to be located along major transportation routes and were often separated by distances that could be covered in a day's ride by horse. The character of urban development was also often based on transportation considerations: the densities of cities allowed people to get around by walking, and neighborhoods tended to develop in radial patterns along streetcar routes. The affordable personal automobile, relatively cheap gasoline, and a

public works program that provided a world-class network of roads all resulted in major changes in development patterns whereby transportation was no longer such a limiting factor in where one lived and worked. This has changed in recent years with the rising cost of fuel, roadway maintenance, limited capital funds to continually expand the road network, and rising concern about the environmental impacts of transportation on the land, air, and animal and plant life, as well as the human health and community cohesiveness.

The Plan was developed in the context of some of these new realities. Like most cities, Lynchburg is a city that was developed based on transportation considerations, ranging from its location on the James River where a ferry could be built, to the layout of streets downtown, to development along Rivermont Avenue that was supported by a streetcar line. Prudent long-range transportation planning requires that Central Virginia explore ways to make existing transportation more effective and efficient through better coordination between land use and transportation planning. Stakeholder workshops held as part of the development of the 2030 Plan reiterated this idea. Workshop discussions identified a convergence of trends that are leading to a fundamentally different approach to long-term transportation planning. Many of the discussions were precipitated by the fact that the 2030 financially constrained long-range transportation plan was being developed in an environment where funding projections were one-fifth of what had been forecast only five years earlier. Trends that were identified as affecting current and future transportation include:

1. An aging population: Nationally, 20 percent of the population will be 65 or older by the year 2030 (as compared to 12 percent today). As a community that appeals to older citizens with its nationally recognized health-care and temperate climate, the percentage of persons over 65 may well be higher in Central Virginia than nationally. Providing alternative transportation through transit and walking will be increasingly important to serve those who cannot drive as they grow older.
2. Increased health consciousness in this country: Outside of major cities such as New York, most of our population gets around for almost all trips by driving. This impacts the health of our society, and there has been increased interest in creating communities where walking can be both a safe recreational activity as well as a way to get to destinations such as shopping.
3. Transportation funding constraints: As indicated above, transportation funding levels are remaining level or being reduced at a time when the maintenance costs for the existing system continue to rise. The result is expected to be continued reductions in the amount that can be spent on major capital projects. Moving goods and people more efficiently will, therefore, become increasingly important.
4. New technologies: New technologies provide opportunities to make alternative modes to the personal car more viable. By providing an increased sense of "connected-ness", cell phones already provide an increased sense of security for those who want to walk. Car-sharing also becomes more viable when last-minute changes can be communicated between driver and passenger. Global positioning systems (GPS) allow transit to be more attractive to passengers as they reduce the uncertainty and frustration of waiting: GPS can allow bus location to be transmitted to displays at bus stops and/or to cell phones or personal digital

assistants (PDAs). One of the prime reasons that people choose not to take transit is the extra time that it takes: being able to work using PDAs makes this time more productive.

5. Traffic congestion: The personal car provides the ultimate in terms of transportation flexibility in today's world. As roadway become more congested, however, the ability to take your car wherever you want, whenever you want, decreases. Congestion is a fact of life that is spreading from major metropolitan areas to mid-size cities such as Lynchburg, and ways to travel without constantly having to deal with the frustrations of traffic delays are becoming more appealing.
6. Decreased tolerance for the impacts of roads: The construction of any transportation project results in impacts on the natural environment and on adjacent communities. Even after being constructed, projects can adversely affect quality of life through noise and air pollution, as well as safety concerns. Increasingly, the general public has become less willing to pay the "price" with respect to their quality of life in order to continue building new roads. In this environment, it is critical to assess alternatives to adding more roadway capacity and look at options that may be able to move more people and goods with lesser impacts.

The 2030 Plan is serving to jump-start regional discussions on the relationship between land use and transportation planning. With the adoption of this Plan, regional transportation planning policy will explicitly seek to strengthen the ties between transportation and land use planning through implementing incentives and regulations to support land development that is located to take advantage of existing transportation facilities. Such actions alleviate pressures, to some extent, for adding new roadways. These actions can also play a large part in preserving and enhancing the viability of transit by locating certain types of development with high levels of employment near existing and proposed transit lines. Starting in Fiscal Year 2006, Region 2000 will be performing a detailed study and developing a regional action plan to develop and implement improved coordination between land use and transportation planning.

Strategy 3: Focus Improvements on Projects that Enhance Intra-Regional Accessibility

Tied to the concept of improved coordination between land use and transportation is a regional need for improved connections to major activity centers. This need was also highlighted in the stakeholder workshops and public meetings. Examples of regional activity centers cited include Lynchburg General Hospital, River Ridge Mall, Madison Heights, and Wyndhurst. To provide for improved accessibility to these activity centers, policies to continually upgrade travel signs (for roadways, multi-use trails, and the interface between the two) as well as the provision of several needed connections are being proposed. One key connection that would provide improved access to Lynchburg General Hospital is a new roadway connection between Lakeside Drive and Langhorne Road (Atherholt Road Extension). This connection is included in the Plan as a local Lynchburg City project. Follow-on studies to enhance regional signage and develop a comprehensive traveler information program are also recommended.

Strategy 4: Construct Key Linkages in the Regional Greenway/Blueway Plan

The Region 2000 Greenways and Blueways Plan serves as a guide for the creation of a linked network of trails, parks, rivers, and other major destinations within the region. The Greenways/Blueways Plan seeks to provide a system that improves travel safety for non-automotive travel, provides an attractive alternative to travel by motor vehicle, maximizes opportunities for economic development, and increases options for recreational and healthy life styles. This 2030 Plan incorporates the recommendations of the Greenways/Blueways Plan by reference.

Strategy 5: Improve the Region's Transportation System to Accommodate Special Needs and Changing Demographics

As highlighted in Strategy 2, transportation service for persons with disabilities is of key importance today, and is projected to become a more critical priority as our population ages. The role of transportation as a quality of life issue quickly becomes apparent to those who do not have access to it. In the entire Region 2000 planning district (of which the Central Virginia MPO is a part), the Lynchburg Area Center for Independent Living estimates that there are over 44,000 persons with disabilities, half of which are classified as severe. Close to 17,000 have difficulty walking three city blocks. As a regional transportation issue, it is important that transportation be provided to this important population segment as a matter of policy. Transportation policy should ensure that providing non-medical transportation options during evenings and weekends for work, shopping, and recreation trips is and remains a priority. Emphasis on access through well-designed sidewalks, curb cuts, bus stops, and building entrances is also important. Such improvements, when tied to land use planning that provides accessible and affordable housing along transit routes, ensure a high quality of life for all of the region's citizens.

3.2 Regional Transportation Goals and Policies

As part of the development of the Plan, the region developed a set of transportation goals, along with policies that support these goals. These goals and policies will help the region realize the future described by the five key transportation strategies. The goals and policies provide a framework for the ultimate implementation of transportation actions, including the setting of transportation priorities, the construction of projects, making funding decisions, and more. In fact, the prioritized projects included in the Plan were developed to address goals and policies described below. Nine transportation goals were identified for regional transportation in Central Virginia. They are:

1. Promote transportation safety and security.
2. Ensure that the existing transportation system is maintained.
3. Improve mobility and connectivity across all travel modes.
4. Support and enhance environmental quality in the region.
5. Ensure consistency with local comprehensive and economic development plans and goals.

6. Balance cross-jurisdictional transportation needs and concerns.
7. Identify and develop new sources of transportation funding.
8. Maximize transportation operations and efficiency in the region.
9. Promote equal access to all modes of transportation regardless of abilities.

The following regional transportation policies, incorporated as a key element of the Plan, will support the nine transportation goals:

- Transportation in the Central Virginia metropolitan area will:
  - Provide for safe and secure travel by all modes.
  - Preserve the functionality of existing and new roadway corridors through access management.
  - Enhance connections from the region to other areas within and beyond the Commonwealth of Virginia by all travel modes.
  - Provide for more direct and less confusing travel within the region through improved roadway connections as well as simple, clear, and effective traveler information.
  - As described in the Region's Greenway/Blueway Plan, promote a connected system of appropriate roadways that will allow for safe use by non-automotive modes of travel.
  - Minimize adverse impacts on neighborhoods, historic features, and the natural environment.
  - Maximize green space and aesthetics.
  - Encourage the movement of goods by non-roadway modes, including rail and air.
  - Ensure that accessibility needs are considered in the planning and design of all projects.
  - Pursue and encourage the participation of persons with disabilities in reviewing all transportation improvement plans and designs to ensure that the projects incorporate appropriate features to support mobility for all.
  - Seek to enhance the availability and redundancy of regional evacuation routes.
  - Increase the usage of transit for travel within the region, and support expanded geographic coverage of regional transit service.
  - Identify and make use of new approaches and technologies in order to enhance transportation operations, efficiency, and safety.
- Transportation and land use improvements in the metropolitan area will seek to make use of existing and proposed transit services by locating higher-density transit-oriented development along these routes.
- The MPO will seek to increase inter-city rail capacity. These efforts will include support for state policies on passenger rail that will advance the proposed TransDominion Express rail service.
- The MPO will continue to enhance regional cooperation on transportation issues by expanding cooperative review of large developments near jurisdiction boundaries and exploring a regional transportation authority to address both transportation coordination and funding.

- The region will strengthen alliances with nearby metropolitan areas to promote common transportation goals such as the Route 29 Charlottesville Bypass.
- Transportation projects in the Central Virginia metropolitan area will seek to:
  - Increase the safety and security of the transportation system for motorized and non-motorized users.
  - Support the expansion of the geographic areas served by transit.
  - Increase the number of opportunities for intermodal connectivity.
  - Encourage increased transit ridership.
  - Support the coordination of transit and major activity centers.
  - Support an increase in the number of sidewalk-miles and a connected system of sidewalks.
  - Serve the mobility needs of all users regardless of abilities.
  - Support an increase in the number of miles of multi-use trails.
  - Minimize adverse impacts from transportation improvements to neighborhoods, historic features, and the natural environment.
  - Minimize total travel time on corridors connecting Central Virginia to other metropolitan areas and to the interstate highway system.
  - Promote efficient system management and operation of key regional roadway corridors; preserve and enhance the functionality of these corridors.
  - Improve intra-regional connectivity and provide an increase in clear and direct routes for travel within the region.
  - Promote access management on major roadways in the region.
  - Provide improved access to major regional activity centers by multiple travel modes.
  - Support and promote the economic vitality of Central Virginia.

3.3 Development of the Regional Transportation Strategies, Goals, and Policies

The strategies, goals, and policies described above were developed through a process that included the identification of regional transportation concerns and issues at a series of six workshops that were held in May and July of 2004. A full day workshop was then held in August of 2004 with the region's Transportation Technical Committee (the TTC includes planning staff from each jurisdiction in the metropolitan area along with representatives from the Virginia Department of Transportation, the Virginia Department of Rail and Public Transportation, the Federal Highway Administration, the Greater Lynchburg Transit Company, and the Lynchburg Chamber of Commerce). At this workshop, goals and policies were identified to address regional transportation issues and these goals and policies were then tested against various trends in transportation such as changes in funding, an aging population, new technologies, etc. The goals and policies were then refined in conjunction with the TTC over the course of several meetings, were approved by the TTC in December 2004, and were then presented for public comment at a public meeting in February 2005. The policies were reviewed as part of the overall draft Transportation Plan presented at a public hearing on October 5, 2005.

Chapter 4 – Financially Constrained Transportation Plan

The Financially Constrained Transportation Plan, described in this chapter, includes those projects which are capable of being funded based on a reasonable estimate of available transportation funding to the year 2030.

4.1 Estimates of Available Funding

The Virginia Department of Transportation (VDOT) provides estimates of available transportation funding to the year 2030. Funding for the first six years, covering fiscal years 2006 through 2011, is included in the current VDOT Six-Year Improvement Program. Estimated funds for the period from 2012 through 2030 are as follows:

- Primary and National Highway System (both Lynchburg and Salem Districts): $17.99 million
- Urban System (City of Lynchburg): $15.95 million
- Secondary System in Amherst County: $4.46 million
- Secondary System in Bedford County: $6.49 million
- Secondary System in Campbell County: $6.52 million

4.2 Project Prioritization Model

Because the list of projects identified to address existing and future transportation needs for the region far exceeds estimates of available funding, it was necessary to prioritize projects. The prioritization model accounts for variables that were identified in public and stakeholder meetings early in the plan development process, as well as standard variables related to traffic volumes as well as estimated project costs. While all prioritization models include a level of subjectivity, these models provide initial guidance for use in decision-making. The output of the prioritization model was used to inform decisions by the regional planners, the Transportation Technical Committee, and the MPO Board on which projects to include in the Financially Constrained Transportation Plan. The prioritization model results were also presented for comment at public meetings.

The prioritization model awarded points to proposed projects based on the parameters described below. Projects with the highest number of points were ranked as the highest priority.

- Traffic served by proposed facility: 1 point for each 2,000 daily vehicles
- Estimated project cost: -1 (negative one) point for each $2.5 million in project cost
- Safety: Based on crash experience on entire corridor; 2 points per each annual crash per thousand daily vehicle-miles
- Intra-regional accessibility: 0.5 point for each of the following areas that the project addresses:
  - Improves intra-regional connectivity and provides an increase in clear and direct routes for travel within the region

- Provides improved access to major regional activity centers by multiple travel modes

- Transit/Multi-Modal Travel: 0.5 point for each of the following areas that the project addresses:
  - Supports the expansion of the geographic areas served by transit
  - Increases the number of opportunities for intermodal connectivity
  - Encourages increased transit ridership
  - Supports the coordination of transit and major activity centers
  - Supports an increase in the number miles of pedestrian facilities and/or encourages greater connectivity in the system
- Transportation Efficiency: 0.5 point for each of the following areas that the project addresses:
  - Promotes efficient system management and operation of key regional roadway corridors; preserves and enhances the functionality of these corridors
  - Promotes access management on major roadways in the region
- Economic Development and Transportation Connections to Outside the Region: 0.5 point for each of the following areas that the project addresses:
  - Minimizes total travel time on corridors connecting Central Virginia to other metropolitan areas and to the interstate highway system
  - Supports and promotes the economic vitality of Central Virginia

4.3 Roadway Projects in the Financially Constrained Plan

The Financially Constrained Plan includes projects that are in the current VDOT Six-Year Improvement Program (Fiscal Years 2006-2011), as well as those that are anticipated to be capable of being funded based on the estimated funding streams to the year 2030. Projects in the Six-Year Improvement Program are listed in Exhibit 10 and shown on the map in Exhibit 11 (note that the map key shown in the first column of Exhibit 10 corresponds to the numbers on the map in Exhibit 11). Similarly, those projects that could be funded based on estimated funding streams for the years from 2012 to 2030 are included in Exhibits 12 and 13. Estimated costs for the Six-Year Improvement Program projects shown in Exhibits 10 and 11 were developed by the Virginia Department of Transportation. It is important to note that the estimated costs are refined as a project proceeds through the development process, with those projects in the final design phase having the most accurate costs. The reader should, therefore, be aware that all costs are estimates and subject to refinement. Cost estimates for projects in Exhibit 12 were developed as part of the Plan development and are based on statewide average unit costs (generally per-mile costs) for various types of facilities. These costs, in 2005 dollars, include preliminary engineering, right-of-way, and construction unless otherwise stated. As with the estimates for Six-Year Program projects, these planning-level costs are subject to refinement based on more detailed engineering. A description of the planning-level cost estimating process is included in Appendix D of this report.

A review of potential environmental impacts was also performed for the projects proposed for the Financially Constrained Plan. As with the cost estimates, this analysis was performed as a planning-level overview to identify any environmental or man-made features that would preclude a project from being constructed. Many of the projects in the Financially Constrained Plan may require federal funding; as a result, environmental studies would be required to fully identify and quantify the environmental impacts of the project. For many projects, several alternative alignments and/or designs may be assessed for the projects in order to identify the alignment/design that would result in the least environmental impact. Appendix F of this document includes mapping that shows the generalized alignment of the projects proposed in the Financially Constrained Plan as well as the location of various environmental features such as wetlands, floodplains, prime farmland, historic districts, etc. A description of the mapped features is also included in Appendix F. None of the projects in the Financially Constrained Plan are anticipated to have major, unavoidable environmental or socio-economic impacts.

While substantial amounts of transportation funding are dedicated to larger capital projects, funding for transportation in the Central Virginia MPO also covers projects that are identified within VDOT construction districts based on identified needs on a year-by-year basis. Funding is shown in Exhibit 10 based on four broad categories: Safety/traffic operations/ transportation system management, Transportation Enhancements, Rail crossing safety, and general system maintenance. Funding for the first three categories is allocated on a statewide basis and distributed on a competitive basis by project. Funding for the fourth category, general system maintenance, is allocated by highway system to individual VDOT construction districts. Note that the Central Virginia MPO covers a portion of two VDOT construction districts: the Lynchburg and Salem districts.

Total funding for the Six-Year Improvement Program projects shown in Exhibit 10 is $81.42 million (an additional $46.62 million is for two projects that have already been completed but are still programmed for deficit financing). Total funding for the projects in the 2012 to 2030 portion of the Financially Constrained Plan shown in Exhibit 12 is $49.96 million. Note that these are the amounts that are funded, not necessarily the full cost of the proposed transportation improvements. Specific costs, including the amounts previously funded or needing to be funded beyond the year 2030, are shown for each individual project in Exhibits 10 and 12.

Exhibit 10

Roadway Projects in the Current VDOT Six-Year Improvement Program (Fiscal Years 2006 through 2011)

Map Key	Juris-diction [1]	Project Location and Description	Length (miles)	Proposed Typical Section [2]	Estimated Cost/Funded Amount/Funding Class [3]	Description/Notes
1	Lyn	Route 29/460 (Richmond Highway) -- Route 501 (Campbell Avenue) to Route 29 Bypass North	2.4	R6	$40,000,000 to $60,000,000 $15,948,000 Primary	Improve to 4-6 lane limited access roadway (funded amount is for preliminary engineering, right-of-way, and accrual towards construction)
2	Lyn	Midtown Connector/Route 221 (Lakeside Drive) -- Old Forest Road to Route 501 Expressway	2.4	U4	$23,181,000 $10,638,000 Urban	Widen to 4 lanes; additional funding will be required beyond 2011
3	Lyn	Midtown Connector -- Route 29 Expressway (29 Business) to Old Forest Road	2	U4	$30,000,000 $10,723,000 Urban	Widen to 4 lanes; additional funding will be required beyond 2011
4	Lyn	Breezewood Drive -- Route 501 to Route 221 (Lakeside Drive)	0.5	U3	$2,847,000 $439,000 Urban	Extend to Lakeside Drive
--	Lyn	Various locations – traffic safety improvements	NA	NA	$538,000 $538,000 Urban	
--	Amh	Riverwalk Trail Extension	NA	NA	$1,739,000 $496,000 Discretionary/Other	Extend bicycle and pedestrian trail from current terminus
--	Amh	Route 29 (Madison Heights Bypass) – Lynchburg Corporate Limits to the northern MPO boundary	NA	R4D	$135,327,000 $41,297,000 Primary	Construct 4 lanes on new alignment. Project complete, Six-Year Program funding is for final payoff of this project
--	Amh	Route 210 Connector – Route 29 Business to Route 29 Bypass (including Route 622 Connector)	1.8	R4D	$12,728,000 $5,321,000 Primary	Construct 4 lanes on new alignment. Project complete, Six-Year Program funding is for final payoff of this project
5	Amh	Route 652 (Cedar Gate Road) -- Route 675 to Route 130	NA	NA	$345,000 $345,000 Amherst Secondary	Replace bridge at Graham Creek

Exhibit 10

Roadway Projects in the Current VDOT Six-Year Improvement Program (Fiscal Years 2006 through 2011)

Map Key	Juris-diction [1]	Project Location and Description	Length (miles)	Proposed Typical Section [2]	Estimated Cost/Funded Amount/Funding Class [3]	Description/Notes
6	Amh	Route 657 (Cedar Gate Road) -- Route 652 to Route 636	0.5	R2	$581,000 $581,000 Amherst Secondary	Widen pavement to 20 feet
7	Amh	Route 659 (Union Hill Road) -- bridge over Rutledge Creek	NA	NA	$670,000 $670,000 Amherst Secondary	Bridge replacement
8	Amh	Route 652 (Cedar Gate Road) -- Route 657 to Route 675	2.4	R2	$1,881,000 $1,881,000 Amherst Secondary	Widen pavement to 24 feet
9	Amh	Route 659 (Union Hill Road) -- west of Norfolk Southern railroad crossing to Route T-606			$2,912,000 $2,912,000 Amherst Secondary	Reconstruct 2 lane roadway
10	Bed	Route 221 (Forest Road) -- 0.15 miles east of Route 663 to 0.5 miles west of NS Railroad	2.26	U4	$12,370,000 $11,464,000 Primary	Widen to 4 lanes
11	Bed	Route 644 (Coffee Road) -- Route 665 North to Route 665 South	0.2	R2	$1,533,000 $1,533,000 Bedford Secondary	Improve bridges and approaches
12	Bed	Route 811 (Thomas Jefferson Road) -- Route 622 to Route 661	0.54	U2	$3,524,000 $3,524,000 Bedford Secondary	Upgrade for safety and traffic operations
13	Bed	Route 668 (Goode Road) at NS Railroad tracks	NA	NA	$1,512,000 $1,512,000 Bedford Secondary	Reconstruct bridge and approaches
14	Bed	Route 621 (Cottontown Road) -- Route 660 to Route 1201	0.6	U2	$1,666,000 $1,666,000 Bedford Secondary	Reconstruction
15	Bed	Route 660 (Hawkins Mill Road) at Ivy Creek	0.8	NA	$3,535,000 $3,535,000 Bedford Secondary	Replace bridge and approaches

Exhibit 10

Roadway Projects in the Current VDOT Six-Year Improvement Program (Fiscal Years 2006 through 2011)

Map Key	Juris-diction [1]	Project Location and Description	Length (miles)	Proposed Typical Section [2]	Estimated Cost/Funded Amount/Funding Class [3]	Description/Notes
16	Bed	Route 621 (Cottontown Road) -- Route 662 to Route 660	1.71	R2	$6,977,000 $6,977,000 Bedford Secondary	Reconstruction, including replacement of bridge over Ivy Creek
17	Cam	Route 622 (Lynbrook Road) -- Route 683 to Route 29	2.53	R2	$5,808,000 $5,808,000 Campbell Secondary	Reconstruct 2 lane roadway
18	Cam	Route 622 (Lynbrook Road) at Flat Creek	NA	NA	$225,000 $225,000 Campbell Secondary	Bridge replacement
NA	NA	Safety/traffic operations/ transportation system management	NA	NA	Determined on an annual basis [4]	Covers general improvements to traffic safety and operations; the individual projects are each generally low-cost improvements
NA	NA	Transportation enhancements	NA	NA	Determined on an annual basis [4]	Improvements to expand transportation choices through such activities as safe bicycle and pedestrian facilities, scenic routes, and beautification
NA	NA	Rail crossing safety	NA	NA	Determined on an annual basis [4]	Improvements to increase safety at locations where roads and railroads cross
NA	NA	General system maintenance	NA	NA	Determined on an annual basis [5]	Roadway maintenance funds on an MPO-wide basis

Notes:

[1] – Lyn=City of Lynchburg; Amh=Amherst County; Bed=Bedford County; Cam=Campbell County

[2] – R=rural cross-section; U=urban cross-section; 2,4,6=number of lanes; NA=not applicable

[3] – The first figure shown is the total estimated project cost in 2005 dollars, the second number is the amount that is funded in the Six-Year Program (2006 through 2011). Any amounts accrued in years prior to 2006 in the Six-Year Program are not included in this second figure. The funding class indicates which category of VDOT funding would apply to the improvement.

[4] – Funding for these categories is allocated statewide and awarded to individual projects on a competitive basis.

{5} – Funding for this category is allocated to each of the VDOT Construction Districts by roadway system. Further distribution within the MPO area is based on need.

Exhibit 11

Map: Roadway Projects in the Current VDOT Six-Year Improvement Program (Fiscal Years 2006 through 2011)

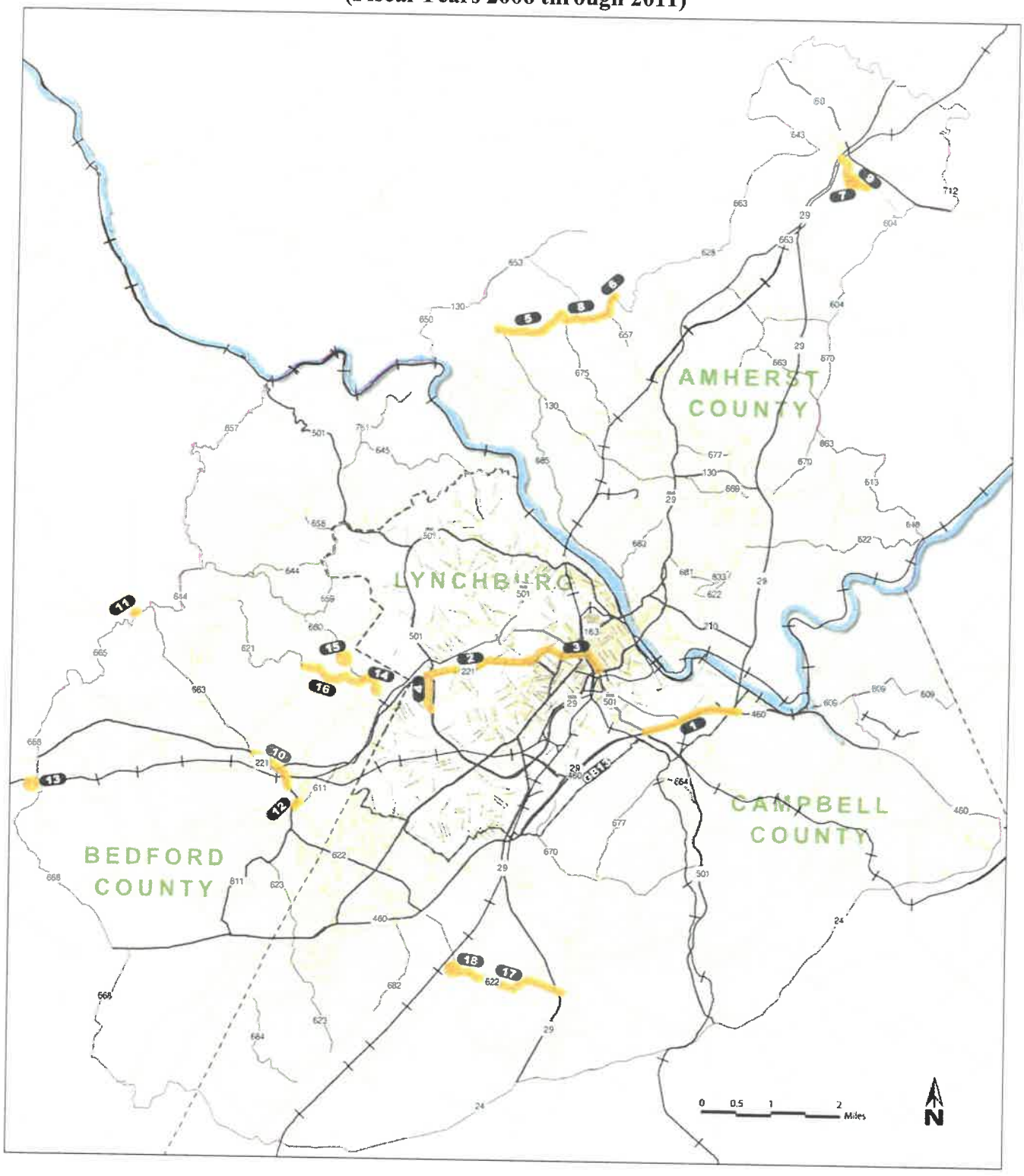


Exhibit 12

Roadway Projects in the Year 2030 Financially Constrained Plan

Map Key	Juris-diction [1]	Project Location	Length (miles)	Proposed Typical Section [2]	Estimated Cost/Funded Amount/Funding Class [3]	Description
--	Cam	Route 29 Bypass South -- Route 460 East to Route 29 at Yellow Branch	NA	NA	$3,000,000 $3,000,000 Primary	Study for new 4-lane roadway
19	Lyn	Route 501 (Candlers Mountain Road) -- Woodall Road to Mayflower Drive	0.5	U6	$22,348,000 $14,990,000 Primary	Widen to 6 lanes, including bridge over railroad and interchange; accrual towards total estimated cost
2	Lyn	Midtown Connector/Route 221 (Lakeside Drive) -- Old Forest Road to Route 501 Expressway	2.4	U4	$23,181,000 $6,564,000 Urban	Widen to 4 lanes; represents additional funding required beyond VDOT six-year horizon
3	Lyn	Midtown Connector -- Route 29 Expressway(29 Business) to Old Forest Road	2	U4	$30,000,000 $2,807,000 Urban	Widen to 4 lanes; represents additional funding required beyond VDOT six-year horizon
20	Lyn	Route 501 (Lynchburg Expressway) Interchange at Route 221 (Lakeside Drive)	NA	NA	$42,000,000 $6,580,000 Urban	Construct interchange; preliminary engineering and accrual towards construction
21	Amh	Route 682 (Woodys Lake Road) -- Route 29 Business to dead end	0.83	U2	$3,007,000 $3,007,000 Amherst Secondary	Reconstruct 2 lane roadway
22	Bed	Route 622 (Waterlick Road) -- Route 811 to Campbell County line	0.9	R4	$4,192,000 $4,192,000 Bedford Secondary	Widen to 4 lanes
23	Bed	Route 811 (Thomas Jefferson Road) -- Route 460 to Route 221	5.0	R4	$23,288,000 $2,300,000 Bedford Secondary	Widen to 4 lanes (funding included for preliminary engineering only)
24	Cam	Route 622 (Waterlick Road) -- Bedford County Corporate Limits to Route 1520 (Rainbow Forest)	1.1	R4	$5,123,000 $5,123,000 Campbell Secondary	Widen to 4 lanes
25	Cam	Route 738 (English Tavern Road) at Routes 677 (Sunnymeade Road) and Route 680 (Suburban Road)	NA	NA	$1,400,000 $1,400,000 Campbell Secondary	Reconfigure to single intersection

Exhibit 12

Roadway Projects in the Year 2030 Financially Constrained Plan

Map Key	Juris-diction [1]	Project Location	Length (miles)	Proposed Typical Section [2]	Estimated Cost/Funded Amount/Funding Class [3]	Description
NA	NA	General system maintenance: City road system	NA	NA	Determined on an annual basis [4]	Roadway maintenance funds within the City of Lynchburg
NA	NA	General system maintenance: State road system	NA	NA	Determined on an annual basis [5]	Roadway maintenance funds on state-maintained roads in Amherst, Bedford, and Campbell Counties

Notes:

[1] – Lyn=City of Lynchburg; Amh=Amherst County; Bed=Bedford County; Cam=Campbell County

[2] – R=rural cross-section; U=urban cross-section; 2,4,6=number of lanes; NA=not applicable

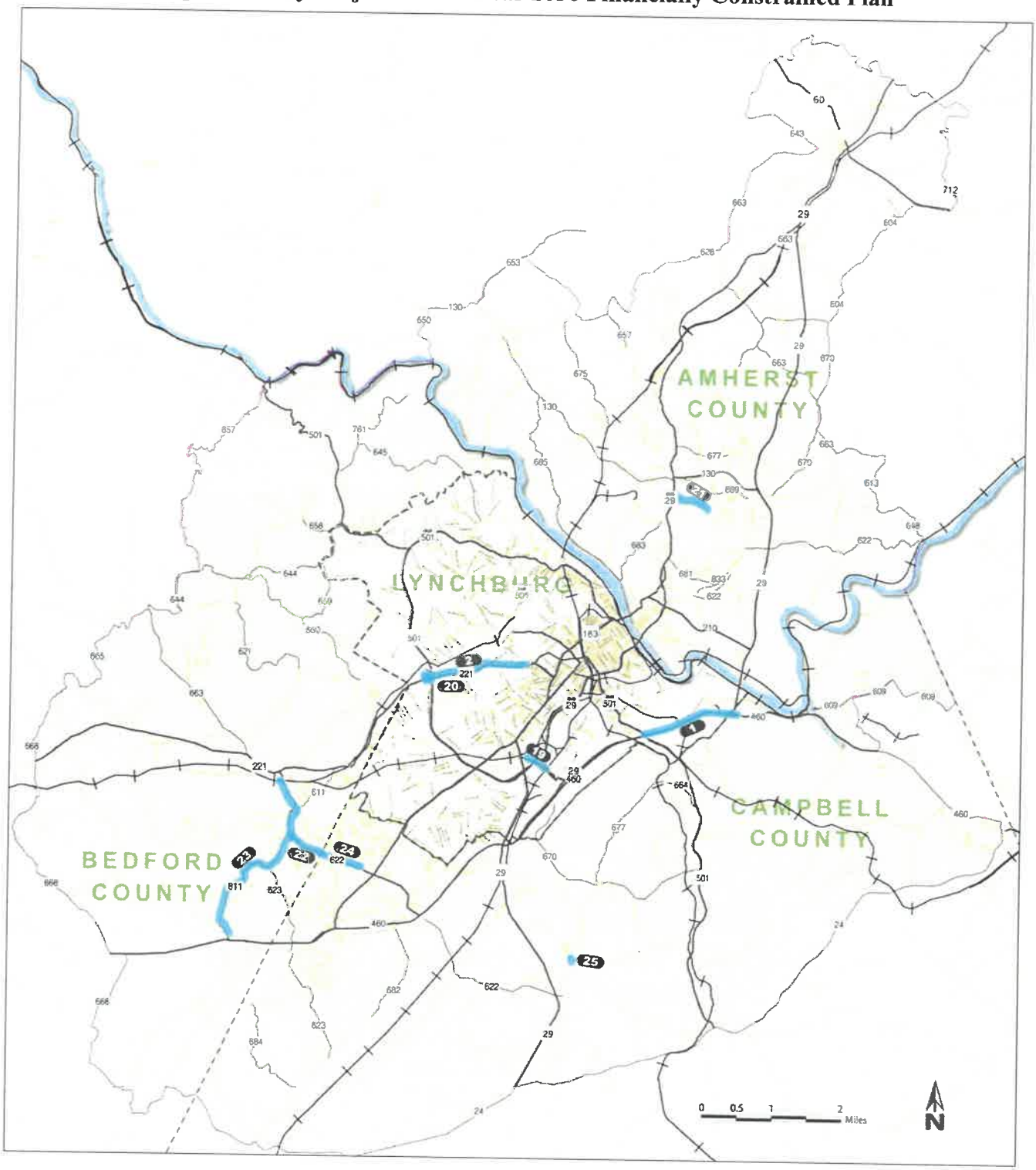
[3] – The first figure shown is the total estimated project cost in 2005 dollars, the second number is the amount that is funded in Financially Constrained Plan (2012 through 2030). The funding class indicates which category of VDOT funding would apply to the improvement.

