swas *SOUTHWEST AREA STUDY*

Connecting people with places through quality transportation choices

acknowledgements

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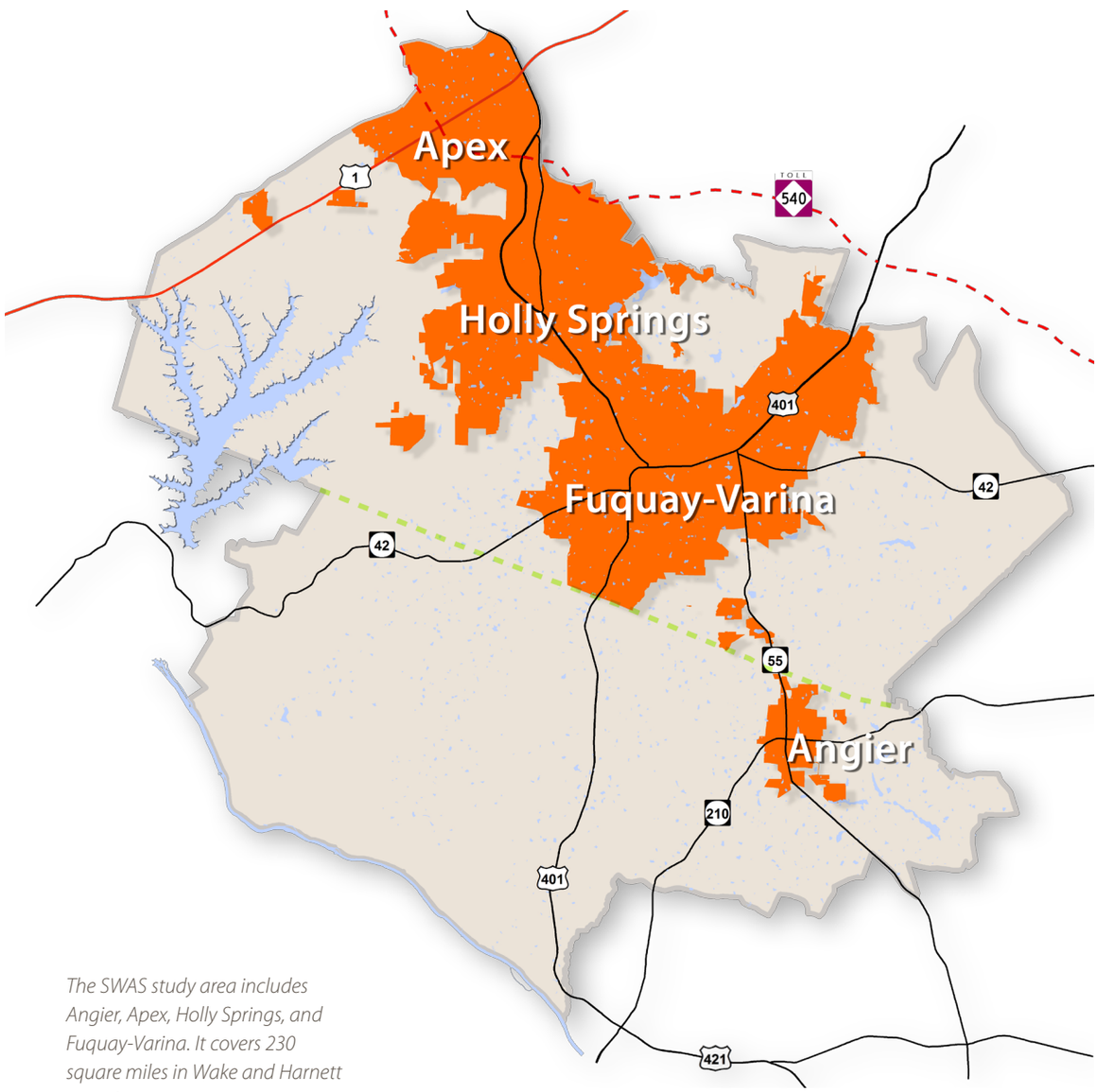
In addition to the participants listed here, there have been additional municipal staff, related organizations, and involved citizens who were very engaged throughout the development of the Southwest Area Study. Although they are greater in number than can be listed here, their participation was vital to the success of this plan.

Preface

The Southwest Area Study (SWAS) was initiated by the North Carolina Capital Area MPO (NC CAMPO) to create a comprehensive transportation strategy for 230 square miles in Wake and Harnett counties, including the towns of Angier, Apex, Fuquay-Varina, and Holly Springs. Young families and professionals populate the study area, and regional employers surround it. The dependence of local commuters on regional routes such as NC 55, US 401, NC 42, and NC 210, coupled with potential demand for increased development, has resulted in a conflict between current development, existing neighborhoods, and transportation interests. In response, to these changing circumstances CAMPO commissioned this study to identify a sustainable transportation strategy for the area. The study process embraced an integrated approach that considered land use, development, environment, and transportation simultaneously. The philosophy and approach for the plan remained simple – connect people and places through quality choices.

Over the last decade (2000- 2010), North Carolina has seen an 18% increase in population. Compare this percentage growth to that of the towns located within the study area; Holly Springs, Fuquay-Varina, and Apex have all grown by over 85% in the past decade, and Angier has grown by 27%. These staggering increases in population have continued to stress an already overburdened transportation system. One of the primary contributors to this problem is the disconnect between housing

and employment — 22% of work trips originating in Harnett County are destined for Wake County and Research Triangle Park (RTP), while only 2.5% of workers commute from Wake to Harnett County. Local commuters depend on regional routes such as NC 55, US 401, NC 42, and NC 210 which also draw new development and more regional commuters. The demands on the system continue to increase, and a fractured approach to planning is not likely to yield favorable outcomes. Therefore a comprehensive and collaborative approach was required.



The SWAS study area includes Angier, Apex, Holly Springs, and Fuquay-Varina. It covers 230 square miles in Wake and Harnett counties.

*"The Research Triangle Park (RTP) and the I-40 corridor are **magnets** for jobs and economic activity."*

Demographics

The demographic characteristics have and will continue to influence the pace of development and the corresponding transportation demands in the study area. Percentage of family households, age structure, and median household income are typically good predictors of travel behavior. The US census defines family households as having two or more persons related by blood or marriage living together. These households are usually larger, have higher incomes, and contain most of the children who live in a community. They tend to generate more demand on the transportation system—in each of the communities within the study area, the percentage of family households is well over 50%. In addition, these communities favor a younger demographic with over 20% of the individuals in each community falling between the ages of 18-34 and almost 30% or more of their residents falling under the age of 18. Families in the study area generally have larger household incomes—this trend is certainly true within the study area, where the smallest discrepancy in income between families and non-families is $15,000 in Angier. Another contributing factor to demand on the transportation system is the employed work force — in the study area the employed work force is substantial and must travel some distance to their jobs.

The industry mix of the workforce, often created by age and education, influences the distribution of commute distances. The communities oriented more toward high-tech manufacturing, research, and professional/technical services have a greater likelihood of commuters traveling to the Research Triangle Park. Jobs in other industry sectors are likely to be more widely distributed across the region.

Regional Influences

Although closely located to both the Raleigh-Cary and Durham-Chapel Hill metropolitan statistical areas, the SWAS study area's primary economic center is Wake County. 63% of all SWAS residents work in Wake County. Public facilities have generally located near major residential areas, but several specific drivers of development have influenced the study area. The Research Triangle Park (RTP) and the I-40 corridor are magnets for jobs and economic activity. RTP is the largest research park in the United States and home to more than 170 companies, employing 42,000 high-tech workers in more than 22.5 million square feet of developed building space. The adjacent area along I-40 has grown in tandem with RTP, itself hosting a sizable number of jobs and commercial/industrial building space. As a magnet for jobs and economic activity, the RTP/I-40 Corridor has exerts a significant influence over development patterns in the Raleigh-Durham region—communities closer to RTP and I-40 have larger populations, higher levels of income and educational attainment, and have grown faster.

Other development drivers include downtown Raleigh and Fort Bragg. Downtown Raleigh is the largest anchor point in the Triangle, and a key destination for many living in the southwest area. Each day, more than 40,000 people work in the downtown Raleigh area. Downtown contains several large employers, a healthy mix of smaller businesses, a large body of government workers associated with both state and local services, and several universities including NC State University. The Fort Bragg Military Base and Pope Air Force Base also have had a regional presence since they were activated in 1942. The influence of the military community is expected to grow over the next several years as the Army continues to implement its base realignment goals. Over 40,000 military and civilian personnel are planned to relocate to Fort Bragg from Fort McPherson in Georgia. Although Fort Bragg is located outside of the study area, impacts will likely be felt as part of the military's growth.

In addition to existing development drivers, Apex approved a planned unit development, Veridea, in 2007. Veridea is envisioned as the next version of the Research Triangle Park, and preliminary designs promise 10 million square feet of office development, 3.5 million square feet of mixed-use retail and commercial space, 2 million square feet of high-tech manufacturing, and 8,000 residential units covering 1,000 acres. This mixed-use urban community will also be designed to accommodate the most technologically advanced aspects of sustainable living and to promote interconnectedness between the development and other parts of the Triangle.

Housing

Housing prices in the Raleigh/Durham region have steadily increased over the past 20 years, and, although these price increases were stalled by the economic recession, they are expected to return to pre-2008 prices. The median sales price of homes for the study area is in the top tier within Wake County and single-family detached homes are the predominant residential product type in the study area. New construction, formerly concentrated in Apex, is now focused on the Holly Springs and Fuquay-Varina areas, where the average value of new homes increased steadily from the mid 2000s through 2010. Although the single family

housing market remains strong, especially when compared to the national market, multifamily housing stock in the study area is relatively small. Apex has added a significant amount over the past ten years (outside of the study area), and Fuquay-Varina has a significant existing stock that is primarily rental. Holly Springs and the Harnett County communities have the smallest inventories, although Holly Springs is beginning to see increased development activity in this product type.

Non-Residential Development

Retail development has followed similar trends and is located primarily in Apex and Fuquay-Varina. Each of these locations has more than twice the building space of Holly Springs. The vacancy rate in the study area's relevant submarket is one of the healthiest. Retail growth did not begin in earnest until the mid-2000s and retail space per capita remains low, suggesting room for retail growth and expansion to serve the current population of the study area. The opportunity for office space development within the study area is more limited than retail space because RTP and Cary are the leading regional office submarkets and are in close proximity to the study area. Existing office space in the study is primarily small professional and medical space filled by local serving businesses. The office-using employment base in the study area is small.

At the regional level, industrial space is highly concentrated in the RTP/I-40 Corridor and a few other submarkets. Although the study area has significant stock of industrial space, especially in Fuquay-Varina, it will not compete with RTP. Like office development, higher quality buildings and locations continue to perform well, and healthcare is the predominant sector using industrial space locally, as seen by the construction of the Novartis vaccine plant, built in Holly Springs in 2008. While industrial jobs employ a significant amount of persons in the study area, the industrial employment trend does not appear to be expanding.

Natural Environment

The natural environment has contributed to the location and pace of growth within the study area. The Shearon Harris Reservoir and Jordan Lake are physical barriers to development. The Progress Energy nuclear plant and utility-owned land places additional restrictions on growth around the reservoir. The presence of these areas has pushed growth towards the southeast, where developable land and better accessibility have been available. Generally, the preservation of sensitive areas can be categorized into three main land conservation priorities: working lands, environmental quality, and habitat protection. Working lands include viable agricultural areas, forest tracts, and prime farmland. Lands conserved to preserve environmental quality are characterized by major water sources, susceptibility to erosion, and steep slopes (greater than 20%). Habitat protection lands are those identified by a high level of biodiversity and important wildlife habitat. Recognizing and conserving these lands is particularly important in the southern and western areas where a significant portion of the environmentally sensitive areas tend to exist.

As new roadways and connections are discussed in these areas, stakeholders should be mindful of development implications.

Transportation

Development in the southwest area is suburban in nature and the transportation system is generally automobile-based with large lots, increased parking demand, and lower building densities. Suburban roadway networks are not designed within a grid network and 76% of workers commute alone in the study area. The primary corridors for automobile travel include NC 55 and US 401. NC 55, primarily a north-south route, connects all four municipalities in the southwest area and provides a direct link to RTP and US 1 (and downtown Raleigh). US 401 provides a critical northeasterly route to downtown Raleigh from Fuquay-Varina and is a major connector serving commuters between Fayetteville and Raleigh. Other key routes in the area include Holly Springs Road, Sunset Lake Road, NC 42, and NC 210.

