▶ The Special Transit Advisory Commission ▶

STAC

FINAL REPORT | MAY 2008

Regional Transit Vision Plan:

Recommendations for North Carolina's Research Triangle Region

A Report from the Special Transit Advisory Commission to the Capital Area Metropolitan Planning Organization and the Durham-Chapel Hill-Carrboro Metropolitan Planning Organization.

Capital Area Metropolitan Planning Organization

DCHC Metropolitan Planning Organization

Triangle J Council of Governments

triangle transit

Regional Transportation Alliance

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State of the Triangle
In the past decade, the Triangle has experienced an extraordinary rate of growth. Our current population is approximately 1.5 million, and we can expect an additional 1 million people over the next 30 years. These numbers confirm what we already know: the Triangle enjoys a robust economy and a high quality of life. People want to move here to build businesses, careers and families. At the same time, our rapidly growing economy and our low density development patterns have made our region one of the most sprawling, auto-centric regions in the nation. Our transportation system is straining under current demand and far from adequate to meet future needs. Residents across the region express frustration with long commutes, pollution, congestion and the lack of transportation choices.

For the past fifty years, our region has relied primarily on road-building to provide mobility. All projections indicate that our roads will become even more congested than they already are. The regions that we are competing with for new industry and better jobs are already investing in transit. For the Triangle to compete, we need a complete, multi-modal transportation system. We must take a new approach.

Recommendations
The Special Transit Advisory Commission (STAC) has developed a Regional Transit Vision Plan for the Triangle to provide a framework for future investments. The recommendations reflect the complexity of our region, which requires multi-pronged, multi-modal strategies to building a complete transportation system. Map 1 presents three major categories of investments:

Enhanced Region-wide Bus Network:
Denoted by green lines. Expanded bus service throughout the region to connect communities and bring communities presently unserved by transit into a regional transit network.

What is the Regional Transit Vision Plan?

This plan recommends a high-quality, regional transit system to serve North Carolina's Research Triangle Region by promoting closer connections between our land use and transportation patterns and providing more travel choices for our growing population. The Vision Plan was developed by the Special Transit Advisory Commission (STAC), a broad-based citizen group with 38 members from across the region.

The Capital Area Metropolitan Planning Organization (Capital Area MPO) and the Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC MPO) appointed the STAC to assist in the joint development of a plan for a regional transit system and to craft the transit component of their respective Long Range Transportation Plans, with a focus on major transit investments.

Improvements to local bus networks are also recommended; local transit providers will play a key role in locating and designing these service enhancements.

- High frequency, express service between the Raleigh-Durham International Airport (RDU) and downtown Durham, downtown Raleigh including the Convention Center, and the Cary train station park and ride
- Rush Hour Only service to outlying communities
- Enhanced bus service in core areas to support the rail and circulator investments
- A system of park and ride lots to be served by the regional network and the express service

- Enhanced transit access for pedestrians and bicycles around park and ride lots and bus stops

Circulators: Denoted by orange shaded areas. Circulators to provide flexible travel options within our major activity centers. Circulator zones are depicted at the conceptual level only, actual routes will be sited by the respective communities and MPOs. Initially all circulators are anticipated to be buses with potential future operations by modern street cars or trolleys depending on local conditions, communities and costs.

- RDU/RTP circulator connecting RDU to the Triangle Metro Center and other major activities areas in RTP
- Circulators in the downtowns of Raleigh, Durham, Chapel Hill/Carrboro and Cary

Rail Investments: Denoted by blue lines. The regional system is anchored by rail service that connects the region's principal centers of activity, serves our most congested corridors, and offers the greatest opportunities to influence development patterns.

- The segments connecting Durham, RTP, Cary, downtown Raleigh and north Raleigh will use diesel multiple unit (DMU) rail cars operating within existing railroad rights-of-way.
- The segment connecting Chapel Hill to Durham will use Light Rail Transit (LRT), electrically-driven rail cars on a new alignment.

These investments should be coordinated with the North Carolina Railroad Shared Corridor Track Expansion Study, which is investigating the feasibility, costs and operating standards for rush hour rail service on the Burlington to Goldsboro and Hillsborough to Chapel Hill/Carrboro corridors.

Implementing the Vision

The Regional Transit Vision Plan faces three significant implementation challenges that the region will need to address in bold and creative ways in order to achieve success: funding, land use, and leadership and governance. Or, put another way: dollars, development and decision making.

Dollars: It is clear that our present sources of transit funding are inadequate, and federal funding is uncertain. New local and state funding will be essential. Therefore the STAC recommends:

- ½ cent sales tax (5¢ per $10 in purchases)
- $10 increase in vehicle registration fee

If combined with existing local, state and federal funding, and debt financing of approximately $600 million, financial models demonstrate that these revenue sources are adequate to build the Regional Transit Vision Plan.

Development: In order to realize the full benefits of the recommended transit investments, the region, its communities and its development sector will need to do much more to ensure a development pattern that matches major transit investments and maximizes the opportunities for people to routinely use transit. Therefore the STAC recommends:

- Pairing transit service and investment with local government investment in transit-supportive development policies
- Existing land use policies on transit-supportive development be applied consistently

Decisions: Leaders and decision makers need to recognize that local interests are inextricably linked to regional interests as they cooperate in planning, funding and sequencing transit investment decisions. The STAC recommends:

- Greater accountability to voters by ensuring that elected officials serve in decision-making capacities for regional transit investments
- Encouraging continued cooperation between the MPOs
- Establishing a regional staff committee from the working group that supported the work of the STAC to consult, study and coordinate the completion of the Regional Transit Vision Plan

Why Invest in Transit?
Our auto-dependency has far-reaching impacts beyond our transportation system and threatens:

Our Economy: Increasing congestion and unreliability of travel times threaten our attractiveness to businesses and workers. Without a well-functioning transportation system that is reliable, cost-effective and time-competitive for commuters and freight, with a range of options for accessing shopping, medical service and entertainment venues, our overall competitiveness will decline. Fuel prices and the other costs of auto ownership and driving will continue to increase, draining individual households of financial resources. Increasing construction and roadway maintenance costs are draining communities of the financial resources needed to sustain basic services as well as the arts, cultural and natural resources.

Our Communities: Building and expanding roadways brings massive impacts on neighborhoods and rural landscapes. The air quality impacts of our increasingly high levels of ozone pollution generated from vehicle emissions are particularly hazardous for children and the elderly. The time drivers spend in traffic is unproductive and aggravating and takes time away from family and community activities. The separation between home and work by both time and distance frays the social fabric of our neighborhoods.

Our Environment: Continued expansion in the number of vehicles and the distances they travel each day will mean the region will face challenges in meeting federal air quality standards in the future. Reducing auto travel will also reduce our region's contribution to climate change by reducing our overall carbon footprint. Development has taken up land at a much higher rate than our rate of population growth, threatening open spaces and agricultural landscapes, and fragmenting natural habitats.

Our Future Mobility: By 2035, the population of those aged 65 and older in our region will grow from less than 10% to more than 15%. A significant number of people will continue or begin to live without a car, either by choice or necessity; this group increased from 27,000 to 29,000 between 1990 and 2000. Continuing to build and operate an auto-dependent transportation system will exclude these groups from full participation in the economic and cultural life of our region. At the same time, our current transit providers struggle to provide basic service and do not have funding mechanisms in place to meet the needs of our growing population.

The economic, demographic, environmental and social factors signal that a new approach to our transportation system is needed. Taking a fresh look at the Triangle's transportation issues, the STAC saw compelling reasons for giving transit a much larger role in our transportation future:

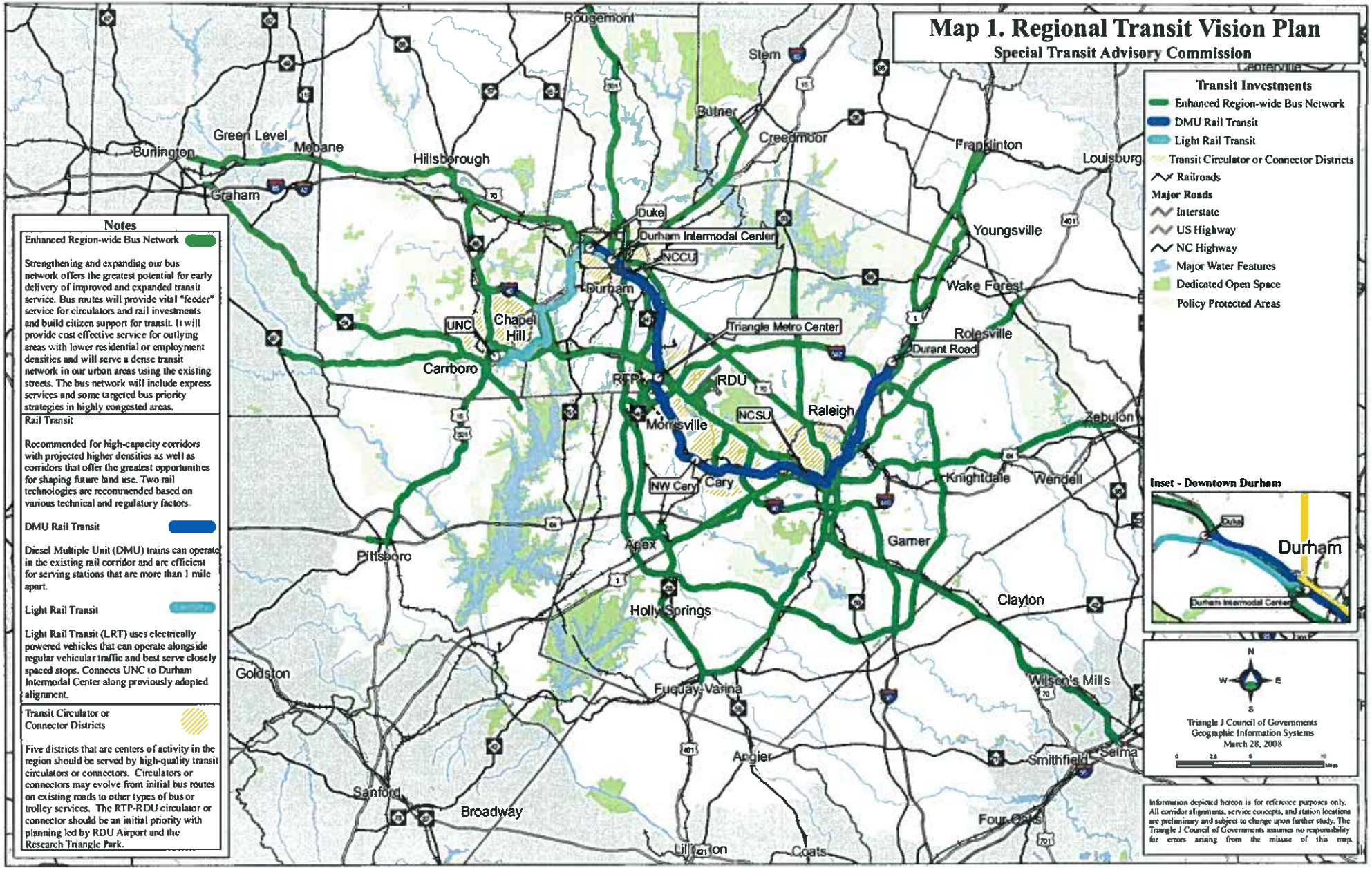
- Provide an alternative to costly and stressful auto travel, and potentially reduce congestion along key travel corridors
- Reduce the need for and cost of new roads and other infrastructure by optimizing the capacity of existing roads and providing an alternative to automobile travel
- Enhance access to existing and future employment, services, leisure, health, education, cultural and natural resources for everyone

- Encourage land use patterns that better fit with changing environmental and demographic factors and that allow us to better preserve open space, trails, farmland, and historic, culturally valuable and environmentally sensitive areas
- Reduce air and water pollution and greenhouse gas emissions
- Improve our health by providing more opportunities to include walking and cycling in our daily routines
- Strengthen feelings of belonging, connection and community by creating shared public and private responsibility and investment for transit
- Demonstrate that we can think and act inclusively with vision, creativity and open communication

We have the opportunity to shape our transportation future by changing our transportation investment strategy. We can offer greater transportation choices, improve our environment and physical health, support the vibrancy of our economy, and preserve our quality of life. Success will require strong, sustained cooperative effort, and a commitment to making game-changing investments in building a transit-rich future.

Map 1. Regional Transit Vision Plan

Special Transit Advisory Commission



Notes

Enhanced Region-wide Bus Network

Strengthening and expanding our bus network offers the greatest potential for early delivery of improved and expanded transit service. Bus routes will provide vital "feeder" service for circulators and rail investments and build citizen support for transit. It will provide cost effective service for outlying areas with lower residential or employment densities and will serve a dense transit network in our urban areas using the existing streets. The bus network will include express services and some targeted bus priority strategies in highly congested areas.

Rail Transit

Recommended for high-capacity corridors with projected higher densities as well as corridors that offer the greatest opportunities for shaping future land use. Two rail technologies are recommended based on various technical and regulatory factors.

DMU Rail Transit

Diesel Multiple Unit (DMU) trains can operate in the existing rail corridor and are efficient for serving stations that are more than 1 mile apart.

Light Rail Transit

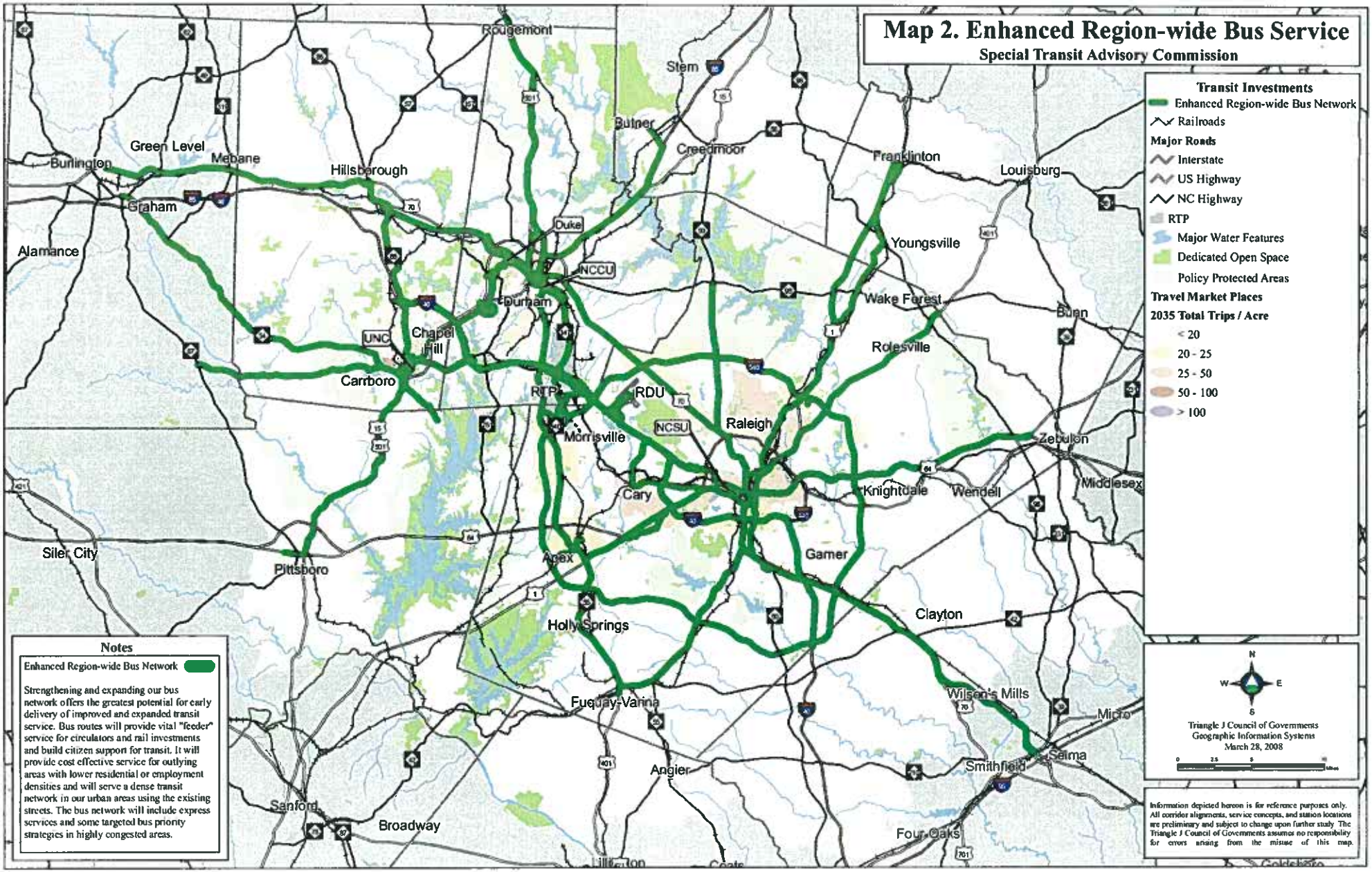
Light Rail Transit (LRT) uses electrically powered vehicles that can operate alongside regular vehicular traffic and best serve closely spaced stops. Connects UNC to Durham Intermodal Center along previously adopted alignment.