{4] – Funding for this category is allocated to each urban locality based on state formula.

{5} – Funding for this category is allocated to each of the VDOT Construction Districts by roadway system. Further distribution within the MPO area is based on need.

Exhibit 13

Map: Roadway Projects in the Year 2030 Financially Constrained Plan



Chapter 5 – Transportation Vision Plan

Projects in the Transportation Vision Plan are those that were developed to address either existing or anticipated transportation needs, but were not able to be included in the Financially Constrained Plan based on funding limitations. Because there is an expectation that available transportation funding may increase within two years based on anticipated action by the Virginia General Assembly, projects in the Transportation Vision Plan were prioritized into two tiers. First tier projects are those that the Transportation Technical Committee believe should be first in line to shift into the Financially Constrained Plan should additional funds become available. Should available funds increase, the Financially Constrained Plan could be amended by MPO action to include one or more of the projects currently in the Vision Plan. The total estimated cost of projects included in the Tier 1 Transportation Vision Plan is $270.6 million.

Projects in the Tier 1 Transportation Vision Plan are shown in Exhibit 14, while the Tier 2 projects, which are of a lesser priority and/or a longer planning horizon, are included in Exhibit 15. As with the projects in the Financially Constrained Plan, planning-level costs were developed for all of the projects in both Tier 1 and Tier 2 of the Vision Plan. Descriptions of the process used to develop these costs are included in Appendix D. Tier 1 projects were also subjected to the environmental overview process and these projects are shown on the environmental constraint mapping included in Appendix E. None of the projects in the Tier 1 Transportation Vision Plan are anticipated to have major, unavoidable environmental or socio-economic impacts.

Exhibit 14

Roadway Projects in the Year 2030 Tier 1 Transportation Vision Plan

Map Key	Juris-diction [1]	Project Location	Length (miles)	Proposed Typical Section [2]	Estimated Cost/Funding Class [3]	Description
26	Lyn	Route 460 Interchange at Odd Fellows Road Extension	NA	NA	$19,205,000 Primary/Urban	New grade-separated interchange
20	Lyn	Route 501 (Lynchburg Expressway) Interchange at Route 221 (Lakeside Drive)	0.3	NA	$42,000,000 Urban	Construct interchange; $6.58 million allocated as part of the Financially Constrained Plan
27	Lyn	Route 670 (Old Candlers Moutain Road) -- Mayflower Drive to Route 460	0.7	U4	$6,826,000 Urban	Widen to 4 lanes
28	Lyn	Odd Fellows Road -- Lynchburg Expressway to End	1.3	U4	$10,764,000 Urban	Widen to 4 lanes

Exhibit 14

Roadway Projects in the Year 2030 Tier 1 Transportation Vision Plan

Map Key	Juris-diction [1]	Project Location	Length (miles)	Proposed Typical Section [2]	Estimated Cost/Funding Class [3]	Description
29	Lyn	5th Street (Route 163) -- Langhorne Road to Main Street	1.2	NA	$300,000 Urban	Improvements for multi-modal corridor
30	Lyn	Memorial Avenue -- Fort Avenue to Langhorne Road	1.3	NA	$325,000 Urban	Improvements for multi-modal corridor
31	Lyn	Oakley Avenue -- Lakeside Drive to Memorial Avenue	0.9	NA	$225,000 Urban	Improvements for multi-modal corridor
32	Lyn	Langhorne Road (Route 501 Business) -- Fort Avenue to Cranehill Drive	2.3	NA	$565,000 Urban	Improvements for multi-modal corridor
33	Lyn	Route 501 Business (Boonsboro Road) -- Lynchburg Expressway (Route 501) to Langhorne Road	3.1	NA	$775,000 Urban	Improvements for multi-modal corridor
34	Lyn	Greenview Drive -- Lynchburg Corporate Limits to Leesville Road	1.3	U4	$10,764,000 Urban	Widen to 4 lanes
35	Lyn	Route 460 Business (Fort Avenue) -- Memorial Avenue to 12th Street	1.0	NA	$250,000 Urban	Improvements for multi-modal corridor
36	Lyn	Fort Avenue -- 12th Street to Park Avenue	0.4	NA	$100,000 Urban	Improvements for multi-modal corridor
37	Lyn	Rivermont Avenue -- Langhorne Road to 5th Street	2.9	NA	$725,000 Urban	Improvements for multi-modal corridor
38	Lyn	Wards Ferry Road -- Wards Road to Timberlake Road	2.3	U4	$20,314,000 Urban	Widen to 4 lanes
39	Amh	Route 29 at Route 163	NA	NA	$12,000,000 Primary	Reconstruct interchange to allow all movements
40	Amh	Route 210 (Colony Road) -- Route 163 to Route 1034	0.3	U4	$2,484,000 Primary	Widen to 4 lanes

Exhibit 14

Roadway Projects in the Year 2030 Tier 1 Transportation Vision Plan

Map Key	Juris-diction [1]	Project Location	Length (miles)	Proposed Typical Section [2]	Estimated Cost/Funding Class [3]	Description
41	Amh	Route 163 (South Amherst Highway) -- Route 685 (River Road) to interchange at Route 29 Expressway (29 Business)	1.6	U4	$15,603,000 Primary	Widen to 4 lanes with bike lane
42	Amh	Connector Road running parallel to and east of Route 29 Business -- Route 163 to Lakeview Drive	0.62	U2	$2,396,000 Primary	Construct new 2-lane connector road running parallel to Route 29 Business
43	Amh	Route 130 (Elon Road) -- NS railroad track to Route 29 Business	1.9	R4	$7,374,000 Primary	Widen to 4 lanes
44	Am	Route 675 (Winesap Road) -- Route 652 to Route 795	3.1	R2 (22)	$3,077,000 Amherst Secondary	Widen pavement to 22 feet
45	Bed	Route 460 -- Study Area Boundary (Goode Road) to Route 811	2.9	NA	$14,540,000 Primary	Construct paved shoulder lane and implement access management recommendations
46	Bed	Route 501 (Boonsboro Road) at Route 647	0.3	NA	$500,000 Primary	Relocate intersection, construct turn lane
47	Bed	Route 501 (Boonsboro Road) -- at Judith Creek Road	NA	NA	$560,000 Primary	Bridge improvements
48	Bed	Route 501 (Boonsboro Road) -- Lynchburg Corporate Limits to Study Area Boundary	4.8	R2	$8,280,000 Primary	Reconstruct portions, add climbing lanes (spot locations)
23	Bed	Route 811 (Thomas Jefferson Road) -- Route 460 to Route 221	5.0	R4	$23,288,000 Bedford Secondary	Widen to 4 lanes; $2.3 million allocated as part of the Financially Constrained Plan
49	Bed	Route 659 (Hawkins Mill Road) -- Route 660 to Lynchburg Corporate Limits	1.5	R2	$2,588,000 Bedford Secondary	Reconstruct 2 lane roadway
50	Bed	Route 644 (Coffee Road) -- Route 665 North to Lynchburg Corporate Limits	3.6	R2	$6,210,000 Bedford Secondary	Reconstruct 2 lane roadway
51	Bed	Route 622 (Everett Road) -- Kensington Parkway to NS railroad tracks	2.2	R2	$3,795,000 Bedford Secondary	Reconstruct 2-lane roadway

Exhibit 14

Roadway Projects in the Year 2030 Tier 1 Transportation Vision Plan

Map Key	Juris-diction [1]	Project Location	Length (miles)	Proposed Typical Section [2]	Estimated Cost/Funding Class [3]	Description
52	Bed	Route 663 (Perrowville Road) -- Route 1431 to Route 644	2.1	R2	$3,019,000 Bedford Secondary	Reconstruct 2 lane roadway
53	Bed	Route 623 (Turkey Foot Road) -- Route 811 to Campbell County Corporate Limits	1.2	R2	$1,725,000 Bedford Secondary	Widen pavement to 24 feet
54	Bed	Route 621 (Cotton Town Road) -- Route 644 (Coffee Road) to Route 662	4.9	R2	$8,453,000 Bedford Secondary	Reconstruct 2 lane roadway
55	Cam	Route 29 (Wards Road) -- South Route 738 to Lynchburg City Corporate Limits	3.5	U4	$7,000,000 Primary	Access management, traffic operations and safety improvements
56	Cam	Route 501 (Campbell Highway) -- Route 24 to Route 680 (Suburban Road)	2.2	U4	$20,766,000 Primary	Widen to 4 lanes
57	Cam	Route 682 (Leesville Road) -- Lynchburg Corporate Limits to Route 460	0.9	R4	$4,502,000 Campbell Secondary	Widen to 4 lanes
58	Cam	Route 738 (English Tavern Road) -- Route 680 (Suburban Road) to Route 29 (north intersection)	1.5	R2	$2,588,000 Campbell Secondary	Widen to 24 feet
59	Cam	Route 738 (English Tavern Road) -- Route 29 (south intersection) to Route 680 (Suburban Road)	1.2	R2	$2,070,000 Campbell Secondary	Widen to 24 feet
60	Cam	Route 681 (Sunburst Road) -- Route 460 to Route 622	2.7	R2	$4,658,000 Campbell Secondary	Reconstruct 2-lane roadway

Notes:

[1] – Lyn=City of Lynchburg; Amh=Amherst County; Bed=Bedford County; Cam=Camplbell County

[2] – R=rural cross-section; U=urban cross-section; 2,4,6=number of lanes; NA=not applicable

[3] –Total estimated project cost in 2005 dollars. The funding class indicates which category of VDOT funding would apply to the improvement.

Exhibit 15

Roadway Projects in the Year 2030 Tier 2 Transportation Vision Plan

Map Key	Juris-diction [1]	Project Location	Length (miles)	Proposed Typical Section [2]	Estimated Cost/ Funding Class [3]	Description
61	Lyn	Route 501 (Boonsboro Road) -- Bedford County Corporate Limits to Lynchburg Expressway (Route 501)	1.8	U4	$14,904,000 Primary	Widen to 4 lanes
62	Lyn/ Cam	Route 29/460 Bypass -- Route 29 South (Wards Road) to Route 501 (Campbell Avenue)	4.4	R6	$37,950,000 Primary	Widen to 6 lanes
63	Lyn	Wards Road (Route 163) -- Campbell County Corporate Limits to Fort Avenue	2.4	U6	$30,470,000 Urban	Widen to 6 lanes
64	Lyn	Mayflower Drive (Route 128) -- Candlers Mountain Road to Odd Fellows Road	1.3	U4	$10,764,000 Urban	Widen to 4 lanes
65	Lyn	Route 460 Business (Timberlake Road) -- Campbell County Corporate Limits to Lynchburg Expressway (Route 501)	2.3	U6	$29,201,000 Urban	Widen to 6 lanes
66	Lyn	Mayflower Drive (Route 128) -- Odd Fellows Road to Campbell Avenue	1.4	U2	$5,072,000 Urban	Improve 2 lane section
67	Lyn	Route 501 (Lynchburg Expressway) -- Lakeside Drive to Boonsboro Road	3.0	U4	$27,428,000 Primary	Widen to 4 lanes
68	Lyn	Harvard Street (Route 368) -- Wards Ferry Road to Wards Road (Route 163)	0.4	U4	$3,312,000 Primary	Widen to 4 lanes
69	Lyn	Old Forest Road -- Linkhorne Road to Lakeside Drive East	1.2	U2	$4,347,000 Urban	Improve 2 lane section
70	Lyn	Ericsson Drive Extension -- Existing Ericsson Drive to Route 29	0.5	U4	$5,968,000 Urban	Construct 4-lane roadway (with RR bridge) on new alignment
71	Lyn	Florida Avenue -- Grace Street to Campbell Avenue	2.3	U2	$8,332,000 Urban	Improve 2 lane section
72	Amh	Route 130 (Elon Road) -- Study area boundary to NS railroad track	4.9	R4	$19,018,000 Primary	Widen to 4 lanes
73	Amh	Route 657 (Cedar Gate Road) -- Route 652 to Route 29	2.8	R2 (22)	$2,779,000 Amherst Secondary	Widen pavement to 22 feet
74	Amh	River Road Alternate (New Location) -- Route 130 to Route 29 Business at Route 210	3.5	R2	$5,730,000 Amherst Secondary	Construct 2 lanes on new alignment (including new bridge)
75	Bed	Route 221 -- Study Area Boundary to 0.55 miles west of Route 663	4.8	R4	$18,436,000 Primary	Widen to 4 lanes

Exhibit 15

Roadway Projects in the Year 2030 Tier 2 Transportation Vision Plan

Map Key	Juris-diction [1]	Project Location	Length (miles)	Proposed Typical Section [2]	Estimated Cost/ Funding Class [3]	Description
76	Bed	Route 643 (Bellevue Road) -- Route 740 to Route 811	1.6	R2	$2,760,000 Bedford Secondary	Reconstruct 2-lane roadway
77	Bed	Route 663 (Perrowville Road) -- 0.62 miles north of Route 221 to Route 1431	1.6	R4	$7,452,000 Bedford Secondary	Widen to 4 lanes
78	Bed	Route 661 (Bateman Bridge Road) -- Route 811 to Route 1440	1.2	R4	$5,589,000 Bedford Secondary	Widen to 4 lanes
79	Bed	Route 761 (Holcomb Rock Road) -- Route 645 South to Route 645 North	0.8	R2	$1,150,000 Bedford Secondary	Widen pavement to 24 feet
80	Bed	Route 660 (Hawkins Mill Road) -- Route 621 to Route 659	2.3	R2	$3,968,000 Bedford Secondary	Reconstruct 2-lane roadway
81	Bed	Route 661 (Homestead Drive) -- Route 1440 to Route 1415 (Enterprise Drive)	2.1	U4	$17,388,000 Bedford Secondary	Widen to 4 lanes
82	Bed	Route 621 (Cotton Town Road) -- Route 221 to Route 660	1.0	U4	$8,280,000 Bedford Secondary	Widen to 4 lanes
83	Bed	Route 668 (Blackwater Road) -- Route 460 to 2.0 miles south of Route 460	2.0	R2	$3,450,000 Bedford Secondary	Reconstruct 2-lane roadway
84	Bed	Route 709 (New London Road) -- Route 811 to Route 24	3.6	R2	$6,210,000 Bedford Secondary	Reconstruct 2-lane roadway
85	Bed	Route 645 (Trents Ferry Road) -- Lynchburg Corporate Limits to Route 761	3.2	R2	$4,600,000 Bedford Secondary	Reconstruct 2 lane roadway
--	Cam	Route 29 South Bypass – Route 29 Bypass at Route 460 (just south of the James River) to Route 29 in the vicinity of Route 24 (Yellow Branch)	NA	NA	To be determined: $60 - $230 million Primary	Construct new roadway
86	Cam	Route 24 (Colonial Highway) -- Route 685 (Calohan Road) to Route 687 (Gough Road)	1.1	R2	$1,898,000 Primary	Reconstruct roadway
87	Cam	Route 29 (Wards Road) -- South Route 738 to Lynchburg City Corporate Limits	3.5	U6	$44,436,000 Primary	Widen to 6 lanes
88	Cam	Route 24 (Colonial Highway) -- Route 682 (Leesville Road) to Route 811 (Ridge Road)	1.1	R2	$1,898,000 Primary	Reconstruct roadway
89	Cam	Route 680 (Suburban Road) -- Route 738 to Route 501	3.2	R2	$5,520,000 Campbell Secondary	Reconstruct 2-lane roadway, excluding railroad crossing
90	Cam	Route 670 (Candlers Mountain Road) -- Lynchburg Corporate Limits to 677	2.0	R2	$3,450,000 Campbell Secondary	Reconstruct 2 lane roadway

Exhibit 15

Roadway Projects in the Year 2030 Tier 2 Transportation Vision Plan

Map Key	Juris-diction [1]	Project Location	Length (miles)	Proposed Typical Section [2]	Estimated Cost/ Funding Class [3]	Description
91	Cam	Route 670 (Sunnymeade Road) -- Route 501 to Route 677	2.8	R2	$4,025,000 Campbell Secondary	Reconstruct 2 lane roadway (includes at-grade railroad crossing)
92	Cam	Route 682 (Leesville Road) -- Route 460 To Route 24	2.5	R2	$4,313,000 Campbell Secondary	Widen pavement to 24 feet
93	Cam	Route 685 (Calohan Road) -- Route 24 to Route 29	1.8	R4	$8,384,000 Campbell Secondary	Widen to 4 lanes
94	Cam	Route 677(Sunnymeade Road) -- Route 738 to Route 670	2	R2	$2,875,000 Campbell Secondary	Widen pavement to 24 feet
95	Cam	Route 623 (Turkey Foot Road) -- Route 858 to Bedford County Corporate Limits	1.0	R2	$1,725,000 Campbell Secondary	Reconstruct 2 lane roadway
96	Cam	Route 623 (Town Fork Road) -- Route 682 to Route 858	2.5	R2	$3,594,000 Campbell Secondary	Reconstruct 2 lane roadway
97	Cam	Route 677 (Old Rustburg Road) -- Route 664 to Lynchburg Corporate Limits	1.1	R2	$1,581,000 Campbell Secondary	Reconstruct 2 lane roadway
98	Cam	Route 664 (Old Rustburg Road) -- Route 501 to Route 677	1.3	R2	$1,869,000 Campbell Secondary	Reconstruct 2 lane roadway
99	Cam	Route 677 (Camp Hydaway Road) -- Route 670 to Route 664	3.2	R2	$4,600,000 Campbell Secondary	Reconstruct 2 lane roadway
100	Cam	Route 1520 (Rainbow Forest Road) -- Route 622 (Waterlick Road) to Route 1551	2.1	U2	$7,607,000 Campbell Secondary	Reconstruct 2 lane roadway
101	Cam	Route 660 (Eastbrook Road/Oxford Furnace Road) -- Route 501 to Route 24	6.4	R2	$9,200,000 Campbell Secondary	Reconstruct 2-lane roadway

[1] – Lyn=City of Lynchburg; Amh=Amherst County; Bed=Bedford County; Cam=Campbell County

[2] – R=rural cross-section; U=urban cross-section; 2,4,6=number of lanes; NA=not applicable

[3] –Total estimated project cost in 2005 dollars. The funding class indicates which category of VDOT funding would apply to the improvement.

Chapter 6 – Non-Roadway Modes of Travel

Enhancing the viability of alternatives to the automobile for travel in the Central Virginia MPO is a key part of the region's transportation strategies, goals and policies which are described in Chapter 3. Expanding the reach of safe and convenient sidewalks, hiking trails, and bicycle facilities will enhance the quality of life for the region's residents by providing healthy opportunities for recreational travel as well as destination travel. Expanding the transit system to serve a wider geographic area and a wider range of patrons will create a transit system that is more self-sufficient and is a more integrated part of how people choose to get around the region. Continuing improvements to the Lynchburg Regional Airport will increase usage for this vital element of the region's attractiveness to prospective businesses. Alternatives to driving for intercity travel will be promoted through implementation of the proposed TransDominion passenger rail service. All of these improvements are important elements of the Plan, and will serve to create a more vital, balanced, efficient, and safe transportation system for the region.

6.1 Bicycle and Pedestrian Facilities

Region 2000, which encompasses the MPO area in addition to the remainder of Amherst, Bedford, and Campbell Counties, as well as the other surrounding communities, developed an extensive bicycle and pedestrian plan in 2003. This document, the Region 2000 Greenways and Blueways Plan, provides policy recommendations, design guidelines, and specific project recommendations for enhancing travel (particularly recreational travel) by walking and bicycling. Key projects from the Greenways and Blueways Plan that are partially or entirely within the MPO are listed in Exhibit 16 and shown in Exhibit 17. These projects are shown by phase – Phase I projects are intended to be short or mid-term projects, while Phase 2 projects will be realized further in the future.

Exhibit 16

Greenways and Blueways Plan Projects Within the MPO

Phase	Location	Project	Description
1	Amherst County	James River Heritage Trail Extension	Extension from Riveredge Park in Amherst County to Galt's Mill in Campbell County.
1	Bedford County	Poplar Forest Trail	Multi-use corridor from Poplar Forest to the junction of Route 221 and Elk Creek
1	Campbell County	Buffalo Creek Greenway	Multi-purpose, paved trail from Timberlake Community to Buffalo Creek Natural Area
1	Lynchburg	Ivy Creek Greenway	Primary link between the James River Heritage Trail and Forest. Beginning at Ed Page Entrance of James River Heritage Trail
1	Lynchburg	Blackwater Creek/Tomahawk Creek Trail	Trail will extend from Blackwater Creek Athletic Entrance, across Lakeside Drive, Lynchburg College, Sandusky Park and along Tomahawk Creek
2	Amherst County	James River Heritage Trail Extension	Extension to Primary Loop connection around Region 2000 and to Amelon Elementary School
2	Amherst County	North-South Connector Trail	From James River Heritage Trail near VDOT bridge to downtown Amherst, ending at high school

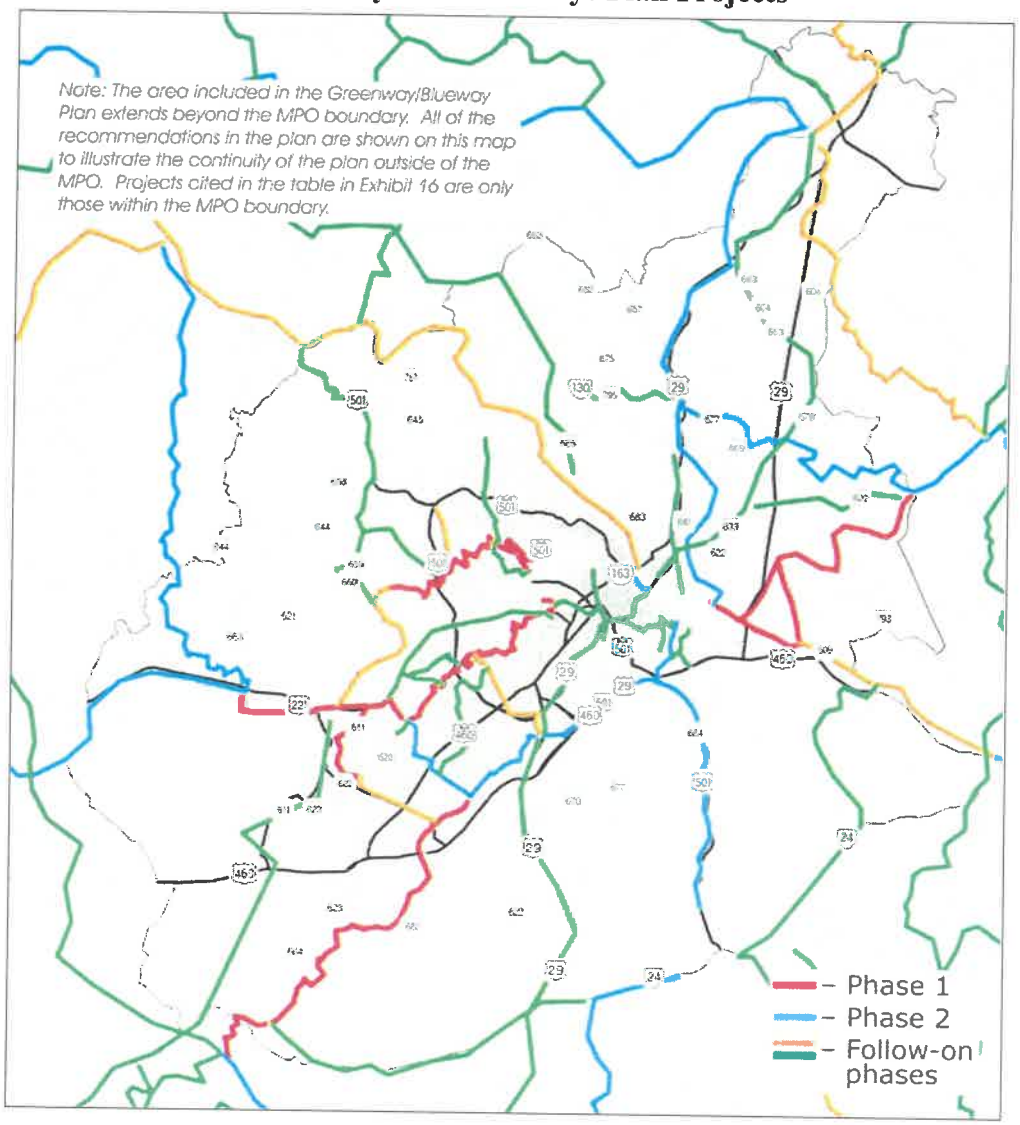
Exhibit 16

Greenways and Blueways Plan Projects Within the MPO

2	Amherst County	Downtown Amherst – Appalachian Trail Corridor	Part of Primary Loop Trail ends at James River Foot Bridge of Appalachian Trail
2	Bedford County	Poplar Forest Trail Connector to downtown Bedford	Follows route laid out by the Virginia Department of Conservation & Recreation; provides access to the Appalachian Trail from Lynchburg
2	Bedford County	Elk Creek Birding Trail	South of US 501, along the James River, between Forest and Lynchburg; follows Elk Creek to the Poplar Forest Trail
2	Lynchburg	Riverwalk	Primary connection through downtown Lynchburg between Blackwater Creek Trail and Percival's Island/Amherst County; part of City's Master Plan
2	Lynchburg	Tomahawk Creek to Buffalo Creek Connect	Links projects in Campbell County and Lynchburg
2	Lynchburg	James River to Forest	Multi-purpose corridor starting near Percival's Island and ending at Leesville Road Elementary

Exhibit 17

Greenways and Blueways Plan Projects



The multi-modal transportation corridors described in Chapter 3 (many of which are also described as roadway projects in the Tier 1 Vision Plan) will provide the region with increased opportunities for safe pedestrian travel as well as improved access to bus stops. Implementing the transportation goals and policies of Chapter 3 at the level of individual localities will also result in the development and implementation of such policies as requiring the construction of sidewalks for all new development in the region.

6.2 Transit Service

At a baseline level, transit service in the Central Virginia MPO is anticipated to grow at a modest rate of 2 percent per year and short-term transit improvements include a modest growth in route-miles, as well as limited expansion into adjacent Amherst, Bedford, and Campbell Counties. The Plan also proposes an increased emphasis in smaller "minibus" vehicles will provide additional flexibility in transit service. Additional transit flexibility should also be provided through increased demand-response service as well as deviations from fixed-routes for the region's existing fixed-route service.

Creating a transit service that is a more integral part of the region's overall transportation system will become increasingly important as the population ages and becomes more reliant in ways to get around by means other than the personal automobile. With an approach that is moderately more aggressive than the baseline described above, Greater Lynchburg Transit Company (GLTC) should seek major expansions of the transit system in the region, both within the City of Lynchburg and surrounding counties. Service to major existing and planned employment centers would serve to make transit a more viable mode of transportation for a larger percentage of the region's population. With this moderate approach, service hours would increase by a factor of two over the baseline. New transportation technologies such as real-time bus routing information (provided by global positioning systems) would provide patrons with bus arrival and routing information via cell-phone, other personal data devices, or through small-scale variable message signs at bus stops. Such systems would make transit a much more attractive system for a wider range of users. With an aggressive approach, regional transit projects would also include consideration of Bus Rapid Transit line on the Route 29 Corridor between Amherst and Altavista, as well as the Route 460 Corridor between Appomattox and Bedford City, with a major hub near the Lynchburg Airport. A system of park-and-ride facilities and extensive feeder bus service would serve to make this type of service more attractive to riders. With the aggressive approach, expansion of the system's service would increase by over four times. Exhibit 18 provides information on these various transit options.

Exhibit 18

Transit Service Scenarios

	Baseline Service	Moderate Approach	Aggressive Approach
Service Characteristics			
Service Hours (yearly average, thousands of hours)	85	154	366
Average number of operating heavy duty buses	26	51	122
Average number of operating minibuses	8	9	21
Number of replacement heavy duty buses (over 20 years)	52	78	116
Number of replacement minibuses (over 20 years)	61	29	92
Number of new heavy duty buses for service expansion (over 20 years)	4	40	229
Number of new minibuses for service expansion (over 20 years)	8	7	41
Costs (thousands of dollars)			
Operating Budget (20 years)	$93,545	$169,471	$402,157
Capital Budget (20 years)	$65,840	$105,280	$228,398
Bus Rapid Transit (BRT) physical improvements on Route 29 Corridor	NA	NA	$33,300
Bus Rapid Transit (BRT) physical improvements on Route 460 Corridor	NA	NA	$36,000
Replacement Staff Vehicles	$26,000	$39,000	$55,000
Transportation Technology	$5,500	$10,700	$10,700
Buildings and Equipment	$13,100	$28,100	$41,100

The approach that the Central Virginia MPO takes with respect to transit will be tied to ongoing regional goals for increasing transit service and the development of a transportation system that is more balanced across travel modes. Funding will clearly be a key concern. At the time of the adoption and publication of this Plan, there are major funding questions with respect to transportation funding at the state and federal levels, particularly for transit service. GLTC will be preparing an update to their Transit Development Plan in the next fiscal year and issues related to the level of transit service to provide in the region will be more fully explored at that time. In terms of the region's overall transportation system, and the goals and policies developed as part of the development of the Plan, a moderate to aggressive approach for expanding transit service would be most appropriate.

It is also important to recognize that transit usage is particularly sensitive to land development patterns. Moderate to high densities of employment along bus routes promotes the use of transit. Regional employment centers need to be concentrated along bus routes, particularly government and healthcare facilities. The Plan recommends that the region develop procedures to more closely align land use decisions with transportation planning, with a particular emphasis on transit planning.

6.3 Air Service

As with GLTC, the Lynchburg Regional Airport will be updating its Master Plan beginning in Fiscal Year 2006. In addition to the development of the Master Plan, regional improvements with respect to air travel include the extension of the main runway to 7,000 feet to allow for larger aircraft (for both passengers and freight) to serve the Central Virginia region. The cost of the runway extension is estimated to be $8.175 million, with $6.34 million provided by the federal government. The cost of the Master Plan update is anticipated to be $300,000, with $285,000 provided by the federal government. The airport is also seeking to become a regional authority, which is more reflective of the regional role that this facility serves.

6.4 Train Service

The importance of train service was highlighted at the stakeholder workshops that were held as this Plan was being developed. Amtrak service is currently limited to one northbound train and one southbound train per day. A balanced transportation system would be well served by the additional service that the proposed TransDominion passenger train service would provide. Continued support for this service is a key recommendation of this Plan.

Chapter 7 – Locally Funded Projects

The City of Lynchburg Capital Improvement Plan (Fiscal Years 2006-2010) incorporates a number of significant roadway improvement projects. These are shown in Exhibit 19. Note that repairs to the Rivermont bridge over Blackwater Creek are also included in the City's Capital Improvement Program. Funding in the amount of $1.76 million (of the total estimated cost of $4.1 million) was included in the recently passed federal transportation legislation. Several other local projects that are not funded as of the publication date of this document are shown in Exhibit 20; they are indicated as locally funded projects incorporated in the Vision Plan.

Exhibit 19

Locally Funded Projects -- Financially Constrained

Map Key	Juris-diction [1]	Project Location	Length (miles)	Proposed Typical Section [2]	Estimated Cost/ [3]	Description
L32	Lyn	Atherholt Road Extension -- Existing Atherholt Road to Lakeside Drive [4]	0.24	U2	$901,000	Contruct 2-lane roadway
L33	Lyn	Old Graves Mill Road Extension -- Existing Old Graves Mill Road to Graves Mill Road	0.28	U2	$2,400,000	Construct 2-lane roadway
L39	Lyn	Irvington Springs Road -- Beacon Hill Place to New Britain Drive	NA	U2	$345,000	Reconstruct 2-lane roadway

[1] – Lyn=City of Lynchburg; Amh=Amherst County; Bed=Bedford County; Cam=Camplbell County
[2] – R=rural cross-section; U=urban cross-section; 2,4,6=number of lanes; NA=not applicable
[3] – Total estimated project cost in 2005 dollars.
[4] – City staff indicate that this project may be shifted at a later date (as part of an MPO-adopted amendment to this Plan) to the Financially Constrained Plan in order to be eligible for state and federal funds.