The highest traffic volumes in the southwest area occur on US 401 between Fuquay-Varina and Raleigh with volumes ranging between 20,000 and 30,000 vehicles per day. South of Fuquay-Varina, volumes on US 401 are still relatively high, ranging from 10,000 to 20,000 vehicles per day gradually decreasing as the road continues south. US 55 carries the second highest volumes in the study area with 10,000 to 20,000 vehicles per day between Fuquay-Varina and Holly Springs. Generally, the volumes on NC 55 increase going northward as the road approaches RTP. Another significant commuter route within the study area is along Holly Springs Road, which carries more than 14,000 vehicles per day in some sections.

preface

For most people who live and work in the southwest area, mobility means traveling in an automobile. This is no different than most other parts of the country where nationally over 76% of workers commute by driving alone. The Southwest Area Study addressed roadway and roadway safety improvements so automobiles can continue to support the regional economy; however it also analyzed access to other modes of transportation to meet the increased demand for transportation choices. This demand has been prompted by worsening congestion as well as increased concerns over rising gas prices, public health, air quality, and climate change. Although each of these concerns is unique and viewed differently among residents, each also points to a need for greater access to more transportation choices.

Outreach & Guiding Principles

The development of a successful, coordinated strategy required the participation of multiple agencies, and representatives from each of the area's jurisdictions as well as input from the public. A comprehensive outreach strategy was used to ensure adequate participation occurred to exceed federally required Title VI requirements. The strategy included the formation of two oversight committees: a Core Technical Team and the Project Oversight Committee. Each of these is generally described below:

The Core Technical Team (CTT) was established to help guide the development of project goals, and to validate recommendations during the planning process, in an advisory role. The CTT included municipal and agency representatives at the state, regional, and local levels who represented a broad cross-section of the regional community. They generally met on a monthly basis throughout the process.

Participants engaged in the mobility "chip game" as part of the SWAS public workshops. The mobility chip game allowed the public to understand the trade-offs between different transportation investments. This workshop was held on May 5th, 2011 and was part of a series of events held throughout the region.

The study Oversight Committee (OC) consisted of approximately twenty-five (25) members representing study area elected officials, citizens, and stakeholder groups. This group generally met quarterly but also played a role in the identification of Guiding Principles and the selection of a preferred growth strategy for the area. The membership of these committees can be found in the Acknowledgements section of this report.

In addition to these committees a series of indirect outreach initiatives was used including a project website, social media (Facebook), community flyers and newsletters, and media press releases. These initiatives enabled easy public access to the study's timeline and schedule and identified participation opportunities for the public. A project questionnaire was administered at all public outreach events and was accessible via the internet and project website. A total of 110 questionnaires were completed during the process. The results of the questionnaire were shared during outreach activities and presented to the CTT and OC prior to the creation of the Guiding Principles.

A series of active outreach methods was also used throughout the process. These methods included stakeholder interviews, workshops, community specific work sessions and project symposiums. A brief description of these events is provided below.

Project Leadership Symposium — April 13, 2011

A Leadership Symposium was held at the Fuquay-Varina Community Center to engage community leaders in a discussion on the importance of collaborative planning for the study area. This event was structured around a series of five themes: Livability, Transportation Mobility, Greenprint, Economic Vitality, and Regional Collaboration. Southwest area stakeholders helped generate objectives for these themes.

Public Workshops — May 24-26, 2011

To secure community and stakeholder input, a series of three public workshops was held in Angier, Fuquay-Varina, and Holly Springs from May 24-26. During the workshops attendees broke into teams for an interactive planning activity—the mobility chip game—that challenged them to create a multimodal transportation strategy for their community. Each team received a transportation budget and a packet of chips representing different transportation investments. Team members collaborated, debated and even traded some chips to create a plan that best represented their vision. The project team used this information to better understand community priorities.

Strategic Corridor/Concept Design Work Session & Public Open Houses — July 26 & 29, 2011

The Southwest Area Study Team hosted a Project Work Session in conjunction with a series of Public Open Houses at three locations in the study area. Interested citizens and local staff attended these events to get an update on the study's progress, provide input on critical transportation needs in the study area, and discuss ongoing transportation issues. Sessions and Open Houses were held in Angier, Fuquay-Varina, and Holly Springs.

Project Leadership Symposium #2 — September 28, 2011

This Leadership Symposium was the second installment of stakeholder outreach and provided an opportunity to integrate the thoughts and opinions of stakeholders into the planning process. During the second symposium, attendees were able to see how their input from the first session influenced the project's Guiding Principles. Attendees also played a role in the creation and evaluation of preferred growth scenarios for the region. Real-time push button voting was used during the session so that participants could see how their individual preferences weighed against the entirety of the group. Input gathered at the symposium was used to develop a sustainable transportation plan for the southwestern Wake County and northern Harnett County areas.

Public Open Houses — April 17, 19, 25, 2012

As a follow-up to the Mobility Workshops and Project Symposiums in 2011, the Southwest Area Study Team hosted a series of public open houses. Interested citizens who attended these open houses were shown an overview of the draft recommendations and concept designs for the area. The events were held in the Towns of Holly Springs, Fuquay-Varina, and Angier.

A summary of outreach events and materials can be found on the project website: *www.southwestareastudy.com*.

Guiding Principles

Given the diverse study area geography and the need to balance competing interests, cooperation among plan participants was required at several stages in the outreach process to draft the Guiding Principles. These principles were crafted after numerous outreach activities and became the foundation for evaluating future growth scenarios. The Guiding Principles represented the planning themes which plan objectives were organized around. Ultimately, these principles were used to establish recommendations for roadway projects, bicycle and pedestrian strategies, public transportation strategies, corridor improvements, system regional connectivity and ITS integration, and other policy and land use considerations. These principles are listed below:

Livability - protecting community character while balancing mobility needs and accommodating future growth

Mobility - improving transportation mobility with coordinated roadway, bicycle, pedestrian, and transit strategies that mutually support transportation and land use initiatives

Environmental Character- preserving environmentally sensitive areas, scenic viewsheds, and farms

Economic Vitality & Development - promoting a sustainable and diversified economy with greater balance between jobs and housing

Regional Collaboration – initiating a coordinated approach to planning where shared visions are established and objectives are achieved through collaboration without compromising the unique character of our communities.

The remainder of this workbook is organized into the following sections:

Module 2 - Scenario Planning

This section describes the general methods and outcomes from the scenario planning process. Scenario planning is a method that allows planners and plan participants to explore "what if" possibilities for the region. The process explored different growth strategies as well as transportation initiatives. From this information a preferred growth strategy wascreated and served as the foundation for developing a coordinated transportation vision for the study area.

Module 3 - Transportation Recommendations

This section describes in detail the coordinated transportation strategy for the region including highways, bicycle facilities, and public transportation.

Module 4 - Design Considerations

This section addresses best practices and design influences for different locations within the study area. It addresses emerging trends and efforts to enhance the integration between travel modes. This section also highlights conceptual design locations where specific enhancements are described.

Module 5 - Initiatives

This section summarizes regional initiatives that will contribute towards improved success for the region as well as action items associated with implementation of study recommendations.

In addition to this workbook supporting information has been published, including:

Project Website

The project website was developed to keep all stakeholders informed on the planning process and schedule and serves as a repository for all information developed throughout the course of the planning process. All of the below documentation can be found on the project website.

Concept Design Workbook

This document, the Concept Design Notebook includes a series of concept designs for 6 corridors geographically distributed throughout the study area. These concepts express the design intent developed during the study process.

Public Outreach Summary Documentation

This summary inventories the outreach initiatives used during the Southwest Area Study and provides copies of legal advertisements, press releases, fliers, sign-in sheets, and materials.

Project Sheet Inventory

This is a database of 175 roadway, transit, bicycle, and pedestrian projects identified during the planning process. They are summarized on single page project sheets that detail: project location, description, purpose and need, vicinity map, cost estimate, and funding strategy.

Project Poster

The project poster includes a transportation master plan map that represents the overall transportation strategy for the study area as well as supporting graphics.

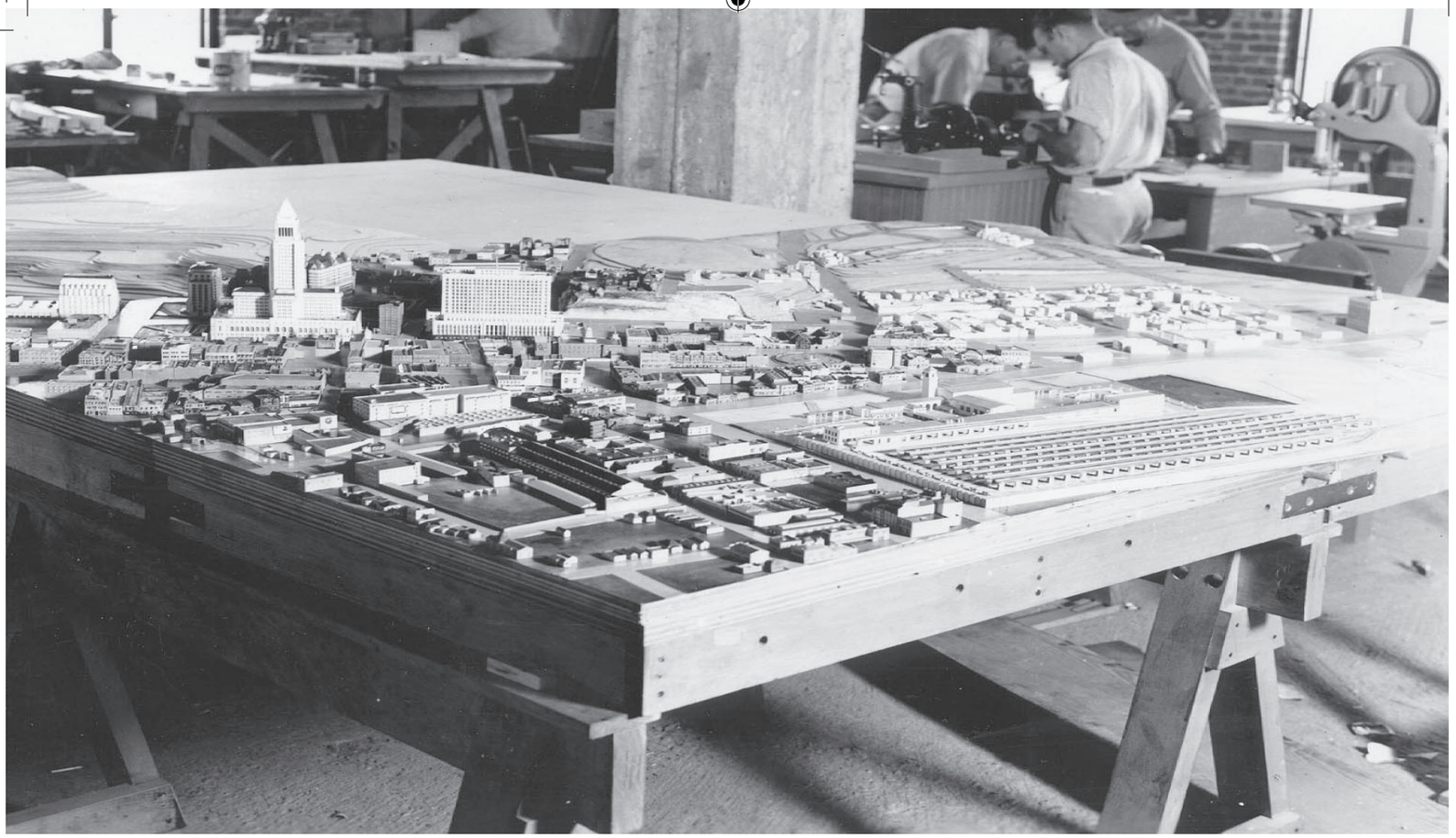
A copy of the aforementioned documents can be obtained through the Capital Area MPO Website as well as the project website:

www.campo-nc.us

www.southwestareastudy.com

module 2

scenario planning

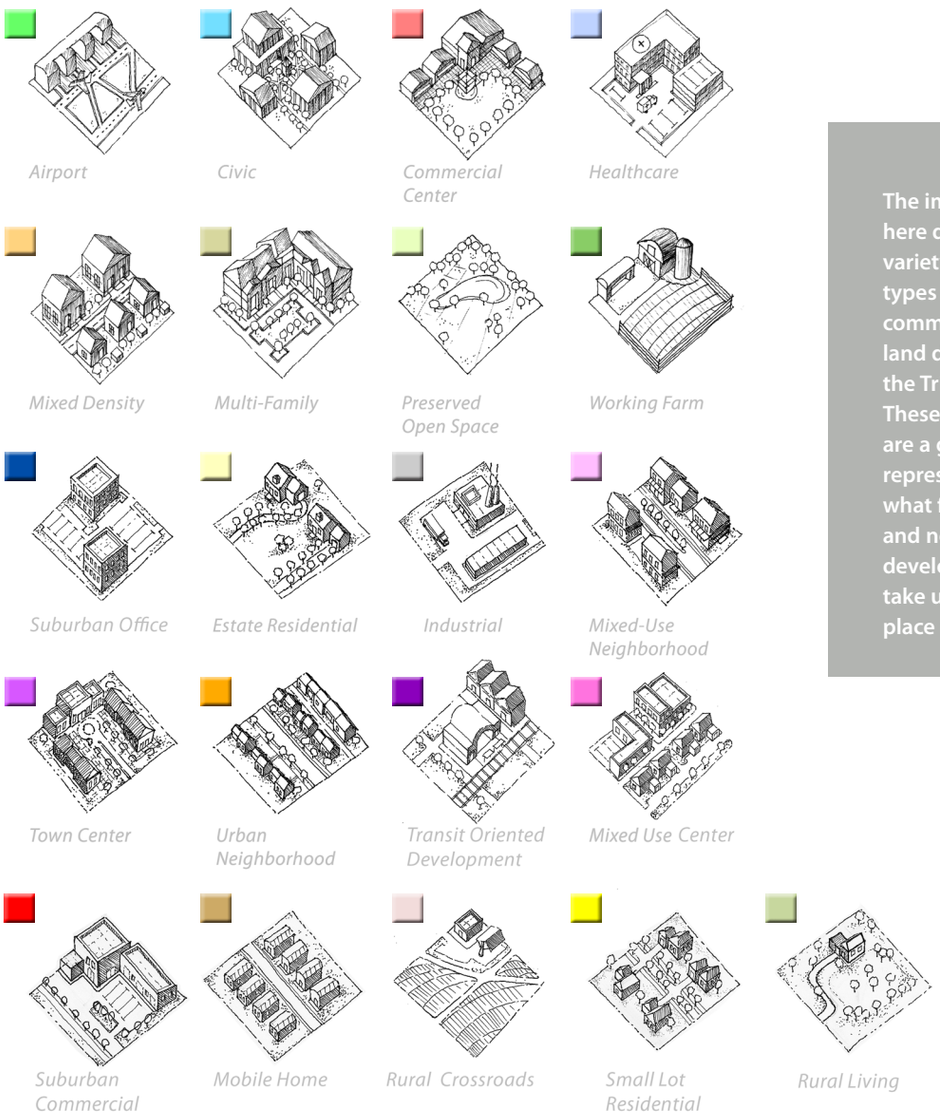


Scenario Planning

Scenario planning provides a forum, process, set of tools, and a means for measuring the likely outcomes of future possibilities. Development scenarios prepared for the region are fictional stories about potential futures. They are not forecasts or predictions. They are alternatives that might come to pass based on what already exists, trends that are evident, or regional goals and community values stated during the study. The essential requirement of any development scenario is that it be plausible, within the realm of what exists or what could be. Scenario planning provides stakeholders with an opportunity to identify and discuss strengths and weaknesses associated with the competing growth strategies, and enables more informed decision-making for the region.

It was important that the development scenarios prepared for this study reflected the guiding principles, the unique challenges of regional influences in and around the study area, the multi-agency coordination required, and the transportation limitations and opportunities. A set of scenarios was developed to help the region think cooperatively about planning and to help educate stakeholders on how planning to accommodate different values resulted in different outcomes. The scenario planning process was closely aligned to the public outreach schedule to allow participants an opportunity to make meaningful contributions to the development of a preferred growth strategy-scenario.

The study team began by facilitating a series of workshops and leadership symposia structured around identifying major issues and planning themes that would later be refined to become the project's guiding principles and evaluation criteria. The themes of *Livability, Mobility, Environmental Character, Economic Vitality & Development,* and *Regional Collaboration*, described in Module 1, were used as a framework to evaluate how each scenario compared with the others. In addition, the resulting guiding principles served as the basis for how different measures of effectiveness were created.



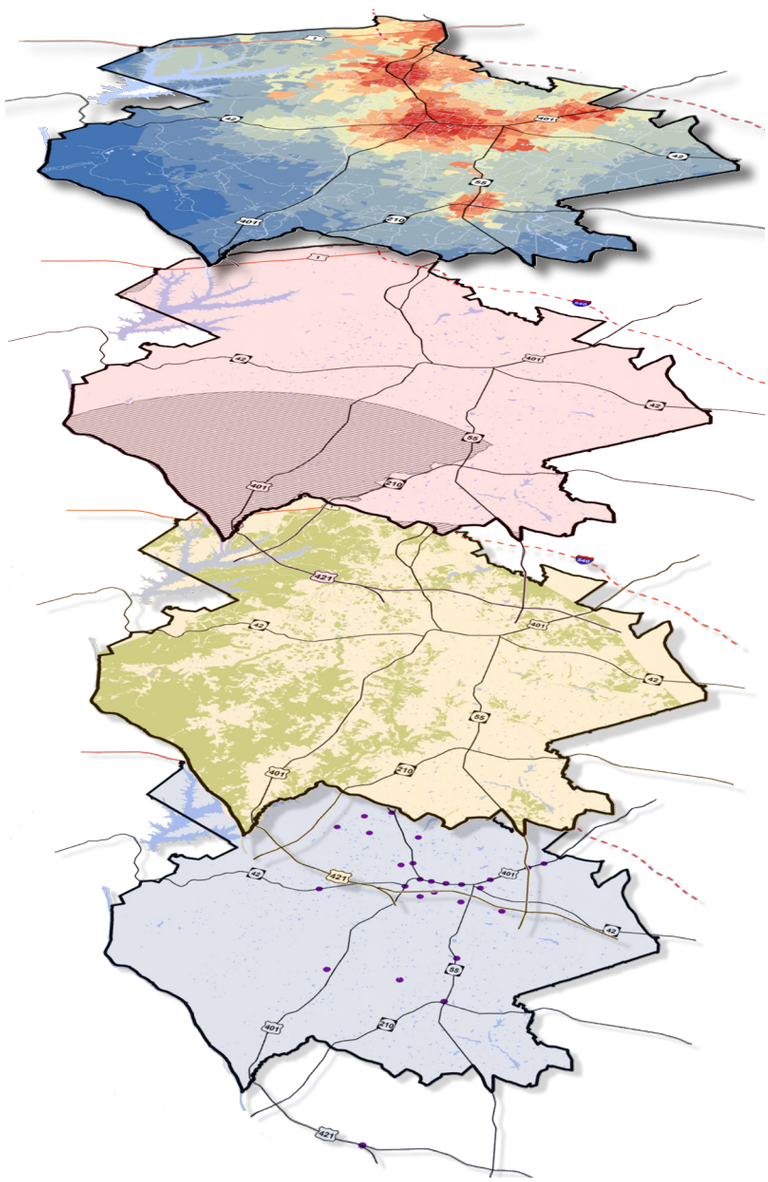
The images shown here depict the variety of place types used to communicate how land develops in the Triangle Region. These drawings are a general representation of what form housing and non-residential development would take under each place type.

Tools and Participants

The scenarios were created using ArcGIS 10.0, CommunityViz 4.2, and the regional Travel Demand Model. These geographic tools helped the project team illustrate, quantify, analyze, and refine the scenarios throughout the project process. Generally, the project team used a series of place types (shown on the previous page) to communicate land development characteristics such as form and composition. Place types were used to describe residential areas, non-residential developments, rural areas, working farms, and recreational areas. Place types were also given unique names, such as "Town Center" or "Urban Neighborhood" to standardize the language of development across the jurisdictions within the study area. This approach to evaluating land use allowed the member jurisdictions to focus on regional cooperation and planning, rather than on specific zoning codes and ordinances. For more information on place types, see the Place Type Palette document, available on the project website.

Once the place type palette was created and communicated, the project team also developed a list of factors that typically make places desirable for development interests. The list of factors was varied and included things like "access to transportation", "proximity to retail", and "recreational opportunities." These factors were based on regional growth drivers and characteristics of the study area that were discussed in a market study prepared specifically forthe SWAS. Collectively, these factors represented the "suitability" component of the model. The intent of suitability was to ensure that growth and development in the model responded to similar phenomena that have historically driven growth in the region. When combined with the place types, the model allocated projected future growth to areas that could accommodate this growth and that matched the suitability index, i.e., areas that were the most suitable received growth over areas that were the least suitable. As scenarios were created, suitability was refined to match the intent of the scenario. For example, in a transit-focused scenario, proximity to transit stations became more attractive for receiving future growth than proximity and access to interstate highways. Each of these scenarios and the corresponding goals of the scenario are described in more detail within this Module.

Across all of the scenarios, the estimated amount of growth (forecast) remained the same, while the nature and location of that growth changed according to the place types used and the suitability index. The amount of growth expected for the study area is a result of the characteristics of the study area, described in more detail in Module 1. Strong regional growth, accessibility to large employment centers including Research Triangle



C omposite Suitability Map of study area

Watershed Map of study area

Greenprint areas within the study area

Activity Centers within the study area

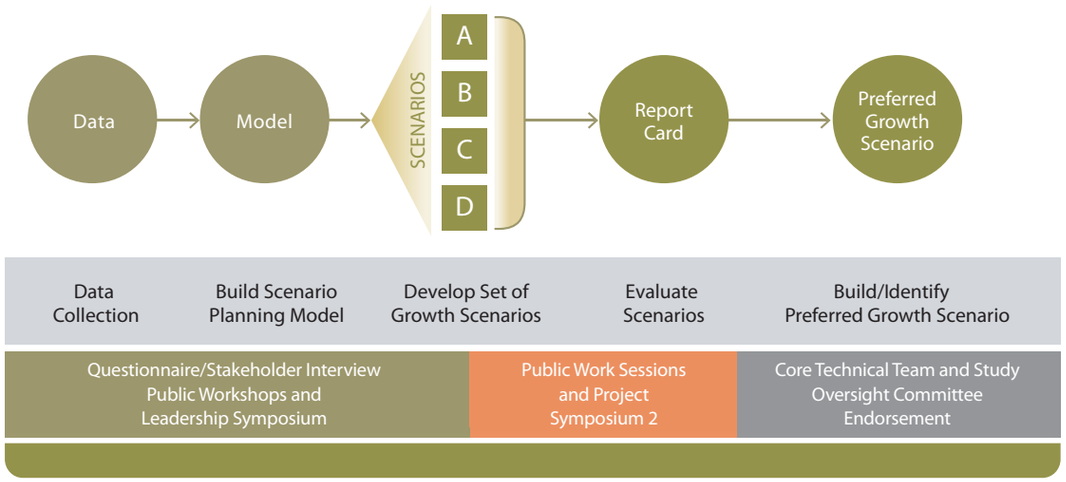
County	2010		New Growth Allocation		Total 2040	
	Housing	Employment	Housing	Employment	Housing	Employment
Harnett	6,134	2,442	4,887	1,076	11,021	3,518
Wake	26,989	14,256	42,266	29,983	69,255	44,239
Total	33,123	16,698	47,153	31,059	80,276	47,757

Park (RTP) and downtown Raleigh, and the addition of the NC 540 toll road continue to make the study area a desirable place. The core communities of Apex and Holly Springs are characterized by strong growth, affluent demographics, and easy connections to RTP and Raleigh, while Fuquay-Varina remains in transition, but still boasts regional links to employment centers, substantial growth, and moderate levels of household income. The edge area of Angier and Northwest Harnett County offers additional space to grow, and is poised to resemble the core and transition areas by 2040. More information is available in the market study (entitled, Southwest Area Study Market Position Statement), available on the project website, *www.southwestareastudy.com*. This amount of new growth, called a forecasted "control total", is summarized in the table above.

*"Strong regional growth, accessibility to large employment centers including Research Triangle Park (RTP) and downtown Raleigh, and the addition of the NC 540 toll road continue to make the study area a **desirable** place."*

Scenario Development

Four distinct scenarios were created, each illustrating real choices for how the region could develop under one or more planning initiatives and transportation strategies. A brief summary of the development scenarios follows, including a description of the concepts underlying each one. Trade-offs among the development scenarios are summarized in the Report Card described later in this module.



This flow chart depicts the scenario planning process from initial data collection to the creation and selection of a preferred growth scenario. As described in this module, the scenario planning model schedule was closely aligned to the public outreach process, ensuring that the public contributed meaningful input along the way to developing the preferred growth scenario.

Scenario A

Trend

The Trend scenario represented a continuation of current trends, described in the previous module, and showed build out of the study area based on currently adopted zoning codes. Bedroom communities and development focused along NC 55, dominated the development shown in this scenario. The scenario generally favored a dispersed growth pattern with commercial retail uses forming along corridors and lower density suburban residential fanning outward off of these corridors. New growth was primarily single-use and single story, occurring in greenfield areas that depended on single occupant automobiles as the primary mode of transportation.