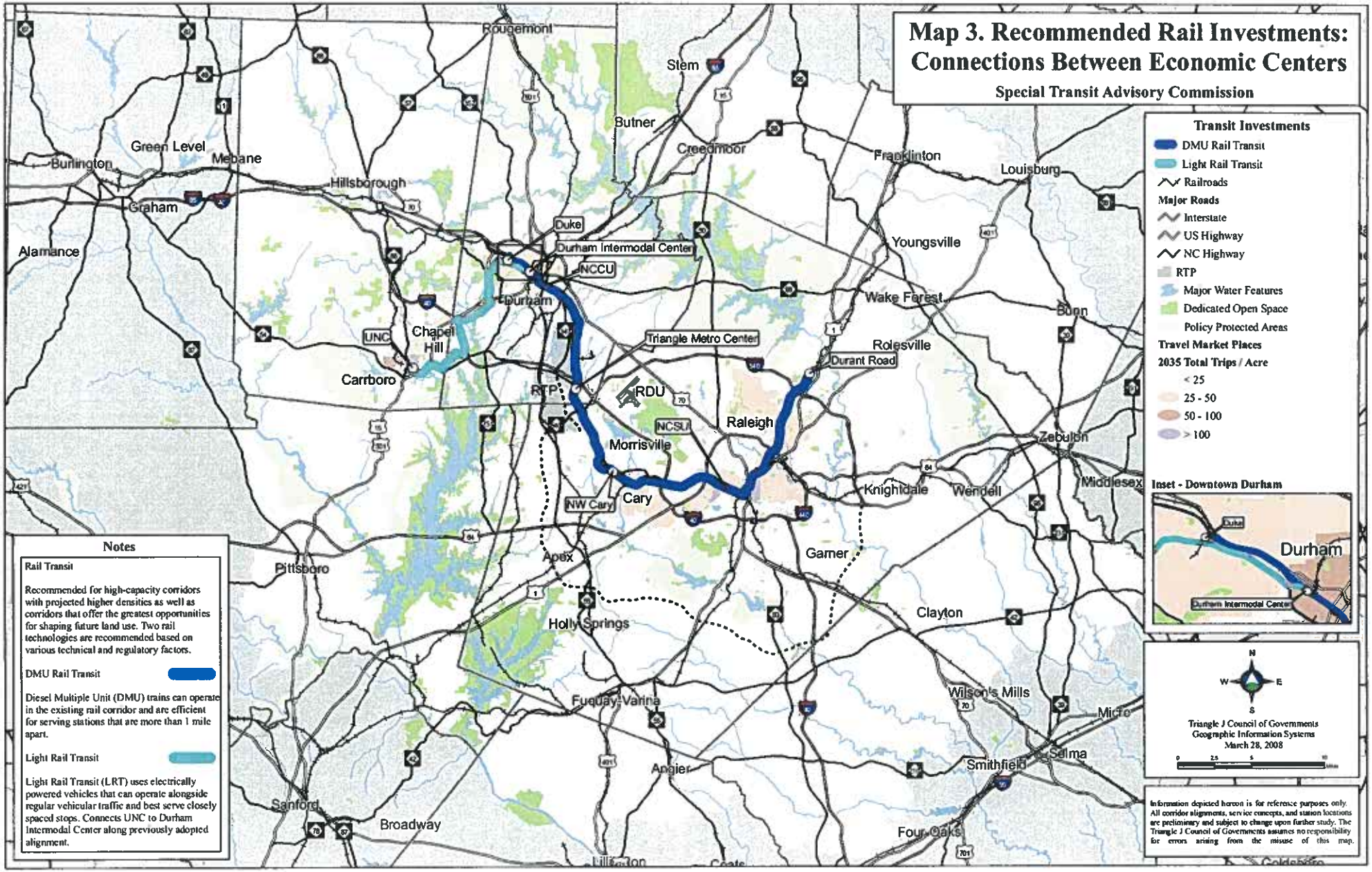
Transit Circulator or Connector Districts

Five districts that are centers of activity in the region should be served by high-quality transit circulators or connectors. Circulators or connectors may evolve from initial bus routes on existing roads to other types of bus or trolley services. The RTP-RDU circulator or connector should be an initial priority with planning led by RDU Airport and the Research Triangle Park.

Map 2. Enhanced Region-wide Bus Service

Special Transit Advisory Commission




Map 3. Recommended Rail Investments: Connections Between Economic Centers
Special Transit Advisory Commission
Transit Investments
DMU Rail Transit
Light Rail Transit
Railroads
Major Roads
Interstate
US Highway
NC Highway
RTP
Major Water Features
Dedicated Open Space
Policy Protected Areas
Travel Market Places
2035 Total Trips / Acre
< 25
25 - 50
50 - 100
> 100
Inset - Downtown Durham
Durham
Duke
Durham Intermodal Center
Notes
Rail Transit
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Triangle J Council of Governments
Geographic Information Systems
March 28, 2008
Information depicted hereon is for reference purposes only. All corridor alignments, service concepts, and station locations are preliminary and subject to change upon further study. The Triangle J Council of Governments assumes no responsibility for errors arising from the misuse of this map.
Rougemont
Stem
Butner
Creedmoor
Franklinton
Louisburg
Green Level
Mebane
Burlington
Hillsborough
Graham
Alamance
Youngsville
Durham
Wake Forest
Bunn
UNC
Chapel Hill
Triangle Metro Center
Rolesville
Durant Road
Carrboro
RTP
RDU
NCSU
Raleigh
Morrisville
Zebulon
Knightdale
Wendell
Middlesex
NW Cary
Cary
Garner
Apex
Pittsboro
Holly Springs
Clayton
Fuquay-Varina
Wilson's Mills
Micro
Selma
Smithfield
Angier
Sanford
Broadway
Four Oaks

SECTION 2: Setting the Stage

This section describes why and how the STAC was convened along with an overview of how the recommendations of the STAC fit into the bigger picture of transportation planning in the Triangle region.

Federal highway and transit statutes require, as a condition for spending federal highway or transit funds in urbanized areas, the designation of Metropolitan Planning Organizations (MPOs), which are responsible for planning, programming and coordinating transportation investments. Here in the Triangle region there are two MPOs: the Capital Area MPO, which serves the eastern side of the Triangle, and the Durham-Chapel Hill-Carrboro MPO (DCHC MPO), which serves the western part of the region. A map of the region's transportation planning area and the MPOs' jurisdictions is provided on page 15.

MPOs are required to develop Long Range Transportation Plans (LRTPs) and regularly update them to maintain a time horizon of 25 years into the future. LRTPs identify the needs of a transportation system to meet user expectations for movement of people and of goods, and must address current and future needs for all transportation modes. LRTPs also address other factors connected to the transportation system including safety, economic development and air pollution standards. The LRTP establishes a vision and policy structure and sets forth strategies for directing investments, including identifying the financial resources needed to build and sustain the system.

The Capital Area and DCHC MPOs are currently in the process of updating their LRTPs to a 2035 planning horizon year. The 2035 LRTPs for both MPOs are expected to be adopted by the MPOs in late 2008 with federal approval of the plans anticipated in summer 2009.

Our two MPOs have moved toward greater planning coordination in recent years, recognizing and reflecting the complex economic, freight and commuter interaction between the eastern and western portions of our region. In order to address one aspect of these regional interactions, the MPOs will coordinate the major transit investment part of their LRTPs during this plan update cycle. The two MPOs decided to work together for several reasons. Both the DCHC MPO and the Capital Area MPO included the earlier Triangle Transit Authority Regional Rail project (sometimes referred to as "Phase I") between Durham and Raleigh in their 2030 LRTPs. When this project failed to receive federal funding, the two MPOs resolved to work cooperatively to develop a new transit plan to serve the region's needs. Furthermore, several major transit investments will connect the eastern and western parts of the Triangle and thus will require agreement between the two MPOs. In addition, the tremendous effort required to fund, build and operate a major transit project was considered to be more likely to be successful if both MPOs worked together. Therefore, they agreed to pursue the joint development of a Regional Transit Vision Plan to serve as the foundation for making comprehensive, cooperative and well-coordinated decisions on future major transit investments.

In November, 2006, the policy boards for the MPOs (known as Transportation Advisory Committees or TACs) met jointly and agreed to convene a citizen advisory group to take a fresh look at regional transit. The group, called the Special Transit Advisory Commission (STAC), was charged with delivering a set of recommended major transit investments and initial investment priorities. These recommendations are to be taken into

consideration by the two MPOs when developing their 2035 LRTPs (see Appendix A for the Charge to the STAC).

The membership of the STAC was established by the TAC of each MPO. The TACs solicited nominations from their various constituencies, including towns, universities and other inter-governmental and regional agencies. Nominees were asked to describe their interest in the STAC and any relevant experience they would bring to the effort. In the subsequent months, the two MPOs appointed 29 members and nine ex-officio members to the STAC (see Appendix B for a list of STAC members). Some had experience as municipal officials, some represented corporate and business interests, others were involved with environmental or community groups. Many had experience with transportation issues in the Triangle. Across this broad range of backgrounds, all members of the STAC recognized the relationship between our region's transportation system and our economic prosperity and overall quality of life. They committed to investigate and debate the issues around transit and develop a set of recommendations for regional transit investments that would serve our regional future.

Recognizing that there would be extensive work required to prepare for and organize STAC meetings, the two MPOs, the North Carolina Department of Transportation, and Triangle Transit contracted with the Institute for Transportation Research and Education (ITRE) at North Carolina State University to provide staff support for the STAC. To guide the work of the STAC and provide technical information and analysis, a staff working group was established with representation from both MPOs, Triangle J Council of Governments, Triangle Transit, local governments, the Regional Transportation Alliance, North Carolina Department of Transportation and ITRE (see Appendix B for list of staff working group members; see page 14 for a diagram of STAC process).

Parallel to the work of the STAC, a collaborative effort between local governments, the MPOs and other organizations across the region such as the Raleigh-Durham Airport Authority, was initiated to provide the technical basis for recommendations on transit investments. This Regional Transit Infrastructure Blueprint Technical Analysis Project analyzed future transit corridors and the potential transit infrastructure investments within those corridors. The Technical Analysis Project was designed to provide consistent, documented information related to land use and transit investments for preparation of the forthcoming 2035 LRTPs and consisted of three main parts:

- **A land use analysis** that described the land use-transit relationship, examined different ways of looking at land use, reviewed land use-related strategies undertaken in other regions, and developed measures for land use intensity tied to transit service provision

- **A travel analysis** that described the nature of travel in different parts of the region and by different groups of travelers, examined travel patterns in major corridors, and compared corridors across a range of travel-related measures

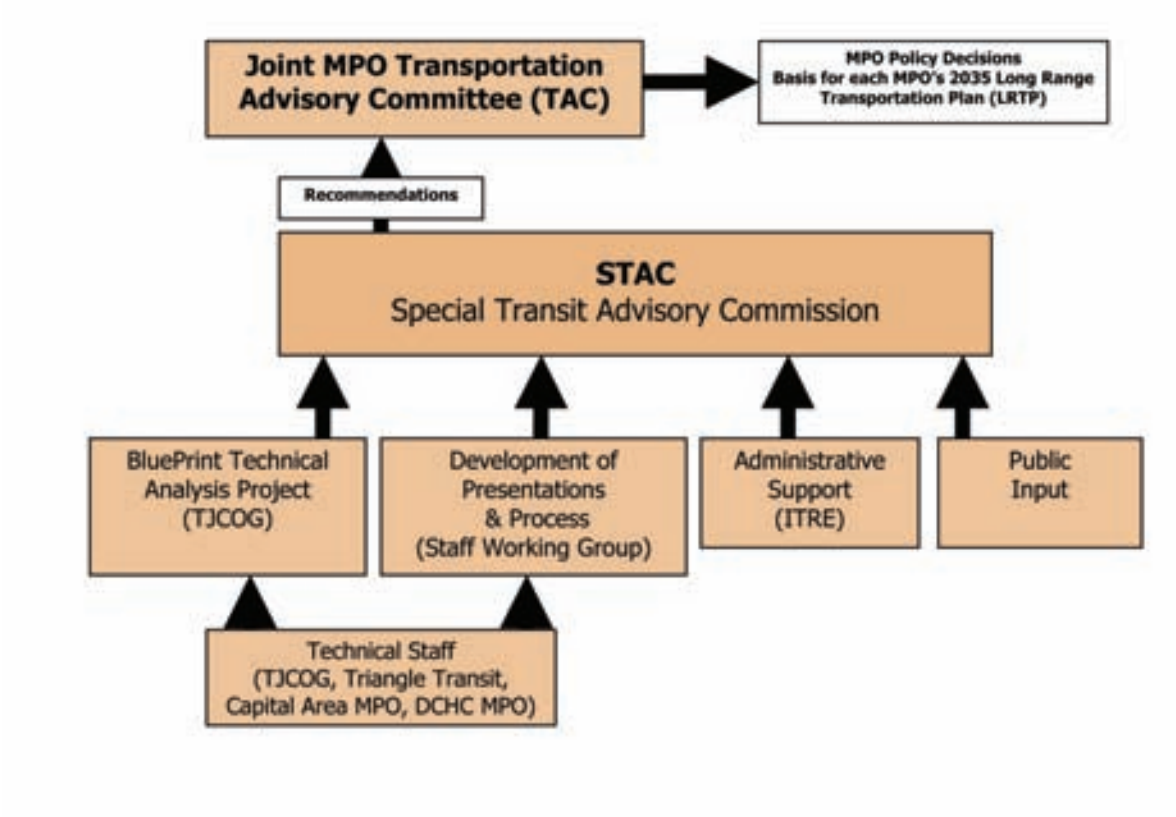
- **A cost analysis** that looked at the building blocks of major transit investments and developed tools and data to estimate transit investment costs.