Exhibit 20

Locally Funded Projects – Vision Plan

Map Key	Juris-diction [1]	Project Location	Length (miles)	Proposed Typical Section [2]	Estimated Cost/ [3]	Description
L34	Lyn	Lynchburg Expressway (Route 501) interchange at Timberlake Road (Route 460 Business)	NA	U2	$800,000	Re-locate eastbound ramp terminus to align with Wards Ferry Road
L35	Lyn	Wiggington Road -- Marguerite Drive to Lynchburg Expressway	NA	U2	$1,500,000	Reconstruct 2-lane roadway
L36	Lyn	Old Graves Mill Road -- south of Robin Drive	NA	U2	$1,300,000	Reconstruct to 3 lanes
L37	Lyn	Greenview Drive -- vicinity of Lighthouse Drive	NA	U2	$120,000	Construct turn lanes

[1] – Lyn=City of Lynchburg; Amh=Amherst County; Bed=Bedford County; Cam=Camplbell County
[2] – R=rural cross-section; U=urban cross-section; 2,4,6=number of lanes; NA=not applicable
[3] – Total estimated project cost in 2005 dollars.

Appendix A – Federal Planning Requirements

The Transportation Equity Act for the 21st Century (TEA-21), enacted by the U.S. Congress in June 1998, describes transportation issues that metropolitan area transportation plans should address. One key requirement is that seven specific planning factors be considered in the development of the Plan. For the 2030 Transportation Plan, the federal planning factors were incorporated into the discussion that took place in developing area-wide transportation goals and objectives. Based on this process, the planning factors were incorporated into both the policy and project aspects of the Plan both early and throughout the process.

A.1 Support the Economic Vitality of the Metropolitan Area, Especially by Enabling Global Competitiveness, Productivity, and Efficiency

Throughout the development of the Transportation Plan, the economic vitality of the Lynchburg region and its relationship to the transportation system was the focus of public input into the process and the development of transportation improvements. Projects in the transportation plan related to economic development include:

- Lengthening the primary runway at the Lynchburg Regional Airport to accommodate larger airplane sizes for passengers and freight
- Widening Route 460 between Route 501 (Campbell Avenue) and the Route 29 Bypass in order to provide for better connections to major activity centers in the region from major national routes such as Routes 29 and 460
- Promoting increased intercity passenger rail service
- Promoting economic vitality is a key component of the region's transportation goals and objectives

A.2 Increase the Safety and Security of the Transportation System for Motorized and Non-Motorized Users

Travel safety was incorporated into the project prioritization process to ensure that improvements in corridors that experience a relatively high number of motor vehicle crashes were addressed through projects in the Plan. Projects to address motor vehicle safety include the Candlers Mountain Road widening, the Midtown Connector projects, the interchange at Routes 501 and 221, improvements to Route 811 in Bedford County, and the reconfiguration of the intersections of Route 677 and Route 680 with Route 738 in Campbell County. Pedestrian and bicycle safety will be addressed through the construction of projects in the Plan that are also in the Region 2000 Greenways and Blueways Plan. VDOT policy of considering bicycle and pedestrian needs on all new roadway projects will also serve to ultimately increase safety for all modes of travel. Projects that will incorporate significant features for bicycle and pedestrian safety include the Midtown Connector projects. Improved pedestrian access to the River Ridge Mall area with the Candler's Mountain Road project will also enhance safety for those who walk or take transit to this major regional attraction.

A.3 Increase the Accessibility and Mobility Options Available to People and for Freight

Accessibility and mobility options will be increased by the multi-modal elements of the Plan. Improved roadway access serves cars, buses, social service transportation, and trucks. Substantial increases in accessibility are provided by several road projects in this plan, including the Route 460 improvements between Route 501 and the southern terminus of the Madison Heights Bypass, improved roads leading to downtown Lynchburg such as the Midtown Connector, and improvements to roads in major commercial areas such as Candler's Mountain Road. Inter-city mobility will be enhanced by the proposed TransDominion Rail service and improvements to the Lynchburg Regional Airport. Sidewalk and transit improvements on major corridors, particularly in the City of Lynchburg, will also serve to enhance the overall mobility of the Lynchburg region's residents.

A.4 Protect and Enhance the Environment, Promote Energy Conservation, and Improve Quality of Life

By alleviating congestion and improving multi-modal transportation service and connections, the Plan will promote energy conservation and improve the quality of life in the Lynchburg region. Upgraded roadways will reduce congestion, enhance travel safety, and improve access to and use of non-automotive modes of travel. Reduced congestion, along with upgrades to transit service, will reduce fuel consumption and improve air quality. The Plan addresses several of the major congestion areas in the region, including the Candler's Mountain Road area and the intersection of Routes 501 and 221 on the west side of the City.

The environment will also be protected and enhanced by projects that seek to enhance the viability of geographic parts of the region that are already developed. The recommended actions and policies of this Plan were developed, in part, to consider the effects of transportation policy decisions on land use and development and to support regional land use plans. Examples of projects that support overall land use goals include those that improve access to the Lynchburg downtown and other developed areas such as Candler's Mountain Road. Region 2000 also has plans to follow-up the development of the Plan with a detailed analysis of the interaction between land use and transportation; several key goals being to reduce overall travel in the region and increase the viability of transit.

All of the Transportation Plan projects have been subjected to a planning-level review of social, economic, energy, and environmental impacts. In addition, as part of the development of both the vision and constrained plans, those projects that were judged to have unacceptably high environmental or community impacts were removed from consideration. Prior to construction, all projects will be subjected to more detailed studies with respect to their impacts on the natural and man-made environment.

A.5 Enhance the Integration and Connectivity of the Transportation System, Across and Between Modes, for People and Freight

Recommended improvements in the Plan will enhance the integration and connectivity of the various travel modes in the Lynchburg region. Improvements to the Midtown Connector will upgrade access to the Kemper Street Station for rail and bus travelers. Sidewalks in areas where transit service is provided will enhance the safety of connections to transit travel.

A.6 Promote Efficient System Management and Operation

The Plan's recommendations will increase the efficiency of management and operations of the Lynchburg area transportation system. Key features of the Plan which will be implemented through local jurisdiction planning agencies include a focus on preserving the functionality of existing transportation corridors through access management and land use controls. Transit plans include expansion of service that will be tied to regional land use policies.

A.7 Emphasize the Preservation of the Existing Transportation System

A key feature of the Plan, as well as VDOT funding priorities, is the preservation of the existing transportation system. The number of projects in the Financially Constrained Plan is limited by the need to divert currently limited financial resources to ensure that the existing system is well-maintained. Many of the projects in the Plan also focus on preservation of the existing system as well as safety by reconstructing existing roadways without adding more travel lanes. In addition, both transit and air transportation improvements include funds to both preserve the existing service as well as to enhance its efficiency.

A.8 Environmental Justice

In addition to considering the seven planning factors, this Plan included an emphasis on several other factors, including consideration of disproportionate impacts on minority communities. The Plan was developed as part of a process that takes into account the requirements of Presidential Executive Order 12898 on Environmental Justice. This order was signed in 1994 and augments Title VI of the Civil Rights Act of 1964 by providing additional specifics on prohibiting discrimination based on race, color, and national origin. The Executive Order applies to persons belonging to Black, Hispanic, Asian American, American Indian, Alaskan Native, as well as low-income groups. Environmental justice principles require that all potentially affected communities participate in the decision-making process; minority and low-income populations are not prevented from receiving the benefits of transportation improvements; and disproportionately high and adverse impacts on minority and low-income populations are avoided, minimized, or mitigated.

Throughout the development of the Plan, efforts were made to reach out to minority and low-income groups by holding meetings at locations that were accessible to all citizens by transit, walking, or car. Stakeholder meetings also included locations in minority communities.

Executive Order 12898 also requires that transportation planning efforts avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority and low-income populations. Many projects in this Plan, including those suggested by the general public early in the study, were developed to increase accessibility to minority and low-income areas while being sensitive to the potential impacts of these projects. Such projects include those that increase accessibility to the downtown, as well as proposals to extend transit service and develop a regional transit service. These projects will serve to increase mobility options for low-income and transit-dependent populations.

To the maximum extent possible, projects that were judged, at a planning level, to have disproportionately high impacts on minority and low-income neighborhoods were dropped from consideration, thus avoiding the impacts. As part of the environmental overview process for all Transportation Plan recommendations, the potential impacts of transportation projects were identified. As these projects are implemented, Environmental Justice principles will be applied throughout the project development and design process to minimize and/or mitigate disproportionately high impacts on minority and low-income groups.

A.9 Intelligent Transportation Systems

Intelligent transportation systems (ITS) is the coordination of new technologies, improvements in information and communications systems, and conventional surface transportation infrastructure. ITS improvements have the potential to improve the efficiency and safety of the regional transportation system, sometimes at significantly less cost and/or with fewer negative impacts. ITS recommendations for roadways in Central Virginia include continued implementation of traffic signal improvements such as video-based signal actuation and provision of traffic information to motorists through variable message signing at key locations. Over the medium to long-term, the addition of ITS to transit service to provide for real-time tracking of bus movements to be provided to patrons via information kiosks, cell phones, bus stop signs, and/or through the Internet is a recommendation of the Plan.

Appendix B – Public Participation Process

B.1 Public Input Process

Public input into the development of the Central Virginia 2030 Transportation Plan (the Plan) was obtained at the outset of the study process and at key milestones in the development of the Plan. Six stakeholder forums were held during the week of May 24, 2004 (including one meeting that was advertised and open to the general public), and one was held in July of 2004. A public meeting was also held on September 28, 2004 to solicit input on projects that should be considered in the Plan. A public meeting to review preliminary transportation goals and objectives and projects for consideration in the Plan was held on February 23, 2005.

B.2 Description of Stakeholder Forum Input

Additional input on transportation concerns and needed transportation improvements was gained through a series of stakeholder forums that were held with various interest groups in the region as well as with the general public. There were workshops that were held in May of 2004 with an additional meeting in September 2004. The meetings were held in Downtown Lynchburg's Galleria behind City Hall. Stakeholders representing the following interest areas were identified by staff from the City of Lynchburg, Campbell County, Amherst County, and Bedford County:

- Local business and industry
- Government agencies
- Community associations
- Historic preservation
- Environmental protection
- Bicycling and walking advocacy groups
- Minority groups
- Central Virginia Transportation Services Coalition

A total of 63 persons were invited to one of five forums by direct letter. The sixth session was open to the general public and was advertised in local newspapers and radio. While the forums were organized by interest area and stakeholders were invited to a specific forum, stakeholders were invited to attend any of the sessions that would meet their schedules.

The format for each forum was generally the same; some modifications were made in terms of the discussion format, however, based on the number of participants. As participants entered the meeting, each was given an agenda as well as a questionnaire on the Central Virginia transportation system. This questionnaire asked participants to rank fifteen aspects of the regional transportation system, including:

1. Roadway Condition/ Maintenance
2. Rush Hour Traffic Congestion
3. Mid-Day/Weekend Traffic Congestion

4. Traffic Signals/Road Signs
5. Need for New Roads/Roadway Pavement
6. Commercial Trucks
7. Traffic/Truck Noise
8. Tourist/Non-Resident Traffic
9. On-Street Parking
10. Sidewalks/Bicycle Paths
11. Local Bus Transit
12. Intercity Bus
13. Intercity Passenger Rail
14. Freight Rail Service
15. Air Travel

Following introductions, the study team provided a brief description of the transportation plan development process and the schedule. The general discussions were structured so that the study team could collect participant thoughts in terms of:

1. General transportation system conditions
2. Strengths and weaknesses in the existing transportation system
3. Opportunities for improving the transportation system and any trends that pose potential concern to the system

While many of the discussions touched on more than one aspect of the transportation system, the content of these discussions is summarized by each of the fifteen aspect areas for ease of organization and understanding. These summaries are included below.

Roadway Maintenance and Conditions

- Roadway maintenance is more of a concern on secondary roads than on major thoroughfares.
- Many of the maintenance concerns relate to the lack of funding.
- In general, however, overall roadway conditions in the region are not a major concern.
- The entrance ramps on the Route 29 Expressway were noted as a problem, specifically the short or non-existent merge areas.
- Many of the median crossovers in the region are difficult to see and have insufficient deceleration lanes. A need for better design of median crossovers was noted as a concern.
- It was noted that service roads should, in many instances, be constructed by developers to aid in traffic flow.
- Participants cited a concern about roadway aesthetics and the visual quality of the public spaces in roadway corridors. This concern was particularly acute for historic areas. Roadways should seek to support a consistent look within individual neighborhoods, be compatible with their surroundings, and support the distinctiveness of various areas.
- The group expressed concern about funding levels for roadway maintenance keeping up with needs. Maintenance issues in the region have been more acute over the past few years.

- In the more rural portions of the region, the number of unpaved roads was cited as a concern. The impacts of these unimproved roads on school buses was also cited.
- Route 29 in Madison Heights was noted as a particular problem location. The aesthetics and upkeep of this roadway's median was cited as a problem.
- The design of entrances from public streets into parking lots was cited as a regional problem. Improved definition of these entrances through design and signing was cited as a need.
- Participants cited the following locations as areas with maintenance issues:
    - Route 24
    - Wards Road (Route 29) south to Route 24
    - Leesville Road
    - Wards Ferry Road (the lack of shoulders was cited as a concern)
    - Route 29 Expressway from Wards Road to the James River (geometrics, safety issues, pavement condition)
    - Several downtown streets including Church, Main, and Commerce Streets
    - Route 29 through Madison Heights
- The lack of a direct connection to the interstate system was cited as a problem.
- It was noted that the condition of roadways in the region is generally good.
- The time needed to perform roadway projects is too long.
- Comments were made indicating that roadway maintenance has been worsening over the years. One participant stated that it is taking longer to fix potholes than it used to.
- Manhole covers were also cited as a roadway maintenance concern. It was stated that appropriate procedures are often not being followed in terms of leveling manhole covers with the surrounding pavement, resulting in uneven pavement which is a concern for cars, pedestrians, and bicycles.

Rush-hour Traffic Congestion

- The group believed that traffic congestion in the region as a whole is not a big issue; however there are localized areas where congestion is a concern. These are: Route 29 in Madison Heights, Wards Road, Route 221 Forest, Route 221 at Route 501, Route 29 South of the airport, Lakeside Drive in the City
- There is a major short-term congestion concern in the region along Route 29 south of Route 460 and the airport. This is because when Madison Heights Bypass opens and puts traffic onto Route 460, the major tie-ups in traffic will occur on this stretch of Route 29. There is a concern about the use of secondary roads for cut-through traffic (Route 811 was cited as example of cut-through traffic using a road that is not designed to accommodate these volumes).
- Many in the group believed that congestion could be mitigated in many areas with better traffic signal coordination and operations. This was believed to be a way to address congestion now when funds for transportation are limited.
- Areas of concern include: Timberlake Road, Timberlake Road at Wards Ferry Road, Wards Road, Lakeside Drive, Route 221 in Forest, and the area around Memorial Drive, Langhorne Road, and Park Avenue.

- Generalized concerns were noted on all of the region's commuter arteries; with particular concerns on Fridays and in rainy weather conditions.
- Areas that were cited as experiencing problems with rush hour traffic congestion include:
    - Wards Road
    - Route 221
    - Route 29 in Madison Heights
- Langhorne Road (near the hospital and EC Glass High School)
- The following locations were cited as areas of concern with respect to rush hour traffic congestion:
    - Route 29 in Madison Heights
    - Route 29 Wards Road
    - Route 221 in Forest
    - Candlers Mountain Road
    - Coffee Road (a particular concern was recent growth in traffic on this road)
    - Route 811 between Route 460 and Route 221 (including the intersections at either end of this corridor)
    - Route 221 extending from Enterprise Drive to the edge of the urbanized area (it was noted that this road should be widened all the way to the City of Bedford)
    - Enterprise Drive through Wyndhurst (peaking associated with schools and company shift changes was noted as an issue)
- Concerns were also noted about future traffic congestion on Route 29 in Amherst County north of the Town of Amherst. Once the Madison Heights Bypass is completed, this area will be at the end of a stretch of limited access on Route 29 (comprising both the Madison Heights Bypass and the Town of Amherst Bypass). Workshop participants noted the development pressures that frequently occur at either end of limited access sections of roadway. These development pressures could create future congestion north of the Town of Amherst.
- It was noted that new development in Campbell County is creating increased traffic on English Tavern Road (Route 738). This increase in traffic is expected to continue.
- Regional roadways that were cited as experiencing rush hour traffic congestion include:
    - Route 29 in Madison Heights
    - Interchange at Route 501 North and Route 29 South
    - Intersection of Route 221, Old Forest Road, and Route 501 Expressway
    - Wards Road
    - Candlers Mountain Road
    - Timberlake Road
- Route 501 through Rustburg
- It was noted that, while there are areas of congestion, overall traffic congestion in the region is limited. This is particularly true in comparison to larger urban areas such as Northern Virginia or the Tidewater region.

- Traffic congestion and aggressive driving was noted as a concern on Route 221 (Lakeside Drive and Forest Road) from inside the City of Lynchburg (Old Forest Road) to Enterprise Drive.
- Other roadways that were noted to experience rush hour traffic congestion include: Wards Road, Timberlake Road, Route 29 in Madison Heights, 5th Street, and Memorial Avenue.

Off-peak Traffic Congestion

- Comments on this topic were generally similar to those for rush hour traffic congestion. Localized areas that were cited as experiencing off-peak and weekend congestion include: Candlers Mountain Road, Wards Road, and Wards Ferry Road.
- It was noted that students at Central Virginia Community College have trouble getting onto both Wards Road and Wards Ferry Road during mid-day periods. It was suggested that traffic counts could be performed on this road to help quantify some of this congestion.
- Another area that was cited as experiencing substantial off-peak congestion is Langhorne Road. This congestion affects accessibility to Lynchburg General Hospital.
- Problem areas include: Wards Road, Timberlake Road, Route 29 in Madison Heights.
- A general concern was provided with respect to the delays that occur at all-way stop signs.
- Areas that were cited as experiencing problems with off-peak traffic congestion include:
    - Wards Road
    - 5th Street (particular issue with trucks). A need to re-configure 5th Street was also cited by the group.
    - 7th Street
- A number of the locations cited above were also noted as areas with congestion problems during off-peak periods (including Route 29 in Madison Heights, Wards Road, and Enterprise Drive). Other locations that were cited include:
    - Timberlake Road
    - Route 460 between Timberlake Road (Route 460 Business) and Route 811
    - Route 29 in Campbell County down to Foster Fuels (Route 685)
- New facilities and continued growth at Liberty University were also noted as activities that will create increased traffic congestion, often during off-peak periods.
- Many of the same locations listed above were also cited as experiencing off-peak congestion. These include Wards Road, Timberlake Road, Route 501 in Rustburg (particular issue at this location is mid-day traffic associated with schools).
- Memorial Avenue in Lynchburg was cited as an additional location experiencing off-peak congestion (due to school and fast-food restaurant traffic).

Traffic Signals and Roadway Signs

- Traffic signal operations were cited as a problem on Lakeside Drive, particularly in the evening rush hour.
- It was noted that there is an overall need in the region for advance signs at traffic signals ("Signal Ahead").
- Overall directional signage in the region was cited as an area of concern. Both the roadway network and the signage make the region's roadway system confusing.
- Specific concerns were cited with respect to the traffic signal on Candlers Mountain Road at River Ridge Mall entrance. It was felt that the left turn signal for westbound traffic turning left into the mall has too little signal time.
- Traffic signals on Timberlake Road were cited as problematic, particularly the lack of coordination. Similar concerns were noted with respect to the traffic signals on Enterprise Drive (the closely spaced signals near the intersection with Route 221).
- There was general agreement among the group that signal operations in many corridors (with particular concerns on Route 29 in Madison Heights) provide too much priority to side streets at the expense of the much higher traffic volumes on the main street.
- There was general agreement within the group that region's road system is very confusing, and that it is particularly difficult to provide directions to non-residents. It was noted that these problems result from streets that change names, routes with multiple and overlapping numbers, and many signs with confusing route designations.
- A particular area of concern cited was the insufficient signal green time for the southbound left turns at the traffic signal at Candlers Mountain Road and Wards Road.
- A need was cited to better accommodate bicycles at traffic signals (provide a mechanism for bicyclists to trip the signal).
- A need was cited for count-down signals for pedestrians, as well as pedestrian-only traffic signal phases in the Downtown (as in the past).
- There was discussion and conflicting opinions of count-down signals for motor vehicles that one participant noted he had seen in Germany.
- Participants noted a need to update the current signage system because the current system is based on old travel patterns.
- It was also recommended that the traffic signal that was removed at the intersection of Madison and 5th Streets be re-installed.
- The number and spacing of traffic signals on Timberlake Road was noted as a problem.
- Regionally, it was noted that improvements in traffic signal timing and coordination are needed. A lack of funds needed to make many of these needed improvements was cited as a problem. The time needed to install new traffic signals was also cited as a problem.
- Workshop participants noted a regional need for better and more consistent signage. A system of color-coded wayfinding signs was suggested.
- Signal timing was cited as a concern on Wards Road, Candlers Mountain Road, Timberlake Road, Wards Ferry Road, and Leesville Road).

- Participants noted that the region's signage is confusing due to the complexity of the road system and overall too many signs. An overhaul of signage is needed to rationalize and simplify signage.
- The timing of the left turn from Route 221 northbound onto Perrowville Road is too short.
- A comment was made that traffic signal features need to ensure their usefulness and safety for users of all levels of ability. Therefore, traffic signals should include audible features for the blind and access to push-button controls for those in wheelchairs.
- It was noted that a pedestrian-only phase used to be included in the traffic lights in the Lynchburg downtown and they were removed (presumably to provide for greater throughput of motor vehicles). The removal of these pedestrian-only signal phases, along with the addition of right-turn-on-red has resulted in a less safe and pedestrian-friendly environment.
- One participant questioned the need for a left-turn restriction at the intersection of Park Avenue and Langhorne Street. He indicated that this may be a holdover from the past when it was needed, but that this wide intersection did not currently require this restriction.
- It was noted that both the roadway and the traffic signals on Candler's Mountain Road and Wards Road and the shopping areas along both roads do not provide for safe pedestrian travel. The lack of pedestrian amenities was cited as a major problem in these areas.
- The lack of signage directing motorists to the Route 29 Expressway from the area around Kemper and 12th Streets was noted as a problem.
- Maintenance of signs was noted as a problem, with many signs being unreadable due to overgrowth of vegetation.
- The confusion of road signs in the region was also noted as a concern. The inconsistent placement of signs was noted as a problem, and the application of universal standards on the design and placement of signs was suggested as a solution.

Commercial Trucks and Traffic Noise

- Truck traffic was cited as a concern on the following roads: Route 29 in Madison Heights, Route 501 through the region from Rustburg north to Big Island (including Route 501 Boonsboro Road).
- It was noted that truck traffic on Route 501 is and has been a major regional issue and a route for trucks has been developed.
- Wise Carver Road in Campbell County was noted as a short-cut between Route 501 and Route 29. Because this is a secondary road, it cannot be designated as an official truck route, but it is being used as one now.
- Problems with respect to the number of commercial trucks were noted on: Route 29 North in Madison Heights, and on Route 501 from south of Rustburg to Route 501 north to Big Island.
- A need for enforcement of sound ordinances was cited (engine compression brakes or "jake" brakes and car stereo systems were cited as problems).

- Truck traffic was cited as a concern on Church Street and on Route 29 in Madison Heights.
- The number of trucks on Route 29 both north and south of the City of Lynchburg was cited as a problem. A particular concern with respect to truck traffic is Route 29 south of Route 460 (near and south of the Lynchburg Airport) when the Madison Heights Bypass is complete. This stretch of roadway will then represent the transition between many miles of Route 29 on limited access (extending from the Town of Amherst, around the Madison Heights Bypass, and on Route 460) and the at-grade signalized intersections along Route 29 through Campbell County.
- Other roadways with concerns about truck traffic include:
  - Route 221 in Bedford County
  - Timberlake Road
  - Route 811 in Bedford County
- Two areas were cited with respect to truck noise:
  - Route 29 in Amherst County
- Route 29 in Campbell County extending to Route 685 (at Foster Fuels)
- Participants believed that the confusing roadway signage in the region results in many lost trucks. A need for truck routes was cited.
- Methods should be sought to shift more goods movement onto rail.
- Callohan Road in Campbell County was cited as a particular problem with respect to trucks. Trucks use this road as a cut-through and short-cut to Route 460.
- Route 60 in Amherst County was also cited as a road where trucks are a concern.
- The use of engine compression ("jake") brakes was cited as a problem.
- The damage to roadway pavement, entrances, and sidewalks caused by trucks and other large vehicles was noted as a concern.
- Vehicles with loud mufflers and sound systems were cited as a problem. Truck noise itself was not noted as a concern by participants.

Tourist Traffic

- This issue area was not cited as a major regional issue, but several concerns were noted. These include signage and congestion related to special events (Liberty University events were cited).
- The lack of good signage to the region's educational institutions was cited as a concern.
- It was noted that some aspects of the existing road system such as the lack of merge lanes on the Route 29 Expressway are particular problems for non-residents.
- Non-resident traffic concerns were noted as occurring infrequently, with most issues occurring around college graduation days.
- There is a need for signage on the bicycle trail showing how to get from the Blackwater Creek Trail to the Percivals Island trail.
- Two issues with respect to tourist traffic were noted:
  - Roadway signage needs to be revamped to reduce confusion for out-of-town motorists.

- Access to the stadium from the Route 29 Expressway needs to be improved.

- Tourist traffic was overall not judged to be a problem. There are minor concerns at graduation weekends in the Spring.
- Concerns listed in this category include:
  - Confusing signs in the region are often a problem for tourists.
  - It is difficult to direct people from outside of the area into the inner city and places like Lynchburg College.
  - Some problems were noted with out-of-town traffic on college graduation weekends.

Parking

- Lack of off-street parking in the downtown was cited as a concern.
- The group had a discussion about overall parking with some believing that there was not enough parking and others believing that downtown parking was sufficient. There was general agreement that, due to the topography of the Downtown, sufficient parking is needed for each of the various street levels of the Downtown.
- More and better signage for parking is needed.
- One participant noted that the off-street parking in the Downtown could be better utilized on weekends and some of the private garage owners have indicated a willingness to open on weekends if requested by the City for events.
- A concern was cited about whether there would be sufficient parking available for the Downtown Fine Arts Center.
- Parking issues in the City are almost entirely related to the downtown. The group did not have any other specific comments related to parking issues.
- Parking comments were directed entirely to downtown Lynchburg. Construction downtown has resulted in temporary losses of on-street parking as well as difficulties for some in getting to parking areas. A need for better signage to parking areas was cited. Sufficient parking for Amazement Square was cited as something that needs to be assessed.
- Several participants indicated that adding on-street parking should be considered for 5th Street as part of overall plans for this road.
- It was believed that the parking concerns are more of a signage issue than one related to overall parking supply.
- An overall lack of accessible parking was cited as a problem. It was stated that ADA requirements state that parking must be near both an accessible route (roadway access) and an accessible building entrance.
- Parking concerns were noted for both the downtown as well as residential areas in the City.
- Parking and access for patrons to the Courthouse downtown was cited as a problem. These problems include the location of parking (not near the Courthouse), the condition of sidewalks between parking areas and the Courthouse, and the lack of a traffic light with a pedestrian signal for those walking across the street to the Courthouse.

Sidewalks and Bicycle Paths

- An overall lack of sidewalks in the region was noted as a significant concern. Sidewalks in industrial parks were cited as a need so that workers could take walks during lunch breaks.
- Lack of connectivity and continuity in the region's sidewalks and hiking/biking trails was cited as a concern.
- The lack of parking near the Blackwater Creek Trail (particularly the Langhorne Road entrance near the Greek Church) was cited as a problem.
- There is a need for improved landscaping for both roadside areas and for sidewalks. There is also a need for visible, identifiable, and attractive signage to bike and pedestrian trails.
- Many in the group believed that development standards should include sidewalks.
- Participants noted an overall lack of sidewalks in the region. Lack of sidewalk maintenance was also cited as a concern. Handicapped access on sidewalks was also noted as a concern.
- A need to expand the trail system for bicycles was cited. The lack of a grid system in Lynchburg means that bicyclists do not have the option of using smaller parallel streets to get to their destinations. This makes the need for an expanded, connected system even more important.
- Narrow roads were cited as a major deterrent to bicycle travel. A lack of warning signs about bicycles was also noted.
- It was suggested that all new road designs account for bicycles.
- Walking trails from the Tyreanna area down to the river (including along Rockwell Street) were noted as a need.
- An overall need for better pedestrian and bicycle access to the river was noted.
- The complete lack of pedestrian access options to the River Ridge Mall was cited as a concern.
- Pedestrian and bicycle trails were of major interest in this workshop. The following comments were made by participants:
    - An increased emphasis on pedestrian safety is needed, particularly in the City of Lynchburg.
    - The river trail system needs to be expanded.
    - There need to be additional rails to trails efforts in the region.
    - Efforts need to focus on connectivity in the bicycle and pedestrian networks.
    - The importance of sidewalks cannot be over-stated. Sidewalks play an important role in defining the distinctiveness of neighborhoods. They also create a sense of community. They are of key importance in neighborhoods with children.
- Workshop participants noted a need for more sidewalks throughout the region. Specific locations cited include Route 221 and along Route 29 in Madison Heights.
- Workshop participants stated that there is an overall need for more sidewalks and pedestrian/bicycle trails in the region. This need is in both residential and

commercial areas. Particular areas cited included Candlers Mountain Road and Wards Road. Sidewalks in the Town of Amherst were also cited as a need.

- It was suggested that a sidewalk ordinance should be considered for Amherst County.
- Many concerns with sidewalks were noted by participants in this workshop. These include:
  - The lack of a curb cut for wheelchairs for one side of the access to the new Lynchburg Stadium.
  - Overall poor condition of sidewalks, and a lack of understanding of how difficult it is for disabled persons to navigate sidewalks that are in poor condition. Locations where sidewalks cross driveways were noted as particular problems. The maintenance of sidewalks appears to be a very low regional priority.
  - Sidewalks beginning and ending unexpectedly, and for no apparent reason, are a major problem.
  - Poor design and location for many curb cuts. Examples that were cited of unsafe conditions include locations where those in wheelchairs have to navigate on the street at or near intersections in order to gain access to a curb cut.
  - An important safety feature of curb cuts for blind persons is a change in texture or a slight change in elevation to demarcate the line between the sidewalk and the road. It was noted that when curb cuts flow smoothly to the road, it is difficult for blind persons to identify road edges.
  - Where sidewalks are not located, it was stated that there are often insufficient roadway shoulders for pedestrians. Where such shoulders are provided, they are often not maintained sufficiently.
  - Issues related to the historic features, such as cobblestones, on the mobility of disabled persons was noted as a concern. The need to meet ADA requirements for historic areas was emphasized.
  - The importance of sidewalks and overall accessibility for all persons was noted as a concern that goes beyond physically disabled persons. The importance of curb cuts for baby strollers was also cited. The increasing need for such amenities over the 26-year horizon of this long-range plan was also cited as of critical importance because of our aging population.

Local Bus Transit

- The group generally believed that the existing service is adequate -- the major concerns were financial threats to continued service.
- Consideration should be given to moving the transit hub from the Plaza, or the land use and overall activity needs to be improved at the Plaza.
- A need for additional flexibility in transit services was noted.
- Connections between land use and transit service was cited as a need. Of particular importance is the need for transit service to focus on service to hospitals, health department, offices and industrial areas, and the Central Virginia Community College.

- Participants noted a need for increased geographic coverage with the existing fixed-route transit system. Service to the Tyreanna area was noted as a need.
- Consideration of moving the transit hub from the Plaza was noted as a major need. Alternatives would be to re-design the bus hub and reinvigorate the area.
- Private commuter bus service to park-and-ride facilities was noted as a possible solution to congestion on commuter routes.
- Workshop participants believed that the current system is disjointed and needs to be regionalized. The system would also benefit from increased diversity of service. Effort should focus on making transit a mode of choice rather than one of necessity as it currently is.
- The transit service would benefit greatly from re-development of the Plaza area where the hub is located.
- Shuttle service between the Plaza and the downtown should be considered.
- Workshop participants noted the lack of bus service in Forest as a problem.
- The desire for a regional bus service covering all of the jurisdictions in the metropolitan area was expressed.
- Participants stated that the bus system should explore more flexibility in bus sizes and types of service.
- The design of bus stops, sidewalks near bus stops, and the roadway at bus stops in the region should be assessed and improved.
- The lack of a regional bus system was cited as a concern.
- Several participants indicated that the general lack of service in the counties and the limited service in the City is a problem for the region. It was suggested that demand-response service and other types of service be considered.
- The location of the bus service hub (at the Plaza shopping center) was noted as a problem since this shopping center has, over the years, become less of an activity center. A major revitalization of this area or a shift in the location of the hub were suggested.
- Long-term consideration of higher level service such as bus rapid transit lanes or light rail was suggested.
- This was noted as a big transportation issue for the region. The workshop participant believed that the existing system is not adequate and that service needs to extend to key employment destinations in the counties surrounding Lynchburg.
- Participants provided the following comments on local bus transit:
    - Service areas for the fixed-route service need to be expanded.
    - A regional system is critical – it is currently impossible to live outside of the city if you do not have access to a car.
    - There is a need for more paratransit service.
    - Key areas with needs for transit access include employment centers, medical facilities, schools and universities, and social service facilities.
    - One single hub and transfer point is too limiting. An additional transfer point should be considered, certainly within the 2030 horizon of this transportation plan.
    - Over the 2030 horizon year of this transportation plan, it will be important to develop more creative routing options and to consider smaller buses and more flexible services.

- Comments were made on several aspects of the current hub at the Plaza. These include:
    - Lack of ADA compliance at this location – a difficult problem because the land is privately owned.
    - Major safety concerns as buses line up on along a busy street. Pedestrian cross the street by walking between the buses and therefore have difficulty seeing traffic. An overall re-design for this hub facility in badly needed.
    - There are real and perceived crime issues resulting in significant personal security concerns.