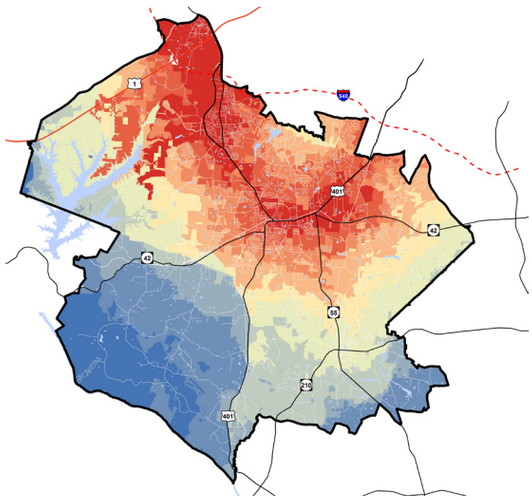


Image depicting how likely one area is to develop over another based on the presence of certain development factors. Areas depicted in red were most suitable for development and areas in blue were the least suitable.

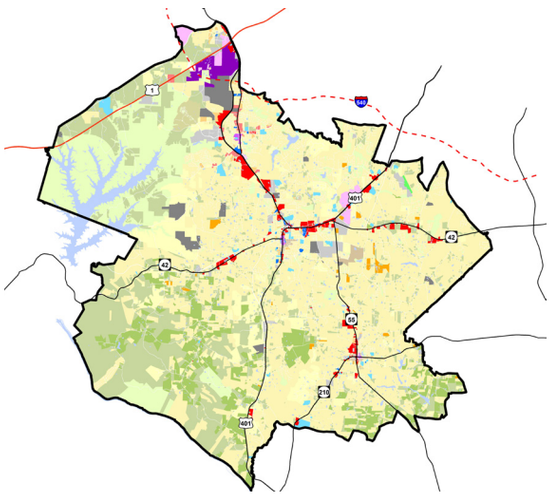


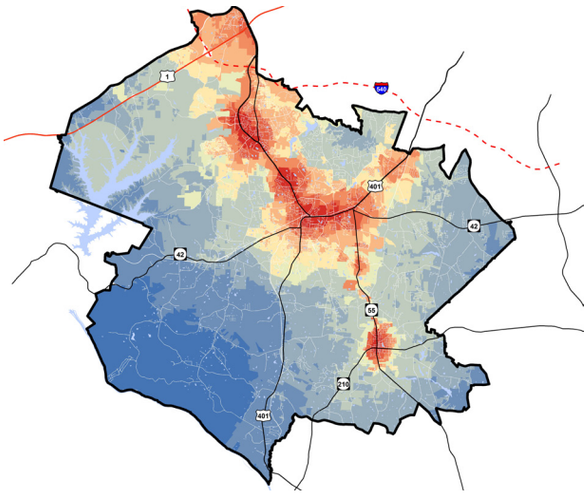
Image depicting the arrangement of place types in the scenario.

Highway Investment

Transit Investment

Land Consumption

Greenprint Support



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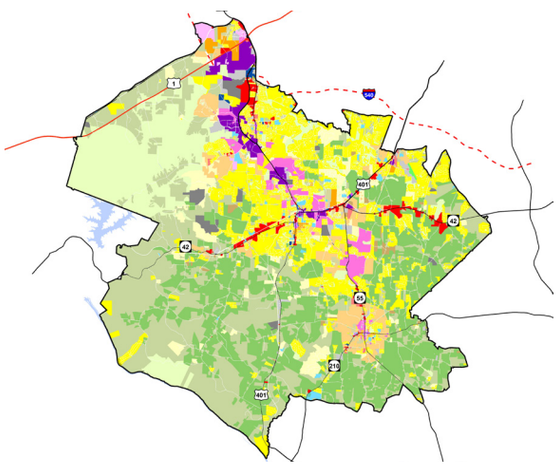
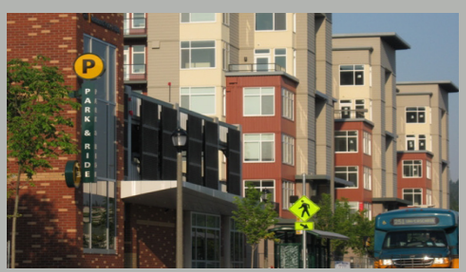


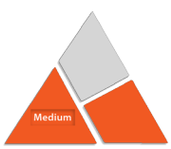
Image depicting the arrangement of place types in the scenario.

Scenario B

Transit Investment

This scenario focused growth into more compact centers along the NC 55 corridor. These centers were supported by a local inter-jurisdictional, high frequency rapid bus service, with local bus routes connecting east/west off of the corridor. Jobs and housing were more evenly distributed along nodes in the NC 55 corridor as multiple town centers created a balance of uses. Each node depicted had a balance of compact residential uses, walkable streetscapes and a range of other retail, office and light industrial jobs. This scenario created more opportunities for walking, biking and transit trips relative to every day, non-work related travel, and increased the number of commute trips remaining within the study area.





Highway Investment

Transit Investment

Land Consumption

Greenprint Support

Scenario C

Major Road Improvements

This scenario focused growth towards the north and northeast quadrants of the study area. This growth was supported by proposed new interchanges along the 540 toll-facility beltway. This scenario was similar to the trend in that it relied primarily on automobile trips for daily travel; however it also attempted to maximize roadway connectivity towards the 540 corridor and to create smaller nodes of commercial activity to reduce total vehicular trip lengths.

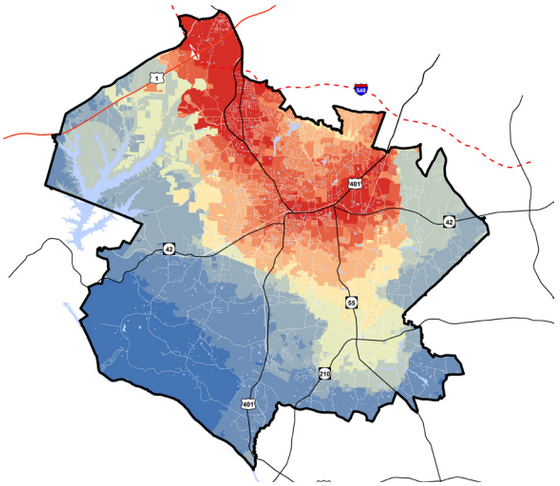


Image depicting how likely one area is to develop over another based on the presence of certain development factors. Areas depicted in red were most suitable for development and areas in blue were the least suitable.

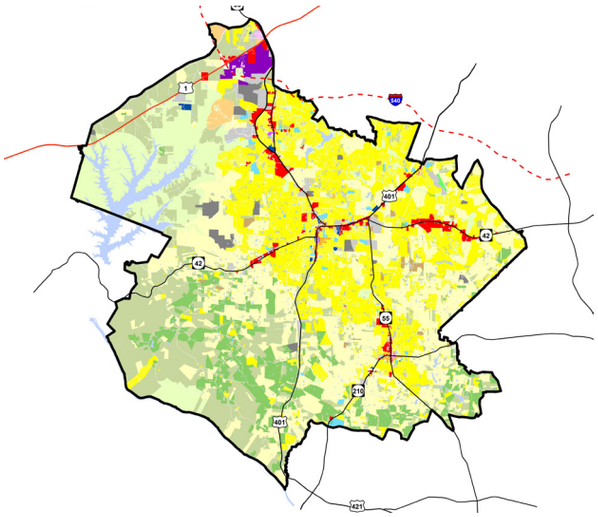


Image depicting the arrangement of place types in the scenario.

Highway Investment

Transit Investment

Land Consumption

Greenprint Support

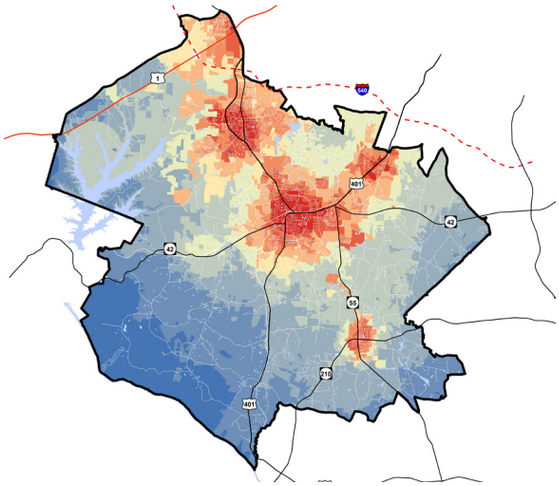


Image depicting how likely one area is to develop over another based on the presence of certain development factors. Areas depicted in red were most suitable for development and areas in blue were the least suitable.

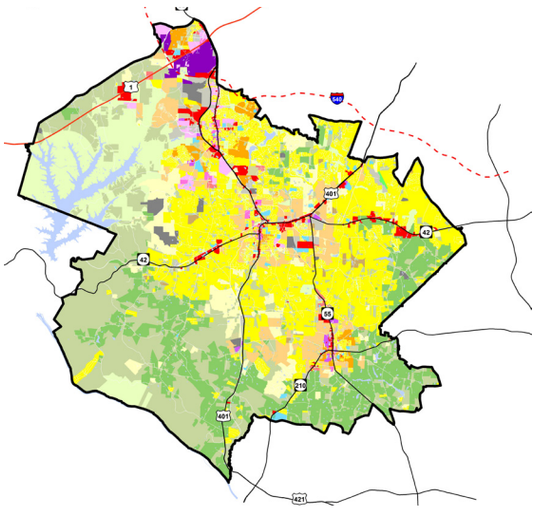


Image depicting the arrangement of place types in the scenario.

Scenario D

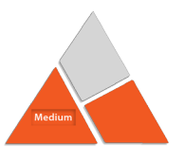
Compact Centers

This scenario reduced land consumption associated with new development and maximized preservation of existing agricultural lands and open space. Growth was oriented towards existing town centers, but maintained levels of density and intensity consistent with a small town main street character. This was the slower growth scenario for Holly Springs, Fuquay-Varina and Angier, with considerable job growth remaining in the north end at Apex.

Major transit investments were not considered in this scenario, however there was a desire to create strong walkable compact centers in the existing towns and reduce overall vehicular trip lengths within the greater study area. There was a limited opportunity for modest transit service in some of the larger nodes.

Highway Investment

Transit Investment



Land Consumption

Greenprint Support

Report Card

The Guiding Principles were developed in response to public input and refined by the Core Technical Team and endorsed by the Project Oversight Committee. The Guiding Principles were used in the scenario planning process to develop performance measures (measures of effectives-MOE's). These measures allowed for a standardized way of evaluating the alternative growth scenarios against the project's Guiding Principles and desired goals and objectives. The MOEs reflected quantifiable data extracted from the CommunityViz and Regional Travel Demand Model outputs. Ranking the MOEs not an exact science, rather it provided a methodology for consideration and evaluation of different policy options, market influences, and transportation strategies. The evaluation process was organized around the themes of Livability, Mobility, Environment, Demand for Public Infrastructure, Economic Vitality, and Regional Collaboration as described below.

Livability

Livable communities are places where transportation, housing and commercial development investments have been coordinated so that people have access to adequate, affordable and environmentally sustainable travel options (US DOT Strategic Plan). Performance measures used to evaluate the principle of livability include: the character of development, the percent of new growth inside municipal planning area indicating infill, closer proximity of jobs and housing and more efficient use of existing infrastructure.

Mobility

Mobility generally refers to the ability of residents and visitors to move from place to place within and outside of the region. Performance measures used to evaluate the principle of mobility include: vehicle miles traveled per capita, vehicle hours traveled per capita, concentration of potential riders near a transit node, congested corridors, percent of income spent on transportation, and viable mobility options.

Environment

Environment is a broad category that includes the physical features of the region and the ability of policies and programs to protect certain environmentally-sensitive areas. In addition, this category includes concerns for the adequate provision of natural resources — drinking water, open space, and agriculture. For the SWAS, a Greenprint analysis was conducted for the study area identifying an interconnected network of green space that conserves natural ecosystems and provides benefits to human populations. The greenprint was evaluated by a conservation planning tool that identified such environmental features factors as wildlife habitat, forestry lands, farmland, open space and conservation lands, marine/estuarine, and water services. Depending on the presence of the above features, areas were ranked into composite measures of low, medium and high priority for environmental impact.

Performance measures used to evaluate the principle of environment included: development footprint, working farms lost, and acres consumed of low, medium and high greenprint priority areas.

Demand on Public Infrastructure

Over the past decade, growth in the region has stressed the ability of local jurisdictions to provide public services at the levels to which residents are accustomed. By maximizing the use of existing infrastructure, the region can promote responsible growth and relieve financial investments required by the construction of new infrastructure. Performance measures used to evaluate the principle of maximizing efficiencies in public infrastructure include: demand for new parks, demand for new schools, demand for water service, and demand for sewer service.

Economic Vitality

Each scenario assumes the same amount of job growth for the region, however there are subtle differences between the location and form of this

job growth that can impact economic vitality at the local and household levels. In particular, those scenarios with more compact centers are likely to result in fewer vehicles miles traveled per capita which could reduce household transportation costs. Scenarios that supported a diverse mix of housing located in close proximity (within walking distance or a short drive) to existing main streets may help foster a stronger retail base in these locations.