The Technical Analysis Project cannot provide an actual "blueprint" of specific projects to be built and does not constitute an engineering study. It also does not provide an automatic method to select the "best" projects for the region, but rather offered technical inputs for the STAC to consider along with other qualitative factors to shape

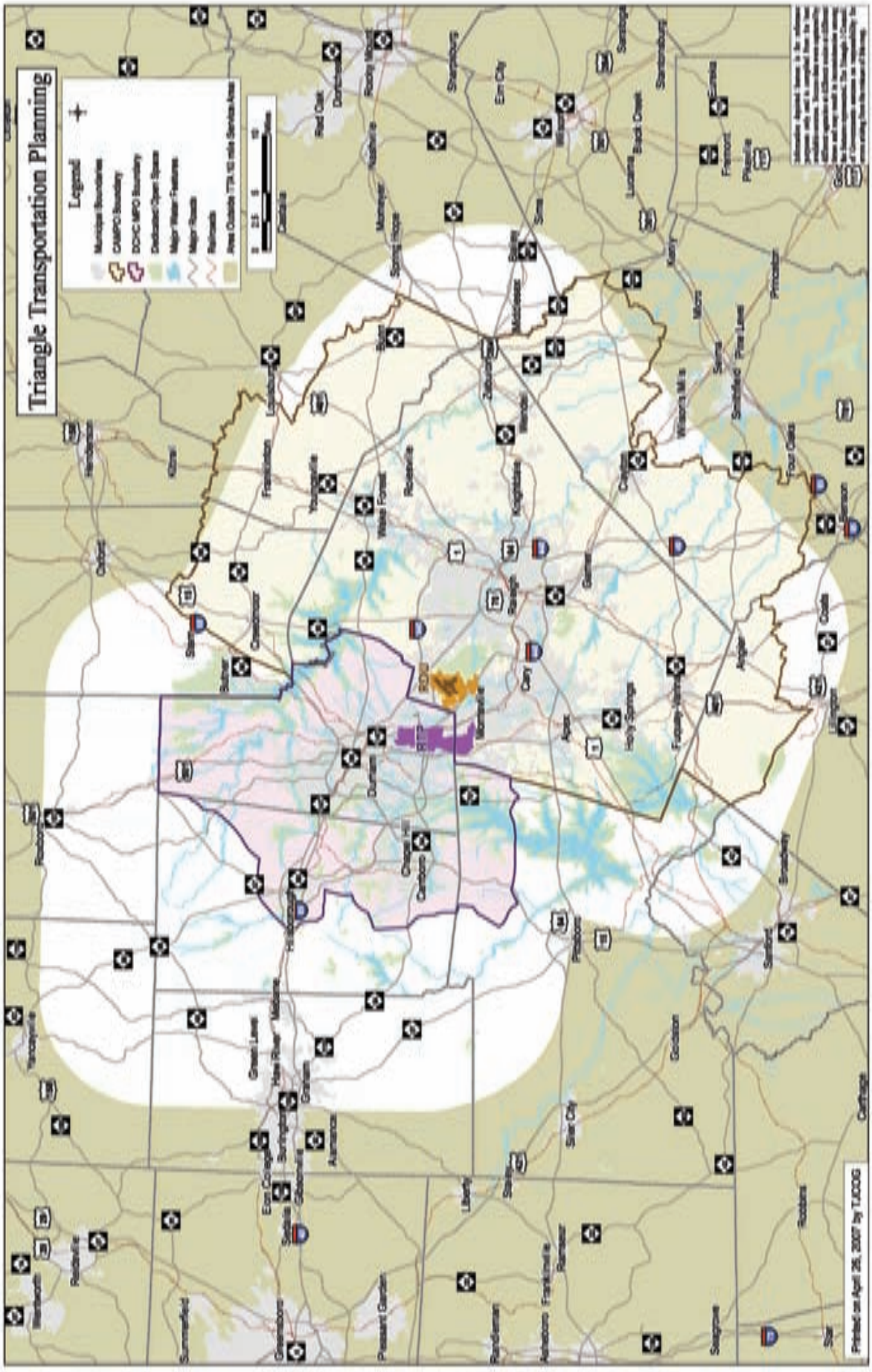
their recommendations. (See Appendix C for additional information on the Technical Analysis Project.)

One of the most compelling stories the technical analysis revealed was the story of growth in the Triangle. The numbers show our recent, tremendous growth, both in population and in geographic extent as we've expanded our communities to absorb that greater population. The numbers also forecast continued, dramatic change ahead for the Triangle region. Because growth has outpaced investment to meet many of the mobility needs of our current population, it is expected that future growth will translate into even greater demand on our transportation system, compounding the demands of tomorrow on top of the needs of today. The region has the opportunity to address those current and future mobility needs, and tackle them in a strategic way so that we do not find ourselves faced with crisis conditions that may force extremely unpleasant choices. Or worse, no choices at all. Yet the window of opportunity is narrow. Because large-scale infrastructure projects require careful planning and rigorous approval processes, the time to begin is now. The two MPOs in the region are set to develop their LRTPs that will shape the Triangle's transportation system for the next 25 years. They are looking for workable solutions to the region's collective transportation future. Local governments are looking for new ways to resolve our communities' mobility problems. The residents of the region, our co-coworkers, families, friends and neighbors are looking for relief from dependence on personal vehicles, and for viable options for their individual transportation futures.

Schematic of the STAC process and relationship to the regional transportation planning processes.



The Triangle Region Transportation Planning Area



The members of the STAC also have a sense of urgency about our region's mobility issues. They recognize that failing to act now will lead to worsening traffic conditions, increasing costs of commuting and dangerous declines in air quality. In short, the Triangle faces the prospect of unacceptable declines in our quality of life that will threaten the desirability of our region to businesses, residents and visitors and reduce our overall competitiveness. Although many of these forces already have considerable momentum, members of the STAC believe there is an opportunity to begin to turn the tide, and that substantial investments in improving our transit system will play an important role in doing so. With their recommendations, the STAC is urging the Triangle's citizens, leaders and transportation agencies to seize the opportunity before us now.

Sponsors of the STAC Effort

Capital Area MPO: The MPO serving the eastern part of the Triangle region including Wake, parts of Granville, Franklin, Harnett and Johnston.

Durham-Chapel Hill-Carrboro MPO: The MPO serving the western part of the Triangle region, including Durham County and parts of Orange and Chatham counties.

Triangle Transit (formerly Triangle Transit Authority or TTA): The Triangle's regional transit service provider; currently operates local and express bus service and vanpools.

RTA: Regional Transportation Alliance: Regional business leadership group focused on mobility issues affecting the Triangle; supported by 22 chambers of commerce and over 100 companies.

NCDOT: North Carolina Department of Transportation, Public Transit Division: The division involved in planning transit systems and services across the State. NCDOT does not operate buses, trains or vans directly, but rather helps local and regional transit providers plan and operate more effectively.

TJCOG: Triangle J Council of Governments: A voluntary organization of municipal and county governments covering Chatham, Durham, Johnston, Lee, Moore, Orange and Wake Counties. Works on regional issues including development and infrastructure, water resources management, sustainable energy and environment, air quality, and aging services. Provides support to member communities including technical assistance, planning, mapping, web page design and maintenance and administrative services.

ITRE: Institute for Transportation Research and Education: An inter-institutional research center administered by NC State University in Raleigh. ITRE conducts research, transportation workforce training programs and technical assistance projects on a wide variety of transportation issues.

In order to take a fresh look at the Triangle's transportation issues, it is important to understand the economic, demographic, environmental and social forces that affect transportation in the region. The Special Transit Advisory Commission (STAC) examined these forces and considered how transit might interact with these forces in a way that would promote greater mobility and prosperity, stronger communities and enhance our quality of life. From these potential benefits, the Commission articulated a set of goals that became the framework for developing their recommendations (see page 24).

Over the past 11 months, the STAC considered an impressive amount of technical material. Members of the STAC asked questions about transit in general and transit in the Triangle. Answers to these questions, many of which are also asked by the public, have been compiled and are provided in Appendix D.

This section describes the role transit can play in the Triangle and the importance of investing in a regional transit system.

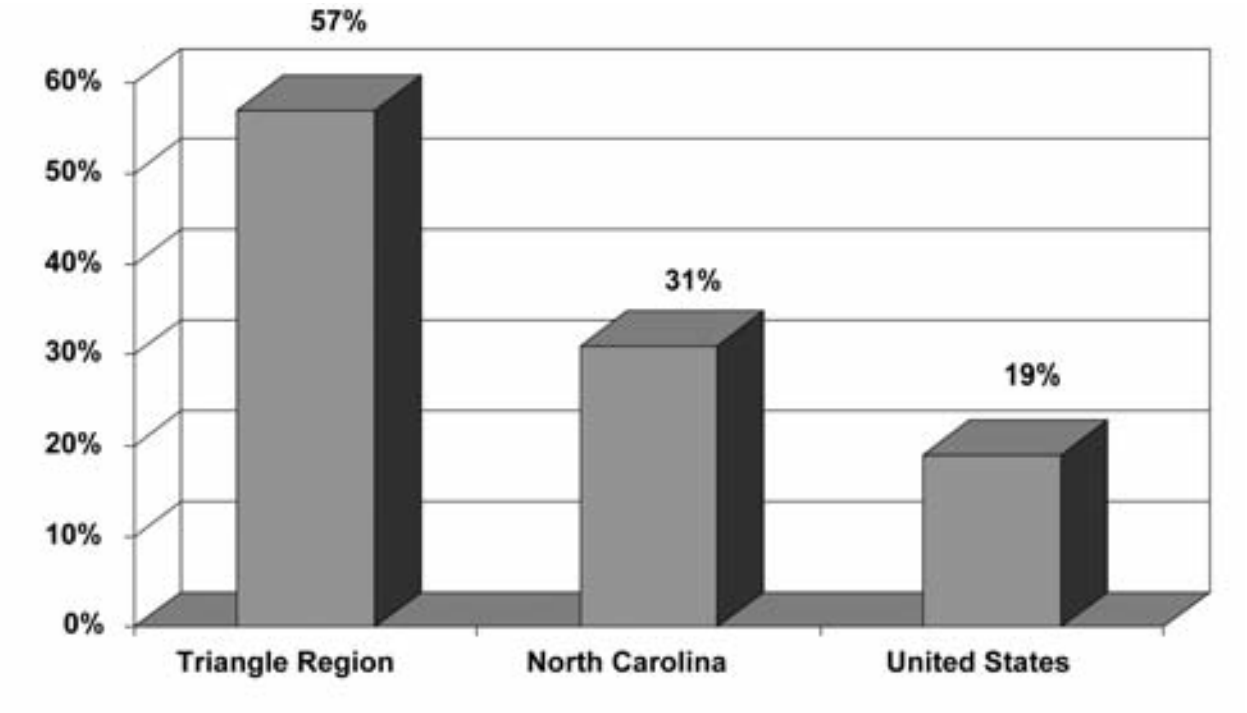
Economic, Demographic, Environmental and Social Forces

Our region has experienced a period of astounding growth in population over recent decades. The Research Triangle Region is home to 1.5 million people and is projected to grow rapidly to 2.5 million by 2035, about 3,000 people per month. Our growth rates have outpaced population growth for the nation and for North Carolina. From 1990 to 2000, Wake County was the 9th fastest growing county in the U.S. Although we are not yet a "big" region, we can expect to become one quickly.

These numbers tell us what we already know: people want to move here to build businesses,

Population Growth 1990–2005

Source: TJCOG



careers and families because of the robust economy and high quality of life. However, the attractiveness of the Triangle is dependent on quality infrastructure, including our transportation network. This network is already straining to serve our current travel needs as the demand for transportation has steadily grown at a rate that far outpaces population growth. Future population growth and the increased traffic this will bring will only worsen the situation.

The maps below show the anticipated increase in congestion on our roadway network from 2002 to 2030. The projection for increasingly congested conditions have implications for businesses, which need travel time reliability for workers and for freight, and for individuals, who must cope with frustration and time lost to congestion on a daily basis.

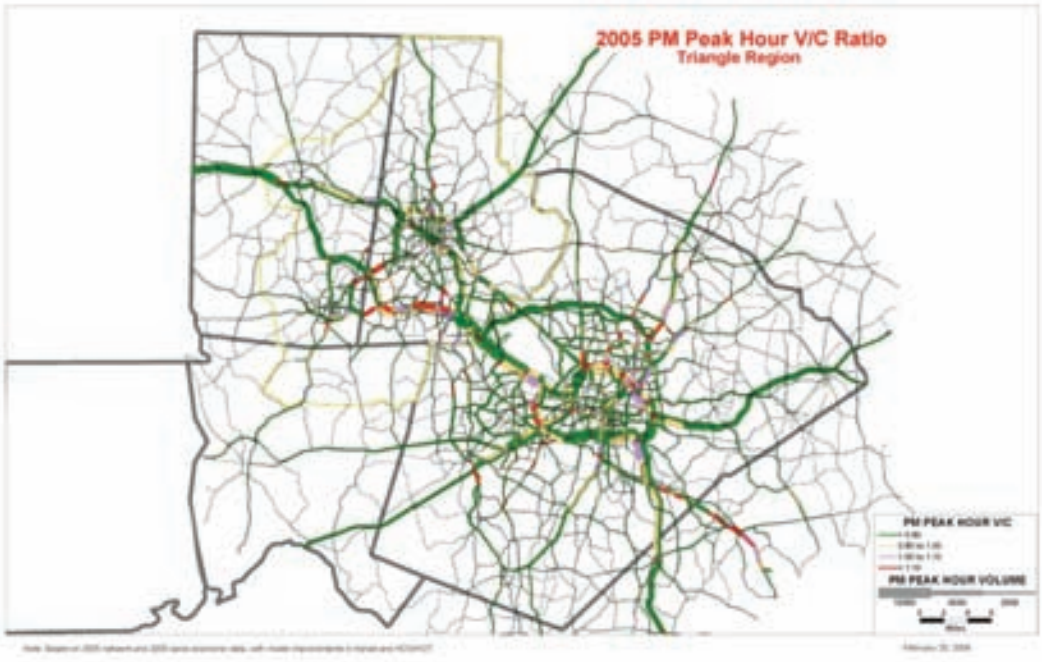
Not surprisingly, Triangle commuters are spending more time commuting, either because of congestion or because they are traveling greater distances. According to US Census figures, our commutes are getting longer. From 1990 to 2000, the average commute time in the Raleigh-Durham-Chapel Hill metropolitan area increased 23%. The number of workers who were able to reach their jobs in 20 minutes or less declined, while at the same time the percent of workers reporting one-way commutes of greater than 60 minutes increased.[1]

These figures are a concern for several reasons. Long commutes, especially when combined with congestion:

- Limit the reach of businesses in marketing their goods and services and in their ability

Regional Road Network showing 2005 ratios of daily traffic volume (shown by width of lines) to capacity.

Purple are roads at or just over capacity; red are roads well over capacity. Source: DCHC MPO



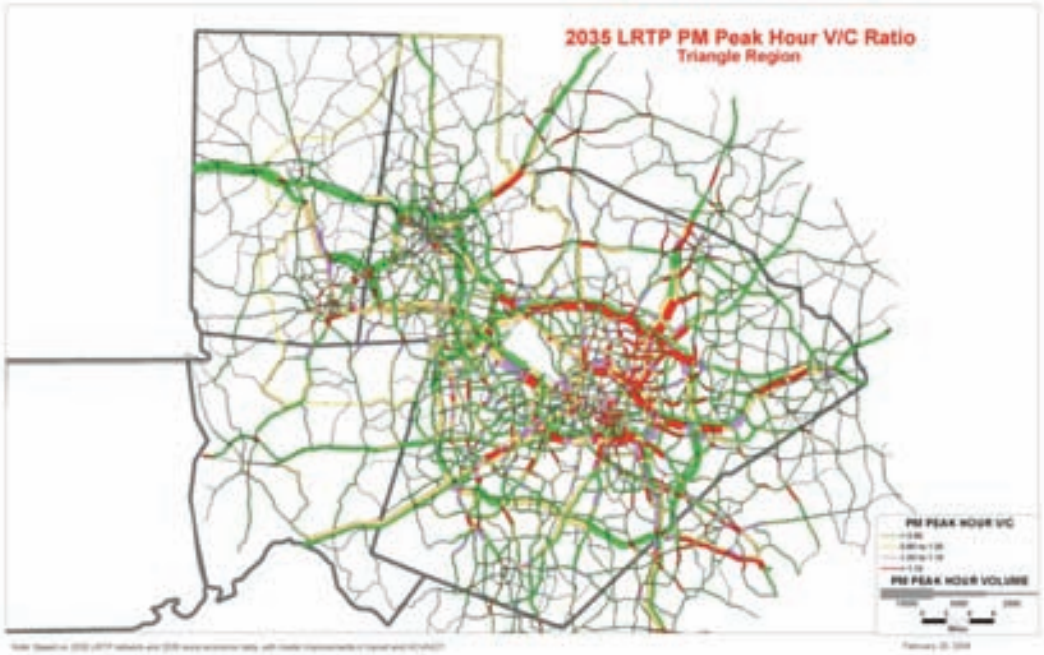
to attract employees from the regional labor pool

- Increase air pollution from vehicles resulting in impaired health for citizens and negative environmental impacts
- Are often intertwined with land use development that reinforces a regional pattern of sprawling, bedroom communities that empty out for the workday; these communities have difficulty developing a robust local economy and diversified tax base to build and sustain public services such as schools
- Are associated with lower levels of involvement in community affairs. Studies have shown that every additional 10 minutes spent commuting is associated with a 10% drop in involvement in a range of activities including town meetings, PTAs, church services, political activism and volunteerism.[2]

Many of the indirect effects of our travel patterns are actually effects stemming from the interplay between land use and transportation. An examination of our region's land use characteristics reveals several patterns that contribute to the increasing time we spend driving and the distances we drive:

- We are a low density region. Despite our tremendous growth, our regional population density is still lower than it was in 1980. With few natural barriers to development like mountains or large rivers, development has consumed land at a far more rapid pace than the increase in our population. Low density development increases infrastructure costs to run lines to distant locations. Also, providing police, fire and other services are more expensive with lower density.