Intercity Bus Service

- Security at the Kemper Street Station (where service is provided for both intercity buses and trains) was cited as a concern. The limited number of hours when staff is available was also noted as an issue.
- Workshop participants also expressed concern with respect to the reliability of the intercity bus service in terms of on-time arrival and departure.
- Workshop participants believed that the bus station move to the Kemper Street station was a positive one. The renovation of this facility was also seen as a positive accomplishment.
- Problems that were noted with respect to the existing intercity bus service include the relative infrequency of service and the routing of buses. It was noted that the service was relatively good to nearby localities such as Charlottesville or Roanoke, but connections and timing made longer trips inconvenient and difficult.
- A concern about the impact on Greyhound service of potential cutbacks in GLTC management of the bus terminal was stated.
- The lack of transit connections at times when Greyhound buses arrive and depart was cited as a concern (this is also an issue with train service listed below).
- The lack of direct connections for intercity bus service was cited. Workshop participants stated that the resulting circuitous travel, along with infrequent service, were problems.
- One participant also stated that ADA compliance in terms of providing appropriate buses for those in wheelchairs was not always followed by Greyhound and that those requiring such service were required to notify Greyhound in advance.

Intercity Passenger Rail

- The group believed that it is important to focus on synergy between modes; using bus service as feeder to rail intercity, and rail service as feeder to air service.
- The importance of intercity rail service was noted by many of the workshop participants. Intercity rail service was seen as very important because it provides a needed alternative to driving for intercity travel.
- The passenger rail subsidy that North Carolina provides in order to obtain additional service was cited as an example of a program that Virginia should seek to emulate.
- One workshop participant noted that signage is poor at the Kemper Street Station, and cited the lack of good signs directing patrons to the elevator as an example.

- The limited number of office hours at the Amtrak ticket window was noted as a problem.
- The location where the train stops was cited as a problem because it requires patrons to walk long distances back to the station and their vehicles.
- Participants believed that Lynchburg needs an increase in intercity train service. Transportation in the future requires that travelers have more choices.
- The limited service and inconvenient times of service were noted as problems with the passenger rail service in the region.
- Participants believed that the rail tracks are under-utilized. Additional service, including excursion trains, should be considered.
- Participants expressed support for the proposed TransDominion Rail service.
- The schedule of the existing train service was cited as a concern.
- Intercity train service to Richmond was cited as a transportation need. It was noted that the proposed TransDominion Rail would provide this service.
- The importance of the TransDominion Rail service was emphasized.
- The following comments were provided with respect to intercity passenger rail:
    - The lack of east-west service (i.e., to Richmond) is a problem.
    - Trains are often full, and Amtrak gives priority to long-distance travelers. Often, blocks of seats are unavailable for travelers between Greensboro and Washington within a few days of travel.
- It was noted that, within the 2030 timeframe, there is a need for a much better and more accessible train service to/from Lynchburg. Because this service needs to be built almost from the ground up, there are opportunities for building in better accessibility from the beginning.

Freight Rail Service

- The lack of intermodal facilities was cited as a concern (the closest facility is in Greensboro).
- The lack of responsiveness and competitiveness from railroads for freight service was cited as a concern.
- It was noted that the railroad tracks block access to the James River.
- The general lack of a customer focus by freight railroads was noted as a problem that adversely affects increased use of rail for the movement of goods.
- It was stated that more goods need to be moved on rail to relieve stress on roads from trucks.
- The trend towards taking up railroad track and thereby removing rail system capacity was cited as a major concern with respect to future use of railroads.
- Concerns about the interface between railroads and roads/sidewalks/bicycle facilities at railroad crossings was cited as a concern. Safety features at such crossings need to address the needs for persons of all abilities and should include audible features. All unprotected crossings in the region need to be improved.

Air Travel

- The concerns cited with air travel include the cost, level of service (number of flights), and flexibility.

- The availability of air travel was noted by workshop participants as an economic development issue for the region.
- Specific concerns about the existing air service is the limited amount of service and the high fares. Workshop participants noted that jet service at the airport is definitely a positive development.
- Many workshop participants supported jointly developing a regional airport with Roanoke in the long term.
- Participants believe that air travel from Lynchburg is too expensive.
- Comments on air travel related to high cost and limited number of flights.
- A long-term need for a regional airport (combining Lynchburg and Roanoke markets) was cited.
- Air connections to more cities was also cited as a need.
- Air travel was cited as a key economic development issue for the region. Support of the consideration of a long-term shared airport between Lynchburg and Roanoke was provided.
- Concerns stated about air travel for the region include:
    - High cost of service compared to other airports
    - Lack of transit access to airport
    - Need for connections between intercity modes
    - No ability to load power wheelchairs on airplanes (a national, industry issue)
- A participant cited the critical importance of air travel to the region in terms of providing connectivity to other places.

Other Concerns

- A regional need for commuter parking lots was noted.
- A focus on moving people without necessarily building more roads was cited as a need for the region. This would include major emphases on bicycle and pedestrian travel, increased travel efficiency through operations and signage, improved safety, and an emphasis on quality of life and the natural environment.
- Intra-regional access was cited as a major concern. Difficulties in getting to and from major regional activity centers (hospitals, schools, the Downtown, etc.) need to be addressed through improved roadway connections, re-considering turn prohibitions, and better signage.

B.3 Summary of September 28, 2004 Public Meeting

This meeting was held to provide information to the public on the transportation plan development process, describe the input that had been received to date, and solicit input on projects that should be considered in the Plan. Approximately 15 people attended this meeting. The transportation planning process, including how projects proceed from conception through inclusion in a transportation plan and then ultimately to construction, was the subject of much of the discussion at this meeting. Issues related to how projects are funded in Virginia was also a topic of discussion at the meeting. Additional discussion revolved around the need for additional focus on non-automotive modes of travel, including bicycle trails, sidewalks, and increased transit service.

B.4 Summary of February 23, 2005 Public Meeting

The purpose of this meeting was to solicit input on the projects and policies under consideration for the 2030 Transportation Plan. Meeting displays summarized the proposed transportation goals and objectives for the region, as well as all of the projects that were under consideration for either the Financially Constrained Plan or the Vision Plan. Approximately 25-30 people attended this meeting and provided input. This input is summarized below:

Bikeways

- Overall priority needs to be given to the bikeway system, particularly trails connecting Appomattox to James River Heritage Trail, Peaks View Park, Lynchpin Industrial Park, Poplar Forest, D-Day Memorial in Bedford.
- Connect above trail to a new trail system in Wyndhurst area
- Extend trail to College Lake via Lynchburg College and Sandusky areas
- Use abandoned Route 29 roadbed between Virginia Center for the Creative Arts (VCCA) and Sweet Briar College for biking and walking path
- Need to clear roadway shoulders more often to allow bicycle use
- All new or reconstructed roadways should include bicycle lanes
- In addition to recreational bicycle trails, need to be able to accommodate bicycles on roads so that people can ride to work (reduces auto travel)

Sidewalks

- Need for sidewalks, with crosswalks and traffic signals to support walking in commercial areas such as Route 221 (Forest Road).

Roadways

- Connecting road (extension of Route 210) between Route 29 and Virginia Fibers (located on James River in eastern Amherst County)
- Improve intersection of Route 24 and Route 501 in Campbell County
- Don't need to widen short section of Route 501 (just south of railroad track) in Rustburg
- Not necessary to widen Route 660 (Eastbrook Road/Old Furnace Road) to 4 lanes; 2-lane reconstruction is sufficient.
- Widening of Harvard Street (shown as ranked 45) should be a higher priority.
- Need to build service roads (such as recommended in the Route 221 Corridor Plan) quickly so that new businesses don't keep adding new driveways onto key roadway corridors.

General/Overall

- Need to increase emphasis on meeting the transportation needs of the disabled.
- Need to extend bus service into surrounding suburban jurisdictions

B.5 Summary of October 5, 2005 and November 17, 2005 Public Hearings

Final public hearings on the Plan were held on October 5 and November 17, 2005. Comments received at the October 5 public hearing included suggestions to further emphasize the transportation needs of the disabled by strengthening the policy statements included in the Plan. A specific comment suggested the inclusion, as a matter of policy throughout the region, of persons with disabilities in the review process for transportation designs. In response to this comment, the following was added to the Plan as a regional transportation policy and approved by the MPO:

> *Pursue and encourage the participation of persons with disabilities in reviewing all transportation improvement plans and designs to ensure that the projects incorporate appropriate features to support mobility for all.*

Other comments received at the October 5 hearing related primarily to changes in the structure of the report and to the need to update route number references based on the recent opening of the Route 29 Madison Heights Bypass. These changes and updates were made and approved by the MPO.

There were no public comments at the November 17, 2005 public hearing. Directly following this meeting, therefore, the Central Virginia Long-Range Transportation Plan – Year 2030 was adopted by the MPO.

Appendix C – Transportation Model Development

Chapter 1
INTRODUCTION

1.1 OVERVIEW

The Lynchburg Urbanized Area, designated as the Lynchburg Metropolitan Planning Organization (MPO), is expanding to encompass a larger geographical area. This expansion requires a long-range transportation planning process over and above that applied in developing the previous Lynchburg Area Transportation Study (LATS). The LATS study was developed with a TRANPLAN peak-hour only model that does not reflect 24-hour volumes necessary for MPO planning purposes. The purpose of this project is to develop a new travel demand model using TP+ software. The new model estimates average weekday travel for the AM peak, PM peak, and off-peak periods using a traditional 4-step model structure, but excluding the 3rd step – mode choice. The model was developed with specific effort to "standardize" the individual model components for use in other smaller urban areas throughout the Commonwealth.

One of the key requirements for an MPO long-range plan is that the planning horizon year be at least 20 years in the future. A 2030 horizon year model was developed since the horizon year for the initial Lynchburg MPO plan will also be 2030. The traffic model base year is 2000.

1.2 STUDY AREA

The Lynchburg Urbanized Area is located along Route 29, and includes the City of Lynchburg and parts of Amherst, Bedford and Campbell Counties, Virginia, as shown is Figure 1-1 on the next page. The base year for the model validation is 2000. The model has 282 internal traffic analysis zones (TAZ range: 1-444) and 14 external stations (TAZ range: 487-500).

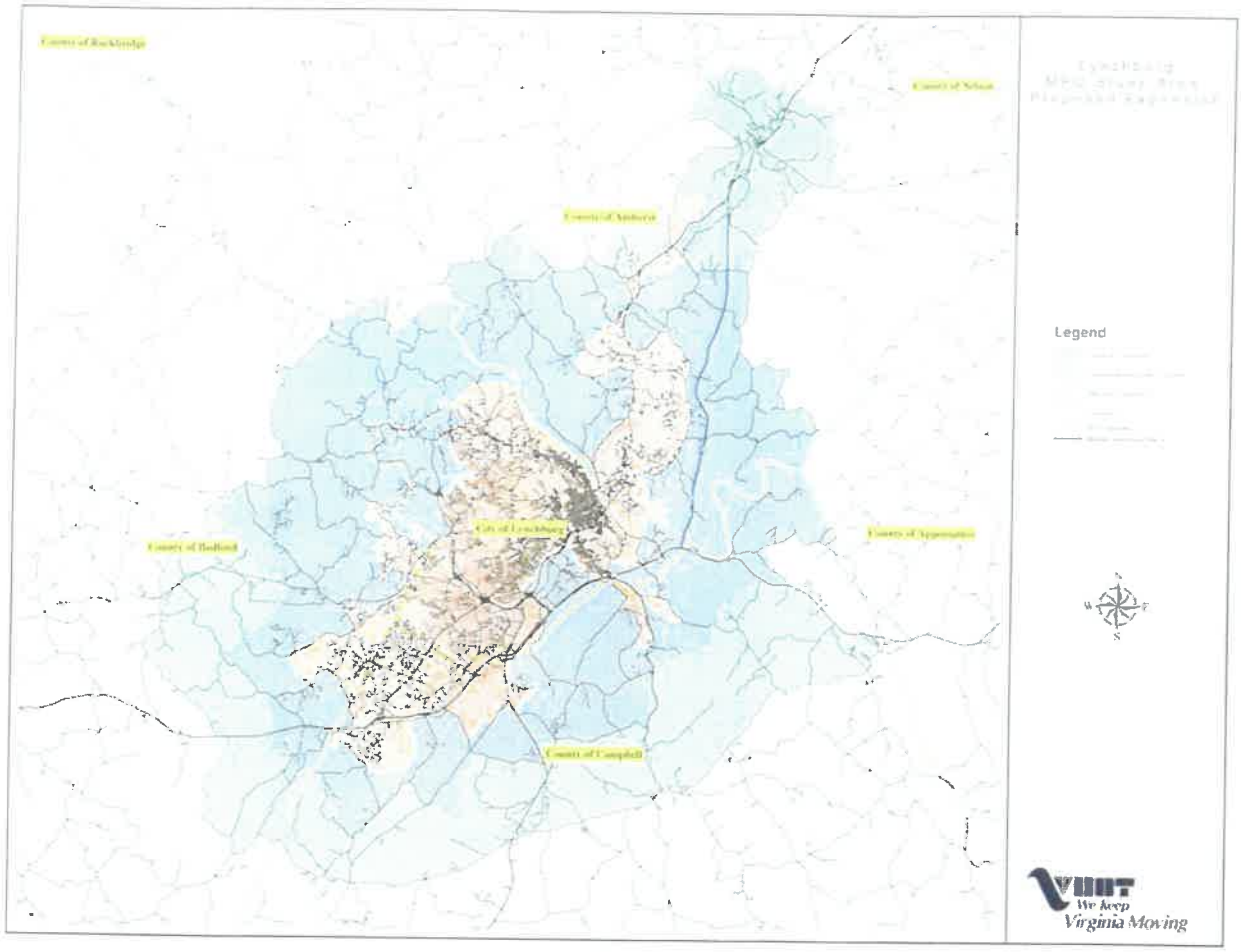


Figure 1-1: Study Area

1.3 MODEL FEATURES

The model consists of 3-steps (trip generation, trip distribution, and highway network assignment) and was developed using TP+ software.

1. The highway network and zones are updated to create the 2000 Base year highway network and zonal structure. Work performed under the previous LATS effort, and current socioeconomic data analysis, are the starting point for model development. Although a computerized network was developed under the LATS study, a new network was developed that reflects true spatial geography and facilitates matching between roadway and traffic zone geography. VDOT's Transportation and Mobility Planning Division (TPMD) maintains a database of roadways for which the state provides funding for maintenance and construction activities. The Statewide Planning System (SPS) database provided pertinent information necessary to provide the roadway

network specifications for the traffic model. Arcview GIS is used to develop the highway network and zone structure, as well as for socioeconomic data analysis. Updated land use data is provided by the City of Lynchburg's Department of Community Planning and Development, Amherst, Bedford Counties' Department of Planning, Campbell County's Department of Community Development, the Virginia Employment Commission, and the 2000 Census.

2. Trip generation estimates the number of person trips for each TAZ, given its socioeconomic characteristics. A zonal trip production cross-classification model is developed based on trip generation relationships derived from the Harrisonburg household survey data. A linear regression model is used to estimate trip attractions. Equations are borrowed from the Harrisonburg model and adjustment factors are applied during model calibration.

   According to land use activity, three travel purposes are used: Home Based Work (HBW), Home Based Other (HBO), and Non Home Based (NHB). Truck trips and external travel are estimated separately from other trip purposes.

3. Trip distribution estimates person travel patterns, by trip purpose. It is based on the standard gravity model used by most travel demand estimation processes. In the case of HBW, Census Transportation Planning Package (CTPP) data is used for observed data.

4. Traffic assignment estimates link-level travel demand volumes. Person trip tables produced by the model chain are converted from production and attraction format to vehicle trips in origin-destination format using vehicle occupancy and time of day factors. The model uses a capacity restraint algorithm with incremental loading to assign traffic to the highway network.

Chapter 2
HIGHWAY NETWORK and TRAFFIC ANALYSIS ZONES

2.1 HIGHWAY NETWORK

The highway network represents the principal street system of the study area as defined by the Virginia Department of Transportation and local planning agencies. Street sections and their associated intersections are represented in the travel demand model as links and nodes respectively. The model has a total of 1,072 nodes and 2,820 one-way links (Figure 2-1). Link attributes for the network are verified using existing SPS data and new information about the transportation facilities collected in the study area. This updated data is used in the development of the model network and supplements information contained in the LATS study. The data collection effort entailed windshield surveys to verify the existing SPS data. This included drive-by verification of conditions and not actual field measurements. The following items were identified/verified for each SPS road segment included in the study area:

- Street name
- Roadway network
- Number of lanes
- Lane width
- Access control
- Posted speed limits
- Operation orientation
- Location of on-street parking
- Commuter parking
- Environment
- Right-of-way width

Additionally, daily traffic counts representing average annual weekday traffic are coded on approximately 500 links in the highway network. A GIS database of counts by counter location was provided by VDOT to aid in locating the counts on the appropriate links. Other counts are added using the 2000 Count book for interstates, arterials, and primary routes. Centroids and centroid connectors are located with the aid of GIS and aerial photography to reflect the center of activity in each zone along with appropriate connections to the roadway network.

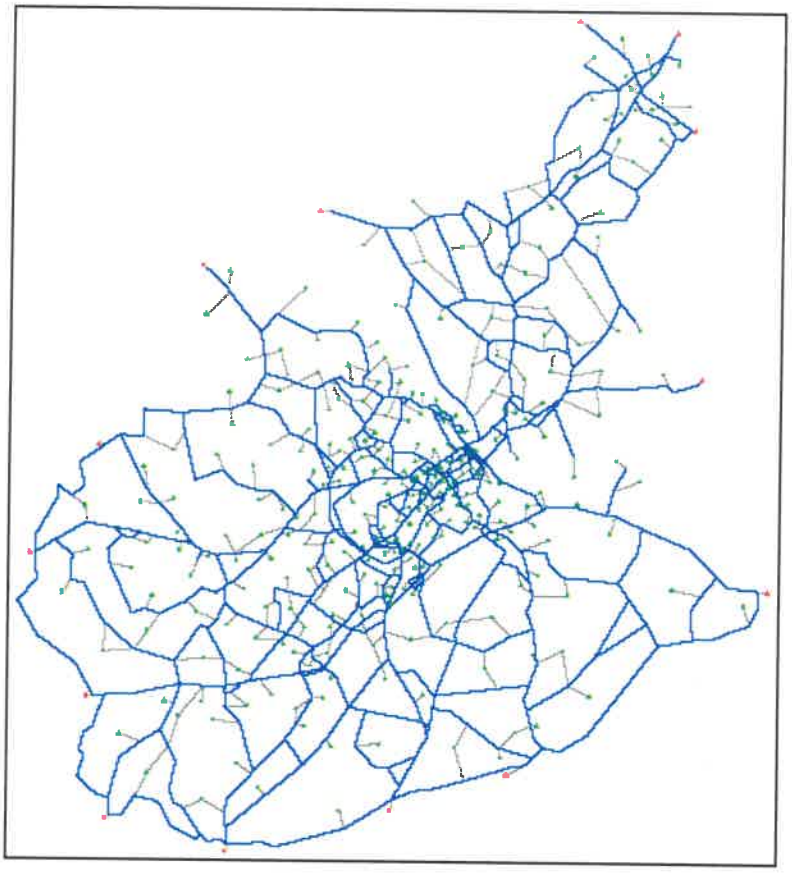


Figure 2-1: Highway Network

Links attributes for the network include variables that are the result of the initial TRANPLAN network conversion, as well as new text and numeric variables. Additionally, output variables are created when the model is executed.

Initial Variables from TRANPLAN network

1) A, node A
2) B, node B
3) Twoway, 0 (one way road), 1 (two way road).

The rest of the initial attributes are not used to avoid conflicts with the new variables names.

Text Variables

1) ROUTENAME, Route name (Example: US 460)

2) STRNAME, street name (Example: LYNCHBURG HWY)

3) ACCESSCTL, access control. F (full), P (partial), N (no control)
4) OPERAT, operation. 2W (two ways)
5) FUNC, functional class

Urban other principal arterial
Urban minor arterial
Urban collector
Rural other principal arterial
Rural minor arterial
Rural major collector
Rural minor collector
Rural local

6) TERRAIN, terrain type. L (level), M (mountain), R (rolling)
7) MEDIAN, median type. None, Jersey Barrier, Depressed, Center Turn Lane, and Alternating Left Turn
8) PARKING, commuter parking. B (both sides), N (no parking), R (right side), and L (left side)

Numeric Variables

1) JUR_INDEX, jurisdiction index
2) AAWDT, 2000 Average Annual Weekday Traffic (AAWDT)
3) CNT, Observed Traffic Count (AAWDT)
4) LANES, number of directional lanes per link
5) WIDTHLANE, lane width (feet)
6) SPDPOSTED, posted speed (mph)
7) SPDCLASS, speed class
8) CAPCLASS, capacity class

9) FUNCLASS, functional class

FUNCLASS=0, Centroid connector
FUNCLASS=1, Urban other principal arterial
FUNCLASS=2, Urban minor arterial
FUNCLASS=3, Urban collector
FUNCLASS=4, Rural other principal arterial
FUNCLASS=5, Rural minor arterial
FUNCLASS=6, Rural major collector
FUNCLASS=7, Rural minor collector
FUNCLASS=8, Rural local

10) ATYPE, area type is measured based on developed square feet per acre factor for each zone:

Factor = (3000 * du + 275 * nremp) / zone size in acres,

Where du is dwelling units, and nremp is non-retail employment.

Area type	Factor Range	ATYPE
Urban	>= 7200	1

Suburban	1350 - 7200	2
Rural	< 1350	3

11) FTYPE, facility type

FTYPE=0, centroid connector
FTYPE=1, expressway
FTYPE=2, principal arterial
FTYPE=3, minor arterial
FTYPE=4, collector
FTYPE=5, local roads

12) DISTANCE, link distance (in hundredths of miles, e.g. DISTANCE = 150 represents 1.50 miles)
13) SCREEN, screen lines used to compare model volumes with traffic counts
14) DISTRICT, based on 2000 Census Tract
15) TIME_PEN, Time penalty

Output Variables

1) VOL_AM2, estimated directional traffic volume, AM peak period, second iteration
2) VOL_PM2, estimated directional traffic volume, PM peak period, second iteration
3) VOL_OP2, estimated directional traffic volume, Off Peak period, second iteration
4) VOL00_1way, estimated 24 hours directional traffic volume, final iteration
5) VOL00_2way, estimated 24 hours non-directional traffic volume, final iteration
6) S2, congested speed (mph), second iteration
7) FCST30_1way, forecast 2030 directional traffic volume
8) FCST30_2way, forecast 2030 non-directional traffic volume

The 2000 base year network uses a speed/capacity table to assign operating speeds and capacities to links in the network based upon the link's facility type and area type. The speed/capacity table is internally consistent in that speeds and capacities always increase from lower to higher facilities types. Also, urban speeds and capacities are always less than or equal to suburban/rural values, for the same facility type. Free flow speeds are estimated by factoring the posted speeds using the linear equations recommended in *National Cooperative Highway Research Program (NCHRP) Report 387*. A weighted average free flow speed is then calculated for each facility type and area type combination. Capacities in the lookup table are also calculated using the weighted average capacities on the network links by facility type and area type. These capacities are based on the default capacities by facility type, terrain, and speed as recommended in *NCHRP Report 365* and FHWA's manual on *Calibration and Adjustment of System Planning Models*. Free flow speeds are in mph, and capacities are in passenger car per hour per lane at a level of service (LOS) E. (Table 2-1, and Table 2-2)

Table 2-1: Free Flow Speed Table (mph)

		Area Type		
		Urban	Suburban	Rural
Facility Type	Centroid Connector	30	30	30
	Freeway	62	62	62
	Principal Arterial	37	48	59
	Minor Arterial	37	43	54
	Collector	31	35	47
	Local Roads	25	32	32

Table 2-2: Capacity Table (pcphpl*)

		Area Type		
		Urban	Suburban	Rural
Facility Type	Centroid Connector	9999	9999	9999
	Freeway	1300	1307	1340
	Principal Arterial	895	1261	1316
	Minor Arterial	681	719	863
	Collector	600	579	706
	Local Roads	550	600	600

* Passenger cars per hour per lane (pcphpl)

2.2 TRAFFIC ANALYSIS ZONES

As mentioned previously, the model consists of 282 internal traffic analysis zones (TAZs). Each zone, represented by a single point or "centroid", can be thought of as a producer and attractor of trips. Figure 2-2 shows the 2000 traffic analysis zones for the study area. The City of Lynchburg has TAZs 1-132, Amherst County has TAZs 200-256, Campbell County has TAZs 300-345, 350, 351, and Bedford County has TAZs 400-444.

Several guidelines were adhered to in the development of the 2000 TAZs:

- Wherever possible, 2000 TAZ boundaries match 2000 Census geography.

- Zone boundaries follow natural features, such as rivers.
- Zone boundaries follow major roadways and rail lines.

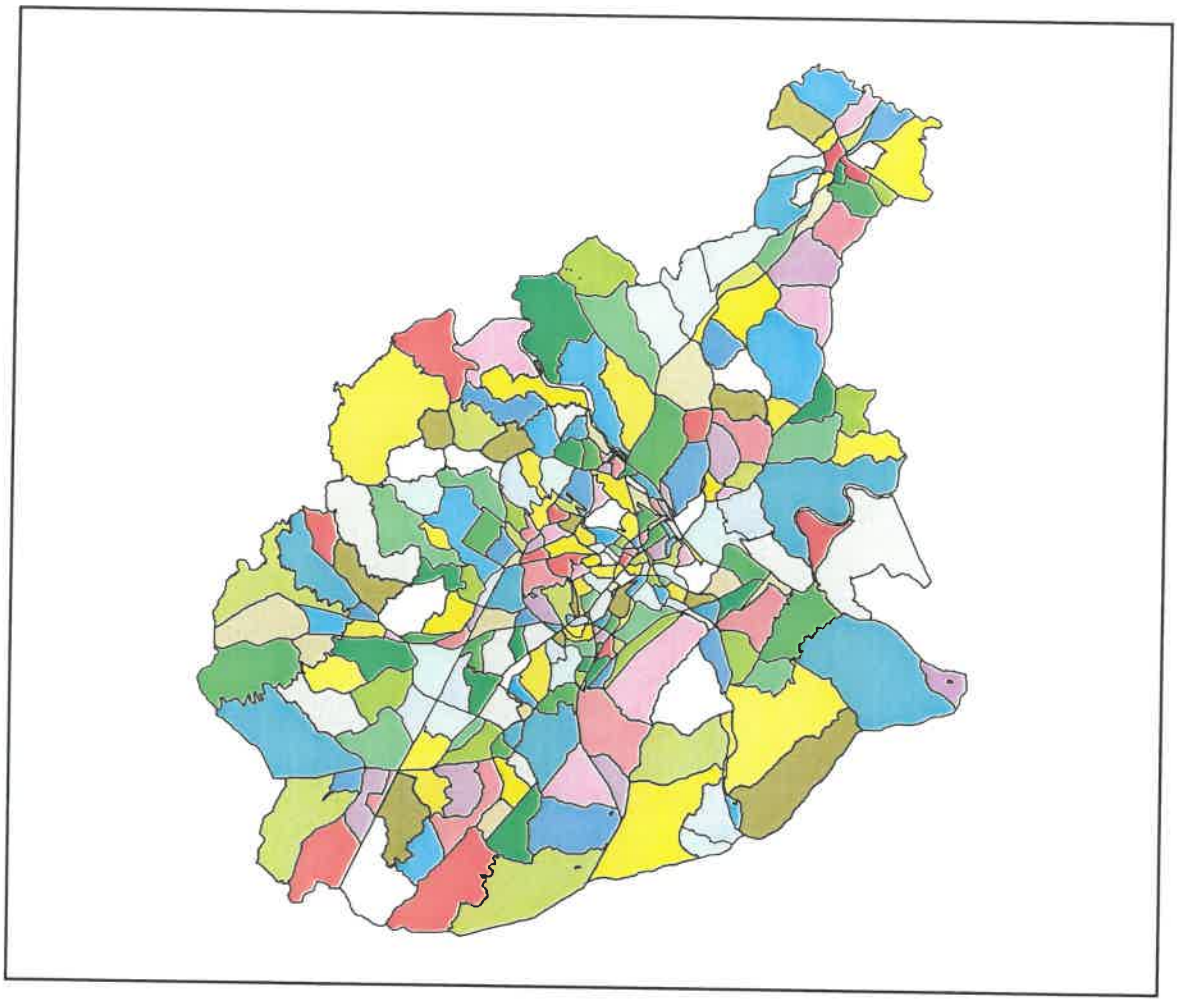
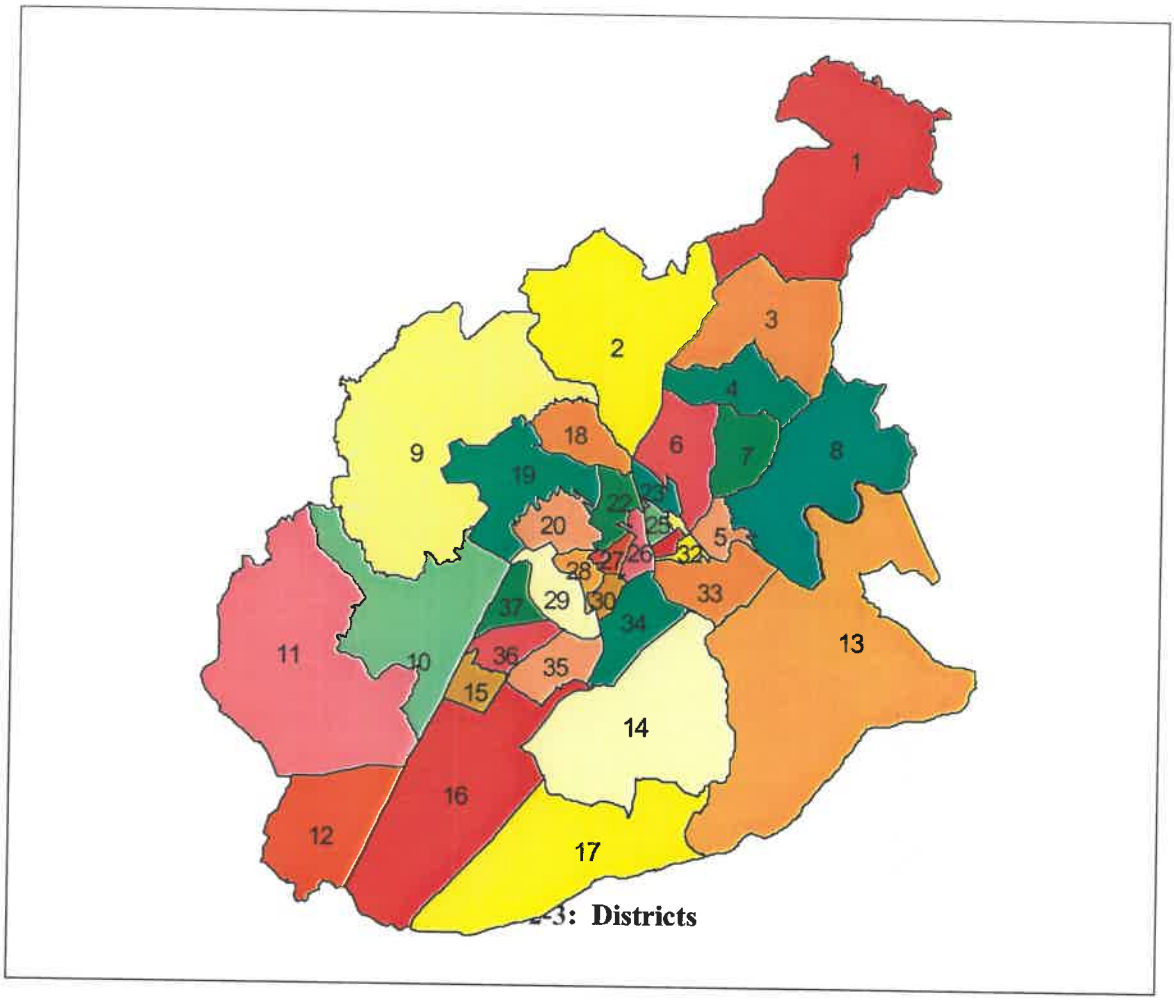


Figure 2-2: Traffic Analysis Zones

To facilitate model review and reporting at various stages in the analysis, geographical units larger than TAZs are created. These units are referred to as "districts", and can sometimes provide a clearer picture of the traffic movement within the study area. The study area is comprised of 42 districts, shown in Figure 2-3, based on 2000 Census Tracts. Districts 1 through 37 represent the aggregated zone structure of the Lynchburg MPO Study Area. Districts 38-42 represent the external stations. See Table 2-3 for District to TAZ equivalencies.