Regional Collaboration

All scenarios will require stronger regional collaboration in terms of expanding interlocal agreements on growth policies and the need for partnerships in pursuing economic development initiatives throughout the area. Scenarios that supported a more equalized balance of jobs and housing in each of the smaller communities and designated growth areas are likely to encourage regional collaboration as each community pursues its share of regional growth. Additionally, those scenarios that supported existing plans and policies are also likely to enhance regional collaboration.

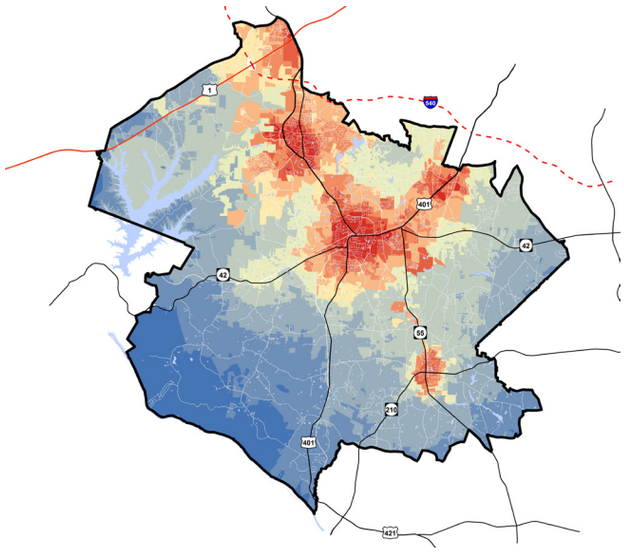


Image depicting how likely one area is to develop over another based on the presence of certain development factors. Areas depicted in red were most suitable for development and areas in blue were the least suitable.

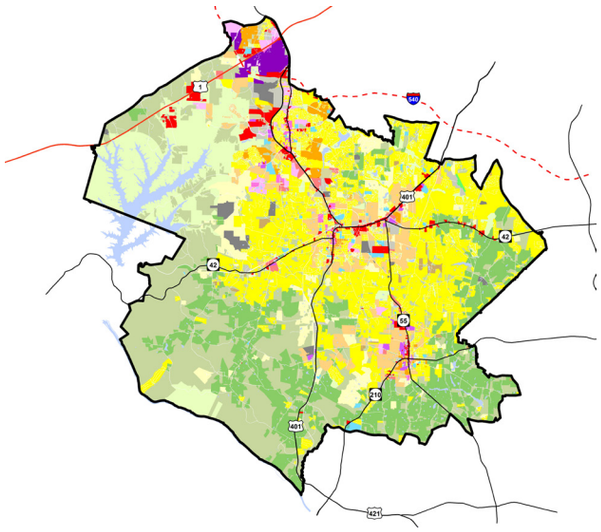
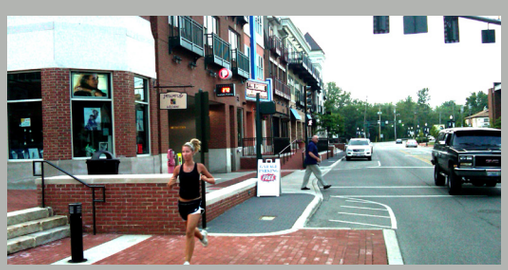


Image depicting the arrangement of place types in the scenario.

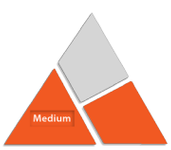
Scenario E

Preferred Scenario

Once the previous four scenarios were evaluated according to the guiding principles and measures of effectiveness, the project team met with CTT members to discuss the preparation of a preferred scenario. The intent of the final scenario was to blend the best elements of the preceding four scenarios, and maximize the fulfillment of Guiding Principles according to the measures of effectiveness. Over the course of three work sessions, the project team helped define elements of the preferred scenario, illustrated how it might look with precedent images and mapping, and reported back on how the scenario performed against the already defined measures of effectiveness in the other four scenarios. The process culminated in the adoption of the SWAS Preferred Growth Scenario to be put forth as the vision for the area and incorporated into other regional land use planning processes.



Highway Investment



Transit Investment

Land Consumption

Greenprint Support

The preferred growth scenario focused on activity centers identified by local plans and planning staff. Growth was focused in existing centers, while maintaining levels of density and intensity consistent with a small town main street character. Adjustments were made to the location of some growth in Harnett County around Angier to reflect more rural and suburban densities than Scenario D originally portrayed. In the preferred scenario, job growth was distributed in the major centers along the 55 and 401 corridors, as well as existing town centers, and emerging activity centers identified by local planning staff and plans. Major transit investments were not anticipated to be made in the immediate future, but a development pattern that supports future implementation was a desired strategy. Existing transit service was maintained and, as towns and centers grew, some limited opportunities for expanded transit service could be realized at some of the larger nodes. Similar to Scenario D, the blended growth scenario incorporated placemaking design principles that created walkable compact centers. New residential growth was located in existing towns, along emerging corridors, and generally closer to employment centers to reduce overall vehicular trip lengths within the greater study area. Specifically, the preferred growth scenario included the following assumptions:

I-540 was completed, including improvements to enhance roadway capacity in major corridors, in line with the Long Range Transportation Plan (LRTP) recommendations. Committed roadway projects were completed, excluding construction of US Hwy 401 Bypass. A context Sensitive approach to improvements was used in town centers.

Existing tranist service was maintained and park-and-ride/carpool lots were located at major nodes. There was potential for node specific circulator transit service.

The traditional town development pattern was extended by expanding the street grid, and concentrating growthin comprehensive plan focal areas. Growth was contiguous and consistent with existing town centers, with an emphasis on creation of walkable neighborhoods. Growth and development was also assumed along the primary corridors of 55 and 401, as well as in the town cores and emerging activity centers. Development outside town limits followed a largely rural pattern as a result of development controls applied by counties.

The directed growth pattern reduced land consumption and sensitive, forested, and working lands were protected through policy or conservation.

SWAS Summary Report Card

	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E
Livability & Development Character					
Permanent Open Space	●	◪	◪	◪	●
Maintain Rural Character	⊙	●	○	◪	●
Walkable Neighborhoods	⊙	⊙	○	●	●
Focus Development Inside Municipal Planning Areas	○	◪	⊙	●	●
Housing Mix	◪	●	◪	◪	◪
Mobility					
Vehicle Miles Traveled in Study Area (SWAS)	○	●	◪	⊙	◪
Vehicle Hours Traveled in Study Area (SWAS)	○	⊙	●	◪	●
Congested Corridors (% VMT over LOS E) (SWAS)	●	⊙	●	◪	●
Transit Ridership (SWAS)	◪	●	○	⊙	◪
Greenprint & Environment					
Development Footprint	○	⊙	◪	●	●
Preservation of Working Farms	⊙	●	○	◪	●
Consistency with Regional Green Print	○	⊙	◪	●	●
Regional Collaboration					
Consistency with Local Plans	◪	○	⊙	●	◪
Consistency with Regional Plans	○	◪	⊙	◪	●
Land Use - Transportation Connection	○	●	⊙	◪	●
Efficiencies in Public Infrastructure					
Minimize Demand for Water	⊙	◪	●	○	○
Minimize Demand for Sewer	⊙	◪	●	○	○

● = Most satisfies the performance measure
◪ = Moderately satisfies the performance measure
⊙ = Somewhat satisfies the performance measure
○ = Least satisfies the performance measure

The scenarios and MOEs were developed in the context of the larger scenario planning process for the region, Imagine 2040. For more technical information on these MOEs and the Imagine 2040 project, please see the CAMPO website. A regional clearinghouse is being maintained for member jurisdictions participating in the Imagine 2040 effort. A copy of the aforementioned documents can be obtained through the CAMPO Website as well as the project website:

www.campo-nc.us

www.southwestareastudy.com

module 3

transportation

Transportation Recommendations

The purpose of the Southwest Area Study—connecting people and places through quality choices—did not belie the many transportation challenges that could have derailed the process. These challenges included stitching together a series of local plans that did not necessarily align, blending a variety of transportation modes that competed for space and dollars, and involving diverse stakeholders that held fast to ingrained agendas.

To overcome these challenges, the study area process used an integrated planning approach which considered land use, development, environment, and transportation simultaneously to achieve the project's vision.

"The SWAS is a study intended to identify a sustainable transportation strategy for the area. The process embraces an integrated approach that considers land use, development, environment and transportation simultaneously."

Methods and Tools

A variety of tools were employed to create a unified vision for transportation with recommendations for all travel modes. These tools were reflected in future plans including an area wide Comprehensive Transportation Plan (CTP) and an urban area Long Range Transportation Plan (LRTP). As described in Module 1, the Guiding Principles embodied a set of value statements for a series of planning themes developed specifically for the SWAS. Not surprisingly, transportation played a critical role in each principle. These value statements provided the footing for the multimodal recommendations described in this module.

With residential, commercial, and industrial growth inevitable, understanding the spatial distribution of people and jobs was critical to understanding the impact on transportation infrastructure and the potential markets for transportation beyond personal automobiles. These following analysis tools were used to understand how the distribution of people and jobs would affect the functionality of the transportation system.

Scenario Planning

Building on the guiding principles, land suitability and constraints analysis, and the market study, five distinct land use scenarios were developed to show real choices for how the region could develop. Trade-offs among the scenarios were summarized into a report card and a preferred, or blended, scenario was accepted. (See Module 2, Scenario Planning).

Triangle Regional Travel Demand Model

The Southwest Area Study recognized the need, and at times, the difficultly in stitching together the analysis and recommendations for the region's most heavily traveled corridors. The Triangle Regional Model was used to create future year forecasts. The results were scrutinized, compared with previous forecasts, and interpreted to develop a true 2040 forecast for the study area. Most importantly, the model results were based on socioeconomic outputs from the scenario planning process.

Enhancing access to significant local destinations and natural areas in the community facilitates community ownership, improves public health, and supports local identity and quality of life. Equally important is promoting mobility among transportation modes and across jurisdictional boundaries. The various outreach events, beginning with the establishment of the Core Technical Team and Oversight

Committee and carrying forward through the series of Public Open Houses in April 2012, established this vision. These events, as introduced in Module 1, included:

- Project Symposia
- Public Workshop Series
- Public Open House Series
- Community Work Sessions
- Core Technical Team/Oversight Committee
- Public Questionnaire.

Existing Conditions

For most people who live and work in the southwest area, mobility means riding in an automobile. This is no different than most other parts of the country where nationally over 76% of workers commute by driving alone. The Southwest Area Study addressed roadway and roadway safety improvements so automobiles could continue to support the regional economy; however, it also analyzed access to other modes of transportation to meet the increased demand for transportation choices. This demand was prompted by worsening congestion and increased concerns for rising gas prices, access to oil supplies, public health, air quality, and climate change. Although each of these concerns is unique and viewed differently among residents, each points to a need for greater access to more transportation choices.

To tackle transportation challenges, the Southwest Area Study documented transportation needs within the region as a precursor to developing specific recommendations that addressed vehicular congestion and improved access to alternative modes of travel. A comprehensive transportation network that improves vehicular operations and provides opportunities for alternative modes will be important to protect the vitality of the area.

Bicycle and Pedestrian

Pedestrian access typically is thought of and designed at a very local scale such as in a downtown , along a streetscape, or within a neighborhood or development. For regional planning projects such as the Southwest Area Study, walkability is a critical consideration but in a slightly different context — creating a regional collection of localized walkable places. Such places can have a major impact on how regional trips occur if they are connected by safe bike routes or reliable transit.

In the southwest area the existing downtowns or emerging activity centers are the foundations for such a network of walkable places. As expected, most pedestrian and bicycle facilities are located around the local downtowns. These areas typically have sidewalks and some bicycle facilities (even if only in the form of low volume bicycle friendly streets). As roadways transition from urban to rural areas, sidewalks and bike facilities tend to disappear.

Transit

Since World War II, the historical trend for mode choice has included greater dependence on personal automobiles and a general decline in transit use. This trend has been acknowledged by local staff and elected officials as well as regional decision-makers. These leaders acknowledge the importance of public transportation to increase choice in transportation. Regional plans such as the Wake County Transit Plan and plans created by local municipalities reflect this trend.

Several public transit services currently operate in or near the study area. No fixed routes bus systems extend into the study area, though both Wake and Harnett counties operate demand-response service. Establishing fixed route service is documented as a high priority in existing local and regional transit plans, primarily along the US 401 and NC 55 corridors. According to the implementation schedules of some current plans, fixed route service may become available in the southwest area as early as 2013. Transit operations in the larger region are listed on the next page.

Triangle Transit offers fixed route service between Raleigh, Durham, Chapel Hill, and adjacent towns in Wake, Durham, and Orange counties. No fixed routes extend into the southwest area, though two regional commuter routes terminate nearby in Apex. Route 305 operates from Apex, through Cary, and into Downtown Raleigh. Route 311 operates from Apex to the Regional Transit Center (RTP).