Regional road network with 2035 projected volume to capacity ratios.
The increase in congestion comes despite implementing all projects in the region's two current Long Range Transportation Plans. Source: DCHC MPO

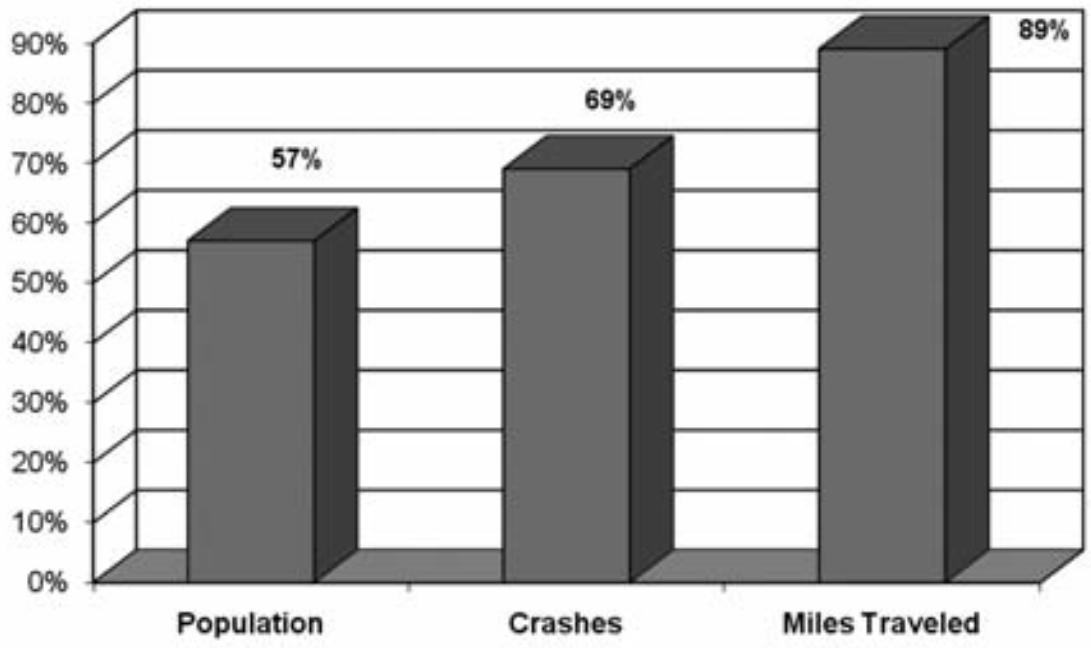


- We have a pattern of separate and segregated land uses. Generally our residential areas are segregated from retail stores, workplaces, schools, and civic and cultural facilities. This separation increases both the number of trips we make and the length of those trips at a rate faster than our population growth (see figure below).
- Our geographic and economic center, Research Triangle Park, is developed as a low-density, business and employment-only destination. Because the employees, customers and tenants of RTP do not live on the campus, these commuters travel longer distances and generally at the same time each day resulting in significant congestion and patterns of trips that begin at scattered locations and end at equally scattered destinations.

For transportation planning, these characteristics create unique challenges compared with the "typical" metropolitan pattern of a single, dense, downtown central business district. These land use factors, combined with our rapidly growing economy have been major forces in making our region one of the most sprawling, auto-centric regions in the nation.

This reliance on auto travel has consequences for individuals, households and the region. Substantial outlays are required to purchase, insure, maintain and operate an automobile. Fuel costs are becoming significant for many households, and with our long commutes, we can expect this to have an increasing impact on our residents. Auto-dependency also affects our physical health, creating fewer opportunities to make exercise part of our daily routines,

More People Driving More Miles: Changes from 1990–2003.
Note: Population and miles traveled are Triangle urbanized area;
crashes are core counties of Durham, Orange and Wake. Source: TJCOG.



contributing to an obesity epidemic. Our auto-centric infrastructure also severely curtails opportunities for active-living choices in our region. New and widened roadways have fragmented neighborhoods, towns, farms and wildlife habitat, disintegrating our essential community vitality and the health of natural systems. Aside from these direct impacts, our reliance on petroleum has regional and national policy implications. Automobiles are a major contributor to air pollution and greenhouse gases, so continuing to expand the highway system will negatively affect air quality and in turn, our physical health. Air pollution has financial impacts as well: increasingly stringent federal air quality standards will mean that the federal government may withhold transportation monies if our region cannot meet the standards.

Our changing demographics indicate that an even greater number of future residents will need alternatives to driving, because of age or economic status. For the elderly, physical issues can preclude auto ownership or driving. By 2035, those aged 65 and older will increase from less than 10% or our population in 2000 to more than 15% by 2035.[3] Our auto-focused transportation system will present this group with considerable challenges to their personal mobility. Low income households can be heavily affected by the rising costs to own, maintain and operate an auto. Access to employment centers and educational opportunities becomes very difficult for those who do not have access to a car, challenging their ability to get and keep a job. From 1990 to 2000 the number of households without cars, either by choice or necessity, increased from 27,000 to 29,000. For these groups, considerable social and economic isolation can result from their constrained personal mobility. Furthermore, our region suffers when mobility limits the contributions the poor and elderly can make to our economy and community life.

Benefits of Transit

Taken together, these factors and projections compel us to take a new approach to our transportation future. A multi-modal web of transportation options including expanded regional bus service, city circulators, express routes and rail service to our downtowns, universities and medical centers would provide the following benefits:

- An alternative solution to the increasingly congested roadway network, which is unlikely to improve as travel demand will outstrip road construction
- More reliable travel times for commuters and customers; helps alleviate congestion for freight operators
- Practical alternatives for low income households, the elderly and other households without autos to meet their daily travel needs
- Employers can continue to attract employees from the entire region, giving greater flexibility locating firms and a wider labor pool from which to hire workers
- Reduced risks to the economy and to households when faced with future fuel cost or supply variability
- An alternative to driving alone that allows travel time to be productive
- Wider use of walking and bicycling as practical modes of travel, bringing health and environmental benefits and potentially increasing interactions within communities
- Reduced personal and economic risk of auto crashes and diminished auto use that may lower insurance premiums
- Address our air quality problems and reduced pressure on other natural systems
- Decrease our region's contribution to global climate change by reducing the number and length of auto trips
- Enhanced opportunities to shape development patterns to use land more

efficiently and sustainably, to preserve open space, forests and valuable agricultural lands
- Shorter commutes by providing more efficient links between residences and work places
- Reduced need to construct or expand major roadways that can have major negative effects on our communities and the natural environment
- Opportunities for redevelopment and infill development that can increase the overall tax base while providing a greater range of housing types and business sites in highly accessible locations in transit-oriented developments

Planning and building a transit system that has such far-reaching benefits is a complex and

Regions of Comparable Size and Fixed Guideway Transit, excluding commuter rail

Note: Includes all Combined Statistical Areas or Metropolitan Statistical Areas of comparable population in 2005; population figure for Research Triangle Region is combined total of the Raleigh-Cary MSA and the Durham MSA (includes Chapel Hill and Carrboro).

Region	2005 Population	Fixed Guideway Transit?
Baltimore-Towson	2,660,000	Yes
Buffalo	1,230,000	Yes
Charlotte-Gastonia	2,120,000	Yes
Cincinnati-Middleton	2,070,000	No
Cleveland-Akron	2,930,000	Yes
Denver-Boulder	2,870,000	Yes
Memphis	1,260,000	Yes
New Orleans	1,360,000	Yes
Pittsburgh	2,480,000	Yes
Portland-Vancouver	2,100,000	Yes
Research Triangle Region	**1,415,339**	**No**
Sacramento	2,190,000	Yes
St. Louis	2,840,000	Yes
Salt Lake City	1,590,000	Yes
San Diego	2,930,000	Yes
San Jose	1,750,000	Yes
Tampa-St. Petersburg	2,650,000	Yes

challenging task. But we see considerable opportunity for such a system including:

Our innovative culture and regional competitiveness: Our region is known worldwide for being a center of technological creativity. The establishment of RTP was an early step in creating this culture, and represents truly visionary thinking about how our region could invest in its future to be well positioned in a changing global economy. One aspect of competitiveness among regions is the efficiency and effectiveness of their transportation systems. The Triangle is well located along major transportation corridors, both rail and highway, that can be used to build a more diversified transportation system. In comparison, nearly all metropolitan regions comparable in size to the Triangle have fixed guideway transit service, that is transit service that operates in its own lanes or tracks, separate from regular traffic (see table on page 22).

Our development community and our local governments: Many developers and local officials are showing increasing interest in, and commitment to, the type of land use planning and development needed to ensure the success of a regional transit system. We are seeing signs of substantial revitalization in our major downtowns and in other locations that will be well coordinated with regional transit corridors. Examples include the Plaza Condominiums in Raleigh, Meadowmont and 54 East in Chapel Hill, and West Village II in Durham. Throughout the region we see pockets of density and developments with a mix of activities that can be expected to support transit.

Real estate market research indicates that about 20–30% of people would prefer to live in compact, walkable neighborhoods where people can get to jobs, shopping and recreation without using a car.[4] Where such neighborhoods exist or are built, they typically command a premium over comparable suburban housing, reflecting rising demand and a relatively limited supply of housing in a walkable, transit-oriented pattern.[5] Here in the Triangle, our housing market shows healthy demand for housing in these developments; our residents are paying for the opportunity to live in these places. Our developers and local planning professionals are also demonstrating that these developments can include an affordable housing component that opens up these desirable locations to lower income households.

Our inventory of transportation corridors: We have an extensive inventory of transportation corridors that can be used for transit service. For example, on roadways, many regions are finding ways to get buses out of existing roadway facilities, including allowing buses to run on shoulders during congested peak periods, giving buses priority at signals, or offering express routes between remote park and ride lots and major employment centers. These strategies can make buses competitive with autos for many trips. Our region also has rail corridors that link many of our communities, and continue on beyond our boundaries. These corridors are important freight and intercity passenger rail routes, and we can leverage these valuable assets to provide rail transit service within our region. We also have transit hubs built or under construction in Raleigh, RTP and Durham.

Setting Our Course

In order to develop a successful transit system, the region needs to give careful thought to why it should invest in transit. These reasons are the foundation for the goals that the region wants to attain in connection with a regional transit system. While many of the decisions made about transportation systems are based on technical data, transportation systems touch on many factors that are only measured in qualitative ways. To this end, the STAC developed a set of goals to use in conjunction with the technical data to guide the decisions about where transit

investments should be made, what kind of investments are needed, and when and in what sequence to make them. These goals represent the values and principles that shaped the STAC's recommendations and are recommended as guidance for the MPOs as they work through the LRTP process and on into designing and building the system. Even when faced with difficult choices because of financial or political pressures, the goals describe the choices that will enhance quality of life in our region. Throughout this report, the values and principles that underlay these goals surface in the specific recommendations and the rationale behind them.

STAC Goals for Regional Transit Vision Plan

- *Create a regional transit system which is efficient, convenient, affordable, attractive, safe, secure and accessible for people and commerce.*
- *Create a regional transit system which is multi-modal, seamless and interconnected with multiple transit choices for people and commerce.*
- *Encourage sustainable land use, ranging from compact, mixed-use, walkable and bikeable development to allowing for and preserving open space, trails, farmland, and historic, culturally valuable and environmentally sensitive areas.*
- *Reduce the need for and cost of new roads and other infrastructure by optimizing the capacity of existing roads.*
- *Minimize the impact on the natural environment, neighborhoods and cultural resources when selecting, building and improving transportation corridors.*
- *Create a regional transit system that improves our health by reducing air pollution, greenhouse gas emissions, water pollution and by promoting active living.*
- *Create a regional transit system that reduces our dependence on foreign oil and reduces our consumption of fossil fuels.*
- *Create a cost effective regional transit system with positive economic and social value for the region with adequate and proportional funding.*
- *Encourage economic development and reduce travel time and make it more productive*
- *Improve access to existing and future employment, services, leisure, health, education, cultural and natural resources for everyone, including the mobility impaired and economically disadvantaged.*
- *Strengthen all residents' feelings of belonging, connection and community throughout the region by creating shared public and private responsibility and investment for transit which demonstrates that the region can think and act inclusively with vision, creativity and open communication.*

Our region is unique and complex, with a polycentric urban pattern that includes several sizeable downtowns, four major universities, three major medical centers and many satellite communities, with travel and economic patterns that link them to the region's core counties of Durham, Orange and Wake. Our airport and our major economic engine, the Research Triangle Park (RTP), draw traffic to the center of our region.

Overall, our region is the result of three urban areas growing together around a central, yet low-density, core. At the same time, rapid population growth in the outlying areas provides a high-quality labor supply for firms at the center of the region. These patterns result in complex commuting flows that crisscross the Triangle. Although the complex nature of our region presents challenges to planning a regional transit system, there are physical connections between these places that have promise as major transit corridors and hubs. This section presents the corridors evaluated for regional transit investments and the technical process that analyzed those corridors.

Transit Components

Transit has three components:

- ***A route:*** The pathway followed to go from one place to another
- ***A service concept:*** How passengers are served, including characteristics such as distance between stops, hours of operation and frequency of vehicles
- ***A technology:*** The type of vehicle used to transport passengers.

This section focuses on the first component, transit routes. Section 5 discusses service concepts and technologies.

This section describes the places and corridors in the Triangle where transit investments are recommended. It also explains the data-driven, technical analysis of these places and corridors.

Building a successful transit system begins with identifying where the most promising transit markets are located, the places that can be served most effectively and efficiently. The Special Transit Advisory Commission (STAC) began its consideration of where to make investments by reviewing travel market and land use data for 16 "corridors" between places. These corridors had been analyzed in previous studies or plans for potential major transit investments. The 16 corridors also represent the most heavily traveled and congested routes serving our most intensely developed activity centers as well as areas emerging as new high-activity places. The deliberations of the STAC were not limited to these 16 corridors, however. Based on its judgment, the Commission added two corridors to the Vision Plan. The 18 corridors are listed below. Additional information on the configuration of the corridors is available in Appendix C.