2-3: Districts

Table 2-3: District / TAZ Equivalence Table

District	Jurisdiction	TAZs
1	Amherst County	200-221
2	Amherst County	249-252, 254-256
3	Amherst County	222-225, 229, 253
4	Amherst County	226-228, 238
5	Amherst County	231
6	Amherst County	239, 242, 243, 247
7	Amherst County	240, 241, 244-246, 248
8	Amherst County	230, 232-237
9	Bedford County	400-408, 410-412, 415
10	Bedford County	409,413,414,418-422, 424-428, 430, 431, 435
11	Bedford County	416, 417, 423, 429, 432, 433, 434, 436-439
12	Bedford County	440-444
13	Campbell County	300-307, 312-319
14	Campbell County	308, 309, 311, 322, 325, 326, 330
15	Campbell County	336, 341

District	Jurisdiction	TAZs
16	Campbell County	321, 323, 324, 327, 331-335, 337-340, 342-345, 350, 351
17	Campbell County	310, 320, 328, 329
18	City of Lynchburg	99, 105-111
19	City of Lynchburg	88, 92, 96-98, 100, 101, 103, 104, 113
20	City of Lynchburg	89, 90, 93-95, 102, 112, 114, 118, 119
21	City of Lynchburg	74
22	City of Lynchburg	115-117, 120, 122
23	City of Lynchburg	126-129, 131, 132
24	City of Lynchburg	1, 2
25	City of Lynchburg	3-5, 130
26	City of Lynchburg	26-33, 35, 37, 123
27	City of Lynchburg	75, 81, 121, 124, 125
28	City of Lynchburg	70, 73, 77
29	City of Lynchburg	53, 60, 68, 69, 72, 76, 78, 79, 83, 86, 87, 91
30	City of Lynchburg	43, 45, 80, 82
31	City of Lynchburg	6-8
32	City of Lynchburg	9-11
33	City of Lynchburg	12-25
34	City of Lynchburg	34, 36, 38-42, 44, 46-52
35	City of Lynchburg	54-59, 61-63
36	City of Lynchburg	64, 67, 84, 85
37	City of Lynchburg	65, 66, 71
38	Externals - NE	489-491
39	Externals - East	492-493
40	Externals - South	494-497
41	Externals - West	498-500
42	Externals - NW	487-488

Chapter 3
LAND USE DATA

3.1 YEAR 2000 DATA

The socio-economic data used in the transportation model is a critical component for the transportation planning process. Socio-economic data sets for the 2000 base year includes the variables needed for model development and validation of a standard 3-purpose trip generation model. All of the demographic data was developed in cooperation with the Management Team and ultimately approved by the MPO. The following summarizes some of the key elements of this effort:

As mentioned previously, year 2000 Census TAZ boundaries and data sets are used in GIS format. Existing boundaries are modified, when necessary, for improved model performance. New TAZs are added for the expanded study area not covered by the LATS model.

The base year socio-economic data for the expanded MPO area is validated using Census, Virginia Employment Commission (VEC) data, Bureau of Economic Analysis (BEA) data, Comprehensive Plans, aerial photography, and local input. The socio-economic data includes the following variables:

Population (including students)
Dwelling units
Retail Employment
Non-Retail Employment
Total Employment
Auto ownership

3.1.1 POPULATION

Population is updated using 2000 Census statistics at the Block level. In most cases, Census Blocks remain intact and are aggregated to create individual TAZs. In a few instances, Census Block boundaries needed to be subdivided.

Table 3-1: Base Year (2000) MPO Area Populations

Locality	2000 Total Population	2000 Population within MPO Area	% of Total Population within MPO Area	# of TAZs within MPO Area
Amherst County	31,894	23,408	73%	57
Bedford County	60,371	18,698	31%	48
Campbell County	51,078	27,663	54%	45
Lynchburg City	65,269	65,269	100%	132
MPO Region Total	NA	135,038	NA	282

Sources: 2000 U.S. Census Bureau and March 2004 GIS calculations based on aggregation of Census Blocks to TAZs within MPO area.

3.1.2 HOUSEHOLDS

Household data was also updated using 2000 Census statistics at the block level. The households in each Census Block were distributed to their corresponding TAZ.

Table 3-2: 2000 Regional Population and Households

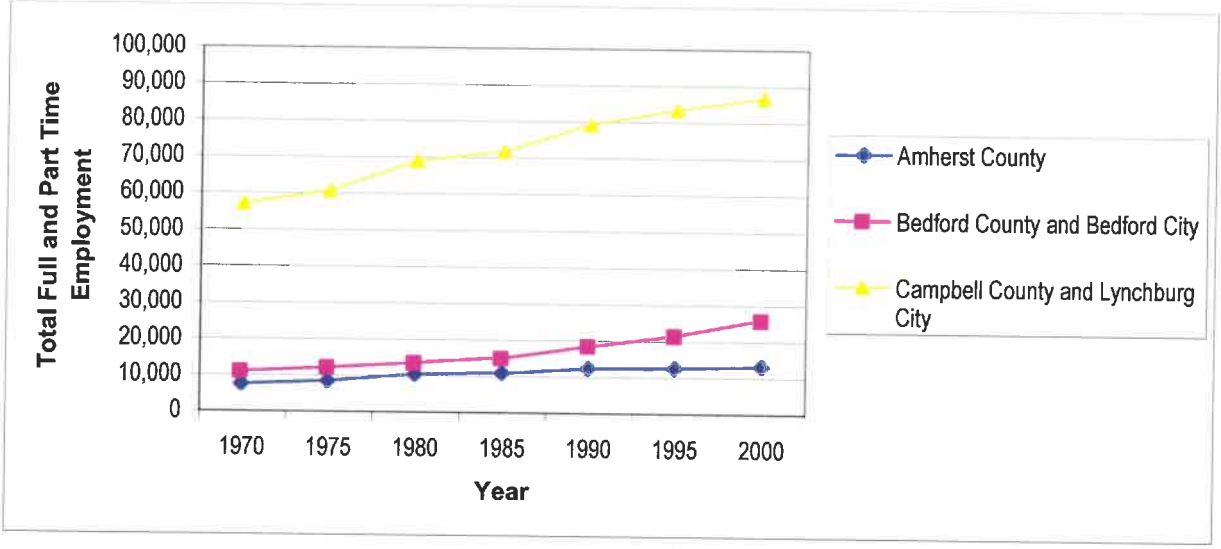
Locality	2000 Total Population	2000 Group Quarters	2000 Household Population	2000 Households	2000 Average Household Size
Amherst County	31,894	1,972	29,922	11,941	2.51
Amherst Town	2,251	199	2,052	940	2.18
*Madison Heights CDP**	11,584	694	10,890	4,451	2.45
Bedford County	60,371	376	59,995	23,838	2.52
Campbell County	51,078	504	50,574	20,639	2.45
Lynchburg City	65,269	6,551	58,718	25,477	2.30
Virginia	7,078,515	231,398	6,847,117	2,699,173	2.54

Source: 2000 U.S. Census Bureau
*CDP: census designated place

3.1.3 EMPLOYMENT

The Virginia Employment Commission (VEC) provides employment data that consists of name, address, North American Industry Classification System (NAICS) code, and number of employees for all business in the study area. Using the NAICS code, the employment data is subdivided into two categories, retail and non-retail, then each employer is assigned to a TAZ using ArcView's geocoding module. The number of employees working at every company in each TAZ is then calculated.

Figure 3-1: Employment Trends



Source: 2000 U.S. Bureau of Economic Analysis

Table 3-3: Base Year (2000) Number of Jobs

Locality	2000 County Business Patterns	2000 Bureau of Economic Analysis	2000 2nd Quarter VEC ES-202	2000 Total Employment in model	2000 Retail Employment in model	2000 Non-Retail Employment in model
Amherst County	7,219	13,264	9,583	8,214	1,703	6,511
Bedford County	8,620	NA	13,272	6,435	804	5,631
Campbell County	14,048	NA	18,073	11,204	1,399	9,805
Lynchburg City	57,539	NA	55,342	53,271	8,398	44,873
MPO Region Total	Na	Na	Na	79,124	12,304	66,820

Sources: 2000 U.S. Census Bureau, 2000 U.S. Bureau of Economic Analysis, 2000 Virginia Employment Commission (VEC)

Notes:

- County Business Patterns includes the number of employees from March 12th and does not include government employment.
- Bureau of Economic Analysis counts part-time employment as a full-time equivalent and includes government employment. Bedford County and Bedford City are grouped together with a total of 25,890 employees and Campbell County and Lynchburg City are grouped together with 86,960 employees.
- VEC – ES-202 does not include self-employment or non-profits. This data is collected by the Bureau of Labor Statistics based on second quarter employment as filed on quarterly tax reports to track employees covered by unemployment insurance. Geocoding of employment found discrepancies of locality filed in versus actual location of business (i.e. business filed as part of Campbell County, but was actually located in Lynchburg City, and vice versa).

3.2 YEAR 2030 DATA

Projections for 2030 are developed for total population, households and employment for Lynchburg Study Area. Socio-economic forecasts for 2030 are developed using state, regional, and local resources.

Land capacity for future development is identified by TAZ using GIS data from the Lynchburg MPO and surrounding counties. This data consists of digitized parcels with associated information and additional layers such as zoning, soils, wetlands, rural landmarks, and floodplains. This data is used to help allocate regional housing and employment forecasts to the TAZ level.

Regional/jurisdictional socio-economic forecasts from public and private sources are used to develop MPO level control totals for key socio-economic variables. The resulting forecasts were submitted to the Management Team for review. Adjustments were made based on Management Team input and then resubmitted for final approval by the MPO.

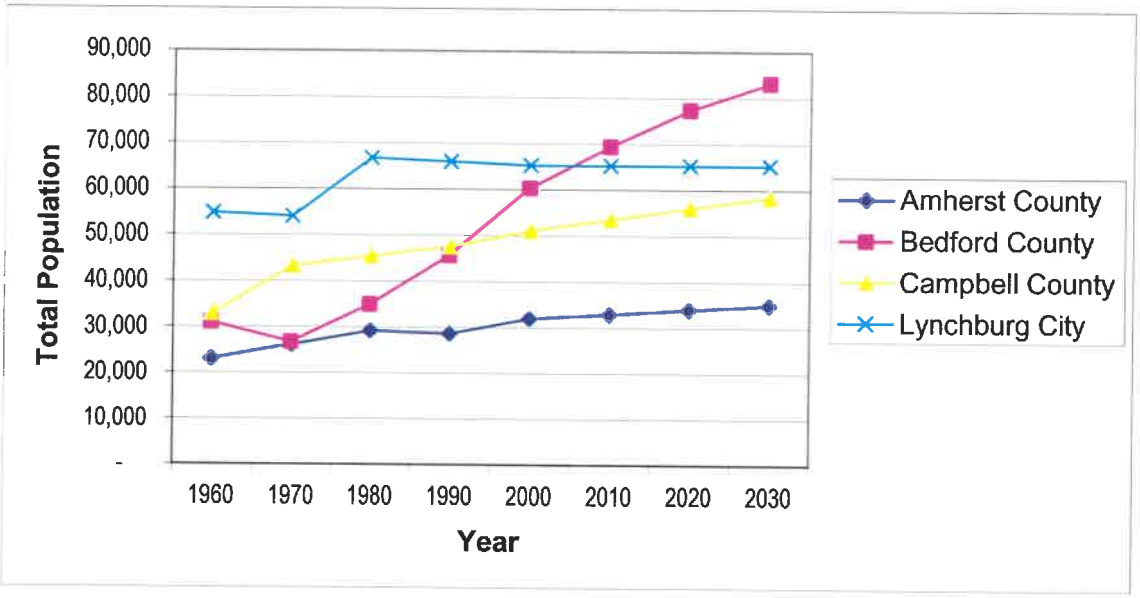
3.2.1 POPULATION PROJECTIONS

Table 3-4: Regional Population Trends and Projected Growth

Locality	1990	2000	2030	Annual Average Growth 1990 to 2000	Annual Average Growth 2000 to 2030	Population Growth 2000 to 2030
Amherst County	28,578	31,894	34,900	1.00%	0.29%	3,006
Bedford County	45,656	60,371	83,200	2.57%	1.04%	22,829
Campbell County	47,572	51,078	58,400	0.65%	0.43%	7,322
Lynchburg City	66,049	65,269	65,300	-0.11%	0.00%	31

Sources: 2000 U.S. Census Bureau and May 2003 Virginia Employment Commission
Notes: Average Annual Compounded Growth

Figure 3-2: Regional Population Trends



Sources: 2000 U.S. Census Bureau and May 2003 Virginia Employment Commission

3.2.2 HOUSEHOLD PROJECTIONS

Table 3-5: Forecast Year (2030) Population and Households assumed in the Model

Locality	2030 total population assumed for locality	2030 total population assumed in model	% of 2030 total population within MPO area	2030 household population assumed in model	2030 group quarters assumed in model	2030 households assumed in model	2030 avg household size
Amherst County	36,645	27,589	75%	25,770	1,819	10,666	2.42
Bedford County	87,360	32,193	37%	32,167	25	12,443	2.46
Campbell County	58,400	32,788	56%	32,597	191	13,804	2.40
Lynchburg City	68,565	68,565	100%	59,404	9,161	26,402	2.25
MPO Region Total	250,970	161,134	64%	149,938	11,196	63,315	na

Source: Michael Baker Jr. Inc. in coordination with MPO technical committee, March 2004.
Notes:

- To account for historic and anticipated population trends and discussion with the localities, 2030 total populations for Amherst County, Bedford County, and Lynchburg are 5% higher than VEC projections.
- 2030 average household size is based on 2010 national projection ratio provided by the Census Bureau.

3.2.3 EMPLOYMENT PROJECTIONS

Table 3-6: Forecast Year (2030) Number of Jobs

Locality	2030 Total Employment in model	2030 Retail Employment in model	2030 Non-Retail Employment in model
Amherst County	9,760	2,028	7,732
Bedford County	11,890	1,459	10,431
Campbell County	13,078	1,493	11,585
Lynchburg City	62,178	10,090	52,088
MPO Region Total	96,906	15,070	81,836

Source: Michael Baker Jr. Inc. in coordination with MPO technical committee, March 2004.

3.2.4 DISTRIBUTION OF GROWTH TO INDIVIDUAL TAZs

Table 3-7: Summary of Land Use Changes

Locality	Change in Total Population (number)	Change in Total Population (percent)	Change in Vehicle Ownership (number)	Change in Vehicle Ownership (percent)	Change in Total Employment (number)	Change in Total Employment (percent)
Amherst County	4,181	18%	3,976	23%	1,546	19%
Bedford County	13,495	72%	12,183	80%	5,455	85%
Campbell County	5,125	19%	4,851	22%	1,874	17%
Lynchburg City	3,296	5%	1,618	4%	8,907	17%
MPO Region Total	26,096	19%	22,682	24%	17,782	22%

Source: Michael Baker Jr. in coordination with MPO technical committee March 2004.

Table 3-8: Summary of Base Year (2000) MPO Land Use

Locality	2000 Total Population	2000 Household Population	2000 Group Quarters Population	2000 Households	2000 Vehicle Ownership	2000 Total Employment in model	2000 Retail Employment in model	2000 Non-Retail Employment in model
Amherst County	23,408	21,718	1,690	8,791	17,532	8,214	1,703	6,511
Bedford County	18,698	18,673	25	7,064	15,304	6,435	804	5,631
Campbell County	27,663	27,473	190	11,378	22,191	11,204	1,399	9,805
Lynchburg City	65,269	58,718	6,551	25,477	38,999	53,271	8,398	44,873
MPO Region Total	135,038	126,582	8,456	52,710	94,026	79,124	12,304	66,820

Table 3-9: Summary of Forecast Year (2030) Land Use

Locality	2030 Total Population	2030 Household Population	2030 Group Quarters Population	2030 Households	2030 Vehicles	2030 Total Employment	2030 Retail Employment	2030 Non-Retail Employment
Amherst County	27,589	25,770	1,819	10,666	21,508	9,760	2,028	7,732
Bedford County	32,193	32,167	25	12,443	27,487	11,890	1,459	10,431
Campbell County	32,788	32,597	191	13,804	27,042	13,078	1,493	11,585
Lynchburg City	68,565	59,404	9,161	26,402	40,617	62,178	10,090	52,088
MPO Region Total	161,134	149,938	11,196	63,315	116,708	96,906	15,070	81,836

Chapter 4
MODEL DEVELOPMENT and VALIDATION

4.1 MODEL DEVELOPMENT

The main purpose of this project is to develop a 2000 Base year and 2030 Build model of the Lynchburg area. The new model uses the TP+ software platform. The Lynchburg traffic model consists of highway network and land use input data, and a main TP+ script, which performs trip generation, trip distribution, and traffic assignment. The flowchart in Figure 4.1 shows the structure of the model. The following input data and references are used in this effort:

- 2000 socioeconomic data from the local jurisdictions and U.S. Census
- 2000 traffic count data from VDOT
- 2000 geo-referenced highway network created by Baker
- FHWA 1990 Calibration and Adjustment of System Planning Models
- FHWA 1997 Model Validation and Reasonableness Checking Manual
- National Cooperative Highway Research Program (NCHRP) Reports 255, 365, & 387

4.1.1 TRIP GENERATION

This module establishes the relationship between trip productions, attractions, land use, and socioeconomic characteristics of the region. The intent of this module is to estimate the magnitude of trip making for each TAZ. The trip generation procedure uses a cross-classification model for trip productions and a regression model for trip attractions.

The Lynchburg trip generation model uses the following trip purposes:

- Home-based work (HBW)
- Home-based other (HBO)
- Non-home based (NHB)
- Truck (TRK)
- External Persons (EXP)
- External Truck (EXT)

This trip generation model was originally developed for use in the Harrisonburg travel demand model. For purposes of developing the Lynchburg Model it is assumed the travel characteristics in Lynchburg are similar to Harrisonburg and therefore the same trip generation model can be applied. This model estimates daily, internal, motorized person trips for the first four trip purposes. That is, the first three types of trips are trips internal to the study area. These are trips made by means of motorized modes such as cars and transit and do not include non-motorized trips. In addition, truck trips are defined as trips

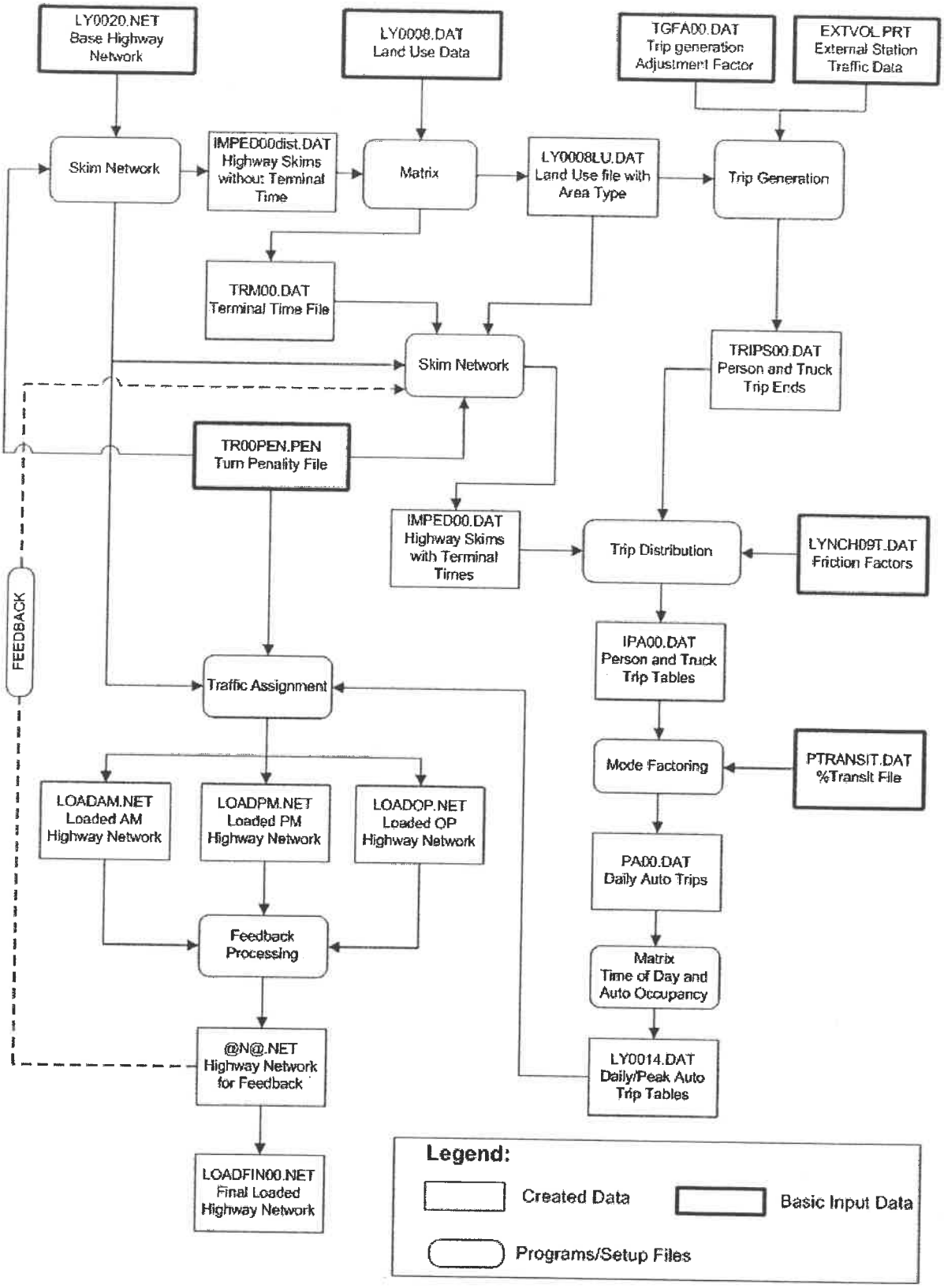


Figure 4-1: Model Structure of the Lynchburg MPO Model

made by heavy trucks, which include single-unit trucks with six or more tires, tractor and semi-trailers, dual-trailers, and intercity buses, based on the VDOT vehicle classifications.

The first three types of trips are estimated as trip ends, namely, productions and attractions for home-based trip purposes, and origin and destinations for non-home based trips. Production models are cross-classifications by household size and autos available, with an exogenous adjustment factor for districts in the study area. Attraction models are linear regressions with the constant term removed, and an exogenous adjustment factor for districts.

In the estimation process, the models estimate total daily person trips (I/I+I/X productions, I/I+X/I attractions) at each TAZ, and then split total trips into internal and external trips based on the area type and a TAZ's distance to the CBD. Area types include urban, suburban, and rural. Distance to CBD is aggregated into three ranges, less than 3 miles, 3-6 miles, and greater than 6 miles. The internal-external split is done separately for productions (I/I vs. I/X) and attractions (I/I vs. X/I), and for different trip purposes (HBW, HBO, NHB, Truck). These external trips by trip purposes are then aggregated to total external person trips and truck trips by TAZ.

External person trips and truck trips (IX/XI) are then allocated to cordon stations, based on a station's shares of total internal-external traffic (IX/XI) for auto and truck trips, separately. Total cordon volumes are split into auto and truck volumes using truck percentages at each station. With the base-year truck and auto counts at the cordon stations, through trip percentages are then computed for auto and truck trips, respectively. Total internal-external traffic is equal to total cordon volume minus the through trip traffic at each station. Each station's shares of total internal-external traffic (IX/XI) are then calculated for auto and truck trips, respectively.

Household size and vehicle availability sub-models were initially developed in 1989. For this 2000 model validation, household size and vehicle availability sub-models were developed based on the 2000 Census Transportation Planning Package (CTPP) data. The procedure for developing these two sub-models follows the state of practice in the demand forecasting industry.

The household size sub-model forecasts the household distribution by household size, based on the average household size of a TAZ. Households are divided into four household size categories, namely 1, 2, 3, and 4+ person households. The new household size sub-model is a look-up table that relates average household size of a TAZ to the household size distribution in four size categories (Table 4-1). This look-up table was developed based on the CTPP 2000 data and compared with the previous model results. CTPP 2000 data provide households by size distribution at the block level. The block-level data are aggregated to the TAZ level. Average household size is calculated and sorted out. TAZs are grouped

based on the increments of average household size, and household size distributions are computed. Four curves are plotted for four household sizes, using the average household size and percent households. These curves are smoothed to ease the irregularity that may result from inadequate number of observations for an increment. Smoothing also ensures that the percentages of households by four sizes total 100 percent, and the average household size computed from the percentages of household by size equals the average household size used for a particular distribution.

The final results are shown in Table 4-1 and Figure 4-2.

Table 4-1: Household Size Sub-model Look-up Table

Average HH Size	% of 1-Person HHs	% of 2-Person HHs	% of 3-Person HHs	% of 4+-Person HHs	Total
1.0	100.0	0.0	0.0	0.0	100.0
1.3	82.6	10.8	3.7	2.9	100.0
1.5	66.8	21.2	6.7	5.2	100.0
1.7	53.8	30.2	8.7	7.3	100.0
1.9	44.0	35.5	10.6	10.0	100.0
2.1	37.0	37.2	12.1	13.7	100.0
2.3	29.6	37.4	15.1	18.0	100.0
2.5	24.4	37.3	15.9	22.4	100.0
2.7	19.9	35.2	17.6	27.4	100.0
2.9	17.1	32.2	18.3	32.4	100.0
3.1	14.4	29.3	19.0	37.2	100.0
3.3	12.9	25.0	18.3	43.8	100.0
3.5	11.3	20.7	17.6	50.3	100.0
3.7	9.8	16.4	16.9	56.9	100.0
3.9	8.3	12.1	16.2	63.4	100.0
4.1	6.1	9.1	15.3	69.5	100.0
4.3	4.2	7.0	12.8	76.0	100.0
4.5	2.2	5.2	10.1	82.5	100.0
4.7	0.1	3.4	7.4	89.1	100.0
4.9	0.1	1.3	3.2	95.4	100.0
5.1	0.0	0.0	0.0	100.0	100.0

A similar methodology is used to develop the vehicle availability models. The vehicle availability sub-model forecasts the household distribution by vehicle availability, based on the average vehicle availability of a TAZ. Households are divided into three vehicle availability categories, namely 0, 1, and 2+ vehicle households. The 1989 and 2000 Harrisonburg MINTUP models use the same vehicle availability classification and forecast vehicle availability distribution by using a series of three non-linear equations, which were developed from the 1980 Census and 1989 Harrisonburg household survey.

The new vehicle availability sub-model is a look-up table that relates average vehicle availability of a TAZ to the vehicle availability distribution in three categories (Table 4-2). This look-up table is developed based on the CTPP 2000 data and compared with the previous model results. CTPP 2000 data provide households by vehicle availability distribution at the block group level. The block-group-level data are aggregated to the TAZ level. Average vehicle availability is calculated and sorted out. TAZs are grouped based on the increments of average vehicle availability, and vehicle availability distributions were computed. Three curves are plotted for three vehicle availability categories, using the average vehicle availability and percent households. These curves are smoothed to ease the irregularity that may result from inadequate number of observations for an increment. Smoothing also ensures that the percentages of households by three-vehicle categories total 100 percent, the average vehicle availability computed from the percentages of households by vehicle available equals the average vehicle availability used for a particular distribution.

The final results are shown in Table 4-2 and Figure 4-3.

Table 4-2: Vehicle Availability Sub-model Look-up Table

Average Number of Vehicles available	% of 0-Vehicle HHs	% of 1-Vehicle HHs	% of 2+-Vehicle HHs	Total
1.1	25.8	48.4	15.8	100.0
1.3	19.3	44.5	25.7	100.0
1.5	14.6	38.7	33.1	100.0
1.7	9.5	35.5	38.8	100.0
1.9	6.7	30.0	41.8	100.0
2.1	3.8	23.3	45.1	100.0
2.3	3.0	19.8	39.5	100.0
2.5	2.2	16.3	33.5	100.0
2.7	1.5	12.8	26.7	100.0
2.9	0.9	9.3	20.9	100.0
3.1	0.5	5.6	15.2	100.0

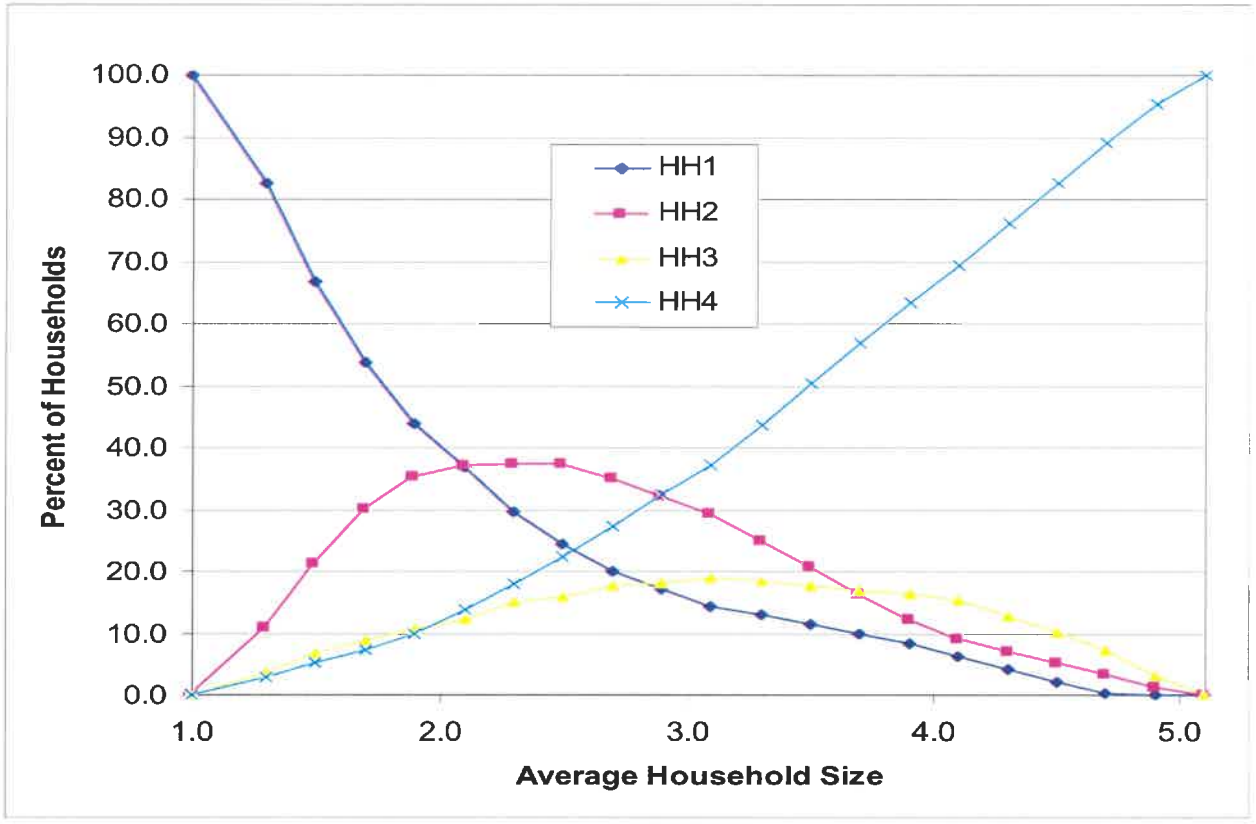


Figure 4-2: Household Size Sub-model

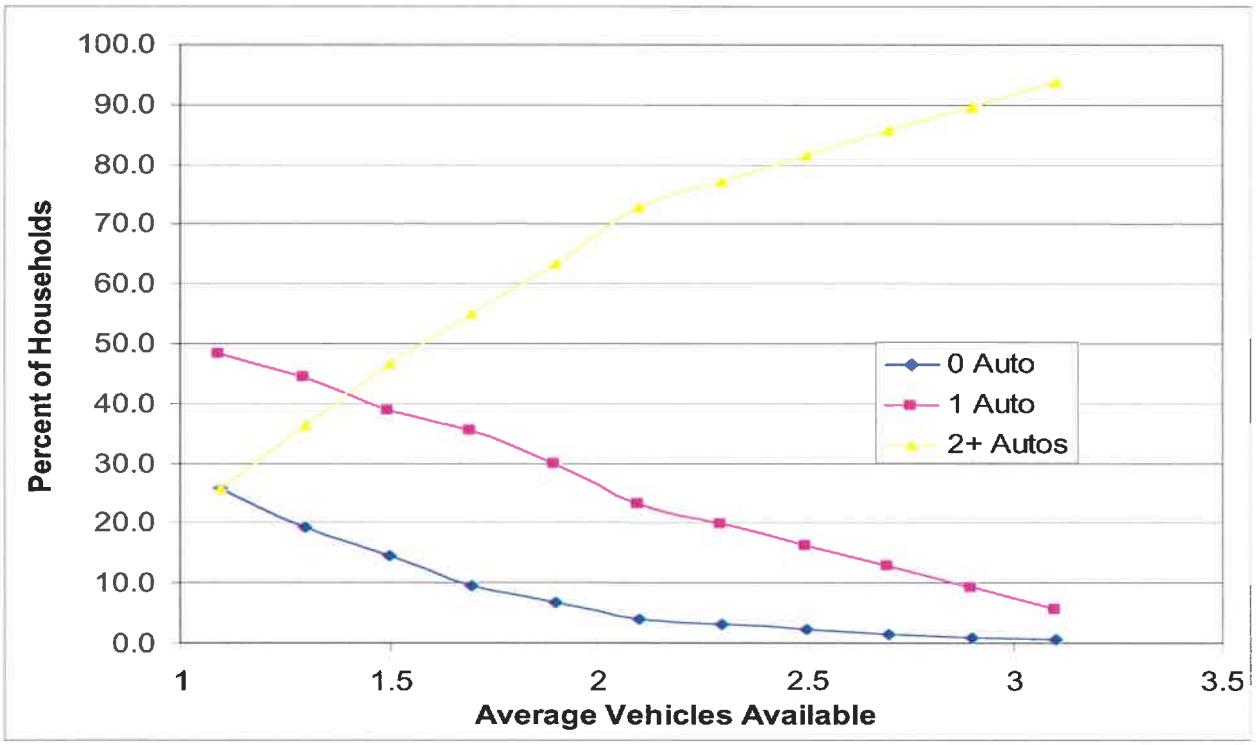


Figure 4-3: Vehicle Availability Sub-model

4.1.2 TRIP GENERATION RATES AND TRAVEL SURVEYS FROM THE HARRISONBURG MODEL

The Lynchburg trip generation model is based on the procedures developed for the Harrisonburg travel demand model. This section reiterates the survey procedure used for the Harrisonburg model. A household interview survey was conducted in the winter / spring of 2004. The survey was a telephone – mail out – mail back survey:

1. Random digit sample, drawn from City of Harrisonburg and Rockingham County (portion of County within the study area) residential phone numbers, was acquired.
2. Interviewers called potential respondents, collected some basic respondent information, asked the respondents to participate in a travel diary survey, and then obtained respondents' mailing addresses.
3. Travel diary forms were mailed to respondents. Data collected include the following:
   Household information
   - Number of people in HH
   - Number of vehicles
   - Street address of HH

   Person information
   - Sex of each HH member
   - Age of each HH member
   - Employment / student status of each HH member

   Trip information
   - Travel diary information for all trips made by all members age 16 or older of HH on designated day. This included day, date, start time, end time, origin, destination, trip purpose, travel mode, and number of occupants.
4. Respondents recorded travel data for the pre-specified day on the diary forms that were mailed to them.
5. Respondents entered the information on a website or returned completed survey materials by mail.