Van Pools sponsored by Triangle Transit primarily focus on points south and east of Raleigh and northwest of Durham. Nine van pools currently operate from the study area to a destination in the Triangle, though multiple van pools operate along some higher demand routes.

Transportation and Rural Access (TRACS), operated by Wake County, coordinates general public rides in rural areas, senior transportation, Medicaid, and persons with disabilities, among many others. In 2010, TRACS served 7,844 one-way trips in Fuquay-Varina and 4,404 trips in Holly Springs through its three largest programs — Rural General Public, Resources for Seniors, and Medicaid.

Harnett County Transportation (HARTS) includes curb-to-curb dial-a-ride (demand-response) transportation service throughout the county to human service agency clients and members of the general public.

Capital Area Transit (CAT) operates 25 local bus routes, two express bus routes, and one regional bus route in and near the City of Raleigh. Like Triangle Transit, CAT is looking to expand its express route services, according to its Five-Year Transit Plan. Though no routes extend into the study area, one route—Route 40e to Wake Tech—terminates just north of the southwest area.

More information about each of these services can be found on the following websites:

www.triangletransit.org
www.wakegov.com/humanservices/adult/transportation
www.harnett.org
www.cattransit.com

Roadway

According to the 2010 census, approximately 80% of adult workers living in the study area commute to work by driving alone. Thus, the area's roadway network is vital to the area's economy and quality of life. The rapid economic growth in the southwest area has spurred increased congestion on the existing network.

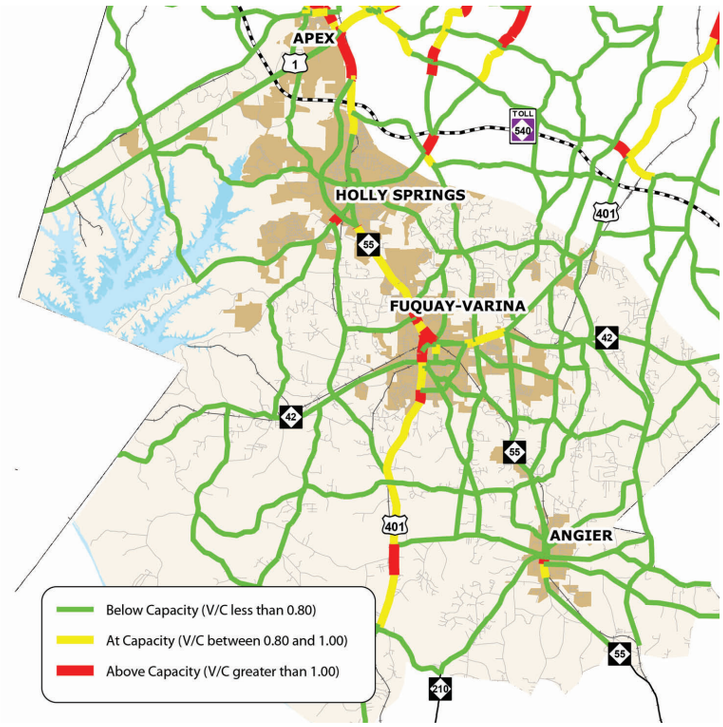
Congested Corridors

A roadway's level of congestion is measured by comparing the observed and projected traffic volumes against the roadway's potential capacity. Volume-to-capacity (V/C) ratios are calculated by dividing the traffic volume of a roadway segment by the theoretical capacity of the roadway to produce a universal measurement. The V/C ratios for the southwest area fall into one of the following categories:

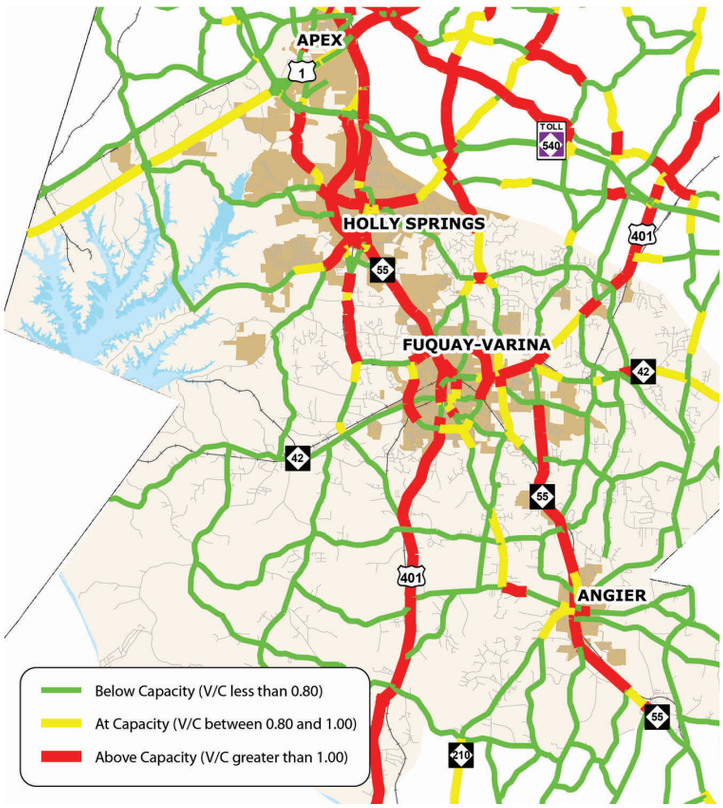
Below Capacity (V/C < 0.8) — A roadway with a V/C less than 0.8 typically operates with efficiency. As the V/C nears 1.0, the roadway becomes more congested. A roadway approaching capacity may operate effectively during non-peak hours, but may be congested during morning and evening peak travel periods.

At Capacity (V/C = .8 to 1.0) — Roadways operating at capacity or slightly above capacity are heavily congested during peak periods and moderately congested during non-peak periods. A change in capacity due to incidents greatly impacts the travel flow on corridors operating within this V/C range.

Over Capacity (V/C > 1.0) — Roadways in this category represent the most congested corridors in the area. These roadways are congested during non-peak hours and most likely operate in stop-and-go gridlock conditions during the morning and evening peak travel periods.



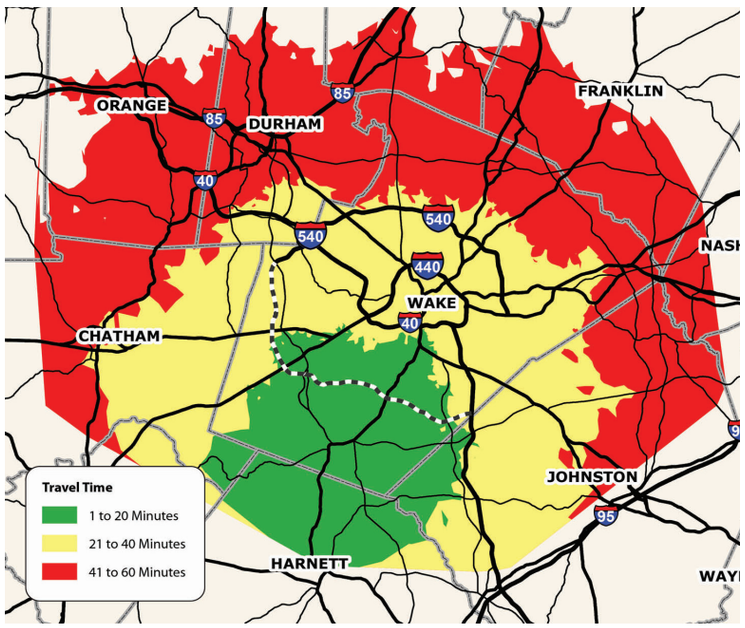
2005 Congestion Map



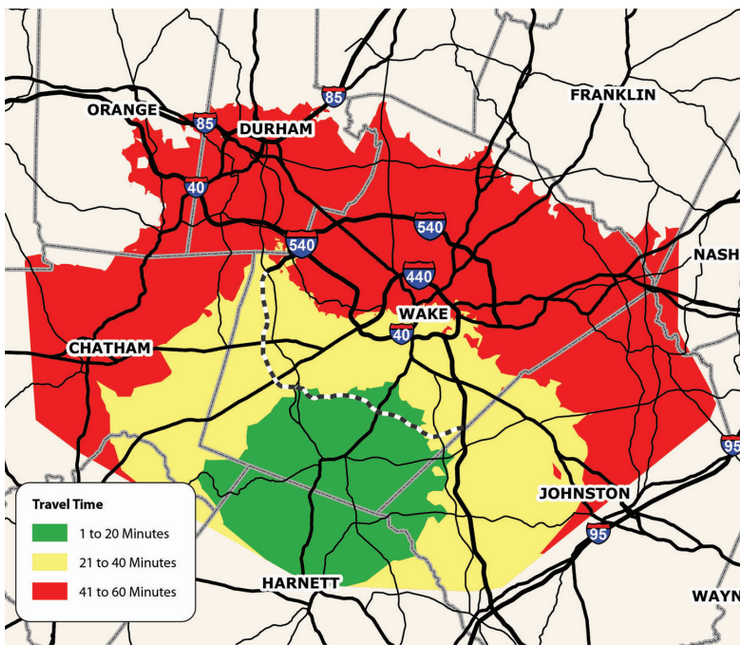
2040 Congestion Map

Results from the Triangle Regional Model showed only isolated pockets of congestion in 2005. If improvements are not made to the network, the model predicts that significant congestion will impact almost every major corridor in the area by 2040. In particular, US 401 and NC 55 show considerable congestion throughout the southwest area. Other corridors that appear to be congested in 2040 include Sunset Lake Road, Judd Parkway, Avent Ferry Road, and Piney Grove Wilbon Road.

Using existing volume data and the Triangle Regional Model, current travel times were approximated. Part of the attraction of living in the southwest study area is that it traditionally has offered affordable housing just outside of the more urbanized areas while still offering a reasonable commute time. The associated images show how far a motorist can drive from Fuquay-Varina in one hour in 2005, compared to 2035 if existing land use trends are allowed to continue and no further roadway improvements beyond those already underway are implemented. Left unchecked, the significant decrease in travel distance within this timeframe could lead to substantial degradations in the quality of life for southwest area residents.



2005 Travel Time Map



2040 Travel Time Map

In addition to the maps in this chapter, a full composite map of both the roadway recommedations and the bicycle and pedestrian recommendations for the entire SWAS study area can be found at: www.campo-us.com and www.southwestareastudy.com

Recommendations

This section presents a series of multimodal recommendations for the study area. Based on the guiding principles and public feedback, these recommendations present a multi-faceted approach to travel in the study area.

Bicycle and pedestrian transportation were considered as important elements of the area's sustainable transportation strategy and contribute to quality of life. The recommendations from previous planning efforts were aggregated and built upon with public & committee input, GIS analysis, and an examination of current guidelines, to generate a recommended network covering the entire study area.

Bicycle and Pedestrian

The goals of the bicycle and pedestrian analysis were established from the identified guiding principles. The ultimate goal was to increase the number of trips made on foot or bicycle significant enough to realize environmental, economic, and social benefits. There are three main ways for this to occur:

Connectivity — Establish bicycle and pedestrian connectivity at the local and regional scales, providing opportunities for recreation and a connection to the outdoors and enabling functional transportation by these modes.

Safety — Improve the safety of pedestrians and cyclists by creating a space for them on- and off-road through the development of complete streets and a comprehensive greenway network. Focus improvements both in areas with high crash rates and areas with poor facilities that are not currently attractive to cyclists and pedestrians.

Access — Provide bicycle and pedestrian access to key destinations throughout the study area with particular emphasis on access to transit facilities.

Several key tenets were adhered to during recommendations development to ensure that strategies recognized the diversity of cyclist types—experienced, novice, and child — functional vs. recreational. Strategies are often different for each type.

- Every trip starts and ends with a pedestrian trip
- Facilitate both local and regional connectivity
- Safety is critical—identify conflict points, alternate routes
- Consider short and long-term solutions

Methodology

Information from the public, core technical committee, previous planning efforts, NCDOT's Complete Streets Design Guidelines, available GIS datasets, and East Coast Greenway development efforts influenced the creation of the bicycle and pedestrian recommendations for the study area.

Previous planning efforts have examined bicycle and pedestrian issues and made recommendations throughout the study area. These recommendations were used as the starting point for this effort. Plans reviewed included the CAMPO Long Range Transportation Plan, the Angier Land Use Plan, the Holly Springs 2011 Bicycle Plan, the Holly Springs 2008 Pedestrian Plan, the Fuquay-Varina Comprehensive Transportation Plan, the Harnett County Land Use Plan, and East Coast Greenway plans.

NCDOT currently is developing guidelines for the design of complete streets that accommodate all users, including cyclists and pedestrians. They specify that cyclists, pedestrians, and cars are not mutually exclusive and almost all roadway types and designations should account for all of these users, (see *www.nccompletestreets.org)*.