- Apex to Raleigh
- Durham to Apex
- Durham to Burlington
- Durham to Carolina North
- Durham to North Durham
- Durham to Raleigh via RDU
- Durham to Raleigh via RTP
- Durham to Raleigh via US-70
- I-40 Corridor from Wake/Johnston County to NC-86

- Northern Arc I-540
- Pittsboro to Carolina North
- Raleigh to Franklinton
- Raleigh to Fuquay-Varina
- Raleigh to Selma
- Raleigh to Zebulon
- RDU to Carolina North
- UNC Hospitals to Burlington
- Southern Arc NC-540 (Triangle Expressway Turnpike)

Technical Analysis of Transit Corridors
Based on the considerable data already available for the corridors, more detailed study and analysis was undertaken through the Regional Transit Infrastructure Blueprint Technical Analysis Project, a cooperative effort by the region's two Metropolitan Planning Organizations (MPOs), the North Carolina Department of Transportation (NCDOT), Triangle J Council of Governments (TJCOG), and Triangle Transit. The Technical Analysis Project was designed to improve the analysis of potential transit investments and provided the technical information used by the STAC. It included three major components:

- ***Land use analysis:*** Uses 2005 land use and anticipated changes in land use for 2035 developed by the region's planners to show existing conditions and the anticipated changes over time. The analysis forecasts residential and non-residential densities to evaluate how many, what type and at what intensity jobs and housing will be located in the region.

- ***Travel Analysis:*** Uses the latest information on travel patterns in the region, generated by the current version of the Triangle Regional Model, the computer model that generates projections used by the two MPOs to identify transportation system needs. The model projects the number of trips, where trips begin and end and the time of day trips are made, combined with demographic measures and data on type of trips. This allows the comparison of corridors by measures that are important for transit including density of trips per acre, travel by lower income households, and trip volumes during the peak commute hours.

- ***Cost Analysis:*** Uses a cost estimating methodology for transit investments which includes capital and operating costs for a range of potential transit technologies.

Additional background on the Technical Analysis Project and a table of the statistics for the corridors analyzed are available in Appendix C.

The Technical Analysis Project worked with the MPOs and local planners to group the 2,317 Traffic Analysis Zones in the Triangle Regional Model into 207 Travel Market Places. These market places generally follow potential investment corridors so travel associated with the corridors can be examined for the 2005 (the base year) and 2035 (the time horizon of the current planning effort). The analysis also designated over 70 places where travelers enter or leave the region, so that trips that begin and/or end outside the geographic limits of the Triangle Regional Model could be included.

The level of detail and consistent methodology used in the Technical Analysis Project allows for a data-driven process to identify:

- Appropriate service concepts
- Transit technologies best suited to meet the service concept

The 18 corridors included in the Regional Transit Vision Plan extend transit service to growing satellite communities. In the region's

Where People Work: Major Employment Centers in the Triangle Region

Our universities and their associated medical centers are among our largest employers. In Durham County, Duke University and Medical Center is by far the largest employer with approximately 30,000 employees. North Carolina Central University is also a large employer in Durham County with approximately 1,500 employees. In Orange County, the University of North Carolina at Chapel Hill and UNC Healthcare employ approximately 22,000 employees. Wake County's largest university, North Carolina State University, has approximately 17,575 employees. These universities also have plans to for new or continuing expansion at Duke University's Central Campus, UNC's Carolina North Campus, NCCU's campus and NCSU's Centennial Campus.

The employment opportunities located at these universities in addition to the students taking classes account for significant travel demand. Furthermore, many jobs are concentrated on campuses, creating some of the highest densities of trips in the region. Besides students and employees, the university campuses also attract many other visitors for special events such as sporting events, theater productions, lectures and graduation ceremonies. These special events cause congestion on highways and local streets and consume all available parking on campus. The density of trips and the parking limitations make these campus areas well suited to being served by a major transit investment.

In addition to the region's universities, Wake County has a healthy cross-section of employment in other sectors. The State of North Carolina is the largest employer with approximately 40,000 employees, and the Wake County Public School System employs approximately 15,000. IBM remains the largest private-sector employer in the region with 13,000 employees, most in Research Triangle Park. Strong growth in employment is also expected to occur in Raleigh's downtown as mid- to high-rise mixed-use buildings continue to be permitted and built. The employment and residential density for downtown would be complemented with additional transit investments.

Furthermore, both Johnston County and Granville County are expected to be significant regional employment generators in the coming decade due to expansion in their current base of industrial employment; along with federal and state employment. Transit connections to these satellite communities will be essential for those "reverse" commuters originating from the region's urban core.

core counties of Durham, Orange and Wake, the corridors connect our downtowns, major universities, hospitals and employment centers, and include many of our most congested roadways where transit will provide a welcome alternative for commuters. The corridors also support potential connections beyond our region, leaving open the opportunity for transit connections to other regions in the state.

Although many transit systems focus on serving downtowns and core areas, the travel patterns in the Triangle region require bringing transit service to our outlying communities, too. Providing transit service to the outlying communities is important to build ridership and support for the regional transit system, serves as "feeder lines" to the core of the system, and offers a practical alternative to driving for those with long commutes. Dependable, affordable transit service is a vital lifeline that will strengthen the links between these communities and the region's employment, educational, cultural and health care centers. At the same time, the Vision Plan balances service to outlying communities with the needs of the denser urban core, with its higher ridership potential in order to ensure that provision of transit service does not encourage even more sprawl.

Each corridor has its own land use and travel pattern, and these patterns also vary within the corridors. These differences mean that there will be differences in the service concept and transit technology best suited for each corridor or for segments within individual corridors. The investments included in the Vision Plan reflect the number and type of trips projected for each corridor. This network of corridors can be added to over time, allowing for incremental investment to strengthen and expand the regional transit system.

What About Highway Investments?

In addition to evaluating transit opportunities for each corridor, investments in highway capacity were also considered. For some corridors, major highway projects are projected to meet capacity needs for the coming 30 years.

For these corridors, the most cost-effective transit strategies focus on services that take advantage of the highway investments, rather than making substantial investments in new structures or acquiring new right of way specifically for transit operations.

In making specific recommendations for transit investments, there are many considerations that come into play. Just as people make different kinds of trips, there are different ways of serving those trips. In making recommendations about various transit investments, careful thought must be given to balancing current and future needs of our growing region, while ensuring that the investments meet the goals for a Regional Transit Vision Plan. This requires consideration not only of initial, shorter-term costs, but the overall cost structure of investments and their potential for providing regional benefits over the short, medium and long term.

Service Concepts

In order to plan an effective and successful transit system, it is important to consider the type of service that is needed in particular corridors. Service concepts define the type of transit service, the way the service functions rather than the kind of vehicle used. Service concepts do not define any particular technology. In fact, any one of several transit technologies can satisfy a service concept. Because service concepts are geared to address types of travel patterns, many elements of a service concept are related to the land use patterns along a corridor.

By starting with service concepts, the Special Transit Advisory Commission (STAC) was able to focus on the elements of transit service that are experienced by users. To build a successful, high-ridership transit system, it is more important to find the appropriate service concept that is best suited to particular land use and travel patterns of the corridor than to debate the merits of specific technologies.

The STAC used three service concepts in developing its recommendations for the region:

This section describes transit service concepts—types of service—and descriptions of various transit technologies and vehicles for modern transit systems. It also includes information on the kinds of places and trips that each can most effectively serve.

- ***Circulating in Town:*** Focuses on moving people through areas with very intense activity, such as downtowns or university campuses. Since the intensity of activity means that stops are close together, the trips most people are taking are short. Service is very frequent, and operates on a Full Schedule Service schedule. A current example of this service concept is the "Greek Court" campus bus route operated by Wolfline, the North Carolina State University (NCSU) transit system, which connects student residences with central campus, libraries and sports facilities.

- ***Serving Long Haul Commuters:*** Focuses on carrying passengers from outlying areas into major employment centers, with Rush Hour Only Service. Current examples of this service concept are the express bus routes operated by Triangle Transit between Chapel Hill and Raleigh and Raleigh and Durham.

- ***Connecting Transit-Friendly Neighborhoods:*** Focuses on providing high-quality, reliable Full Schedule Service for many types of trips. Works best when coordinated with transit-supportive land use policies that seek to focus development around stops, stations or along the corridor. A current example of this service concept is the east-west "F" route operated by Chapel Hill Transit that

connects apartment complexes, the downtown commercial and residential areas and the University of North Carolina at Chapel Hill (UNC-CH).

More information on service concepts is available in Appendix E.

It is important to recognize that service concepts can change within a corridor depending on the travel patterns that need to be served. For example a bus route can originate at an outlying park and ride lot and make no stops until it approaches a downtown district where stops become more frequent. This example would provide Serving Long Haul Commuters service, switching to the Circulating in Town concept in the downtown. Each service concept works best in corridors with certain characteristics:

- ***Corridors for Serving Long Haul Commuters:*** Longer corridors with concentrated development at one or both ends, or have park and ride lots or major transit hub facilities that present the opportunity to concentrate trips to or from many places. Most trips are concentrated in peak commuting hours.

- ***Corridors for Circulating in Town:*** Areas with high density and a variety of activities or special trip generators that need to have frequent and convenient service to the rest of the transit system; trips are relatively short in length but spread throughout daytime and evening hours. This service concept reinforces compact, mixed-use, walkable development which in turn enhances transit ridership.

- ***Corridors for Connecting Transit-Friendly Neighborhoods:*** Existing or potential nodes or centers of activity along a corridor with higher trip-making potential for a variety of trip types. Trips are spread throughout daytime and evening hours. This service concept can induce and support denser, compact, mixed-use walkable development which in turn enhances transit ridership.

Rush Hour Only Service: Transit service during peak commuting hours, with frequencies of 1 to 3 times per hour, on workdays only.

Full Schedule Service: Transit service during peak commuting hours with frequencies of 4 to 6 times per hour, plus service during midday, evening, and weekends at frequencies of 1 to 4 times per hour.

Peak Commuting Hours: The periods of the day during which highways are most congested are generally referred to peak travel periods or rush hour. In our region, the morning peak travel period is roughly 4 hours long, from 6 AM to 10 AM and in the evening, it is roughly 4 hours long, from 3:30 PM to 7:30 PM.

Evaluating corridors from the perspective of service concepts brings into focus user needs for service, and allows for dovetailing transit service with the particular needs of each corridor and segments of corridors. In some cases a service concept can change along a corridor, reflecting a change in trip volumes or patterns, or in the density of development which must be matched with a change in the transit service concept in order to maintain efficient and effective service. The particular service concept needed for individual corridors may change over time, requiring phasing in of increasing levels of service. By tailoring the transit service to meet current and projected future needs in each corridor, the Regional Transit Vision Plan can provide transit service

Completing the Transit Connection

For a transit system to successfully attract riders and reduce auto use, a high level of bicycle and pedestrian accessibility to the transit system is essential. When a transit trip can begin and end with a safe and comfortable segment on foot or by bicycle, the attractiveness of transit increases. Building pedestrian and bicycle friendly development means:

- *A high level of connectivity, including short street blocks*
- *Clear, comfortable and direct routes and pathways between transit stops and stations and residential, employment, commercial and other destinations*
- *Designing transit stops and stations to be secure, comfortable and attractive for users*
- *Integrating transit operations into the physical design and traffic flow of the development*
- *Diverse and complimentary day and night-time uses, close together to reduce the need for cars, especially for short trips*
- *Commercial and office buildings adjacent to the sidewalks with ground floor windows and parking areas behind buildings*
- *Inviting public and private spaces*
- *Ensuring that the roadway and roadside design includes facilities and space for pedestrian and bicycle travel*
- *Influencing driver behavior by design to create a safe walking and cycling environment*

For a transit system to provide a real alternative to driving and realize the full range of potential benefits, the system must be supported by development designed and built with the needs of pedestrians and cyclists in mind. The connection with these non-motorized modes of travel greatly increases the benefits from transit to our physical health, our air quality, our travel cost savings and our community cohesion. According to transportation researcher Robert Cervero, PhD, "Transit-oriented development is synonymous with pedestrian-oriented development" (May 2007 lecture at the Progress Energy Center, Raleigh).

for our diverse region, and focus transit investments in locations that will maximize ridership and enhance long-term economic development opportunities.

Transit Technologies

A transit technology is a combination of a particular type of transit vehicle combined with infrastructure and facilities on which it operates. Specific technologies may require infrastructure or operations strategies related in order to achieve some service concepts more efficiently, such as infrastructure to separate the transit vehicles from regular vehicle traffic. Investments in a given transit technology also can provide service for more than one service concept. Most transit technologies can be operated in different configurations. The technologies can be combined with infrastructure and operating strategies in various ways. Regulatory requirements related to safety and shared facilities define some aspects of how and where technologies can operate. The STAC considered the following transit technologies:

- ***Conventional Express Bus:*** Operates in traffic on highways and freeways; make fewer stops so offer faster trips than local buses. Can use standard buses or articulated double buses depending on passenger volumes.

- ***Low-Level Bus Priority Strategies:*** Combines any type of bus with limited roadway improvements to enhance travel time and reliability through congested areas. Low-level bus strategies are generally "spot improvements" such as using dedicated bus-on-shoulder lanes for short distances at traffic "chokepoints" or under especially congested conditions, or giving buses signal priority at intersections.

What's Curb-Guided BRT?

The STAC investigated curb-guided bus technology for several corridors. Curb-guided bus rapid transit (CGBRT) uses horizontally-oriented guidewheels mounted under buses that fit on a concrete curb, and operates in a designated busway. The guidewheels help reduce oscillation and eliminates driver steering error, resulting in a smoother ride than regular buses and reducing the amount of right of way needed for the narrower busways. Guided buses can also negotiate tighter turns at higher speeds than non-guided buses.

Because guidewheels are retractable, buses can exit the busways and operate on regular streets. This allows a CGBRT system to be constructed incrementally over time, linking portions of busway with regular bus routes as right of way and funding become available.

Most existing CGBRT facilities are relatively short in length, and are combined with other bus strategies.

- ***High-Level Bus Priority Strategies:*** Combines any type of bus with roadway improvements or other investments that give buses special lanes or priority over regular traffic for greater distances, such as allowing buses to operate in carpool lanes.

- ***Bus Rapid Transit (BRT):*** Buses operating in a dedicated right of way, fully separated from traffic. Can use any regular bus transit vehicle, or vehicles equipped with guidewheels to follow a concrete curb in the busway (known as Curb Guided Bus Rapid Transit or CGBRT).

Current Transit Service in the Triangle

The Triangle region currently has multiple transit providers operating a range of services:

- *Regional: Triangle Transit*
- *Municipal: Cary Transit (C-Tran), Capital Area Transit (CAT), Chapel Hill Transit (also serves UNC and Carrboro), Durham Area Transit (DATA)*
- *University: Duke University Transit and NCSU's Wolfline*

Durham, Orange and Wake counties each operate community transportation systems, which provide transportation for human services clients and people living outside urbanized areas

In 2005, CAT, DATA, Chapel Hill Transit and Triangle Transit combined to provide over 14.4 million passenger trips, carrying Triangle residents over 53.3 million passenger miles, which is the equivalent of over 112 trips from Earth to the moon and back. These figures represent a 27% increase in passenger trips and a 56% increase in passenger miles over the year 2000.

Rail transit in our region is currently provided by Amtrak which operates intercity rail service within North Carolina and beyond. There are Amtrak stations open 365 days per year in Cary, Durham and Raleigh. In 2007, 181,379 passengers boarded Amtrak trains at these three Triangle stations. Durham is served by four trains each day, including service to Charlotte, Washington DC and New York. Cary and Raleigh are served by the same trains as Durham, as well as two more trains connecting to Columbia, SC, Savannah, GA, Orlando, FL and Miami, FL. In 2006, two North Carolina trains, the Piedmont and the Carolinian, were among national leaders in train ridership growth, with 25% and 17% increases in the number of passengers, respectively.

Sources: National Transit Database, NASA

- ***Diesel Multiple Unit (DMU) Rail:*** Self-propelled, diesel-powered passenger rail cars that can be driven from either end. DMU trains can be adjusted to changes in passenger volumes by increasing or reducing the number of rail cars in a train. DMUs operate completely separated from regular vehicle traffic in rail corridors that may also be used by freight trains. High cruising speeds, with relatively slow acceleration and deceleration in and out of stations make DMUs more suitable for longer trips where most stations are spaced over a mile apart.