The survey team went through two major rounds of data collection and follow-ups in order to improve the data quality, particularly those households with 0 or 1 vehicle. In the first round, a total of 4001 households were contacted. In the second round, the call center followed up with those respondents who originally indicated their interest in participating and were within the study area. In addition, the call center used the remaining random digit dialing numbers that were left from the first round and screened additional households in the study area. Modeling staff also undertook several rounds of geocoding and

data cleaning to maximize usable data. The sample size of the home interview survey was smaller than the 1989 survey. Nearly 900 surveys were collected, some of which were incomplete, un-geocodable, or outside the study area. A total of 429 surveys were geocoded in the study area, and 400 surveys were complete and usable. These 400 households recorded 3,087 trips and made 1,692 different destination locations (excluding homes). Of the 3,087 trips, 96 percent were made as drivers or passengers of cars. Only three percent were made by the non-motorized modes— walk or bike. Less than one percent of trips were made by bus.

Production trip rates were updated based on the results from the 2004 home interview survey. For home-based trips, trip rates are stratified by household size and vehicle availability (see Table 4-3). Non-home-based trip origins and destinations are estimated using the same formula. Attraction estimations are still based on a series of regression equations, which have independent variables such as retail employment, non-retail employment, total employment, and households.

Some HBW and HBO trip rates (particularly in the 2+ vehicle category) have been adjusted based on the 2000 home interview survey. Generally, the 2000 HBO trip rates for 1 and 2+ vehicle categories are lower than the 1989 rates. HBW trip rates are higher for 3-person HH/2+ vehicle category but lower for 1-person/2+ vehicle HH category, compared with the 1989 rates. In addition, the home interview survey did not generate enough responses from the households who were traditionally under-represented in surveys, e.g., 0-vehicle households and 1-person households, making the results unreliable for these households.

As a by-product, the 2000 Home Interview Survey provided data for travel behavior of those living outside the modeling domain. Because the modeling domain consists of a portion of Rockingham County, there was significant difficulty in screening households for the home interview survey. However, this provided a unique opportunity for trip generation model development. A subset of the survey responses is from households who live outside the study area. This set of data was geocoded and cleaned to provide insights on how the non-residents travel inside the modeling domain. The data were used to make adjustments for NHB trips in the trip generation stage.

Table 4-3: Production Trip Rates

Trip Purposes	Household Size	Number of Vehicles Available		
HBW		0	1	2+
	1	0.12	1.005	1.294
	2	0.22	1.005	2.165
	3	0.22	1.4	2.674
	4+	0.22	1.544	2.828
HBS		0	1	2+
	1	0.11	0.149	0.149
	2	0.11	0.284	0.284
	3	0.11	0.802	1.583
	4+	1.62	1.917	3.237
HBO		0	1	2+
	1	0.907	1.47	1.627
	2	0.907	2.377	2.757
	3	0.907	3.126	3.126
	4+	0.907	3.126	3.337
NHB =	1.430*Retail Employment +0.504* Non Retail Employment + 0.884 * Households			
Truck =	0.702*Total Employment + 1.121*Households			

4.1.3 LYNCHBURG LICENSE PLATE SURVEY – (ORIGIN DESTINATION SURVEY)

As part of the Lynchburg Model Update Project, an origin-destination (O-D) survey for the City of Lynchburg, Virginia and some surrounding areas was conducted. The O-D survey consisted of the following activities: the collection of alphanumeric license plate information, address matching with Virginia Department of Motor Vehicle (DMV) records, respondent completion of an online or mail-back survey regarding an external to internal or external to external trip, creation of a database of valid responses, and geocoding of survey responses. Appendix D summarizes the methodology and results of the O-D survey.

4.1.4 EXTERNAL STATION THROUGH TRIPS

The estimation of through trips at external stations is done following the *NCHRP Report 365* procedures with some modifications. The methodology described in *NCHRP Report 365* produces reasonable results for small urban areas, particularly those with populations of 50,000 or less. For principal arterial, the

rates appear to be reasonable for areas with a population up to approximately 100,000. The Lynchburg model region population is 135,038.

The percentage of through trips for principal arterials at external stations is calculated using *NCHRP Report 365* equation 5-1 (D.G. Modlin, Jr). For the purpose of estimating external travel, it is assumed that travel behavior for Lynchburg is similar to that of a region with a population of 100,000. Percentage of thru trips range from 11-15%.

In the FHWA document, *Calibration and Adjustment of System Planning Models*, the percentage of External-to-External trips for cities with urban area population from 100,000 to 250,000 is 15%; that value is assumed to be the maximum percentage. For minor arterials, the percentage of through trips is based on conditions similar to Harrisonburg. For external station Annual Average Weekday Traffic (AAWDT) greater than 3,000 vehicles, a 15% value is used, and for AAWDT less than 3,000 vehicles, 10% of trips are assumed to be through trips.

4.1.5 TRIP DISTRIBUTION

The trip distribution model estimates travel between traffic analysis zones (TAZs) using the productions and attractions of each TAZ, as well as "skimmed" highway travel times between each TAZ. Trip distribution uses a gravity model formulation. Initial friction factors for HBW, HBO, and NHB are borrowed from *NCHRP Report 365*. HBW friction factors are adjusted using the *NCHRP Report 365* methodology to match the trip frequency distribution derived from 2000 Census Journey-to-Work commuter flows. Friction factors for internal-external and external-internal persons and trucks and internal trucks are borrowed from the Harrisonburg model. External-external friction factors borrowed from the Blacksburg/Christiansburg model produced the best results.

4.1.6 TRIP ASSIGNMENT

Person trip tables produced by the model chain are converted from production and attraction (P/A) format to vehicle trip tables in origin-destination (OD) format using vehicle occupancy and time of day factors. The trip tables represent trip making during the AM peak, PM peak, and off-peak, as well as over a 24-hour period for all trip purposes internal to the study region. The model uses an incremental assignment process and loads vehicles using 40%, 20%, 20%, and 20% increments. Volume/delay functions are specified for each facility type. The formulation for these functions uses the Bureau of Public Roads (BPR) formulation, while the volume/delay coefficients are based on coefficients recommended in *NCHRP Report 365*. Testing various composite cost functions, based on time and distance, failed to produce better results than using just time as a means of calculating the minimum path set.

4.1.7 FEEDBACK

After the first iteration of highway assignment is executed, 24-hour volumes are calculated along with a 24-hour average congested speed on all highway links. These speeds are used to recalculate highway skims for trip distribution. Following each subsequent run of trip assignment, the 24-hour volumes are averaged with the volumes from the previous assignments. Each link is tested to see if the percent change in daily volume is less than or equal to 5%. Once 95% of the links in the network have met the criteria, feedback convergence has been established.

Input Data

LY0008.DAT = land use
TGFA00. DAT = trip generation adjustment factors
LYCH09T. DAT = friction factors
EXTVOL.PRT = external station volumes
LY0020.NET = unloaded highway network
PTRANSIT. DAT = percentage of transit person trips
TR00PEN.PEN = turn penalty

Output Data

IMPED00DIST. DAT = highway distances matrix
TRM00. DAT = terminal times
LY0008LU. DAT = modified land use
TRIPS00. DAT = total trips, production/attraction format
IMPED00. DAT = travel time and distance matrices, including terminal times
IMPED00ff. DAT = free flow travel time and distance matrices, including terminal times
PA00. DAT = trip table by mode of travel
LY0014. DAT = vehicle trip tables by mode and time of day
LOADAM. NET = loaded highway network (AM peak trips)
LOADPM. NET = loaded highway network (PM peak trips)
LOADOP. NET = loaded highway network (Off peak trips)
LOADFIN. NET = loaded highway network (daily trips)

4.2 VALIDATION BENCHMARKS

Federal agencies such as the Environmental Protection Agency (EPA) and the Federal Highway Administration (FHWA) have issued reports and guidelines about travel demand model validation measures and allowable margins of error. These guidelines include FHWA's *Model Validation and Reasonableness Checking Manual* published in 1997 and Transportation Research Board's *NCHRP Report 365 Travel Estimation Techniques for Urban Planning* published in 1998. Based on these reports, the following benchmarks are used to guide model validation:

1. HBW Trips compared with CTPP within 5%

2. Relative VMT error: (Estimated VMT-Observed VMT)/Observed VMT <5%

3. Relative volume error - assigned traffic volume versus traffic count volume:
   - Freeways<7%,
   - Principal arterials <10%,
   - Minor arterials <15%,
   - Collectors <25%

4. Screenline
   - Screenline Analysis (Assigned traffic vs. Observed traffic)

4.3 VALIDATION RESULTS

4.3.1 TRIP GENERATION

The first step in validation of a travel demand model is the evaluation of trip generation. Statistics for the 2000 trip generation model are shown in Table 4-4. According to *NCHRP Report 365*, urban areas with population from 50,000 to 199,999 have an average of 9.2 person trips per household. This is slightly higher than the 8.4 person trips per household estimated by the Lynchburg model. This difference is likely due to variations in household size, geographical characteristics, and other factors. The model estimates 3.3 person trips per capita compared with the 3.7 person trips per capita reported in the 2001 National Personal Travel Survey (NPTS).

Table 4-5 also shows the percentage of person trips by purpose compared to average values reported in *NCHRP Report 365*. For each purpose the error is within 3% of the observed data. For HBW trips, there is less than 1% difference between the model and the number of worker trips calculated using data from the 2000 CTPP. Truck trips in the model account for approximately 18% of the total trips. The Harrisonburg model, which also models truck trips, estimates that 22% of total trips are due to truck trips.

Table 4-4: 2000 Trip Generation Statistics

Motorized Trips by Trip Purpose		Model Percent	NCHRP 365 Percent	Person trips per HH	Person trips per Capita
HBW	97,342	22.1%	20%	1.8	0.7
HBO	244,488	55.4%	57%	4.6	1.8
NHB	99,326	22.5%	23%	1.9	0.7
SUBTOTAL	441,156	100.0%	100%	8.4	3.3
Non-Passenger Trips					
TRUCK	92,799				
TOTAL	533,955			10.1	3.9
NPTS 2001					3.7

4.3.2 TRIP DISTRIBUTION

Performance of the trip distribution model is evaluated by comparing flows of HBW trips between jurisdictions in the model region. Table 4-5 shows that in general, the jurisdiction pairs with the largest number of trips have the lowest error compared to worker flows from the 2000 CTPP. While the total number of productions and attractions for each jurisdiction compares favorably to the observed data, trips between Lynchburg and Campbell County are slightly overestimated and trips between Lynchburg and Amherst County are slightly underestimated. Another means to evaluate trip distribution performance is by looking at the average trip length frequencies. Using worker flows from the 2000 CTPP, an observed trip length distribution curve can be developed as shown in Figure 4-4. In addition to matching the overall shape of the curve, the average trip length of 13.7 minutes for HBW trips is within 2% of the observed average trip length of 13.51 minutes. For urbanized areas with populations less than 500,000, *NCHRP Report 365* suggests that the average trip lengths for non-work trips should be at least 75% of the average trip length for HBW trips. The average trip lengths estimated by the model for HBO and NHB trips are 9.85 and 9.31 minutes, respectively. While these values are slightly below the recommended threshold at 70% and 68%, without observed data for non-work trips, there are no means readily available to adjust non-work friction factors.

Table 4-5: Home-Based-Work (HBW) Trips by Jurisdiction

Observed CTPP Trips

	Amherst	Bedford	Campbell	Lynchburg	Total
Amherst	7,997	96	1,050	7,726	**16,868**
Bedford	471	1,846	1,317	10,633	**14,267**
Campbell	1,082	439	7,415	16,282	**25,218**
Lynchburg	2,442	359	2,554	35,665	**41,019**
Total	**11,992**	**2,739**	**12,335**	**70,306**	**97,371**

Simulated HBW Trips

	Amherst	Bedford	Campbell	Lynchburg	Total
Amherst	9,109	71	868	6,788	**16,836**
Bedford	359	1,197	1,981	10,736	**14,273**
Campbell	898	769	5,661	17,879	**25,207**
Lynchburg	1,815	702	3,791	34,718	**41,026**
Total	**12,181**	**2,739**	**12,300**	**70,122**	**97,342**

Diff (Sim - Obs)

	Amherst	Bedford	Campbell	Lynchburg	Total
Amherst	1,112	-25	-182	-937	**-32**
Bedford	-112	-648	664	103	**6**
Campbell	-184	330	-1,754	1,597	**-11**
Lynchburg	-627	343	1,237	-947	**6**
Total	**189**	**0**	**-35**	**-184**	**-30**

% Diff (Sim - Obs)

	Amherst	Bedford	Campbell	Lynchburg	Total
Amherst	13.91%	-26.05%	-17.34%	-12.13%	**-0.19%**
Bedford	-23.86%	-35.12%	50.43%	0.97%	**0.05%**
Campbell	-17.00%	75.26%	-23.66%	9.81%	**-0.04%**
Lynchburg	-25.66%	95.57%	48.46%	-2.66%	**0.02%**
Total	**1.58%**	**0.01%**	**-0.28%**	**-0.26%**	**-0.03%**

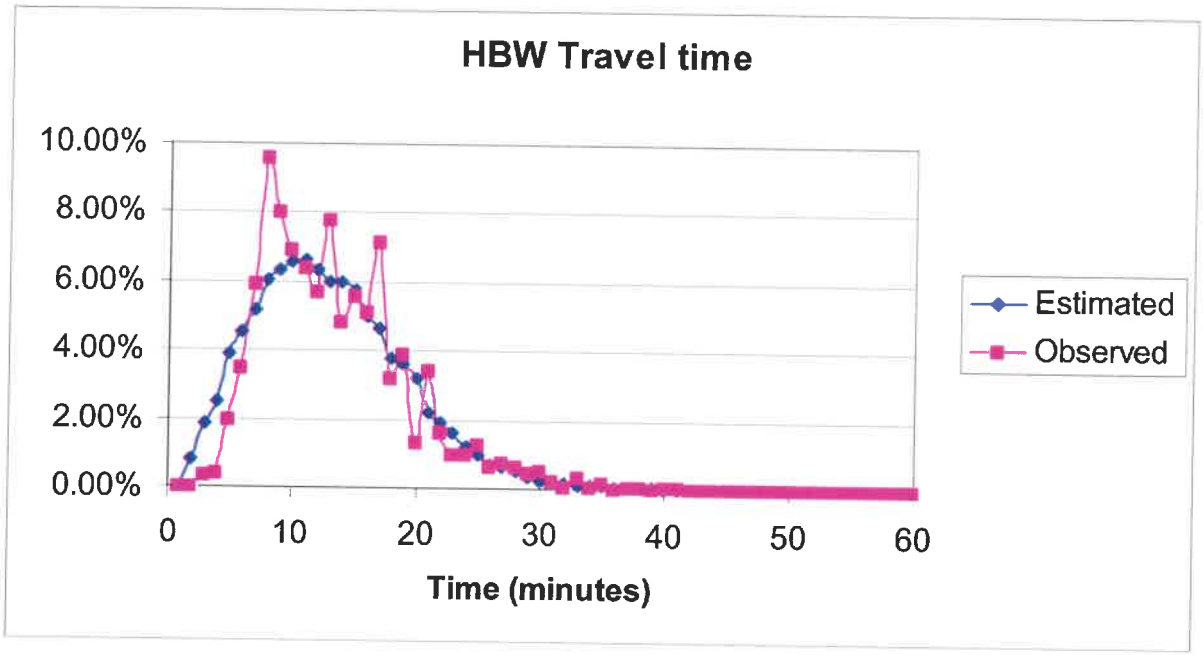


Figure 4-4: HBW Travel Time

4.3.3 TRAFFIC ASSIGNMENT

Traffic count data are used to compare observed versus estimated traffic volumes, and vehicle miles traveled (VMT) values are calculated using traffic volumes and link distance for all links with counts and for pre-defined screenlines. It should be understood that there is inherent error in the traffic data collection process. "Traffic volumes vary greatly by season and by day of the week. Count errors can be caused by variation in the mix of vehicles in the traffic stream. Regularly occurring local events, special events, and accidents can distort the counts on large portions of the highway system. Errors can also be due to mechanical counter failure, field personnel mistakes, or improper counter location" (FHWA 1990).

The sources of the traffic count data used in the validation process are published counts and count databases from the Virginia Department of Transportation. In many cases, the traffic count data are not real counts but factored data, i.e., an actual traffic count taken from an earlier year or years ago was multiplied by a growth factor to derive the 2000 count.

Simulated volumes for each facility type are compared to the 2000 traffic counts in Table 4-6 using links with counts in the highway network. Total volumes for each facility type are within the allowable error specified in the validation benchmarks. Overall, the model underestimates vehicle trips by 1.1%.

Table 4-6: Simulated Versus Observed Volume by Facility Type

Facility Type	Simulated	Observed	Difference	% Error	Benchmark
Freeway	598,667	593,519	5,148	0.87%	±7%
Principal Arterial	1,482,427	1,474,928	7,499	0.51%	±10%
Minor Arterial	1,350,603	1,349,217	1,386	0.10%	±15%
Collector	755,820	813,558	-57,738	-7.10%	±25%
Local	1,332	4,387	-3,055	-69.64%	N.A.
Total	**4,188,849**	**4,235,609**	**-46,760**	**-1.10%**	

Simulated and observed VMT, in Table 4-7, are calculated by multiplying the link distance by the model volume and observed traffic count respectively. The total VMT in the model is underestimated by less than 1%, which meets the validation benchmark for VMT.

Table 4-7: Simulated Versus Observed VMT by Facility Type

Facility Type	Simulated	Observed	Difference	% Error	Benchmark
Freeway	53,605,034	51,801,795	1,803,239	3.48%	
Principal Arterial	68,265,220	67,823,355	441,865	0.65%	
Minor Arterial	45,537,937	47,754,247	-2,216,310	-4.64%	
Collector	37,651,137	38,891,354	-1,240,217	-3.19%	
Local	110,371	355,903	-245,532	-68.99%	
Total	**205,169,699**	**206,626,654**	**-1,456,955**	**-0.71%**	**±5.00%**

Another measure for evaluating assigned traffic volumes is the Percent Root Mean Square of Error (RMSE), which measures deviation between simulated and observed traffic volumes. Percent RMSE is defined as follows:

$$\%RMSE = ((\Sigma_j (Model_j - Count_j)^2 / (Number\ of\ Counts - 1))^{0.5} * 100) / (\Sigma_j\ Count_j / Number\ of\ Counts)$$

The percent RMSE measures how well the simulated data matches the observed data. A lower percent RMSE indicates a better match. Table 4-8 shows that the percent RMSE for the Lynchburg model falls within the range of values for other travel demand models in Virginia.

Table 4-8: RMSE

Facility Type	Lynchburg % RMSE	Harrisonburg % RMSE	Richmond % RMSE	Richmond /Hampton % RMSE
Interstate & Freeway	23.02	8.02	19.7	26.46
Principal Arterial	17.38	22.01	32.1	30.92
Minor Arterial	33.00	37.09	50.5	47.18
Collector	73.81	55.36	87.3	89.19
Total	**35.76**	**33.85**	**43.7**	**44.4**

The *Model Validation and Reasonableness Checking Manual*, published by FHWA, recommends that the coefficient of determination (R^2) should be greater than 0.88. For the Lynchburg model, the R^2 value is 0.89, indicating a good fit between the observed traffic counts and estimated volumes. This can also be seen in Figure 4-5, which shows the observed counts versus estimated volumes.

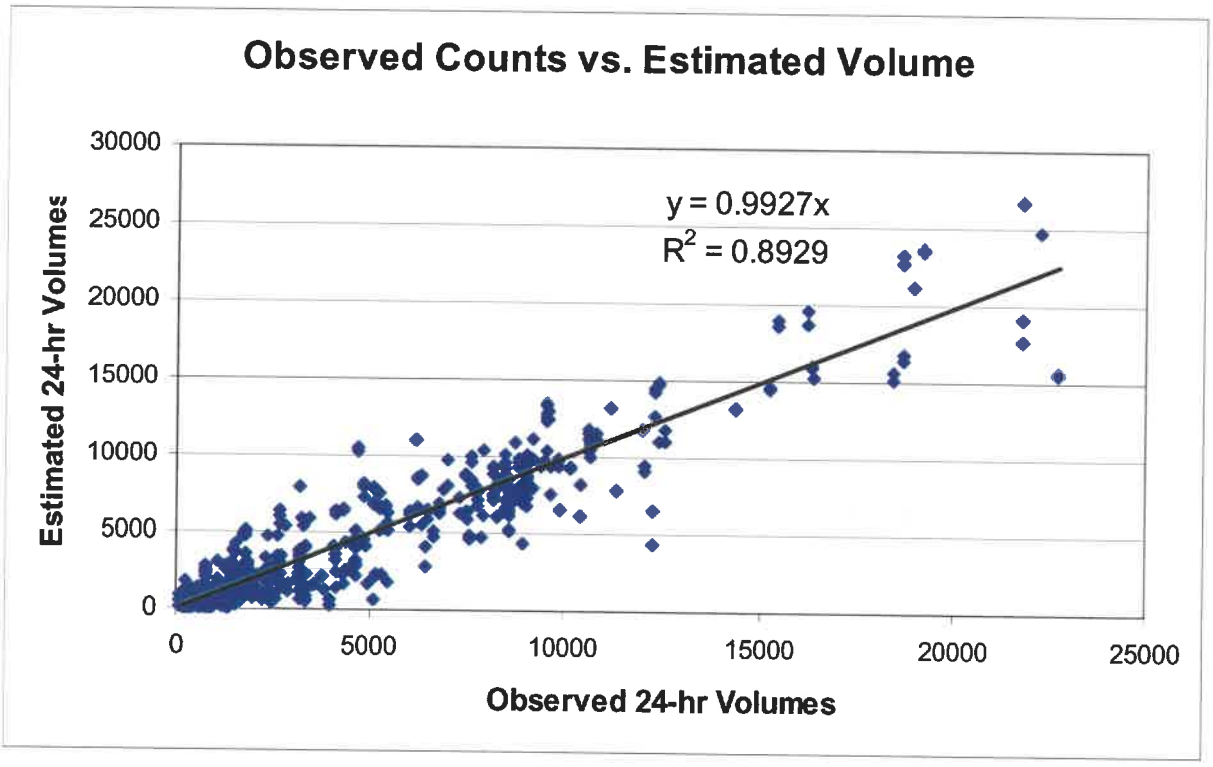


Figure 4-5: Observed Counts versus Estimated Volumes.

One final check of the base year model validation is performed by a comparison of observed and estimated travel volumes at several locations throughout the region. These locations are referred to as

screenlines since they generally cut across regions and major roadways. Model volumes are compared to ground counts for all roadways bisected by the screenline to determine if the modeled traffic flowing across the screenline is representative of the recorded count data. Figure 4-6 shows the screenline locations. The validation summary is presented in Table 4-9. It is important to observe that screenline totals for the region do not include external stations. While screenlines 2 and 10 show the greatest deviation, it's worth noting that they also have the lowest observed volumes. Screenline 7, one of the higher volume screenlines, also did not validate as well. This is due to the sparse network detail and lack of route options for the model to select paths.

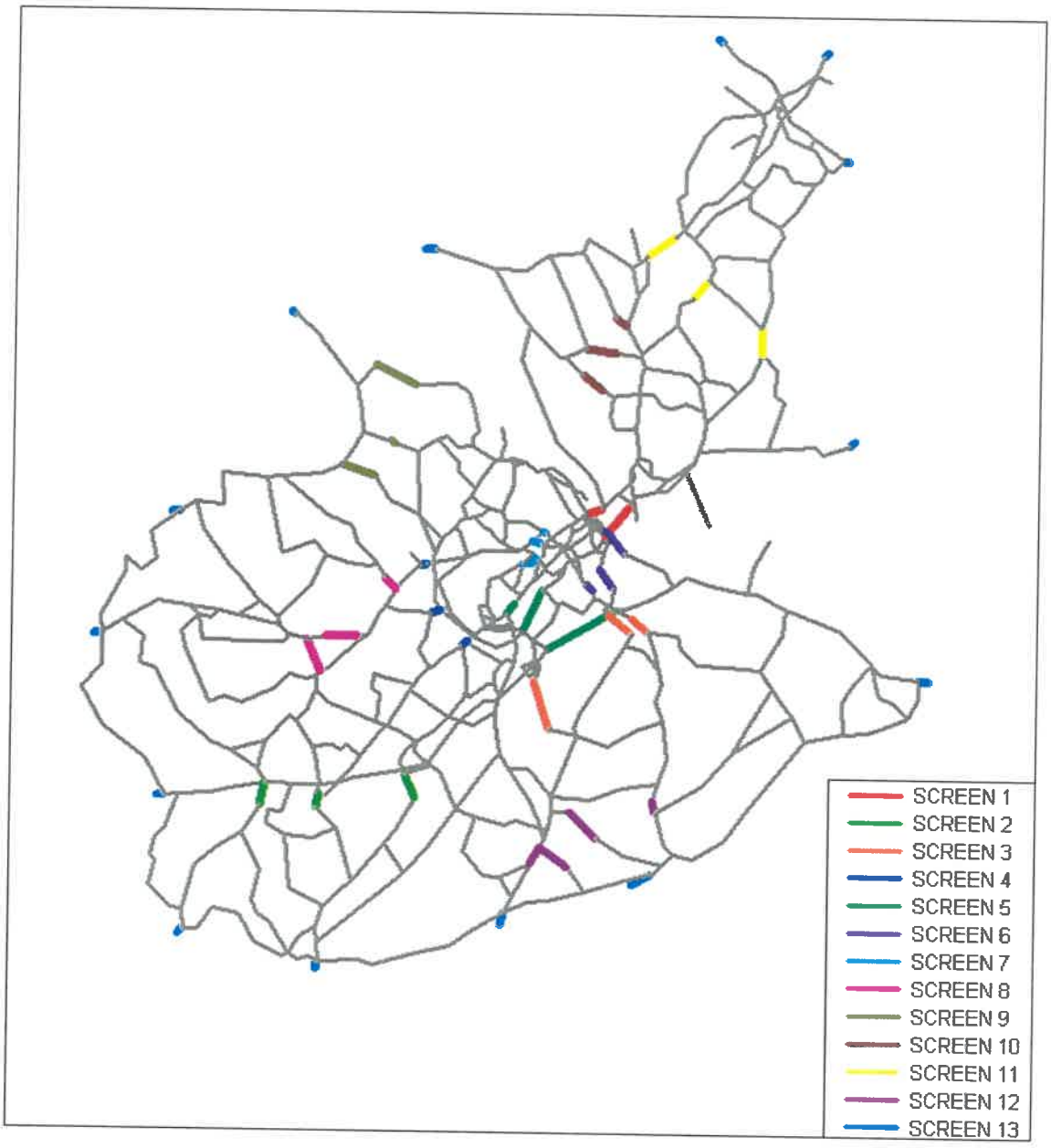


Figure 4-6: Screenline Location

Table 4-9: Validation Screenlines

SCREEN	Name	Simulated Volume	Observed Count	Ratio Sim/Obs	Percent Deviation	RMSE
1	James River Crossings	46,669	45,474	1.03	2.6%	10.18
2	South of US 460 - Bedford	10,639	14,708	0.72	27.7%	65.57
3	South of US 460 - Campbell	16,327	16,334	1.00	0.0%	17.86
4	West of US 501 - Lynchburg	84,841	76,324	1.11	11.2%	15.75
5	Southwest Lynchburg	93,907	90,716	1.04	3.5%	12.07
6	Southeast Lynchburg	28,831	26,836	1.07	7.4%	52.55
7	Northwest Lynchburg	49,097	41,062	1.20	19.6%	38.86
8	North of US 221 - Bedford	32,629	33,326	0.98	2.1%	14.50
9	North Bedford	11,171	10,682	1.05	4.6%	32.67
10	West of US 29 - Amherst	4,462	8,168	0.55	45.4%	72.90
11	South of Town of Amherst	26,580	25,768	1.03	3.2%	13.03
12	North of Rte 24 - Campbell	33,345	31,750	1.05	5.0%	33.11
13	Externals	92,743	92,800	1.00	0.1%	NA
TOTAL		**438,498**	**421,148**	**1.04**	**4.1%**	**23.79**

4.4 2030 BUILD MODEL

To develop estimates of 2030 traffic volumes within the Lynchburg Study area, the 2000 base year model was used as the foundation for executing the 2030 build model. The base year model provided all processes for the trip generation, trip distribution and traffic assignment models steps. Differences between the 2000 and 2030 model were limited to increases in land use and the introduction of improved or new roadway projects. The 2000 model parameters and procedures as calibrated remained the same in the 2030 model. The 2030 Build model was developed using the 2030 land use projections discussed in Chapter 3 as well as the highway projects from the Virginia Transportation Six-Year Improvement Program (fiscal year 2005-2010) and projects that have funding to be built between the 2000 Base year and 2030. Table 4-10 presents the new projects added to the 2030 Build highway network.

Table 4-10: 2030 Improvement and Construction Projects

Project No.	UPC	Description	Improvement	District
1	11813	RTE 29 - Lynchburg-Madison Heights Bypass	4 lanes, new location	Amherst
2	11912	RTE 29 - Lynchburg-Madison Heights Bypass	4 lanes, new location	Amherst
3	15842	RTE 29 - Lynchburg-Madison Heights Bypass	Sweet Briar Interchange	Amherst
4	15844	RTE 29 - Lynchburg-Madison Heights Bypass	Route 460 Interchange	Amherst
5	11914	RTE 130 Connector - Lynch/Madison Heights BP	4 lanes, new location	Amherst
6	11913	RTE 210 Connector - Lynch/Madison Heights BP	4 lanes, new location	Amherst
7	8880	RTE 221	Develop to 4 lanes	Bedford
8	57581	RTE 221	Develop to 4 lanes	Bedford
9	57582	RTE 221	Develop to 4 lanes	Bedford

Project No.	UPC	Description	Improvement	District
10	15843	RTE 29 - Lynchburg-Madison Heights Bypass	Route 460 Interchange	Campbell
11	16604	RTE 221	Widen to 4 lanes	Lynchburg
12	8759	Crosstown Connector	4 lanes, new location	Lynchburg
13	52097	Breezewood Drive	2 lanes, new location	Lynchburg

Tables 4-11 and 4-12 show the growth in simulated VMT and screenline volumes respectively. These growth rates seem reasonable in relation to the estimated growth in population, employment, and vehicle ownership. The screenlines with the lowest and highest growth in Table 4-12 generally tend to correlate geographically with the jurisdictions that experience the lowest and highest socio-economic growth shown in Table 3-7.

Table 4-11: VMT Comparison (2000 vs. 2030) by Facility Type

Facility Type	2000 Simulated	2030 Simulated	Difference (2030 – 2000)	% Difference
Freeway	53,605,034	73,061,650	19,456,616	36.30%
Principal Arterial	68,265,220	75,841,785	7,576,565	11.10%
Minor Arterial	45,537,937	62,988,176	17,450,239	38.32%
Collector	37,651,137	52,632,548	14,981,411	39.79%
Local	110,371	204,310	93,939	85.11%
Total	**205,169,699**	**264,728,469**	**59,558,770**	**29.03%**

Table 4-12: Screenline Volume Comparison (2000 vs. 2030)

SCREEN	Name	Simulated Volume 2000	Simulated Volume 2030	Difference (2030 - 2000)	% Difference	Ratio 2030/2000
1	James River Crossings	46,669	56,631	9,962	21.3%	1.21
2	South of US 460 - Bedford	10,639	22,144	11,505	108.1%	2.08
3	South of US 460 - Campbell	16,327	20,923	4,596	28.1%	1.28
4	West of US 501 - Lynchburg	84,841	111,386	26,545	31.3%	1.31
5	Southwest Lynchburg	93,907	121,075	27,168	28.9%	1.29
6	Southeast Lynchburg	28,831	26,166	-2,665	-9.2%	0.91
7	Northwest Lynchburg	49,097	55,829	6,732	13.7%	1.14
8	North of US 221 - Bedford	32,629	56,354	23,725	72.7%	1.73
9	North Bedford	11,171	18,105	6,934	62.1%	1.62
10	West of US 29 - Amherst	4,462	7,062	2,600	58.3%	1.58
11	South of Town of Amherst	26,580	13,216	-13,364	-50.3%	0.50
12	North of Rte 24 - Campbell	33,345	39,768	6,423	19.3%	1.19
13	Externals	92,743	164,070	71,327	76.9%	1.77
TOTAL		**438,498**	**548,659**	**110,161**	**25.1%**	**1.25**

Appendix D – Project Cost Estimating Process

The development of cost estimates for each proposed recommendation in the Plan was based on unit costs developed by VDOT's Transportation Planning Division. These estimates represent the average of a wide range of proposed road, bridge, intersection, and interchange improvements across the Commonwealth of Virginia. Right-of-way costs are estimated based on the characteristics of development in the area in which the proposed project is located (urban, suburban, rural, etc.). These costs are for planning purposes only and actual construction and right-of-way costs will vary substantially based specifics of project design and local conditions. As projects proceed into more detailed planning, environmental, and design phases, these costs will be refined further. The unit costs used for this study are shown in the table below. Note that some cost estimates shown in this report have been modified from the initial unit-cost-based estimates. These adjustments reflect additional engineering or knowledge of specific local conditions.