Several GIS datasets were used throughout the analysis, including social and environmental features, existing transportation conditions, and recommended transportation features.

Ancillary Bicycle and Pedestrian Improvements

In order to promote a healthy and vibrant bicycle and pedestrian environment, consideration must be given to provisions at trip ends as well as a safe travel environment. The following elements should be considered for implementation:

Bicycle Stations

The term 'bicycle station' can represent a range of facilities, but typically includes secured bicycle parking around transit stops at a minimum. Other amenities may include bicycle repair, cafes, showers and changing facilities, bicycle

rentals, licensing, etc. In the Southwest Area Study, bicycle stations could likely include bicycle lockers around bus stops to encourage the integration of bicycle transportation and transit.

Bicycle Parking

As more bike facilities are constructed and bicycle usage grows, the need for bike parking will climb. Long-term bicycle parking at transit stations and work sites, as well as short-term parking at shopping centers and similar sites, can help to support bicycling in the southwest area. Short-term parking is often best fulfilled with bike racks. Bike racks should support bicycles at two points. The Inverted U rack is a good example.

Bus Stop Upgrades

Bus stops are an important transportation element that should be constructed with safety and accessibility in mind. Sidewalk connectivity and comfortable amenities at bus stops will encourage and facilitate pedestrian, bicycle, and bus travel. Bus stops throughout the southwest area should be updated to include a shelter with seating. In addition, consideration should be given to proper lighting, maps, trash bins, and bicycle parking.

Traffic Calming

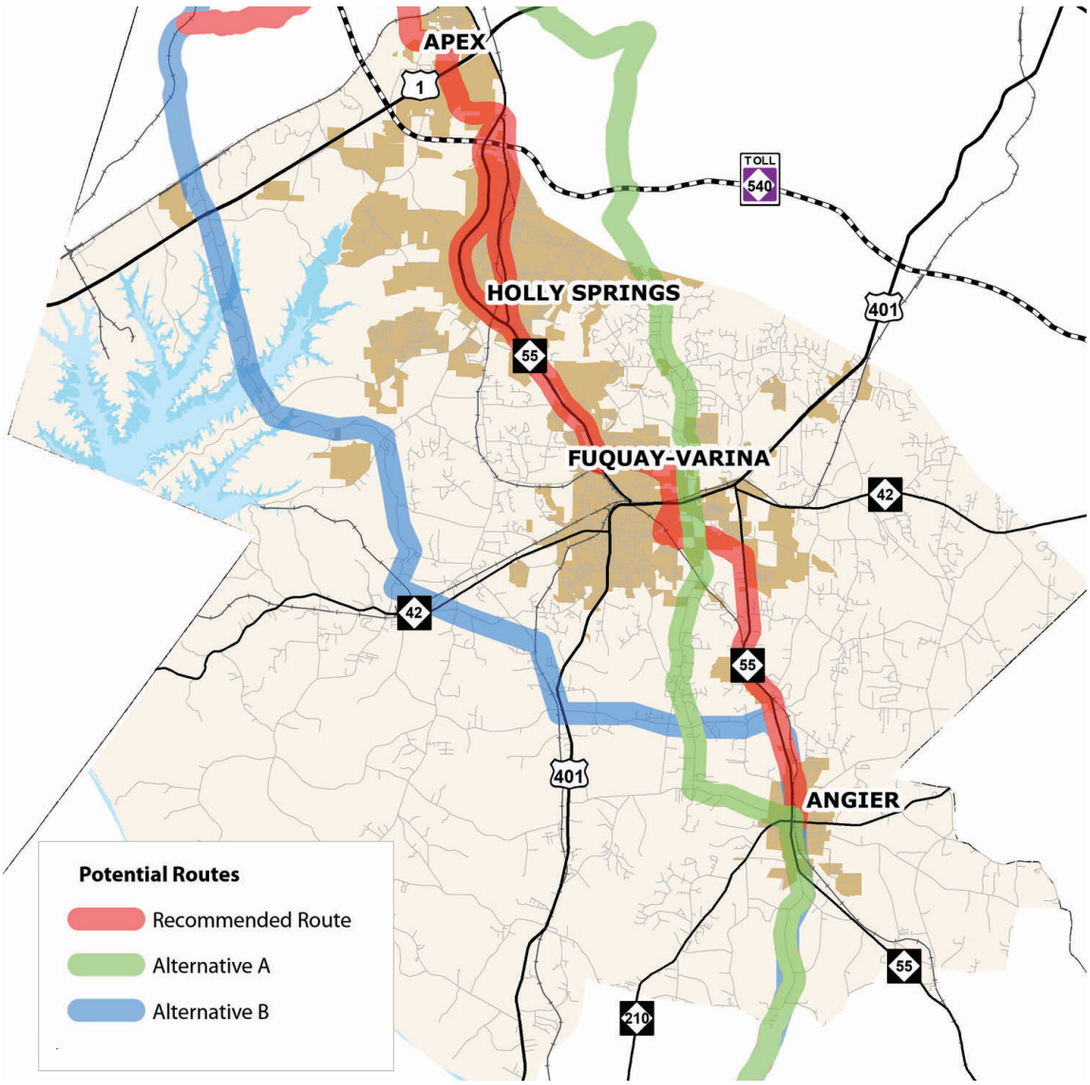
Consider traffic calming tools such as speed humps, neckdowns, curb extensions and/or enforcement techniques to slow traffic on streets with speeding problems.

East Coast Greenway

The East Coast Greenway, a developing trail covering 3,000 miles from Key West to Canada, is currently routed through the study area. This routing has not been vetted to date, providing an opportunity for this study to influence the chosen route to the benefit of study area residents. The East Coast Greenway is intended to link cities, and has the opportunity to bring tourists and the associated economic benefits to the region.

At the northern end of the study area, the route connects to the American Tobacco Trail, a well-used regional trail that attracts visitors far beyond the Triangle. To the south, it heads through Erwin to the east of Fayetteville, until ultimately connecting to Wilmington. With these established end points, three routing options through the study area were considered. The options were chosen based on data provided from previous planning efforts, the current routing on the East Coast Greenway's website, and the recommended greenway network generated through this planning process.

Of the three options, the central route was chosen for several reasons. First, it links the three major towns in the study area, rather than bypassing them on rural roads. The greenway has the potential to bring tourists to the towns, providing economic development benefits to local businesses and residents. It is therefore advantageous to choose a route that passes close enough to activity centers to potentially draw in users to restaurants and shops. Second, the designation of this route increases



East Coast Greenway Recommendations Map

the priority of the recommended greenway segments contained within it. Such a connection can better integrate the towns and benefit the quality of life of residents by providing a safe bicycle connection between them. In an age of limited resources, it makes sense to focus investments on facilities with multiple benefits across several scales.

This routing should be taken to the East Coast Greenway leadership for consideration and examined in more detail during future local planning efforts.

The information contained within this document is intended to serve as an overview for bicycle and pedestrian recommendations. For more detail on these recommendations, refer to the Concept Designs and the Project Inventory.

Policy and Program Measures

For the goal of increasing bicycle and pedestrian trips in the region to be achieved, this physical recommended network must be complemented with policy and programmatic efforts at the local and regional scales. While the physical network helps to improve safety for cyclists and pedestrians, policies like local smart growth strategies and the NCDOT's complete streets policy help to shape future growth and increase the viability of these modes for transportation. Programs encouraging cycling and walking, on the other hand, can help to shift public perceptions about their transportation options and the benefits of various modes. Programs can be broken into education, enforcement, and encouragement, each of which tackles a different barrier to bicycling and walking. A comprehensive approach will be critical to the success of bicycling and walking in the region.

Priority Projects

In addition to a comprehensive bicycle and pedestrian network, off-road projects are integral towards providing connectivity and improved safety throughout the region.

Priority off-road projects include both sidepaths (multi-use paths parallel to a roadway) and greenways (multi-use paths outside of the roadway right-of-way). Off-road multi-use paths are a key component of a comprehensive transportation network as bicyclists and pedestrians often prefer a separated facility (as indicated in the SWAS public input responses and similar responses across the State of North Carolina). These facilities connect important destinations such as schools, parks, commercial destinations, and employment centers. Priority projects were selected that were documented in previous planning efforts, identified by the CTT, OC, and the public, connected multiple land uses and, in many cases, were more feasible because of an existing easement or publicly-owned land.

Priority projects are profiled further in the Project Inventory. For each project, this document includes an explanation of the project's purpose, location, type, length, estimated cost, and potential funding mechanisms. Priority on-road bicycle and pedestrian projects are included as part of roadway priority project sheets.

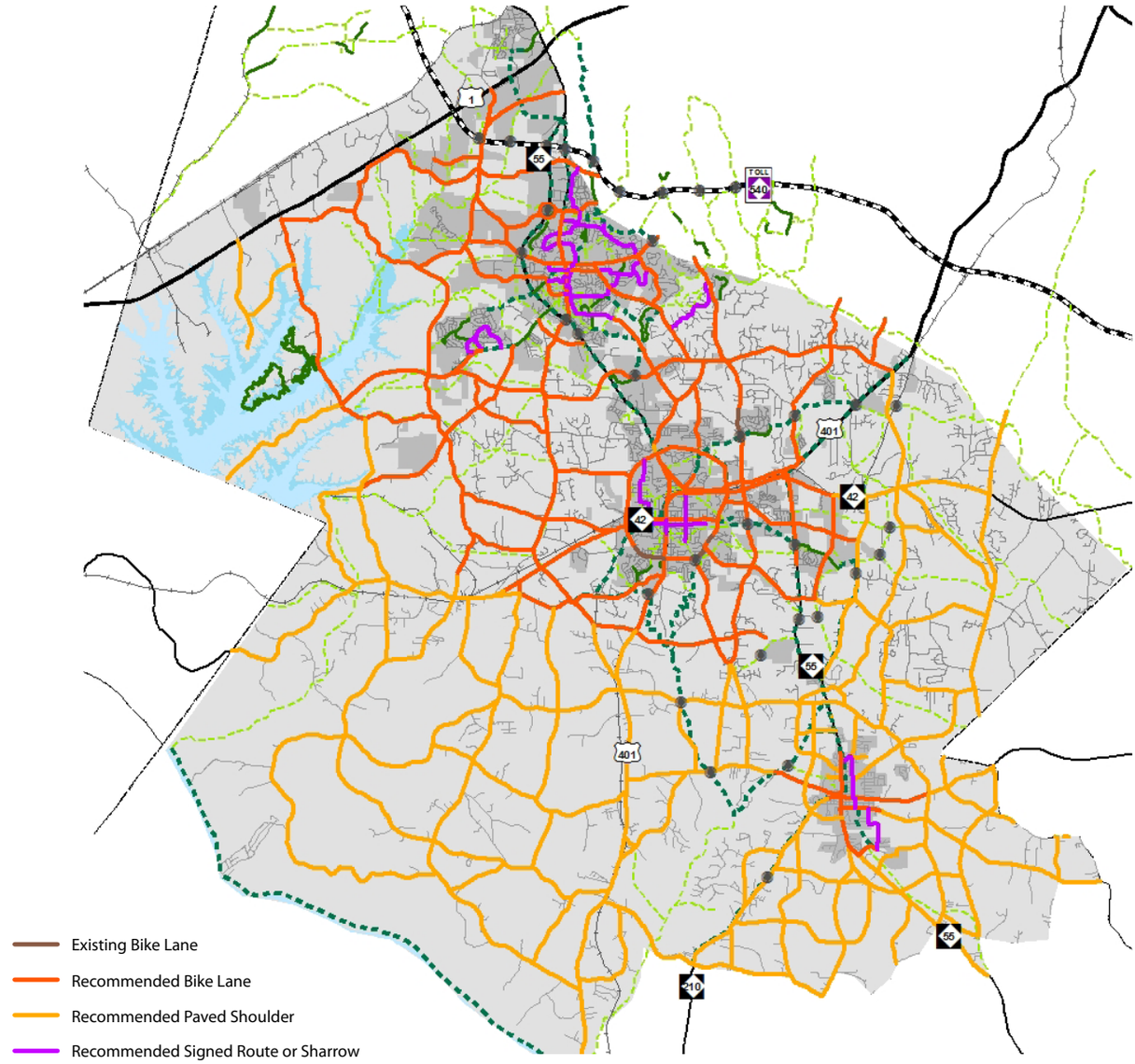
The final recommended network of bicycle and pedestrian facilities builds upon existing plans and accommodates expected growth in the region. Recommendations are shown by the following facility types:

Bicycle Lanes

A bicycle lane is a portion of the roadway that has been designated by striping, signing, and pavement markings for the preferential and exclusive use of bicyclists. The minimum width for a bicycle lane is four feet; five- and six-foot bicycle lanes are typical for collector and arterial roads. Bicycle lanes can be striped on existing roadways, sometimes with modifications to travel lane widths and configuration. Bike lanes are recommended in many areas where future growth is expected throughout the study area, particularly in Wake County. As a general practice, any local arterial or collector that is widened should incorporate bicycle lanes with speed limit reduction considerations.