- ***Light Rail Transit (LRT):*** Electrically powered trains that can operate on their own tracks or tracks shared with freight or intercity rail operations. Nimble LRT vehicles can navigate tight turns and accelerate and decelerate quickly to efficiently serve frequent stops and corridors with tight rights of way. Trains can adjust to changes in passenger volumes by increasing or reducing the number of rail cars. LRT can operate alongside regular vehicle traffic in a dedicated lane.

- ***Commuter Rail:*** Large, self-propelled locomotives that can reach high cruising speeds, but accelerate and decelerate slowly. Passenger cars can be single or double decked.

- ***Modern Streetcar:*** Relatively short vehicles that can operate on streets either in their own lanes or in mixed traffic. Electric-powered, with power delivered by overhead (catenary) wires.

For more details on these technologies, including typical costs, see Appendix E.

It is important to understand that different transit technologies vary in the proportion of costs required in two categories of costs: capital costs and operations and maintenance costs. Understanding these differences helps explain some of the cost trade-offs among the technologies and service concepts.

Capital investments include:
- Vehicles, including replacement vehicles as the fleet ages
- Real estate for right of way to operate transit routes and for maintenance facilities
- Facilities for vehicle operation including tracks, special lanes and over- or underpasses
- Shelters, stations, maintenance garages and railyards
- Other equipment, such as signage, bicycle racks or systems to give passengers real-time information on when vehicles will arrive.

Operations and maintenance costs include:
- Fuel and oil
- Labor, including drivers, maintenance staff, passenger information/service center staff
- Vehicle parts and tires
- Insurance
- Ongoing planning for expansion and service changes to schedules and stops

All these cost categories differ by technology and service concept. For example, although rail cars are more expensive than buses to purchase, they typically last 30 years while buses usually must be replaced every 12 years. This makes capital investment in rail transit front-loaded, while bus capital investments are spread over a longer time frame. Similarly, the benefits from different transit investments vary, with some types of benefits, especially those related to land use and economic development, delivered in the longer term.

Connection with Service Concepts

Because of the differences in how vehicles operate and where they can operate, certain technologies are better suited to certain service concepts. For example, long distance commuters are better served by commuter rail, DMU, high-level bus priority strategies (especially BRT), or express bus—technologies that operate at high speeds between widely spaced stops. Selecting between highway- and rail-based technologies for a particular corridor may be dependent on whether the highway facility has the appropriate level of capacity or right of way, whether sharing freight railroad tracks is feasible, or if there is room in an existing rail corridor to operate passenger trains, thus saving or reducing the cost of purchasing right of way. If the corridor has a major highway, a bus technology might be more appropriate, however operating buses in traffic on heavily congested highways is less attractive to riders because their travel time is not reduced. To make bus transit on highways competitive with auto travel, investments need to be made such as purchasing property for new rights of way for busways, widening existing highways to include new bus lanes, or reconfiguring existing lanes or shoulders for use by buses.

The volume of passengers served in a corridor clearly shapes the service concept, but also influences the selection of technology. For example, buses typically seat 30 passengers, and can accommodate up to an additional 20 standing passengers. When ridership exceeds this amount for a route, an articulated bus can be purchased and put into service, which can accommodate 60 seated passengers plus 50 standing passengers. Beyond this level of ridership, an additional bus must be deployed, thus doubling operating and labor costs. In short as bus ridership increases, the operating cost per passenger also increases. If a high-volume corridor is served by a rail technology, when ridership increases, the increase is handled by adding a rail car to a train that is still operated by one driver. Therefore, as rail ridership increases, the operating cost per passenger decreases. The long-term savings in operations and maintenance costs can offset some of the initial high capital investment needed for rail transit.

There are also safety regulations that govern what types of transit vehicles can be operated in corridors shared with either mixed traffic or freight rail operations. Federal regulations specify the amount of separation–distance between tracks and timing between vehicles–between passenger rail vehicles and freight rail vehicles. Careful consideration to roadway safety is also required when designing bus priority facilities to prevent conflicts and crashes with regular vehicular traffic.

In keeping with their goals for the region, the STAC felt it was important to select combinations of service concepts and transit technologies that would shape land use patterns. Experience in the US has shown that high-frequency rail transit can influence land markets, increasing opportunities for development that is oriented toward transit service both in its design and mix of uses. This relationship is attributed to the permanence of the rail corridor and the dependable, high frequency service which generates a consistent flow of people. Much the same as a freeway interchange signals a level of permanent, high-volume access for autos and trucks.

Although a fixed guideway can be built for either buses or trains, it is much more common for trains. While some US transit systems do include segments of fully separated busways, there are no fully separated BRT transit systems in this country.

Further there is no conclusive evidence of market forces responding to create transit-oriented development around the low- to medium-level BRT investments that do exist. There are, however, international examples of major BRT systems that have affected land prices and apartment rents in cities. The STAC's interest in recommending transit investments with a proven track record of attracting a broad cross-section of riders and inducing market responses from the development community was a major consideration in their recommendation for investment in rail transit in our high-volume corridors where there are development and redevelopment opportunities. Additionally there are limited opportunities to build fully separated busways along existing corridors in the Triangle region.

An understanding of the different service concepts and transit technologies provided a foundation of knowledge about transit that shaped the Regional Transit Vision Plan. The STAC built on this information, by aligning technical recommendations for corridors with their qualitative goals for the regional system. The complete set of recommendations is presented in Section 6.

Transfers

Many believe that requiring transit passengers to make a transfer from one vehicle to another will discourage people from using the system. Transfers can sometimes introduce a level of uncertainty into an overall transit trip, but the quality of the transfer experience greatly affects whether the transfer is perceived as a positive or a negative by the rider. A transfer with a long wait between transit vehicles, an uncomfortable waiting environment exposed to the weather, or a lack of customer information about when the next vehicle arrives can be a deterrent to using transit. A transfer at a location with comfortable seating out of the rain and sun, where vehicle arrivals are coordinated to minimize waiting, with real-time information signs tracking the arrival of the next bus or train, can provide a convenient connection to a destination. Even major transit systems that have been in place for decades require transfers, and making a transfer can sometimes shorten travel time, or provide a shorter walk at the end of a trip.

Here in the Triangle, one of our greatest strengths is the variety of places where people can live, work, learn and play. While getting to and from future rail transit stations should ideally involve walking or bicycling, many transit riders will, at least initially, have to be dropped off (kiss-and-ride) or drive themselves at one end of their transit trip. This will especially be the case for trips that begin and/or end in lower density areas. A reasonable goal in a region like the Triangle would be to have no more than 2 transfers for most riders. But ultimately, the most successful way to reduce transfers is to support the development of significant housing and employment near transit stations.

Transit Service to Airports

Although widely perceived to be the norm and necessary for generating overall transit system ridership, direct rail access to airports is relatively uncommon in US cities. In the US, only 15 airports have direct rail transit access. Dallas-Fort Worth; Harrisburg, PA; Phoenix; Seattle-Tacoma, and Washington Dulles airports anticipate replacing current shuttle bus or busway-to-rail connections with direct rail transit access within the next 9 years. Most of the remaining metropolitan airports have scheduled municipal/regional bus service which varies in terms of frequency, hours of operation and weekday versus weekend schedules.

While 11 of the 12 regions of comparable size to the Triangle have rail transit, among these regions only the airports serving Baltimore, Cleveland, Portland and St Louis can be directly accessed via rail. In most cases direct rail service to airports is added long after the basic framework of the regional system is in service.

There are several reasons for this. First, decisions about investments are based on the largest, consistent travel market: generally the volume of daily peak hour traffic, most of which is not destined for the airport. Volumes of trips to airports are much smaller and spread over the day so serving them with rail raises per passenger costs. Second, airports must manage and control access to their facilities. Therefore most airports prefer to have a connection from their facilities to the regional system rather than having the system run through their properties. The Raleigh-Durham Airport Authority is including a connection from their facilities out to any future regional transit route passing by their property, although the technology for this connection is not yet determined.

Unquestionably, high quality transit connections to the airport provide convenience for air travelers and a savings on parking costs. However, the benefits of these services must be balanced with the usually much higher trip demands elsewhere in a region.

Source: National Association of Railroad Passengers.

The best-functioning transit systems in the United States use a mixture of services, including light rail, commuter rail, subways, ferries and a wide variety of bus services integrated with bicycle and pedestrian facilities. A mix of services and technologies helps transit agencies respond to the specific transportation needs in individual corridors or neighborhoods. The maps and description in this section present the multi-modal components of the Regional Transit Vision Plan recommended for the Triangle region.

Map 1: Regional Transit Vision Plan
Map 1 shows the recommended Regional Transit Vision Plan (see page 8). This is the Special Transit Advisory Commission's (STAC's) long-term regional transit system, envisioned for the Triangle by the year 2035, the time horizon for the two Metropolitan Planning Organizations' (MPOs') Long Range Transportation Plans (LRTPs). It incorporates the best of previous plans and updated travel analysis work, combining new and more far-reaching transit services to outlying communities with investments in our urban areas to comprehensively serve the region. The Vision Plan includes investments in three major categories in order to serve our complex region:

Enhanced Region-wide Bus Network: Green lines. The vision is built on a solid foundation of expanded bus service throughout the region to connect communities and bring communities presently unserved by transit into a regional transit network. See discussion of Map 2 for more details on bus service recommendations.

- High frequency, express service between Raleigh-Durham International Airport (RDU) and downtown Durham, downtown Raleigh (including the Convention Center) and the Cary train station park and ride

This section includes the maps and descriptions of the recommended regional transit investments included in Regional Transit Vision Plan.

- Enhanced bus service in core areas to support the rail and circulator investments, including increased frequency of service on heavily traveled routes, and adding more weekend bus service
- Rush Hour Only bus service to outlying communities
- Bus services to be coordinated with well-located park-and-ride facilities for routes targeted for commuters
- Enhanced transit access for pedestrians and bicycles around park and ride lots and bus stops
- Improvements at bus stops including benches, shelters, sidewalks and real-time bus location information

Basis for Recommendations:
- Greatest potential for early delivery of improved transit service
- Increase the number of Triangle communities with transit service
- Cost-effective way to provide transit service to areas with lower residential and/or employment densities
- Bus service provides vital feeder service to rail transit stations
- Shows the results of investment in transit building confidence in the region's ability to build a complete regional system

Circulators: Orange shaded areas. A series of circulators are planned to provide connections within our major economic activity centers, strengthening these vibrant centers of our region. Circulator services are designed to serve short trips (1 to 2 miles or less) at high frequencies. The circulators are a key new ingredient that the Commission believes is

crucial to a successful transit future. Mapping the specific routes of these circulators will require additional planning and work with the local communities and transit agencies, so they are depicted as zones on the Vision Plan map.

- Circulator service connecting RDU and Research Triangle Park (RTP) is a high priority, frequently mentioned in public comments and by STAC members. Initially, this circulator is anticipated to be bus providing high frequency, curbside service to airport terminals. Ultimately this circulator could use a fixed guideway technology. Raleigh-Durham Airport Authority planning includes a connection with the regional transit system, which will need to be coordinated with regional connections at the Triangle Metro Center (TMC) in RTP.
- Additional circulators in the downtowns of Raleigh, Durham, Chapel Hill/Carrboro and Cary. Detailed planning should be carried out by the respective communities and the MPOs. Circulator routes should be routed to serve major employment centers, educational institutions, and civic and cultural activities.
- Circulators operate on a Full Service Schedule, so frequently that average wait times are no more than five minutes, which means passengers need not consult a schedule.
- The type of vehicle used for circulator services could be buses, modern street cars or trolleys. Local conditions and community considerations will help define specific technology.

Basis for Recommendation:
- Trips within our most intense activity areas are often short in distance
- Extends the reach and impact of the other regional transit investments
- Provides flexible travel options within major centers, for example serving lunchtime trips within our major employment centers
- Can effectively and conveniently serve major event destinations

Rail Investments: Blue lines. The regional system is anchored by rail service that serves and connects the region's principal centers of activity. Rail investments are recommended for corridors projected to have our heaviest trip volumes, and where there are promising opportunities to shape future land use. See discussion of Map 3 for more details on these investments.

- Diesel Multiple Unit (DMU) train service takes advantage of existing transportation corridors between Durham, RTP, Cary, downtown Raleigh and north Raleigh
- Light Rail Transit (LRT) train service between Chapel Hill/Carrboro and downtown Durham
- Rail transit will be provided on a Full Service Schedule

Basis for Recommendation:
- Rail technologies provide solid anchors needed to shape land use along these critical corridors
- High capacity corridors can be served more cost effectively in the long term by rail
- Combination of rail technologies to maximize the effectiveness of transit service in corridors with different kinds of trip patterns.

Map 2: Enhanced Region-wide Bus Network Service

This map shows the corridors for which bus service is recommended (see page 9). While the STAC's charge focused on major transit capital investments, the STAC members also felt strongly that local and regional bus service should be significantly expanded and

improved prior to the opening of any rail services. Overall, approximately 75% of the STAC recommendations for bus enhancements are regional in nature, and 25% are targeted for local bus routes. In the early years of the plan, bus service should be provided on the corridors slated to have rail transit service in the future. As rail services come on line, the buses on those same corridors can then be redeployed elsewhere in the region. See Appendix F for a table showing an example of how buses could be reassigned, effectively increasing the overall number of buses in service in the region.

The recommendations include services for the major corridors in the Vision Plan and additional services already identified by local transit agencies and communities. Local communities and transit providers will play a key role in locating and designing the local service enhancements.

Additional information about previous local bus planning efforts, including the Mayors' Bus Expansion Plan, a cooperative effort by several local communities and transit agencies, are provided in Appendix F. Recognizing that details of specific routes and schedules will need to be developed by local communities and local transit providers, the STAC recommends:

- High frequency, express service between Raleigh-Durham International Airport (RDU) and downtown Durham, downtown Raleigh (including the Convention Center) and the Cary train station park and ride.
- New, commuter express buses connecting outlying communities with major Triangle employment centers such as downtowns and universities operating on a Rush Hour Only schedule.
- Local demand-responsive services in smaller communities during the daytime.
- Increased frequencies on heavily-traveled, existing bus routes. Weekday-only services for these routes will be expanded to weekends, particularly Sundays, when service levels are particularly low at present.
- Buses should be rolled out in substantial numbers in the early years of the Vision Plan to build transit ridership and visibility across the region. The financial models demonstrate that the STAC recommendations for transit funding will cover capital and operating costs (including replacement buses) of 150 buses; as a reference point, Triangle Transit currently operates 52 buses during the peak commuting hours.
- Improvements to the quality of bus service. Many bus stops in the Triangle do not provide a quality waiting environment for customers. Additional benches, shelters, and sidewalks will make waiting for the bus more pleasant and comfortable. The STAC plan will also speed up the introduction of new vehicles and real-time bus location information for passengers.

Basis for Recommendations:

- Greatest potential for early delivery of improved transit service. While a new rail line may take several years to design, construct, and open, expanded bus operations can occur within just a few months of the approval of a new revenue source to fund expanded bus service.
- Increase the number of Triangle communities with transit service. Several outlying communities in the Triangle such as Holly Springs, Knightdale, Wendell, Fuquay-Varina Roxboro and Mebane do not currently have transit service. A regional transit plan should link these communities as soon as possible into the existing transit network.
- Cost-effective way to provide transit service to areas with lower residential

and/or employment densities
- Bus service provides vital feeder service to rail transit stations,
- Shows the results of investment in transit sooner rather than later. This builds confidence in the region's ability to build a complete regional system. As an example, when Charlotte passed a transit tax in 1998, voters very quickly saw the results as new buses were added throughout Mecklenburg County.

Map 3: Region-wide Rail Investments
This map depicts the rail investments recommended to connect the principal areas of activity in the region (see page 10). These investments connect the circulator services, and provide high quality reliable transit options for some of our most congested corridors. Rail investments are recommended for corridors that serve areas with existing and emerging transit friendly development patterns as well as areas that have the greatest potential to be developed or redeveloped in transit-oriented patterns. Two rail technologies are recommended because the specific corridors, travel markets and environs differ. The corridors are subject to different regulatory requirements; and they vary in their geometrics, availability of right of way, and anticipated distance between stops and stations (see Section 5 for additional detail on the different rail technologies).