Unit Costs Used in Project Cost Estimating

Facility Type/ Typical Section Code		Description		Cost Basis	Unit Cost (2005 Dollars)
Urban Typical Sections					
2 lanes	U2	26'-30' pavement	Reconstruct or new	per mile	$2,415,000
3 lanes	U3	36'-40' pavement	Reconstruct or new	per mile	$4,600,000
4 lanes	U4	40'-48' pavement	Reconstruct or new	per mile	$5,520,000
4 lanes divided	U4D	48' pavement	Reconstruct or new	per mile	$6,095,000
6 lanes divided	U6D	72' pavement	Reconstruct or new	per mile	$7,935,000
8 lanes divided	U8D	96' pavement	Reconstruct or new	per mile	$9,890,000
Rural Typical Sections					
2 lanes	R2	18' pavement	Reconstruct or new	per mile	$403,000
2 lanes	R2	20' pavement	Reconstruct or new	per mile	$667,000
2 lanes	R2	22' pavement	Reconstruct or new	per mile	$794,000
2 lanes	R2	24' pavement	Reconstruct or new	per mile	$1,150,000
4 lanes divided	R4D	48' pavement	Reconstruct	per mile	$3,105,000
4 lanes divided	R4D	48' pavement	New	per mile	$4,715,000
4 lanes divided	R4D-P	48' pavement	Parallel roadway	per mile	$2,415,000
4 lanes divided	R4D	48' pavement with 16' raised median	Reconstruct or new	per mile	$3,335,000
6 lanes divided	R6D	72' pavement	Reconstruct	per mile	$4,370,000
6 lanes divided	R6D	72' pavement	New	per mile	$5,750,000
8 lanes divided	R8D	96' pavement	Reconstruct	per mile	$4,370,000
8 lanes divided	R8D	96' pavement	Reconstruct	per mile	$8,625,000

Unit Costs Used in Project Cost Estimating

Facility Type/ Typical Section Code	Description	Cost Basis	Unit Cost (2005 Dollars)
Right and Left Turn Lanes on a Four-Lane Road			
Right turn lane	100' parallel and 100' taper	each	$85,000
Left turn lane	200' parallel and 200' taper	each	$104,000
Crossover		each	$78,000
Provide new crossover with two right and two left turn lanes		each	$454,000
Right and Center Left Turn Lane on a Two-Lane Road (design speed 55 mph)			
One left turn lane	500' parallel and two 700' taper	each	$631,000
Two left turn lanes	900' parallel and two 700' taper	each	$719,000
Right and left turn lane		each	$716,000
Two right and two left turn lanes		each	$888,000
Bridge Cost			
Over 25' to 200' in length	Widen, reconstruct, or new	per sq ft.	$97
Over 200' in length	Widen, reconstruct, or new	per sq ft.	$121
Other Improvements Cost			
Eliminate parking and re-stripe (both sides)		per mile	$69,000
Provide signal at unsignalized intersection		each	$207,000
Improve, replace signal at intersection		each	$104,000
Improve phasing of system, signalized intersections		each	$138,000
Provide pedestrian signal phase		each	$28,000
Provide pedestrian crosswalk		each	$1,000
Downtown signage		per mile	$21,000
Close open ditch drainage and provide curb & gutter		per mile	$1,150,000
Widen radius for truck turning		each	$29,000
Install railroad warning lights (no gates)		each	$29,000
Lower railroad bed by 2 feet over 1,000 foot section		per mile	$2,300,000
Provide park & ride facility		per parking space	$2,000
Fixed route shuttle service		each	$690,000
Provide 5' sidewalk		per mile	$74,000
Provide 8' hike/bike trail off road		per mile	$116,000
Improve grade separated interchange		each	$27,600,000
Provide grade separated interchange		each	$41,400,000
Provide new grade separated interchange		each	$41,400,000
Add 5' bikeway rural		per mile	$179,000
Add 5' bikeway urban		per mile	$397,000
Right of Way & Utilities Cost (as percent of estimated construction cost)			
Rural			25%
Residential/suburban low density			50%

Unit Costs Used in Project Cost Estimating

Facility Type/ Typical Section Code	Description	Cost Basis	Unit Cost (2005 Dollars)
Outlying business/suburban high density			60%
Central business district			100%

Source: Virginia Department of Transportation, Transportation and Mobility Planning Division, factored to reflect 2005 dollars.
Costs include 20 percent for engineering and contingencies.

Appendix E – Traffic Count Data

The charts on the following pages show roadway segment counts and intersection turning movement counts performed as part of this study. These counts were performed in the fall of 2004.

Description: Route 130 (Elon Road) at Route 706 (Crennel Drive) Count Period From: 9/12/2004 To: 9/15/2004

Time Start	Eastbound Volumes Weekday Totals			Westbound Volumes Weekday Totals			Both Directions Volumes Weekday Totals			Eastbound Percentages Weekday Totals			Westbound Percentages Weekday Totals			Both Directions Percentages Weekday Totals		
	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk
0:00	15	0	1	22	0	2	37	0	3	93.3%	0.0%	6.7%	90.9%	0.0%	9.1%	91.9%	0.0%	8.1%
1:00	20	0	2	13	0	3	33	0	5	90.0%	0.0%	10.0%	76.9%	0.0%	23.1%	84.8%	0.0%	15.2%
2:00	9	0	1	13	0	3	22	0	4	88.9%	0.0%	11.1%	76.9%	0.0%	23.1%	81.8%	0.0%	18.2%
3:00	12	0	1	13	0	2	25	0	3	91.7%	0.0%	8.3%	84.6%	0.0%	15.4%	88.0%	0.0%	12.0%
4:00	33	1	19	18	0	3	51	1	22	39.4%	3.0%	57.6%	83.3%	0.0%	16.7%	54.9%	2.0%	43.1%
5:00	60	3	11	35	0	6	95	3	17	76.7%	5.0%	18.3%	82.9%	0.0%	17.1%	78.9%	3.2%	17.9%
6:00	154	9	6	104	9	9	258	18	15	90.3%	5.8%	3.9%	82.7%	8.7%	8.7%	87.2%	7.0%	5.8%
7:00	185	15	9	154	13	13	339	28	22	87.0%	8.1%	4.9%	83.1%	8.4%	8.4%	85.3%	8.3%	6.5%
8:00	165	12	15	114	9	13	279	21	28	83.6%	7.3%	9.1%	80.7%	7.9%	11.4%	82.4%	7.5%	10.0%
9:00	133	13	14	110	9	12	243	22	26	79.7%	9.8%	10.5%	80.9%	8.2%	10.9%	80.2%	9.1%	10.7%
10:00	131	8	15	130	9	11	261	17	26	82.4%	6.1%	11.5%	84.6%	6.9%	8.5%	83.5%	6.5%	10.0%
11:00	120	12	9	148	14	15	268	26	24	82.5%	10.0%	7.5%	80.4%	9.5%	10.1%	81.3%	9.7%	9.0%
12:00	152	10	13	146	10	16	298	20	29	84.9%	6.6%	8.6%	82.2%	6.8%	11.0%	83.6%	6.7%	9.7%
13:00	145	12	13	162	13	19	307	25	32	82.8%	8.3%	9.0%	80.2%	8.0%	11.7%	81.4%	8.1%	10.4%
14:00	146	9	15	178	18	14	324	27	29	83.6%	6.2%	10.3%	82.0%	10.1%	7.9%	82.7%	8.3%	9.0%
15:00	189	12	15	207	13	24	396	25	39	85.7%	6.3%	7.9%	82.1%	6.3%	11.6%	83.8%	6.3%	9.8%
16:00	213	15	13	235	11	17	448	26	30	86.9%	7.0%	6.1%	88.1%	4.7%	7.2%	87.5%	5.8%	6.7%
17:00	223	11	10	221	7	10	444	18	20	90.6%	4.9%	4.5%	92.3%	3.2%	4.5%	91.4%	4.1%	4.5%
18:00	159	6	7	192	8	15	351	14	22	91.8%	3.8%	4.4%	88.0%	4.2%	7.8%	89.7%	4.0%	6.3%
19:00	97	2	9	170	4	9	267	6	18	88.7%	2.1%	9.3%	92.4%	2.4%	5.3%	91.0%	2.2%	6.7%
20:00	79	3	6	129	3	5	208	6	11	88.6%	3.8%	7.6%	93.8%	2.3%	3.9%	91.8%	2.9%	5.3%
21:00	54	2	6	85	2	6	139	4	12	85.2%	3.7%	11.1%	90.6%	2.4%	7.1%	88.5%	2.9%	8.6%
22:00	37	1	6	48	1	6	85	2	12	81.1%	2.7%	16.2%	85.4%	2.1%	12.5%	83.5%	2.4%	14.1%
23:00	15	0	5	47	1	3	62	1	8	66.7%	0.0%	33.3%	91.5%	2.1%	6.4%	85.5%	1.6%	12.9%
Totals	2546	156	221	2694	154	236	5240	310	457	85.2%	6.1%	8.7%	85.5%	5.7%	8.8%	85.4%	5.9%	8.7%

Description: Route 60 between Washington Street (1102) and Route 29 Count Period From: 9/12/2004 To: 9/15/2004

Time Start	Eastbound Volumes			Westbound Volumes			Both Directions Volumes			Eastbound Percentages			Westbound Percentages			Both Directions Percentages		
	Weekday Totals			Weekday Totals			Weekday Totals			Weekday Totals			Weekday Totals			Weekday Totals		
	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk
0:00	18	0	2	17	0	2	35	0	4	88.9%	0.0%	11.1%	88.2%	0.0%	11.8%	88.6%	0.0%	11.4%
1:00	8	0	1	8	0	1	16	0	2	87.5%	0.0%	12.5%	87.5%	0.0%	12.5%	87.5%	0.0%	12.5%
2:00	8	0	2	8	0	1	16	0	3	75.0%	0.0%	25.0%	87.5%	0.0%	12.5%	81.3%	0.0%	18.8%
3:00	8	1	3	10	0	3	18	1	6	50.0%	12.5%	37.5%	70.0%	0.0%	30.0%	61.1%	5.6%	33.3%
4:00	13	0	2	20	1	3	33	1	5	84.6%	0.0%	15.4%	80.0%	5.0%	15.0%	81.8%	3.0%	15.2%
5:00	53	7	1	80	6	2	133	13	3	84.9%	13.2%	1.9%	90.0%	7.5%	2.5%	88.0%	9.8%	2.3%
6:00	179	15	8	256	13	6	435	28	14	87.2%	8.4%	4.5%	92.6%	5.1%	2.3%	90.3%	6.4%	3.2%
7:00	427	39	8	472	50	13	899	89	21	89.0%	9.1%	1.9%	86.7%	10.6%	2.8%	87.8%	9.9%	2.3%
8:00	352	20	11	321	23	10	673	43	21	91.2%	5.7%	3.1%	89.7%	7.2%	3.1%	90.5%	6.4%	3.1%
9:00	255	12	15	267	17	11	522	29	26	89.4%	4.7%	5.9%	89.5%	6.4%	4.1%	89.5%	5.6%	5.0%
10:00	267	12	9	283	16	12	550	28	21	92.1%	4.5%	3.4%	90.1%	5.7%	4.2%	91.1%	5.1%	3.8%
11:00	308	20	16	298	16	7	606	36	23	88.3%	6.5%	5.2%	92.3%	5.4%	2.3%	90.3%	5.9%	3.8%
12:00	280	15	16	360	21	16	640	36	32	88.9%	5.4%	5.7%	89.7%	5.8%	4.4%	89.4%	5.6%	5.0%
13:00	290	20	11	327	18	10	617	38	21	89.3%	6.9%	3.8%	91.4%	5.5%	3.1%	90.4%	6.2%	3.4%
14:00	349	41	14	409	36	11	758	77	25	84.2%	11.7%	4.0%	88.5%	8.8%	2.7%	86.5%	10.2%	3.3%
15:00	367	21	13	451	22	12	818	43	25	90.7%	5.7%	3.5%	92.5%	4.9%	2.7%	91.7%	5.3%	3.1%
16:00	411	14	13	438	21	16	849	35	29	93.4%	3.4%	3.2%	91.6%	4.8%	3.7%	92.5%	4.1%	3.4%
17:00	420	18	8	423	10	8	843	28	16	93.8%	4.3%	1.9%	95.7%	2.4%	1.9%	94.8%	3.3%	1.9%
18:00	295	8	7	269	9	3	564	17	10	94.9%	2.7%	2.4%	95.5%	3.3%	1.1%	95.2%	3.0%	1.8%
19:00	222	7	3	249	6	4	471	13	7	95.5%	3.2%	1.4%	96.0%	2.4%	1.6%	95.8%	2.8%	1.5%
20:00	162	3	4	175	2	3	337	5	7	95.7%	1.9%	2.5%	97.1%	1.1%	1.7%	96.4%	1.5%	2.1%
21:00	100	3	3	119	2	5	219	5	8	94.0%	3.0%	3.0%	94.1%	1.7%	4.2%	94.1%	2.3%	3.7%
22:00	67	2	2	60	1	2	127	3	4	94.0%	3.0%	3.0%	95.0%	1.7%	3.3%	94.5%	2.4%	3.1%
23:00	35	1	0	24	1	2	59	2	2	97.1%	2.9%	0.0%	87.5%	4.2%	8.3%	93.2%	3.4%	3.4%
Totals	4894	279	172	5344	291	163	10238	570	335	90.8%	5.7%	3.5%	91.5%	5.4%	3.1%	91.2%	5.6%	3.3%

Description: Route 644 (Coffee Road) east of Route 621 (Cottontown Road) Count Period From: 9/13/2004 To: 9/15/2004

Time Start	Eastbound Volumes			Westbound Volumes			Both Directions Volumes			Eastbound Percentages			Westbound Percentages			Both Directions Percentages		
	Weekday Totals			Weekday Totals			Weekday Totals			Weekday Totals			Weekday Totals			Weekday Totals		
	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk
0:00	0	0	0	0	0	0	0	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
1:00	1	0	0	0	0	0	1	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
2:00	0	0	0	1	0	0	1	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
3:00	0	0	0	0	0	0	0	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
4:00	2	0	0	2	0	0	4	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
5:00	5	0	0	0	0	0	5	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
6:00	17	3	0	7	0	0	24	3	0	82.4%	17.6%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
7:00	40	1	0	37	2	0	77	3	0	97.5%	2.5%	0.0%	100.0%	0.0%	0.0%	87.5%	12.5%	0.0%
8:00	25	3	0	22	1	1	47	4	1	88.0%	12.0%	0.0%	94.6%	5.4%	0.0%	96.1%	3.9%	0.0%
9:00	12	2	0	8	0	0	20	2	0	83.3%	16.7%	0.0%	90.9%	4.5%	4.5%	89.4%	8.5%	2.1%
10:00	9	0	0	13	1	0	22	1	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	90.0%	10.0%	0.0%
11:00	13	0	0	14	1	0	27	1	0	100.0%	0.0%	0.0%	92.3%	7.7%	0.0%	95.5%	4.5%	0.0%
12:00	17	0	0	12	0	0	29	0	0	100.0%	0.0%	0.0%	92.9%	7.1%	0.0%	96.3%	3.7%	0.0%
13:00	13	3	0	16	0	0	29	3	0	76.9%	23.1%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
14:00	19	1	0	14	1	0	33	2	0	94.7%	5.3%	0.0%	92.9%	7.1%	0.0%	89.7%	10.3%	0.0%
15:00	30	3	0	20	1	0	50	4	0	90.0%	10.0%	0.0%	95.0%	5.0%	0.0%	93.9%	6.1%	0.0%
16:00	22	2	0	25	2	0	47	4	0	90.9%	9.1%	0.0%	92.0%	8.0%	0.0%	92.0%	8.0%	0.0%
17:00	34	2	0	35	5	0	69	7	0	94.1%	5.9%	0.0%	85.7%	14.3%	0.0%	91.5%	8.5%	0.0%
18:00	21	1	0	23	0	0	44	1	0	95.2%	4.8%	0.0%	100.0%	0.0%	0.0%	89.9%	10.1%	0.0%
19:00	19	1	0	13	1	0	32	2	0	94.7%	5.3%	0.0%	92.3%	7.7%	0.0%	97.7%	2.3%	0.0%
20:00	12	0	0	13	1	0	25	1	0	100.0%	0.0%	0.0%	92.3%	7.7%	0.0%	93.8%	6.3%	0.0%
21:00	6	0	0	8	1	0	14	1	0	100.0%	0.0%	0.0%	87.5%	12.5%	0.0%	96.0%	4.0%	0.0%
22:00	2	0	0	4	0	0	6	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	92.9%	7.1%	0.0%
23:00	2	0	0	1	0	0	3	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
Totals	321	22	0	288	17	1	609	39	1	93.1%	6.9%	0.0%	93.8%	5.9%	0.3%	93.4%	6.4%	0.2%

Description: Route 221 between Graves Mill Road and Cottontown Road Count Period From: 9/12/2004 To: 9/15/2004

Time Start	Eastbound Volumes			Westbound Volumes			Both Directions Volumes			Eastbound Percentages			Westbound Percentages			Both Directions Percentages		
	Weekday Totals			Weekday Totals			Weekday Totals			Weekday Totals			Weekday Totals			Weekday Totals		
	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk
0:00	70	0	0	48	0	0	118	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
1:00	34	0	0	39	1	1	73	1	1	100.0%	0.0%	0.0%	94.9%	2.6%	2.6%	97.3%	1.4%	1.4%
2:00	18	0	0	22	0	0	40	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
3:00	18	1	0	19	0	0	37	1	0	94.4%	5.6%	0.0%	100.0%	0.0%	0.0%	97.3%	2.7%	0.0%
4:00	33	2	1	33	0	0	66	2	1	90.9%	6.1%	3.0%	100.0%	0.0%	0.0%	95.5%	3.0%	1.5%
5:00	88	4	3	138	2	1	226	6	4	92.0%	4.5%	3.4%	97.8%	1.4%	0.7%	95.6%	2.7%	1.8%
6:00	345	17	25	400	12	11	745	29	36	87.8%	4.9%	7.2%	94.3%	3.0%	2.8%	91.3%	3.9%	4.8%
7:00	734	46	105	741	34	47	1475	80	152	79.4%	6.3%	14.3%	89.1%	4.6%	6.3%	84.3%	5.4%	10.3%
8:00	738	42	91	701	23	32	1439	65	123	82.0%	5.7%	12.3%	92.2%	3.3%	4.6%	86.9%	4.5%	8.5%
9:00	593	28	62	604	26	30	1197	54	92	84.8%	4.7%	10.5%	90.7%	4.3%	5.0%	87.8%	4.5%	7.7%
10:00	585	37	54	638	26	42	1223	63	96	84.4%	6.3%	9.2%	89.3%	4.1%	6.6%	87.0%	5.2%	7.8%
11:00	622	26	68	754	33	45	1376	59	113	84.9%	4.2%	10.9%	89.7%	4.4%	6.0%	87.5%	4.3%	8.2%
12:00	697	32	91	801	31	63	1498	63	154	82.4%	4.6%	13.1%	88.3%	3.9%	7.9%	85.5%	4.2%	10.3%
13:00	671	33	79	779	29	48	1450	62	127	83.3%	4.9%	11.8%	90.1%	3.7%	6.2%	87.0%	4.3%	8.8%
14:00	652	36	73	768	37	61	1420	73	134	83.3%	5.5%	11.2%	87.2%	4.8%	7.9%	85.4%	5.1%	9.4%
15:00	746	43	80	819	33	67	1565	76	147	83.5%	5.8%	10.7%	87.8%	4.0%	8.2%	85.8%	4.9%	9.4%
16:00	743	38	96	877	41	85	1620	79	181	82.0%	5.1%	12.9%	85.6%	4.7%	9.7%	84.0%	4.9%	11.2%
17:00	755	34	78	781	33	116	1536	67	194	85.2%	4.5%	10.3%	80.9%	4.2%	14.9%	83.0%	4.4%	12.6%
18:00	633	27	57	728	18	37	1361	45	94	86.7%	4.3%	9.0%	92.4%	2.5%	5.1%	89.8%	3.3%	6.9%
19:00	526	15	32	558	10	24	1084	25	56	91.1%	2.9%	6.1%	93.9%	1.8%	4.3%	92.5%	2.3%	5.2%
20:00	422	12	21	417	7	7	839	19	28	92.2%	2.8%	5.0%	96.6%	1.7%	1.7%	94.4%	2.3%	3.3%
21:00	274	7	8	268	3	5	542	10	13	94.5%	2.6%	2.9%	97.0%	1.1%	1.9%	95.8%	1.8%	2.4%
22:00	196	8	4	158	4	2	354	12	6	93.9%	4.1%	2.0%	96.2%	2.5%	1.3%	94.9%	3.4%	1.7%
23:00	130	4	4	120	3	0	250	7	4	93.8%	3.1%	3.1%	97.5%	2.5%	0.0%	95.6%	2.8%	1.6%
Totals	10323	492	1032	11211	406	724	21534	898	1756	85.2%	4.8%	10.0%	89.9%	3.6%	6.5%	87.7%	4.2%	8.2%

Description: Route 29 at railroad bridge south of Lynchburg Airport Count Period From: 9/13/2004 To: 9/16/2004

Time Start	Northbound Volumes Weekday Totals			Southbound Volumes Weekday Totals			Both Directions Volumes Weekday Totals			Northbound Percentages Weekday Totals			Southbound Percentages Weekday Totals			Both Directions Percentages Weekday Totals		
	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk
0:00	88	3	28	162	2	21	250	5	49	64.8%	3.4%	31.8%	85.8%	1.2%	13.0%	78.4%	2.0%	19.6%
1:00	69	3	26	104	3	24	173	6	50	58.0%	4.3%	37.7%	74.0%	2.9%	23.1%	67.6%	3.5%	28.9%
2:00	68	1	29	65	3	21	133	4	50	55.9%	1.5%	42.6%	63.1%	4.6%	32.3%	59.4%	3.0%	37.6%
3:00	121	4	27	78	7	25	199	11	52	74.4%	3.3%	22.3%	59.0%	9.0%	32.1%	68.3%	5.5%	26.1%
4:00	285	12	31	82	5	28	367	17	59	84.9%	4.2%	10.9%	59.8%	6.1%	34.1%	79.3%	4.6%	16.1%
5:00	637	22	46	218	22	28	855	44	74	89.3%	3.5%	7.2%	77.1%	10.1%	12.8%	86.2%	5.1%	8.7%
6:00	928	49	134	453	35	49	1381	84	183	80.3%	5.3%	14.4%	81.5%	7.7%	10.8%	80.7%	6.1%	13.3%
7:00	957	73	158	714	54	75	1671	127	233	75.9%	7.6%	16.5%	81.9%	7.6%	10.5%	78.5%	7.6%	13.9%
8:00	845	62	124	623	59	82	1468	121	206	78.0%	7.3%	14.7%	77.4%	9.5%	13.2%	77.7%	8.2%	14.0%
9:00	788	52	103	640	56	87	1428	108	190	80.3%	6.6%	13.1%	77.7%	8.8%	13.6%	79.1%	7.6%	13.3%
10:00	745	57	102	657	54	85	1402	111	187	78.7%	7.7%	13.7%	78.8%	8.2%	12.9%	78.7%	7.9%	13.3%
11:00	750	51	96	731	54	98	1481	105	194	80.4%	6.8%	12.8%	79.2%	7.4%	13.4%	79.8%	7.1%	13.1%
12:00	735	52	100	818	44	103	1553	96	203	79.3%	7.1%	13.6%	82.0%	5.4%	12.6%	80.7%	6.2%	13.1%
13:00	754	59	102	824	48	101	1578	107	203	78.6%	7.8%	13.5%	81.9%	5.8%	12.3%	80.4%	6.8%	12.9%
14:00	758	47	101	876	48	114	1634	95	215	80.5%	6.2%	13.3%	81.5%	5.5%	13.0%	81.0%	5.8%	13.2%
15:00	788	61	102	1090	64	139	1878	125	241	79.3%	7.7%	12.9%	81.4%	5.9%	12.8%	80.5%	6.7%	12.8%
16:00	786	53	128	1125	59	130	1911	112	258	77.0%	6.7%	16.3%	83.2%	5.2%	11.6%	80.6%	5.9%	13.5%
17:00	732	40	100	1158	58	136	1890	98	236	80.9%	5.5%	13.7%	83.2%	5.0%	11.7%	82.3%	5.2%	12.5%
18:00	613	33	75	854	38	80	1467	71	155	82.4%	5.4%	12.2%	86.2%	4.4%	9.4%	84.6%	4.8%	10.6%
19:00	449	16	44	701	21	56	1150	37	100	86.6%	3.6%	9.8%	89.0%	3.0%	8.0%	88.1%	3.2%	8.7%
20:00	369	8	40	622	10	42	991	18	82	87.0%	2.2%	10.8%	91.6%	1.6%	6.8%	89.9%	1.8%	8.3%
21:00	310	8	32	517	12	38	827	20	70	87.1%	2.6%	10.3%	90.3%	2.3%	7.4%	89.1%	2.4%	8.5%
22:00	253	3	36	343	4	25	596	7	61	84.6%	1.2%	14.2%	91.5%	1.2%	7.3%	88.6%	1.2%	10.2%
23:00	150	4	28	302	4	26	452	8	54	78.7%	2.7%	18.7%	90.1%	1.3%	8.6%	86.3%	1.8%	11.9%
Totals	12978	773	1792	13757	764	1613	26735	1537	3405	80.2%	6.0%	13.8%	82.7%	5.6%	11.7%	81.5%	5.7%	12.7%

Description: Route 501 North of Rustburg

Count Period From: 9/13/2004 To: 9/15/2004

Time Start	Northbound Volumes			Southbound Volumes			Both Directions Volumes			Northbound Percentages			Southbound Percentages			Both Directions Percentages		
	Weekday Totals			Weekday Totals			Weekday Totals			Weekday Totals			Weekday Totals			Weekday Totals		
	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk
0:00	18	2	1	38	2	1	56	4	2	83.3%	11.1%	5.6%	92.1%	5.3%	2.6%	89.3%	7.1%	3.6%
1:00	11	1	2	21	0	1	32	1	3	72.7%	9.1%	18.2%	95.2%	0.0%	4.8%	87.5%	3.1%	9.4%
2:00	16	0	0	17	1	0	33	1	0	100.0%	0.0%	0.0%	94.1%	5.9%	0.0%	97.0%	3.0%	0.0%
3:00	31	1	7	9	1	1	40	2	8	74.2%	3.2%	22.6%	77.8%	11.1%	11.1%	75.0%	5.0%	20.0%
4:00	53	2	3	10	2	1	63	4	4	90.6%	3.8%	5.7%	70.0%	20.0%	10.0%	87.3%	6.3%	6.3%
5:00	158	6	3	32	6	3	190	12	6	94.3%	3.8%	1.9%	71.9%	18.8%	9.4%	90.5%	6.3%	3.2%
6:00	402	11	4	120	3	7	522	14	11	96.3%	2.7%	1.0%	91.7%	2.5%	5.8%	95.2%	2.7%	2.1%
7:00	557	16	10	291	13	13	848	29	23	95.3%	2.9%	1.8%	91.1%	4.5%	4.5%	93.9%	3.4%	2.7%
8:00	361	8	9	240	15	10	601	23	19	95.3%	2.2%	2.5%	89.6%	6.3%	4.2%	93.0%	3.8%	3.2%
9:00	284	12	9	181	12	11	465	24	20	92.6%	4.2%	3.2%	87.3%	6.6%	6.1%	90.5%	5.2%	4.3%
10:00	245	6	9	186	11	12	431	17	21	93.9%	2.4%	3.7%	87.6%	5.9%	6.5%	91.2%	3.9%	4.9%
11:00	227	9	12	185	10	12	412	19	24	90.7%	4.0%	5.3%	88.1%	5.4%	6.5%	89.6%	4.6%	5.8%
12:00	238	8	8	222	9	7	460	17	15	93.3%	3.4%	3.4%	92.8%	4.1%	3.2%	93.0%	3.7%	3.3%
13:00	228	5	8	246	10	9	474	15	17	94.3%	2.2%	3.5%	92.3%	4.1%	3.7%	93.2%	3.2%	3.6%
14:00	308	16	12	321	11	12	629	27	24	90.9%	5.2%	3.9%	92.8%	3.4%	3.7%	91.9%	4.3%	3.8%
15:00	287	12	14	381	12	11	668	24	25	90.9%	4.2%	4.9%	94.0%	3.1%	2.9%	92.7%	3.6%	3.7%
16:00	275	11	12	473	18	13	748	29	25	91.6%	4.0%	4.4%	93.4%	3.8%	2.7%	92.8%	3.9%	3.3%
17:00	241	11	11	590	20	14	831	31	25	90.9%	4.6%	4.6%	94.2%	3.4%	2.4%	93.3%	3.7%	3.0%
18:00	225	11	9	330	8	10	555	19	19	91.1%	4.9%	4.0%	94.5%	2.4%	3.0%	93.2%	3.4%	3.4%
19:00	191	5	6	231	7	5	422	12	11	94.2%	2.6%	3.1%	94.8%	3.0%	2.2%	94.5%	2.8%	2.6%
20:00	132	3	6	158	2	4	290	5	10	93.2%	2.3%	4.5%	96.2%	1.3%	2.5%	94.8%	1.7%	3.4%
21:00	78	2	5	122	5	1	200	7	6	91.0%	2.6%	6.4%	95.1%	4.1%	0.8%	93.5%	3.5%	3.0%
22:00	71	0	4	93	3	2	164	3	6	94.4%	0.0%	5.6%	94.6%	3.2%	2.2%	94.5%	1.8%	3.7%
23:00	37	0	4	89	1	1	126	1	5	89.2%	0.0%	10.8%	97.8%	1.1%	1.1%	95.2%	0.8%	4.0%
Totals	4674	158	168	4586	182	161	9260	340	329	93.0%	3.4%	3.6%	92.5%	4.0%	3.5%	92.8%	3.7%	3.6%

Description: Route 685 South of Route 24

Count Period From: 9/13/2004 To: 9/15/2004

Time Start	Eastbound Volumes Weekday Totals			Westbound Volumes Weekday Totals			Both Directions Volumes Weekday Totals			Eastbound Percentages Weekday Totals			Westbound Percentages Weekday Totals			Both Directions Percentages Weekday Totals		
	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk
0:00	25	0	3	6	1	3	31	1	6	88.0%	0.0%	12.0%	33.3%	16.7%	50.0%	77.4%	3.2%	19.4%
1:00	8	0	1	5	0	1	13	0	2	87.5%	0.0%	12.5%	80.0%	0.0%	20.0%	84.6%	0.0%	15.4%
2:00	7	1	1	12	0	4	19	1	5	71.4%	14.3%	14.3%	66.7%	0.0%	33.3%	68.4%	5.3%	26.3%
3:00	9	0	3	10	0	6	19	0	9	66.7%	0.0%	33.3%	40.0%	0.0%	60.0%	52.6%	0.0%	47.4%
4:00	8	0	4	26	1	9	34	1	13	50.0%	0.0%	50.0%	61.5%	3.8%	34.6%	58.8%	2.9%	38.2%
5:00	21	5	4	89	2	7	110	7	11	57.1%	23.8%	19.0%	89.9%	2.2%	7.9%	83.6%	6.4%	10.0%
6:00	68	13	9	168	13	7	236	26	16	67.6%	19.1%	13.2%	88.1%	7.7%	4.2%	82.2%	11.0%	6.8%
7:00	86	9	8	213	12	11	299	21	19	80.2%	10.5%	9.3%	89.2%	5.6%	5.2%	86.6%	7.0%	6.4%
8:00	77	13	6	158	9	7	235	22	13	75.3%	16.9%	7.8%	89.9%	5.7%	4.4%	85.1%	9.4%	5.5%
9:00	64	11	11	106	7	7	170	18	18	65.6%	17.2%	17.2%	86.8%	6.6%	6.6%	78.8%	10.6%	10.6%
10:00	63	11	7	97	14	8	160	25	15	71.4%	17.5%	11.1%	77.3%	14.4%	8.2%	75.0%	15.6%	9.4%
11:00	73	10	7	90	7	7	163	17	14	76.7%	13.7%	9.6%	84.4%	7.8%	7.8%	81.0%	10.4%	8.6%
12:00	100	10	9	67	11	8	167	21	17	81.0%	10.0%	9.0%	71.6%	16.4%	11.9%	77.2%	12.6%	10.2%
13:00	99	9	11	79	10	6	178	19	17	79.8%	9.1%	11.1%	79.7%	12.7%	7.6%	79.8%	10.7%	9.6%
14:00	109	5	8	80	8	4	189	13	12	88.1%	4.6%	7.3%	85.0%	10.0%	5.0%	86.8%	6.9%	6.3%
15:00	147	11	10	98	12	7	245	23	17	85.7%	7.5%	6.8%	80.6%	12.2%	7.1%	83.7%	9.4%	6.9%
16:00	183	13	13	109	16	10	292	29	23	85.8%	7.1%	7.1%	76.1%	14.7%	9.2%	82.2%	9.9%	7.9%
17:00	224	10	10	104	10	5	328	20	15	91.1%	4.5%	4.5%	85.6%	9.6%	4.8%	89.3%	6.1%	4.6%
18:00	159	8	12	99	9	9	258	17	21	87.4%	5.0%	7.5%	81.8%	9.1%	9.1%	85.3%	6.6%	8.1%
19:00	113	5	5	70	4	5	183	9	10	91.2%	4.4%	4.4%	87.1%	5.7%	7.1%	89.6%	4.9%	5.5%
20:00	103	4	6	43	2	2	146	6	8	90.3%	3.9%	5.8%	90.7%	4.7%	4.7%	90.4%	4.1%	5.5%
21:00	83	1	3	34	2	4	117	3	7	95.2%	1.2%	3.6%	82.4%	5.9%	11.8%	91.5%	2.6%	6.0%
22:00	56	1	4	27	0	2	83	1	6	91.1%	1.8%	7.1%	92.6%	0.0%	7.4%	91.6%	1.2%	7.2%
23:00	43	2	4	18	1	3	61	3	7	86.0%	4.7%	9.3%	77.8%	5.6%	16.7%	83.6%	4.9%	11.5%
Totals	1928	152	159	1808	151	142	3736	303	301	83.9%	7.9%	8.2%	83.8%	8.4%	7.9%	83.8%	8.1%	8.1%