The exact sequencing of rail projects is dependent on the length of time needed for right of way acquisition, environmental studies and approval, and the timing of revenue streams. Additionally, the sequencing of projects should consider how connectivity across the region can be promoted as well as support a strategy to pursue full federal funding participation for as many projects as possible.

As planning proceeds, these investments should be coordinated with the findings of the North Carolina Railroad Shared Corridor Track Expansion Study, an investigation of the feasibility, costs and operating standards for rush hour rail service on the Burlington to Goldsboro and Hillsborough to Chapel Hill/Carrboro corridors. Additional information on this study is available in Appendix D.

A segment-by-segment outline of the rail investments in the Vision Plan, from west to east, is presented below.

UNC Chapel Hill to Downtown Durham via Duke University Medical Center:
Aqua blue line.
- Light Rail Transit (LRT)
- Full Service Schedule

Basis for Recommendation:
- Highest projected trips per acre in the region with intense employment and economic activity at the ends of the corridor
- Expands travel capacity in the US 15-501 corridor which is congested and constrained from expansion
- Provides high frequency transit access between Chapel Hill and Durham
- Land use patterns along corridor require frequent, closely spaced stops that are best served by electric-powered LRT trains which accelerate quickly
- Connects residential, educational and major employment centers as well as other locations at which market opportunities have already begun to focus development which is transit oriented.
- Enable service to additional stops between the Duke University campus and downtown Durham, including expanding Duke student housing areas, which could not be served by the DMU route.
- Operating efficiency, including costs, improves as ridership increases because

adding train cars to accommodate additional riders reduces per-passenger operating costs
- High frequency rail service shown to support transit-oriented development

Duke University Medical Center to Triangle Metro Center: Dark blue line.
- Diesel Multiple Unit (DMU) trains
- Full Service Schedule

Basis for Recommendation:
- Shares stops (but not route) with LRT service between UNC Chapel Hill and Durham at Duke Medical Center, 9th Street and downtown Durham, in order to support different travel markets.
- Expands travel capacity in heavily-used corridors: NC 147, I-40 and US 70 corridors
- Provides high frequency transit access between Durham and RTP
- Supports RTP to RDU circulator
- Connects residential, educational and major employment centers as well as other locations at which market opportunities have already begun to focus development which is transit oriented.
- This corridor has opportunities for development and redevelopment in transit-friendly patterns, which high-frequency rail service has been shown to support
- Operating efficiency, including costs, improves as ridership increases because adding train cars to accommodate additional riders reduces per-passenger operating costs
- Takes advantage of an existing transportation corridor

Triangle Metro Center to NW Cary: Dark blue line.
- Diesel Multiple Unit (DMU) trains
- Full Service Schedule

Basis for Recommendation:
- Expands travel capacity in heavily-used corridor: NC 54 and Davis Drive
- Provides high frequency transit access between Raleigh, Cary, Morrisville and RTP
- Supports RTP to RDU circulator
- Connects residential, educational and major employment centers as well as other locations at which market opportunities have already begun to focus development which is transit oriented.
- Operating efficiency, including costs, improves as ridership increases because adding train cars to accommodate additional riders reduces per-passenger operating costs
- Takes advantage of an existing transportation corridor

NW Cary to Durant Road (just north of I-540) via Downtown Raleigh: Dark blue line.
- Diesel Multiple Unit (DMU) trains
- Full Service Schedule

Basis for Recommendation:
- Expands travel capacity in heavily congested corridors that have very limited options for expansion: US 1/Capital Blvd, NC 54 and I-40
- Connects residential, educational and major employment centers as well as other locations at which market opportunities have already begun to focus development which is transit oriented.
- Operating efficiency, including costs, improves as ridership increases because adding train cars to accommodate additional riders reduces per-passenger operating costs
- Takes advantage of existing transportation corridors
- Connects a major park and ride facility (NW Cary) that can serve outlying communities with the rail transit corridor.

Coordinating STAC Recommendations with Other Plans

These recommendations will also coordinate with many existing land use plans already in place in our region. Beginning in 1997, local governments in Durham, Orange and Wake counties began identifying locations within their communities that would support future growth at higher, transit-supportive densities. Based on previous studies, smaller Triangle communities such as Apex, Garner and Wake Forest adopted locations for future rail stations with nearby development planned as walkable, higher density and to include a mixture of uses under approval or construction. Chapel Hill, Cary, Durham and Raleigh have adopted transit-oriented development implementation tools and designated fixed guideway transit corridors along with specific station locations. They have also undertaken small area planning initiatives which define transit-oriented development around some of the future high frequency rail transit stations.

In August 2007, local government planning directors and staff participated in work sessions during which the STAC corridors within their respective jurisdictions were reviewed. Meeting participants discussed local land use, development patterns and market opportunities as well as potential regional transit investment scenarios. At the September 10, 2007, STAC meeting, several of these planning professionals described the recommendations for rail investments as being consistent with local governments' plans. This confirms that land use planning in the region is prepared to plan for major transit investment, and that the seeds have been planted for more transit-friendly development which will support those transit investments. Maintaining and developing the highest level of consistency between transit investments and land use plans represents an ongoing challenge, which must continue to be addressed as a major priority for local governments and the region's planners.

STAC members were also interested in how their recommendations might coordinate with other plans and initiatives for transportation options that might be extended to commuters coming into our region from communities such as Burlington, Hillsborough, Garner and Selma: all of which are along the North Carolina Railroad (NCRR) corridor. Some of these communities are very interested in commuter rail service, most notably Hillsborough, where a citizen group is actively lobbying for the re-establishment of a passenger stop in their town.

In October 2007, the NCRR announced the commencement of a Shared Track Expansion Study to determine track expansion feasibility, costs and standards for commuter (rush hour) rail service. In addition to communities along the NCRR between Burlington and Goldsboro, the study scope includes the University Railroad, a short rail corridor between Hillsborough and downtown Carrboro/Chapel Hill, currently used to deliver coal to the university power plant. The NCRR study is looking at the infrastructure improvements that would need to be made in order to support four trains during the AM and PM peak periods, plus one mid-day train, from Burlington to Goldsboro. The study does not identify an agency for operating the service. NCRR has indicated that the study is not intended to be a substitute for state, local or regional planning, such as the work that the STAC and the MPOs may undertake. It is meant to complement NCRR's planning efforts by assessing the feasibility and additional infrastructure required to operate rail transit within the freight rail corridor. Findings are anticipated to be released by summer 2008. (For more information on the NCRR study see Appendix D; for a map of the NCRR study corridor,

see page A-27 of the appendicies.)

The STAC recommendations will also need to be integrated and coordinated with the balance of the transportation projects and needs that the MPOs will include in their LRTPs. One important aspect will be demonstrating that the entire plan, including the Regional Transit Vision Plan, is financially feasible. There must be a reasonable source of funding available to implement each project in the LRTP. All of the projects included in the LRTP have a cost estimate that includes construction, operation and maintenance costs. The LRTP also includes an identification of revenue to pay for the proposed projects and there must be a reasonable expectation that these revenue sources will be realized. The LRTP can include new non-traditional revenue sources such as toll roads and additional fuel taxes. Major transit investments being considered for the 2035 LRTP will be evaluated for cost and a revenue source must be identified. Projects for which the MPOs cannot demonstrate available revenue can be included as "unfunded" projects, that is, tabled until the next planning update cycle. A feasible financial plan for the Regional Transit Vision Plan is outlined in Section 7, along with additional recommendations for implementation.

The Regional Transit Vision Plan represents the STAC recommendations based on current information and expectations. However, just as LRTPs are routinely updated, the Vision Plan will need to be revisited and updated. For example, a corridor for which express commuter bus service is recommended may in the future develop to the point where rail service will more effectively serve the travel needs. Rail corridors may need to be extended, or spur lines for rail transit may need to be added to the system to serve heavy demand just off the corridors included in the Vision Plan. The Triangle will continue to grow and change, and the Vision Plan will also need to grow and change to continue to guide transit investments in the region.

Drawing up a plan is only the first step toward having a regional transit system. Successfully implementing the plan will take a broad regional effort that addresses three significant challenges that the region will need to address in bold and creative ways in order to achieve success: funding, land use, and leadership and governance. Or, put another way: dollars, development and decision-making. The voters, business community, local and state elected officials, and transportation agencies and service providers need to understand the issues before us and stand ready to confront difficult choices as a region. The Special Transit Advisory Commission (STAC) recognizes the challenges to realizing the complete vision plan, yet believes the region cannot and must not wait to begin to build it. In fact delays on major construction projects are very costly: financial models show that for a $700 million project, inflation on construction materials adds $60 million to the cost for every year of delay.

Dollars

Currently, the Triangle region's transit services are supported by a combination of various types of funding including the general funds of local municipalities and counties, university student fees, state and federal program funds, state grants, farebox revenue and, for regional bus service, a $5 vehicle registration fee. These existing revenue streams generally cover current levels of transit service, although many local transit providers have substantial unfunded needs, and currently do not have a funding source to cover the expanded service that will be needed to keep pace with population growth.

In the Triangle, the only existing revenue stream currently dedicated to regional transit capital investments is a 5% tax on rental vehicles, which was implemented in 1995.

This section discusses the challenges of realizing the Regional Transit Vision Plan. It sets forth a strategy for implementation that focuses on developing new revenue sources, strengthening the connection between land use and transit and identifying areas where leadership will be needed.

It currently generates approximately $8 million per year which is not sufficient to fund major capital transit investments. Based on the magnitude of investments that will be needed to support the region's growth and economy, it became very clear during the STAC process that additional funding sources would have to be identified. Therefore, in addition to reasonably expected state and federal funding, the STAC recommends that the Metropolitan Planning Organizations (MPOs) pursue the following regional funding mechanisms:

- ½ cent sales tax dedicated to transit investments (5 cents for every $10)
- Increase the vehicle registration fee dedicated to transit by $10 (the current $5 vehicle registration fee for transit has remained unchanged since it was implemented in 1992)
- Continue all existing transit funding mechanisms

Financial models demonstrate that the revenues generated by these mechanisms are adequate to build the complete Regional Transit Vision Plan. The figures below show the projected revenues from each of the recommended mechanisms and cost estimates for each component of the recommended transit investments. If all assumptions in the financial model materialize, the difference between total revenues

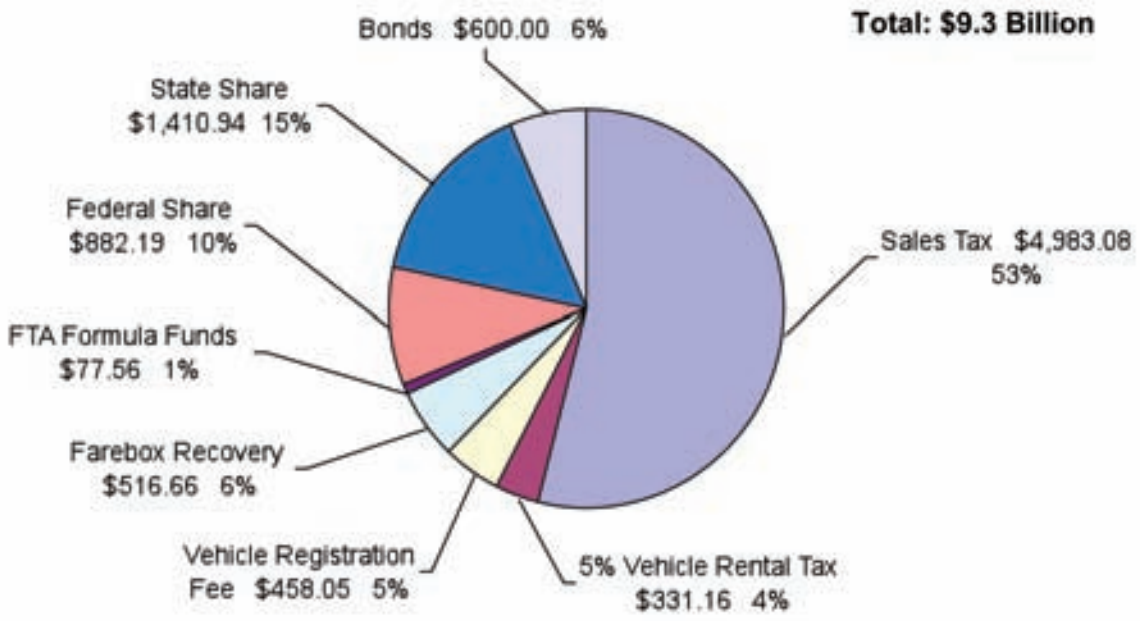
($9.3 Billion) and total expenditures ($8.2 Billion) may be programmed for other transit investments. See Appendix G for additional information and details on the financial model.

Experience has demonstrated that locally-generated revenue is a critical component for success. The local funding mechanisms listed above make major transit investments feasible. They also demonstrate to potential state and federal funding partners that the region is committed to building the system, enhancing opportunities to obtain outside funding.

Financing will also be required to cover the early costs of constructing the regional transit system. The initial estimate is that borrowing a minimum of $600 million will be required with debt service over 30 years (estimated total cost $800 million). This is another instance in which a robust local funding stream will enhance financing opportunities particularly related to securing very favorable bond ratings. Financing a portion of the plan will also allow the region to pursue construction projects sooner. This means that the region begins to realize the benefits of the system earlier.

Some argue that sales taxes are regressive and unfairly penalize lower income households. However, with implementation of enhanced region-wide bus service, these households will be among the first to realize the benefits from the Regional Transit Vision Plan. It is these lower income households who are most in need of transportation options and relief from the rapidly rising costs of auto dependency. From this perspective it is regressive not to provide these households with a high-quality regional transit system.

Assumed amount of revenues raised, by source, through the year 2035.
All amounts are inflated to Year of Expenditure. Interest on cash balances not included.
Source: Triangle Transit



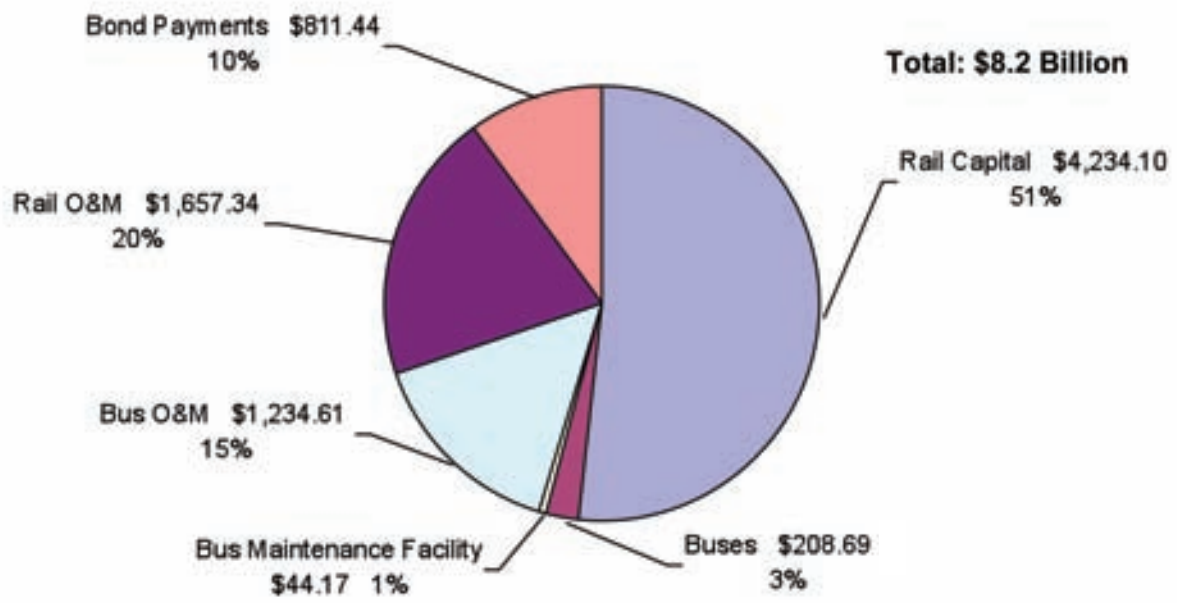
In addition to local and regional sources, the MPOs should vigorously pursue additional revenue from state and federal sources including:

- State funds for capital investments and for operations and maintenance
- Federal funds for capital investments
- State and federal formula funds, some of which are already available

Federal regulations require MPOs to update their Long Range Transportation Plans (LRTPs) every four years. Because LRTPs must be "fiscally constrained", sufficient funding to cover the projects within the Plan must be available or reasonably expected to become available within the time covered by the plan. Therefore, each of the funding sources recommended by the STAC will be carefully evaluated by the MPOs during the LRTP process to determine the likelihood of adoption by the region — from authorization by the legislature, to approval by voters and implementation by the counties. This is especially critical given our region's high-growth environment where other public investment needs may be in competition for the same potential revenues.

In addition to these funding strategies, local governments should consider using ad valorem tax mechanisms to generate funds for fixed guideway projects. Broadly defined, these mechanisms capture the increased tax revenue anticipated from higher property values related to the transit investment, and use that increased revenue to fund construction of transit infrastructure. One type of ad valorem revenue is the establishment of tax increment financing (TIF) districts. TIF districts capture the future increase revenue

Cost elements of Regional Transit Vision Plan, through the year 2035.
All amounts are inflated to Year of Expenditure. No data on current bus service included.
Source: Triangle Transit



from property tax in designated districts, such as around transit stations. A portion of that future increased tax revenue is dedicated to paying off the debt of constructing the transit project. TIF mechanisms are already authorized under North Carolina law. Another option is a special tax district around transit stations for a transit-oriented development project, also already authorized by state law. This can be used in conjunction with or as an alternative to TIFs. By increasing locally collected funds dedicated to transit, this approach could focus a greater share of regionally collected funds on local transit needs.

In North Carolina, the authority to propose local funding mechanisms resides with the state legislature, but much of the responsibility for decisions whether to establish various local funding mechanisms rests with local decision makers. Depending on local economic and political conditions, local governments may choose alternative funding sources from those specifically recommended by the STAC. Before considering alternatives, local decision makers should evaluate whether those alternatives will generate comparable amounts of revenue; under-funding the Regional Transit Vision Plan will mean lower quality service for residents and inefficiencies in operations, less likelihood of securing outside funding and favorable financing, and an inability to build a coherent system that will service current users well and attract new riders.

Decisions and Development

One of the challenges of implementing a regional plan is that, while North Carolina has regional bodies authorized to operate airports, manage water supply, develop and operate regional public transportation and other public infrastructure and resources, there are no provisions for a regional decision-making body with legally binding authority over regional transportation and land use. Currently each of the municipalities and counties within each MPO jurisdiction participates in transportation planning and decisions. The MPO Transportation Advisory Committee (TAC) meetings provide an opportunity for elected and appointed officials to discuss and approve the funding of transportation projects. The

The Charlotte Experience

In November 2007, Charlotte Area Transit System opened the LYNX Blue Line: a 9½ mile Light Rail Transit System (LRT) operating between I-485 at South Boulevard and Uptown Charlotte. Before LRT service began, $1.6B in residential and commercial investment along the corridor had emerged and property values increased 121% since 2000. The $463 M project was paid for with revenues from the ½ cent sales tax which was approved by over 53% of voters in Mecklenburg County in 1998 and now generates over $70 M per year. In November 2007, a referendum to repeal the tax, which has also been used to expand bus service, was held. Mecklenburg County voters voted by a 70% to 30% margin to retain the tax.

LYNX LRT daily ridership is averaging 12,000 trips, exceeding the 9,100 daily ridership forecast for the initial year of service. In addition to serving commuters, the LYNX LRT system is transporting thousands of fans to Bank of America Stadium and Time Warner Cable Arena, both of which are located in Uptown Charlotte, along with major hotels, restaurants, cultural and entertainment centers.

Triangle J Council of Governments also provides an opportunity for discussion and cooperation related to many regional resource and infrastructure issues including transportation and land use. Just as the Research Triangle Region has been a leader in North Carolina in shaping land use patterns to protect the major investments made in water supply infrastructure such as Falls Lake, Jordan Lake, Cane Creek, Lake Michie and the Little River Reservoir, so too we need bold leadership to shape land use patterns to shape investments in creating a new transit infrastructure for the region.

To implement a truly regional transit infrastructure plan the region needs to build on these cooperative efforts, and reshape our governance structures to better address issues that are increasingly regional in scale. Although it is beyond the scope of the STAC's work to propose sweeping changes to the governmental framework in our region, the STAC has identified opportunities for taking a regional approach to transit.

The STAC recognizes that the Triangle already has a regional transit agency: Triangle Transit, which can and does fulfill many of the roles needed to advance regional public transportation initiatives. However, to be able to implement the STAC's goals for transit in the region, some adjustments to its structure and responsibilities are needed. The STAC recommends this regional transit authority:

- Be governed by a board of elected officials, rather than unelected appointees, to promote greater accountability to voters and local communities
- Establish regional transit plans
- Determine transit investment priorities
- Approve funding and supporting efforts to seek approval from voters to establish new funding mechanisms.
- Oversee design, construction and operation of the regional transit system

In all these activities, the regional transit authority will need to work closely with the MPOs.

A high degree of coordination among the regional and local transit agencies will also be needed to build a well-coordinated region-wide system. An example of the specific ways that transit agencies can work together was the Triangle Region Transit Consolidation-Implementation Plan. This project was undertaken in 1995 when the mayors of Cary, Chapel Hill, Durham and Raleigh initiated a study to identify opportunities for a higher degree of coordination between regional and local transit agencies. The plan was completed in August 2003 and looked at the four municipal bus systems, the regional bus system, and the North Carolina State University's Wolfline. The plan included a timetable for consolidating services and functions, to the greatest extent possible, under a single regional system, by December 2007. After deliberating the plan, none of the municipalities adopted a resolution to implement the plan. Instead, a list of demonstration activities and tasks were agreed to in order to provide the most seamless public transportation service possible in the region, without merging staffs or consolidating operations. In September of 2005, the mayors of Durham, Raleigh, Chapel Hill and Cary and the Chair of the Triangle Transit Board of Trustees signed a Memorandum of Understanding to implement those demonstration activities, some of which have been completed, including:

- Launching the GoTriangle brand for the family of transit and ridesharing services in the region, with a joint information center and Web site
- Establishing a complete, regional fare structure
- Regional bus stop signs and bus-stop amenities including shelters, benches, etc.
- Joint procurement of equipment
- Joint farebox maintenance shop and paint shop
- Developed the Mayors' Regional Bus Expansion Plan (more information on this plan is included in Appendix F)

The STAC recommends that the complete list of activities be pursued, and that the participating agencies identify additional joint activities to make it easier for current and potential transit users to understand, access and use the various local bus services. By including the routes and service enhancements that were identified by the local transit agencies in the Mayors' Regional Bus Expansion Plan, the STAC supports this plan and provides a framework for funding it. The STAC also recommends that Wolfline and Duke University Transit identify strategies that would enhance the integration of student transit service with local transit service.

At the MPO level, there are a number of ways to address governance and transportation decision making. Some feel strongly that the MPOs should be merged. If our region had one MPO, some concurrent efforts could be eliminated and perhaps planning and decision-making might be streamlined. However, merging the MPOs would not eliminate the barriers to cooperation and coordination in transportation decision making. There are more fundamental issues to tackle such as the differences among communities in terms of land use and historical patterns of planning and development supportive of transit; a willingness or unwillingness to pay

Express Service to Wake Forest: An Example of a Town-Transit Partnership

The proposal to initiate regional bus service between Raleigh and Wake Forest provides and example of how transit agencies and local governments can share the cost of expanded service.

In response to increasing congestion faced by the rising number of commuters between Wake Forest and Downtown Raleigh, a cost sharing proposal that would cover the $375,000 required to fund express bus service is being considered. Funding is anticipated to be provided by Triangle Transit, the City of Raleigh, a federal Jobs Access Reverse Commute (JARC) grant program and through farebox revenues. To complement this service the Town of Wake Forest is also considering local service that would be linked to the express bus service. The Town is considering providing the matching funds for this $170,000 project. Additional funding is being sought through the federal New Freedom Grant program. The proposal is now under consideration by the local government decision-making bodies.

for public services through taxes; differing levels of need for different types of transportation projects and competition for transportation dollars. Still the Triangle must address its transportation as a region, with transportation and land use issues that require working at the regional level, not just at the MPO level. The MPOs' efforts to increasingly integrate and coordinate their plans and planning processes are evidenced by the creation of the STAC, but opportunities for further collaboration remain.

The STAC process has advanced this coordination by providing a single Regional Transit Vision Plan for both MPOs. Just as the STAC was a truly regional body, with members from across the Triangle, the staff from the various sponsoring agencies that provided the analysis, presentations, maps and documents for the STAC has become a regional working group focused on transit issues. The vigor and breadth of knowledge in this working group should be harnessed to continue to move the Regional Transit Vision Plan forward through implementation. Therefore the STAC recommends the two MPOs evaluate the potential for deepening their cooperative relationship by merging or co-locating technical and administrative staff. This could enhance regional information sharing, technical analyses and decision making. This may, in the longer term, move the region towards having a single MPO as the region's transportation planning and implementation needs change over time. The STAC challenges the two MPOs to seek out greater opportunities for synergy and collaboration, and to consider adopting a new institutional framework that will support a more coherent strategy for resolving regional transportation issues.

Beyond the regional transit authority, transit agencies and the MPOs, there are a number of other organizations and agencies whose jurisdiction, responsibilities and / or operations will influence the successful implementation of the Regional Transit Vision Plan. These interested parties and key interface issues include:

- ***Research Triangle Foundation (www.rtp.org):*** Implementation of the Foundation's 2020 goal to lead RTP and the Triangle region to become the world's leading regional center of innovation, technology commercialization and quality job creation. Strengthening physical connections between RTP and RDU

- ***Raleigh-Durham Airport Authority (www.rdu.com):*** Phased implementation of the RDU Master Plan which includes terminal area and landside development, consolidation of rental car operations and an on-airport automated people mover. Expanding public transit access to include an airport rail link

- ***CSX (www.csx.com) and Norfolk Southern Railroads (www.nscorp.com):*** Operation of freight and Amtrak passenger rail service on the NCRR and CSX rail corridor. Collaboration on the design and implementation of rail transit operations within railroad corridors.

- ***North Carolina Railroad (NCRR) (www.ncrr.com):*** Completion of the Shared Corridor Track Expansion Study which is being undertaken by NCRR to determine track expansion feasibility, costs and standards for commuter (rush hour) rail service. Collaboration on the design and implementation of rail transit operations within railroad corridors.

- ***North Carolina Department of Transportation (www.ncdot.org):*** Collaboration with transit and freight

operators and with the MPOs on the design and implementation of transportation projects in the region. Assistance in the identification and acquisition of funding for transportation improvements.

- ***North Carolina Turnpike Authority (www.ncturnpike.org):*** Facilitation of transit access on turnpike facilities.

The coordinated efforts of the region's major employers, universities and other institutions; business, environmental and community interest groups will be equally essential for the success of regional transit.

Building a system that meets the STAC's goals for regional transit, which include shaping land use will also require addressing governance and decision making. Changing our land use patterns to be more transit-oriented is a daunting challenge, not because there is opposition to creating these kinds of places, but because our land use decision making and decision making related to major transit investments occur in such different settings, with different goals and objectives and unfold on different time scales. Reconciling major transit investments with local land use planning will be a crucial on-going requirement. Other regions have developed mechanisms that provide incentives for communities to plan for transit-oriented development and consequences for those that do not. They facilitate partnering with developers who build transit oriented developments, and encourage major employers to locate along major transit corridors.

In order to build momentum for the Vision Plan, the STAC proposes the development of an incentive plan for local governments. This plan would provide guidance and motivation for local governments who want to enhance transit service for their communities. Incentives should clearly tie regional transit service with local governmental commitment to transit-oriented development and providing infrastructure for transit stations and stops. The incentive plan should:

- Encourage communities to be proactive in planning and building in a way that will support transit operations and build ridership
- Encourage the consistent application of transit-oriented land use policies already in place
- Promote local government involvement in building and maintaining park and ride lots and other transit infrastructure
- Revising zoning ordinances to promote denser, mixed-use development along corridors and at transit stops and stations
- Planning and building better infrastructure for bicycle and pedestrian access to transit facilities

Implementing the Regional Transit Vision Plan will require leadership at all levels of government. Local, county and state governments need to recognize and promote the importance and benefits of committing to major investments in transit, including a commitment to funding, at the regional level. Leadership among citizens who recognize the value of having a high quality, regional system is also needed. Such leaders should be encouraged to reach out to their co-workers, neighbors, community groups, planning boards and local governments to explain the benefits and value of a regional transit system. Community leaders, including those who have served on the STAC, can play an important role in educating the public and decision makers and by participating in the LRTP process.

The Future of the STAC

The STAC recognizes the delivery of the final report does not complete their effort. As the plan moves toward implementation, members of the STAC are in an excellent position to become advocates for transit and for the Regional Transit Vision Plan. STAC members can continue to serve an advisory function to local governments, the MPOs and the sponsoring organizations. Therefore the STAC welcomes the opportunity to communicate the importance and urgency of investing in transit to the voters and decision makers in our region, especially at the public outreach events during the LRTP process. STAC members are committed to continuing to serve the region as "transit ambassadors", reaching out to the public, community organizations, local government bodies and the media. The STAC intends to organize a "speakers' bureau" to accomplish this.

In turn, the STAC strongly believes that the MPOs should accept all their recommendations and integrate them into their upcoming LRTP process. The STAC recognizes that Transportation Advisory Committees of the DCHC MPO and the Capital Area MPO have a critical role in implementing the STAC recommendations. As the governing bodies that develop and approve the LRTPs and that approve transportation funding levels for projects in the Triangle, the STAC's recommendations for transit must be approved by the TACs in order to be implemented. The STAC requests that their recommendations be given full and fair consideration, keeping in mind the importance of making decisions that move the region closer to attaining the goals for the Regional Transit Vision Plan.

The STAC also recognizes that, over time, the Vision Plan will no doubt need to be revised to reflect changing conditions in the region. STAC members could play a valuable role in updating the plan while maintaining continuity of the ideas and goals that underlie the recommendations in this report.

The STAC also charges the MPOs to take the lead in developing a plan for fiscal equity that reflects local government needs and realities. Because the taxing authority resides with local governments, there will be calls for distributing projects according to a strict formula that equates the amount of transit investments with the amount of revenue raised in each county. This approach will lead to a fragmented, less attractive and less cost-effective system. Rather than agreeing to a strict formula, the STAC recommends the MPOs first consider the goals for the system, recognizing that the benefits will be regional in nature and are not defined by county boundaries any more than our economy and travel patterns stop at our county lines.

The STAC anticipates that local government officials will recognize that the Regional Transit Vision Plan will enhance the opportunities and quality of life for all residents. Local governments should recognize that providing transit is part of their public service responsibility, similar to police and fire protection. And it is important to emphasize that although the Regional Transit Vision Plan includes support for local bus routes, local responsibility for funding these services and systems will continue, especially to keep service levels proportionate to the needs of our growing population. By fully supporting the plan through active involvement in implementation, local governments can play a role in keeping our economy vibrant and promoting higher quality of life for all residents.

The Regional Transit Vision Plan is ambitious, and although the entire plan may not be built until 2035, it can be built. The STAC exhorts the region to take a long-range, regional perspective and seize the opportunity to fully implement this "game-changing investment" in our future.

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