Description: Wards Ferry Road north of Harvard Street

Count Period From: 9/13/2004 To: 9/15/2004

Time Start	Northbound Volumes			Southbound Volumes			Both Directions Volumes			Northbound Percentages			Southbound Percentages			Both Directions Percentages		
	Weekday Totals			Weekday Totals			Weekday Totals			Weekday Totals			Weekday Totals			Weekday Totals		
	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk
0:00	34	0	0	37	0	0	71	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
1:00	10	0	0	10	0	0	20	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
2:00	10	0	0	13	0	0	23	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
3:00	6	0	0	14	0	0	20	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
4:00	15	0	0	14	0	0	29	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
5:00	30	0	0	49	0	0	79	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
6:00	91	0	0	127	0	0	218	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
7:00	217	0	0	353	0	0	570	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
8:00	196	0	0	326	0	0	522	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
9:00	177	0	0	311	0	0	488	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
10:00	226	0	0	383	0	0	609	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
11:00	257	0	0	410	0	0	667	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
12:00	350	0	0	507	0	0	857	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
13:00	326	0	0	493	0	0	819	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
14:00	305	0	0	443	0	0	748	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
15:00	301	0	0	523	0	0	824	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
16:00	365	0	0	590	0	0	955	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
17:00	378	0	0	667	0	0	1045	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
18:00	361	0	0	573	0	0	934	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
19:00	258	0	0	396	0	0	654	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
20:00	258	0	0	359	0	0	617	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
21:00	170	0	0	232	0	0	402	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
22:00	112	0	0	130	0	0	242	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
23:00	69	0	0	99	0	0	168	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
Totals	4522	0	0	7059	0	0	11581	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%

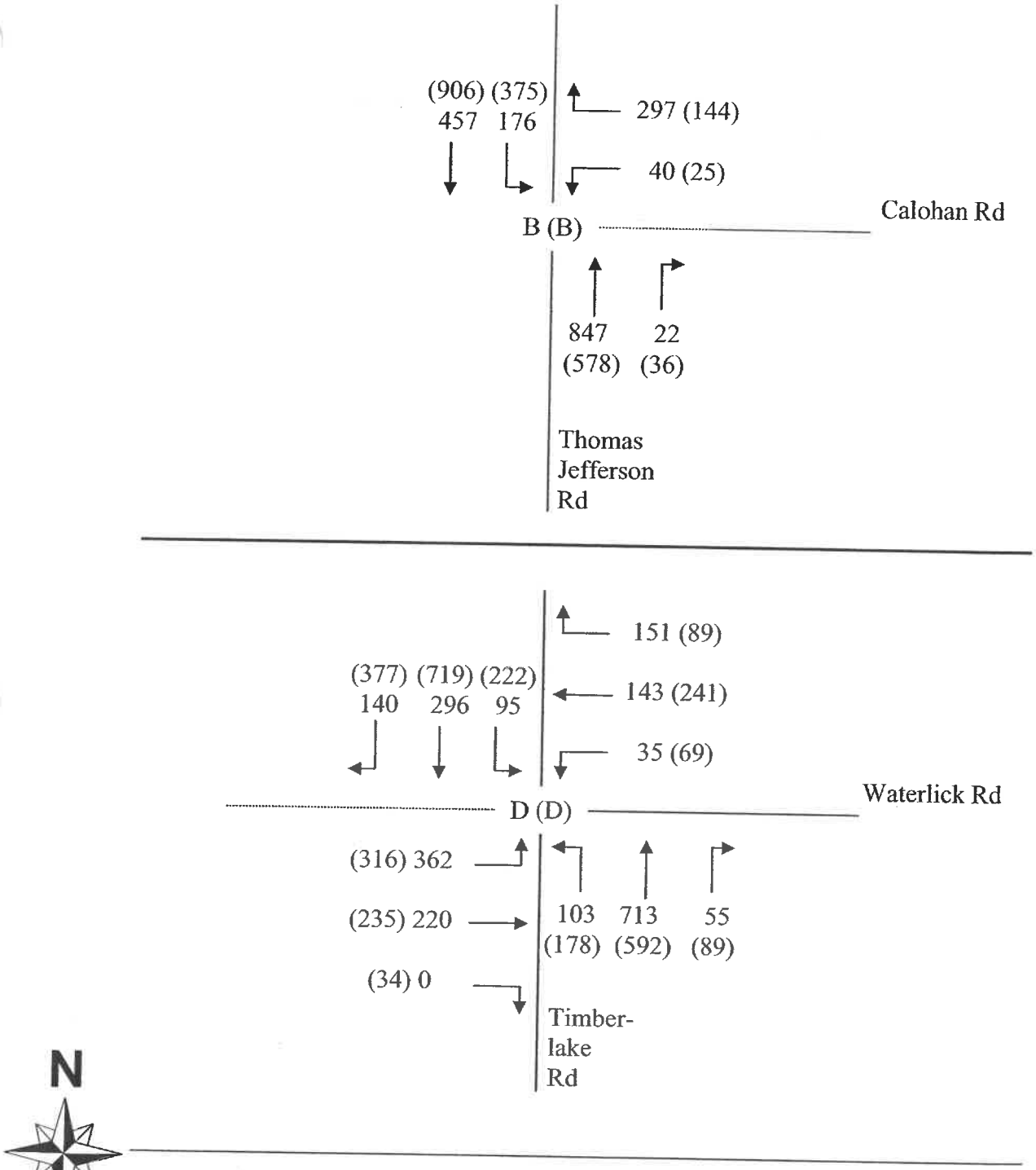
Description: Langhorne Road east of Tate Springs Road

Count Period From: 9/15/2004 To: 9/17/2004

Time Start	Eastbound Volumes			Westbound Volumes			Both Directions Volumes			Eastbound Percentages			Westbound Percentages			Both Directions Percentages		
	Weekday Totals			Weekday Totals			Weekday Totals			Weekday Totals			Weekday Totals			Weekday Totals		
	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk
0:00	36	0	0	48	1	0	84	1	0	100.0%	0.0%	0.0%	97.9%	2.1%	0.0%	98.8%	1.2%	0.0%
1:00	27	0	0	23	1	0	50	1	0	100.0%	0.0%	0.0%	95.7%	4.3%	0.0%	98.0%	2.0%	0.0%
2:00	15	0	0	17	0	0	32	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
3:00	17	0	0	16	0	0	33	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
4:00	24	0	0	30	1	0	54	1	0	100.0%	0.0%	0.0%	96.7%	3.3%	0.0%	98.1%	1.9%	0.0%
5:00	53	3	1	68	3	1	121	6	2	92.5%	5.7%	1.9%	94.1%	4.4%	1.5%	93.4%	5.0%	1.7%
6:00	190	9	1	229	21	5	419	30	6	94.7%	4.7%	0.5%	88.6%	9.2%	2.2%	91.4%	7.2%	1.4%
7:00	515	28	18	481	29	23	996	57	41	91.1%	5.4%	3.5%	89.2%	6.0%	4.8%	90.2%	5.7%	4.1%
8:00	524	24	12	532	24	27	1056	48	39	93.1%	4.6%	2.3%	90.4%	4.5%	5.1%	91.8%	4.5%	3.7%
9:00	514	16	10	464	18	23	978	34	33	94.9%	3.1%	1.9%	91.2%	3.9%	5.0%	93.1%	3.5%	3.4%
10:00	551	21	15	438	19	23	989	40	38	93.5%	3.8%	2.7%	90.4%	4.3%	5.3%	92.1%	4.0%	3.8%
11:00	560	19	19	526	23	30	1086	42	49	93.2%	3.4%	3.4%	89.9%	4.4%	5.7%	91.6%	3.9%	4.5%
12:00	635	16	28	520	25	36	1155	41	64	93.1%	2.5%	4.4%	88.3%	4.8%	6.9%	90.9%	3.5%	5.5%
13:00	620	18	22	549	24	31	1169	42	53	93.5%	2.9%	3.5%	90.0%	4.4%	5.6%	91.9%	3.6%	4.5%
14:00	628	21	19	595	34	34	1223	55	53	93.6%	3.3%	3.0%	88.6%	5.7%	5.7%	91.2%	4.5%	4.3%
15:00	638	24	27	553	21	32	1191	45	59	92.0%	3.8%	4.2%	90.4%	3.8%	5.8%	91.3%	3.8%	5.0%
16:00	647	24	23	510	18	28	1157	42	51	92.7%	3.7%	3.6%	91.0%	3.5%	5.5%	92.0%	3.6%	4.4%
17:00	549	17	26	497	20	27	1046	37	53	92.2%	3.1%	4.7%	90.5%	4.0%	5.4%	91.4%	3.5%	5.1%
18:00	410	10	6	320	7	9	730	17	15	96.1%	2.4%	1.5%	95.0%	2.2%	2.8%	95.6%	2.3%	2.1%
19:00	295	7	5	245	8	5	540	15	10	95.9%	2.4%	1.7%	94.7%	3.3%	2.0%	95.4%	2.8%	1.9%
20:00	202	4	2	209	6	3	411	10	5	97.0%	2.0%	1.0%	95.7%	2.9%	1.4%	96.4%	2.4%	1.2%
21:00	164	3	2	205	5	2	369	8	4	97.0%	1.8%	1.2%	96.6%	2.4%	1.0%	96.7%	2.2%	1.1%
22:00	129	0	1	134	2	3	263	2	4	99.2%	0.0%	0.8%	96.3%	1.5%	2.2%	97.7%	0.8%	1.5%
23:00	89	0	0	80	0	0	169	0	0	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
Totals	8032	264	237	7289	310	342	15321	574	579	93.8%	3.3%	3.0%	91.1%	4.3%	4.7%	92.5%	3.7%	3.8%

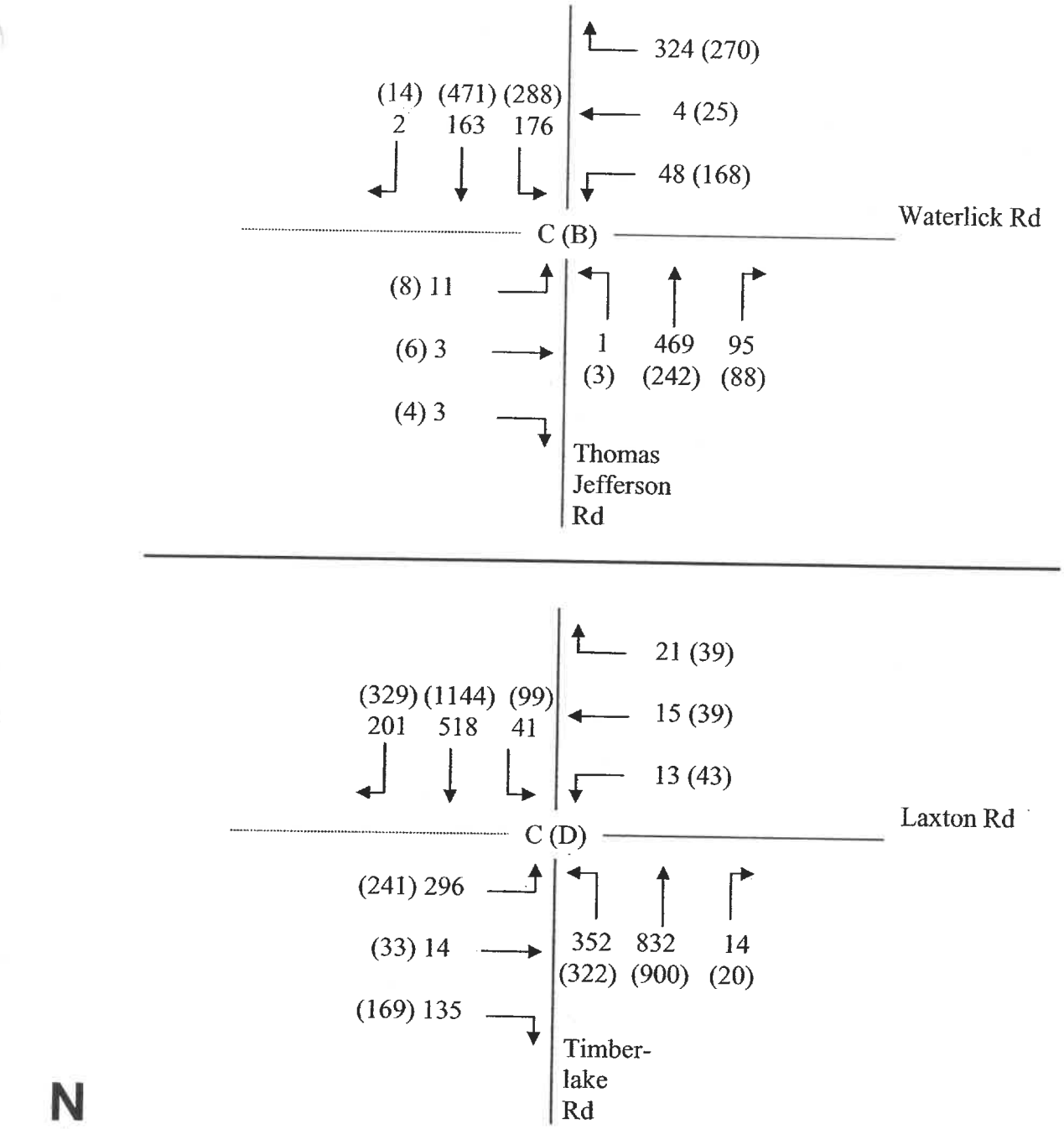
Description: Route 29 (Wards Road) south of Atlanta Avenue Count Period From: 9/15/2004 To: 9/17/2004

Time Start	Northbound Volumes Weekday Totals			Southbound Volumes Weekday Totals			Both Directions Volumes Weekday Totals			Northbound Percentages Weekday Totals			Southbound Percentages Weekday Totals			Both Directions Percentages Weekday Totals		
	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk	Total	SU Trk	MU Trk
0:00	97	2	22	162	4	20	259	6	42	75.3%	2.1%	22.7%	85.2%	2.5%	12.3%	81.5%	2.3%	16.2%
1:00	71	3	30	106	6	19	177	9	49	53.5%	4.2%	42.3%	76.4%	5.7%	17.9%	67.2%	5.1%	27.7%
2:00	53	3	24	66	2	22	119	5	46	49.1%	5.7%	45.3%	63.6%	3.0%	33.3%	57.1%	4.2%	38.7%
3:00	58	3	21	75	7	24	133	10	45	58.6%	5.2%	36.2%	58.7%	9.3%	32.0%	58.6%	7.5%	33.8%
4:00	108	4	21	83	6	21	191	10	42	76.9%	3.7%	19.4%	67.5%	7.2%	25.3%	72.8%	5.2%	22.0%
5:00	234	11	27	181	12	32	415	23	59	83.8%	4.7%	11.5%	75.7%	6.6%	17.7%	80.2%	5.5%	14.2%
6:00	527	29	53	316	19	42	843	48	95	84.4%	5.5%	10.1%	80.7%	6.0%	13.3%	83.0%	5.7%	11.3%
7:00	803	37	81	486	39	66	1289	76	147	85.3%	4.6%	10.1%	78.4%	8.0%	13.6%	82.7%	5.9%	11.4%
8:00	788	43	79	498	37	67	1286	80	146	84.5%	5.5%	10.0%	79.1%	7.4%	13.5%	82.4%	6.2%	11.4%
9:00	767	36	75	539	45	86	1306	81	161	85.5%	4.7%	9.8%	75.7%	8.3%	16.0%	81.5%	6.2%	12.3%
10:00	819	44	70	628	38	119	1447	82	189	86.1%	5.4%	8.5%	75.0%	6.1%	18.9%	81.3%	5.7%	13.1%
11:00	859	45	93	698	32	75	1557	77	168	83.9%	5.2%	10.8%	84.7%	4.6%	10.7%	84.3%	4.9%	10.8%
12:00	903	43	90	738	23	71	1641	66	161	85.3%	4.8%	10.0%	87.3%	3.1%	9.6%	86.2%	4.0%	9.8%
13:00	915	49	97	754	20	78	1669	69	175	84.0%	5.4%	10.6%	87.0%	2.7%	10.3%	85.4%	4.1%	10.5%
14:00	875	43	73	751	21	78	1626	64	151	86.7%	4.9%	8.3%	86.8%	2.8%	10.4%	86.8%	3.9%	9.3%
15:00	863	46	84	795	21	95	1658	67	179	84.9%	5.3%	9.7%	85.4%	2.6%	11.9%	85.2%	4.0%	10.8%
16:00	906	44	75	797	22	77	1703	66	152	86.9%	4.9%	8.3%	87.6%	2.8%	9.7%	87.2%	3.9%	8.9%
17:00	937	25	75	790	43	126	1727	68	201	89.3%	2.7%	8.0%	78.6%	5.4%	15.9%	84.4%	3.9%	11.6%
18:00	852	30	74	717	43	129	1569	73	203	87.8%	3.5%	8.7%	76.0%	6.0%	18.0%	82.4%	4.7%	12.9%
19:00	728	22	43	635	30	101	1363	52	144	91.1%	3.0%	5.9%	79.4%	4.7%	15.9%	85.6%	3.8%	10.6%
20:00	632	18	43	600	20	72	1232	38	115	90.3%	2.8%	6.8%	84.7%	3.3%	12.0%	87.6%	3.1%	9.3%
21:00	485	10	40	532	21	50	1017	31	90	89.7%	2.1%	8.2%	86.7%	3.9%	9.4%	88.1%	3.0%	8.8%
22:00	283	4	28	354	9	30	637	13	58	88.7%	1.4%	9.9%	89.0%	2.5%	8.5%	88.9%	2.0%	9.1%
23:00	185	4	30	285	6	30	470	10	60	81.6%	2.2%	16.2%	87.4%	2.1%	10.5%	85.1%	2.1%	12.8%
Totals	13748	598	1348	11586	526	1530	25334	1124	2878	85.8%	4.3%	9.8%	82.3%	4.5%	13.2%	84.2%	4.4%	11.4%



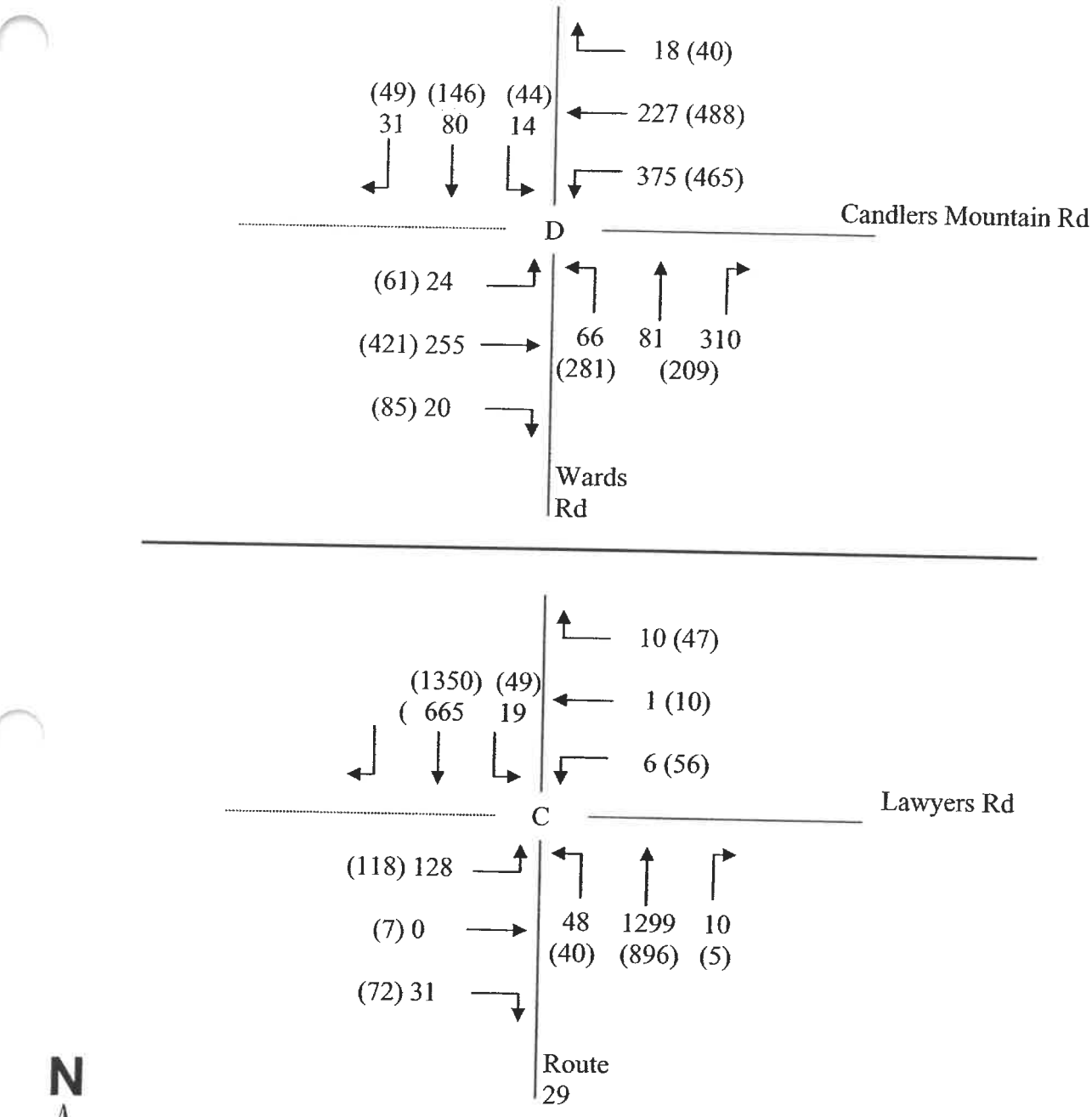
Existing (Year 2004) Peak Hour Volumes and Peak Hour LOS

xxx(xxx) = am(pm) Peak Hour Volumes
A(A) = am(pm) Peak Hour LOS
Not to Scale



Existing (Year 2004) Peak Hour Volumes and Peak Hour LOS

xxx(xxx) = am(pm) Peak Hour Volumes
A(A) = am(pm) Peak Hour LOS
Not to Scale



Existing (Year 2004) Peak Hour Volumes and Peak Hour LOS

xxx(xxx) = am(pm) Peak Hour Volumes
A(A) = am(pm) Peak Hour LOS

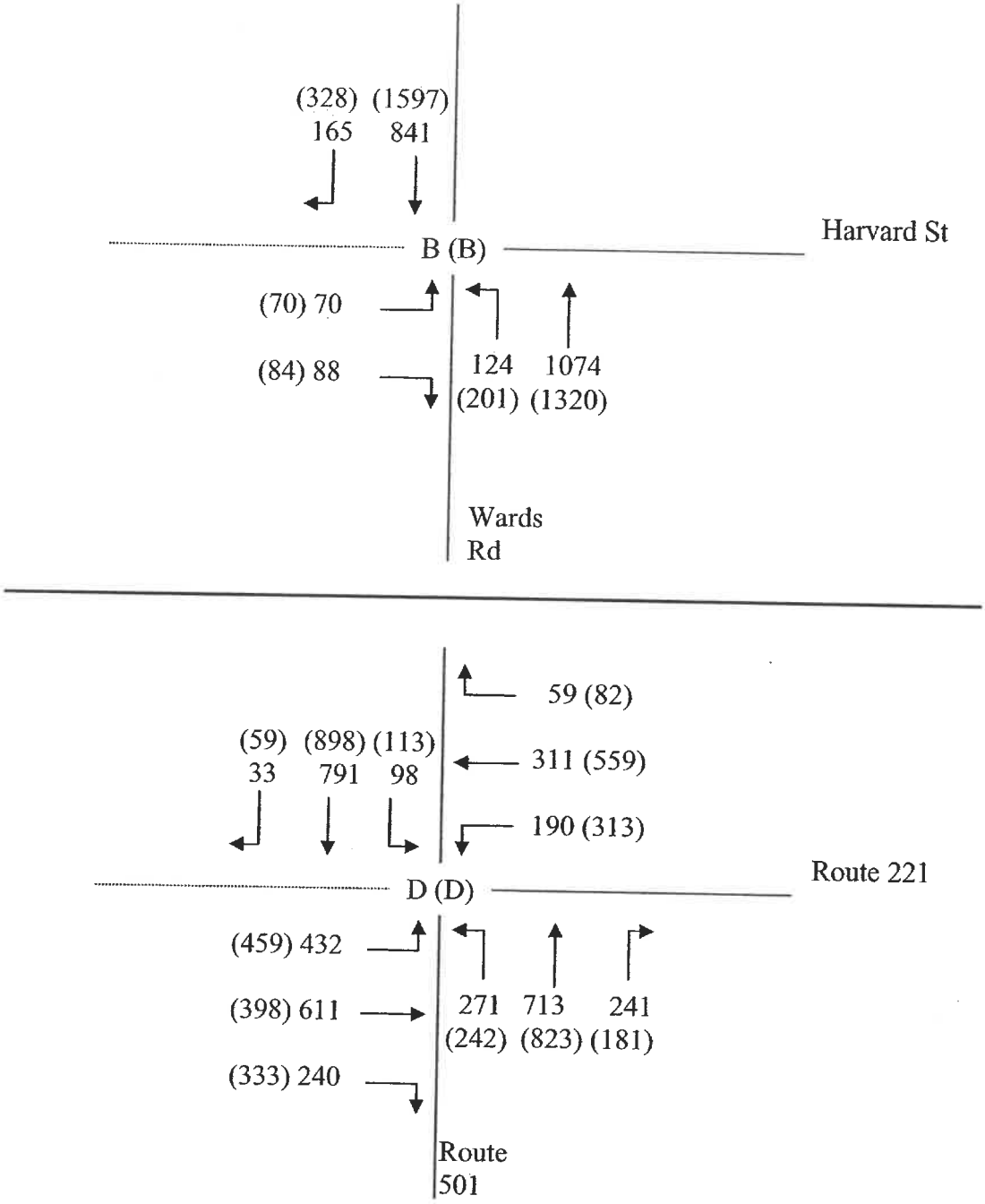
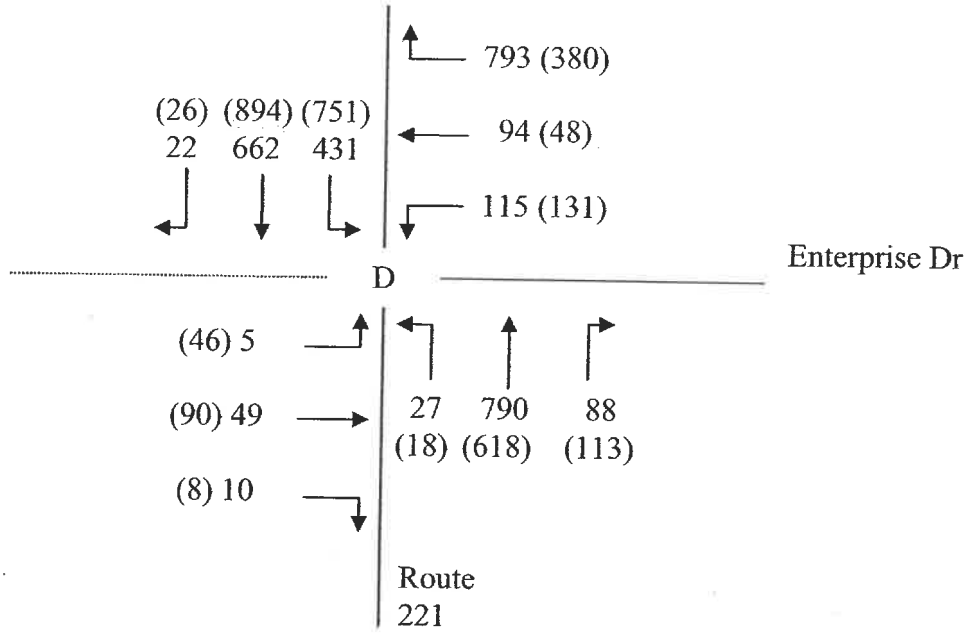
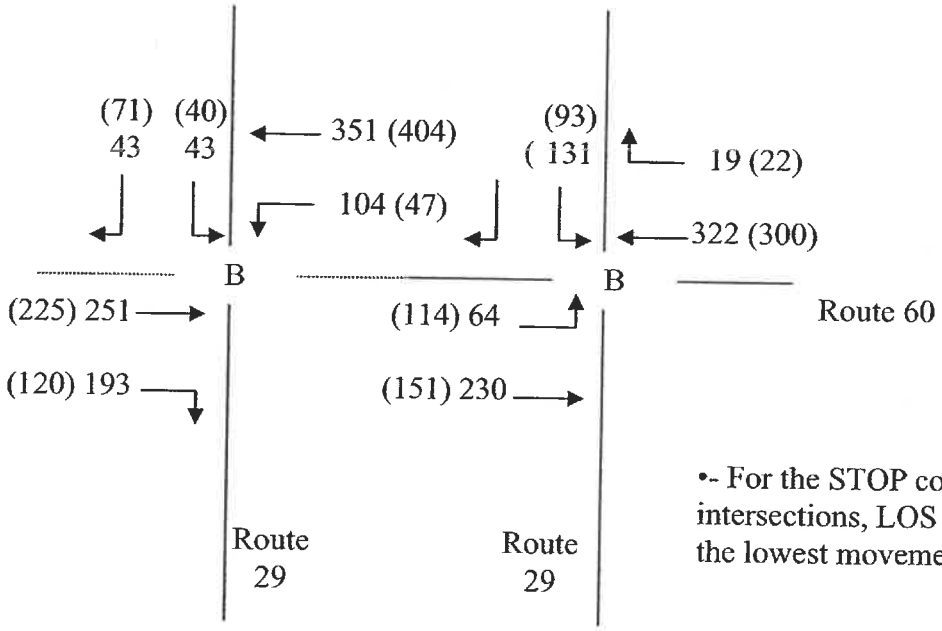


Figure 4

Existing (Year 2004) Peak Hour Volumes and Peak Hour LOS

xxx(xxx) = am(pm) Peak Hour Volumes
A(A) = am(pm) Peak Hour LOS
Not to Scale





•- For the STOP controlled intersections, LOS represents the lowest movement LOS

N

Figure 5

Existing (Year 2004) Peak Hour Volumes and Peak Hour LOS

xxx(xxx) = am(pm) Peak Hour Volumes
A(A) = am(pm) Peak Hour LOS

Appendix F – Environmental Overview

The improvement recommendations in the Central Virginia Long-Range Transportation Plan – Year 2030 (the Plan) have been subjected to a review of the potential for environmental impacts. This overview included the following: potential residential and business displacements;

- environmental justice group (low-income and minority) impacts;
- community disruptions;
- community service impacts;
- land use/zoning conflicts;
- hazardous materials sites;
- impacts on historic sites and districts;
- impacts to wildlife refuges, critical habitats, and known locations of threatened and endangered species;
- proximity to wild and scenic rivers;
- encroachment on critical soil types (prime farmlands, erosive soils);
- proximity to managed forest lands, scenic routes, and parks/recreation areas;
- air quality impacts; impacts to noise sensitive receptors; and
- impacts to water quality, floodplains, and wetlands.

All of the data was reviewed using a Geographic Information System (GIS) spatial-database.

The alignments of the proposed projects were digitized on top of digital orthophotogrammetry provided by VDOT and referenced to roadline data from the US TIGER database. Buffers for environmental screening purposes were established around the centerlines of the improvement recommendation areas. For road improvement recommendations a buffer of 100 feet on either side of the centerline was used. For new road alignment recommendations a buffer of 150 feet on either side of the centerline was used. For interchange improvement recommendations a buffer of 0.25 mile was used.

This environmental overview serves as an initial checklist of potential impacts and environmental issues associated with transportation recommendations. More detailed assessments of impacts would be determined as part of the project development and design process.

F.1 Remote Data Collection

Much of the data that was used in the environmental screening process was obtained from remote sources. Any of the data that was not directly available as shapefiles was converted using geocoding tools. The following is a list of the data that was obtained remotely:

- Census data (Block and Blockgroup data for the City of Lynchburg and Amherst, Bedford, and Campbell Counties) – U.S. Census Bureau

- Prime farmland soils
- Potentially erosive soils

Exhibit F-1 summarizes the presence of environmental impacts for each of the projects in the Financially Constrained Plan. Note that this table indicates the potential for these impacts based on the proximity of various features to the roadway alignment. The attached compact disk also includes mapping in PDF format that depicts on aerial photography and mapping the approximate alignment of projects in the Financially Constrained Plan along with identified environmental and socio-economic constraints. Most of the projects in the Tier 1 Vision Plan are also depicted on this mapping. The first page of the file is a key map which indicates the area covered by each of the maps on the pages following. Mapping showing areas with relatively high populations of minorities, low-income residents, and elderly are also included on the compact disk. All files are in Adobe PDF format. The Adobe Acrobat software to read PDF files is available at no cost at the following Internet site: http://www.adobe.com/products/acrobat/readstep2.html.