Paved Shoulders

Paved shoulders are the part of a roadway which is contiguous and on the same level as the regularly traveled portion of the roadway. There is no minimum width for paved shoulders; however a width of at least four feet is preferred. Ideally, paved shoulders should be included in the construction of new roadways and/ or the upgrade of existing roadways, especially where there is a need to more safely accommodate bicycles. Paved shoulders are recommended in rural areas of the study area where less growth is expected. Paved shoulders should also be implemented as the short-term solution during resurfacing in all locations where bike lanes are recommended before curb and gutter is added.



Bicycle and Pedestrian Recommendations Map

Signed Routes and Sharrows

Signed routes and sharrows both indicate to drivers and cyclists that cyclists are an expected and encouraged street user. Signed routes are recommended on low speed, low volume roadways that connect destinations where no special bicycle facilities are needed, typically through neighborhoods. Shared lane markings, or "sharrows," should be used in areas where speeds are low but traffic volumes are more significant and space limits the feasibility of bike lanes, such as through town cores. Sharrows are placed in a linear pattern along a corridor, typically every 100-250 feet and after intersections. They make motorists more aware of the potential presence of cyclists; direct cyclists to ride in the proper direction; and remind cyclists to ride further from parked cars to avoid 'dooring' collisions.

Greenways

Greenways, also referred to as multi-use trails or sidepaths, are completely separated from motorized vehicular traffic and can either be constructed in their own corridor or along roadway corridors. Multi-use trails include bicycle paths, rail-trails or other facilities built for bicycle and pedestrian traffic, and should be 10 foot wide minimum with a preferred width of 12 feet. The extensive greenway network, recommended in the Wake County greenway plan and other CTPs, was retained in the final network, with additions in easement and roadway corridors. Key links ideal for shorter-term implementation and important to connectivity were identified and emphasized as 'key greenway recommendations'.

Sidewalks & Crosswalks

Sidewalks should be a minimum of five feet wide in all areas, and eight feet wide in mixed use and commercial areas. Sidewalks are recommended to be retrofitted along many existing roadways, but should also be included in all future roadway projects as the region implements the DOT's complete streets policy. New sidewalks will require ADA compliant facilities, including connective curb ramps and cross walks. For persons with disabilities, curb ramps provide critical access between the sidewalk and street. The Federal Highway Administration suggests that curb ramps provide a level land area, be within the marked crosswalk area, avoid large grade changes, and be distinguishable from surrounding terrain. The Federal Americans with Disabilities Act (ADA) mandates curb ramps at all intersections and mid-block locations where pedestrian crossings exist. Marked crosswalks indicate the optimal location for pedestrians to cross a street. While crosswalks are usually installed at signalized intersections, mid-block crosswalks are becoming more popular. In locations that require increased levels of pedestrian visibility, elements such as raised crosswalks, pedestrian refuge islands, and curb extensions can be used. In North Carolina, pedestrians within a crosswalk have the right-of-way and motorists must yield.

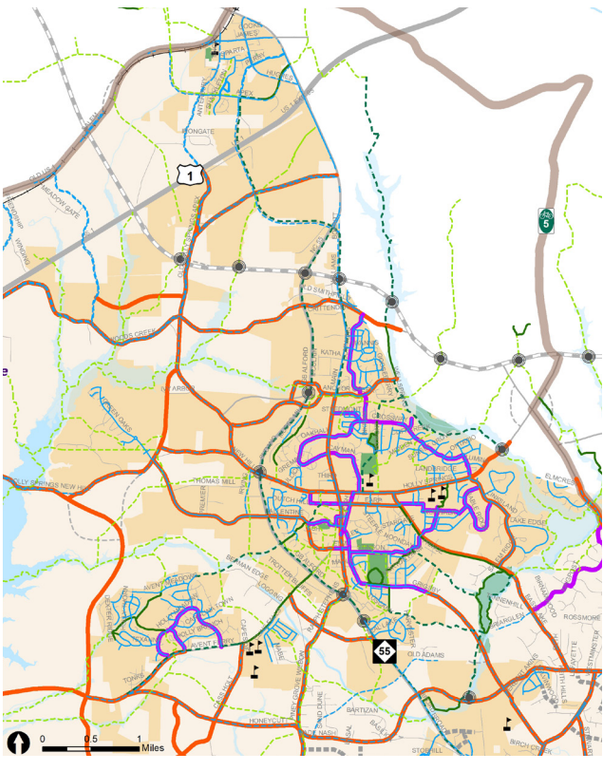
Community Insets

Recommendations in the municipalities of Apex, Holly Springs, Fuquay-Varina, and Angier are shown here in more detail. The following section describes some of the key connections made in each of these locations.

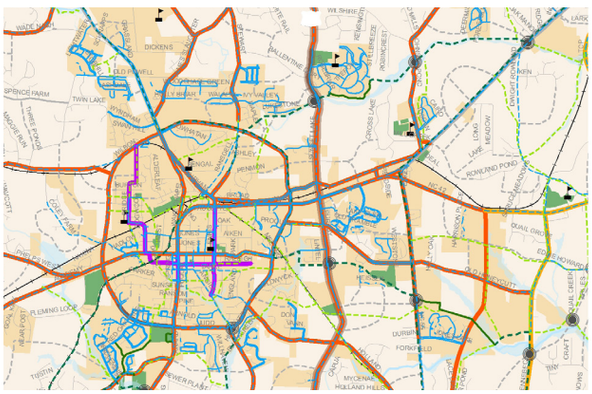
Apex/Holly Springs

The comprehensive bicycle and pedestrian network map for Holly Springs is largely derived from the 2008 Holly Springs Pedestrian Plan and 2011 Holly Springs Bicycle Plan. Sidewalk connectivity along major roads with appropriate intersection crossing treatments is integral to this network. A signed

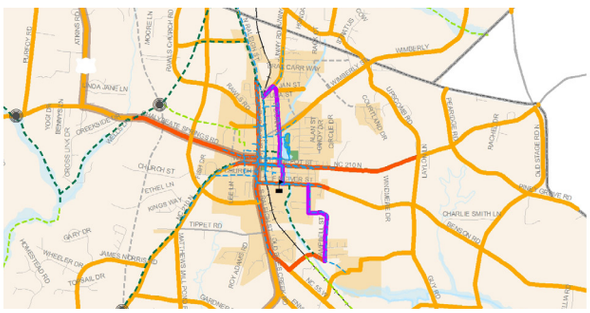
- Existing Sidewalk
- Proposed Sidewalk
- Existing Bike Lane
- Recommended Bike Lane
- Recommended Paved Shoulder
- Recommended Signed Route or Sharrow
- Existing Greenways
- Recommended Greenways
- Key Recommended Greenways
- Proposed Grade Separated Pedestrian Crossing
- School
- Triangle Expressway (proposed)
- Floodplain
- Park
- Municipality



Holly Springs



Fuquay-Varina



Angier

bicycle route creates a loop through the Town, keeping bicyclists off major roads and connecting neighborhoods to schools and parks. Bicycle lanes are recommended along Holly Springs Road and Main Street to serve local traffic, residential density, and the Downtown. Local recommended greenways connect neighborhoods to the Downtown and to Town parks. Regionally, as Holly Springs expands its jurisdiction, bicycle lanes or sidepaths are recommended along new and widened roadways. Maintaining bicycle and pedestrian connectivity southward to Fuquay-Varina and northward towards the future Veridea development and Apex, despite the possible barriers of the future NC 540 and NC 55, is essential.

Fuquay-Varina

The bicycle and pedestrian network map expanded upon the Fuquay-Varina Comprehensive Transportation Plan recommendations to suggest a more comprehensive and connected system. A substantial network of bicycle lanes is recommended along collector and some arterial roadways extending away from the Downtown. Judd Parkway becomes the wheel of connector bicycle and pedestrian spokes. The core of Downtown features a network of sidewalks along with some new developments on the outside of Judd Parkway. Sidewalks are recommended to connect the gaps between these pedestrian facilities. Key greenway corridors include the NC 55 sidepath, the greenway that connects Judd Parkway eastward to Honeycutt Road Park and South Lakes subdivision, and two greenways that run south along the railroad and along a stream corridor.

Angier

The comprehensive bicycle and pedestrian network map generated during this study referenced the 2008 Angier Land Use Plan to help determine greenway corridors. Bicycle lanes are recommended closer to the core of Angier with paved shoulders recommended outward into the more rural areas. These paved shoulders would provide separated space for bicyclists and pedestrians. Within the Town, a signed bicycle route is recommended as a north-south alternative to connect neighborhoods to Jack Marley Park and Angier Elementary. Greenways are recommended northward along NC 55, southwestward along an existing sewer easement, and parallel to Broad Street along a railroad right-of-way. As density increases in Angier, through new and infill development, sidewalk and greenway connections will prepare the town to be more walkable in these areas.

Transit

Effective transit requires more than vehicles carrying riders. Design policies are integral elements to ensure that people can identify and access the transit system, while land use and zoning policies help concentrate people and mix land uses to maximize transit's effectiveness. When combined, design and land use policies increase transit's ridership potential as well as its value as an economic development and sustainability tool. From stakeholder interviews to the Mobility Chip Game to polling at the Project Symposium, the general consensus was that livability and mobility require reliable options for transit.

Using existing plans as a foundation, the transit component of the Southwest Area Study relied on work sessions with local staff and the general public, land use scenario planning, and additional analysis to arrive at a coordinated set of recommendations.

Methodology

Transportation projects require years of planning and coordination before they can be implemented. Transit projects in particular require coordinated decision making and garnering of public support years in advance in order to be successful. Adhering to several guidelines helps communities reap the maximum benefits of recommended transit services.

Density

Increased population and employment densities place more potential riders within walking distance of transit stations/stops. These densities create adequate transit ridership to justify frequent service, and help create active street life and commercial activities, such as grocery stores and coffee shops, within convenient walking distance of homes and worksites.

Mixed-Uses

Traditional zoning separates land uses, sets density thresholds and minimum lot sizes, and usually contains explicit regulations. To support transit, traditional zoning often is turned on its head (i.e., uses are intermixed, not segregated, and required parking is often capped with not to exceed maximum rather than a parking minimum).

Pedestrian Orientation

Pedestrians who can walk to different land uses in less than ten minutes are more likely to utilize retail establishments, parks, and community facilities. Placing daily goods and services, as well as recreational destinations, within walking distance of residences increases the incentive to use alternative modes, supporting transit use for commuting and other regional travel.

Access and Connections

For transit to be successful, pedestrians must be able to easily access the service and conveniently walk when they get off the bus or train. Vehicular and pedestrian policies should promote non-motorized transportation.

Transit Infrastructure and Amenities

Transit stops that are easy to find and use are critical to passengers getting on and off the vehicle. Adequate pedestrian accessibility and enhanced passenger amenities at transit stops are critical to attracting people to transit. Comfortable and safe stops require thoughtful attention to the functionality and design of stops.

The transit element of this study evolved throughout the planning process. The resulting strategy built upon previous plans and provided a blueprint for a vision developed through numerous conversations and exercises with local residents, community stakeholders, staff, and elected officials.

Previous Plans

For the Southwest Area Study, regional plans were reviewed to understand what transit projects already were being discussed that could affect the SWAS communities. These plans included the Triangle Transit Short-Range Transit Plan (2008), the Special Transit Advisory Commission (STAC) Regional Transit Vision Plan (2008), Joint 2035 Long Range Transportation Plan (2009), Triangle Transit Regional Transit Program (2010 - Current), the Wake County Transit Plan, and the Harnett CTP.

Together, these plans demonstrated strong support for express bus service in the area as an important piece of the regional transit network. Express bus service is typically

targeted for commuter trips and is accomplished with buses that originate in suburban communities. The express routes only operate during peak periods and include a limited number of park-and-ride stops with ultimate destinations typically at a major transit hub (intermodal centers) and employment centers like downtown Raleigh. Express service to Fuquay-Varina via US 401 and service to Holly Springs via NC 55 are both scheduled to begin operation in 2025. Other route proposals, including a route along the future corridor of I-540 and service connecting Holly Springs and Fuquay-Varina along NC 55 also are potential services, though more likely in the longer term. It should be noted that light rail service is proposed to run from Apex to either Raleigh or Research Triangle Park (RTP) as described in the Town of Apex Comprehensive Plan. If constructed this could open the possibility of future strong links from the southwest area to the region's emerging rail network.

In additional to regional plans, local plans were also reviewed for transit recommendations. In particular, the local plans included the Town of Apex Comprehensive Plan (2004), Town of Fuquay-Varina Community Transportation Plan (2006), Town of Holly Springs Comprehensive Plan (2009), and the Harnett County Comprehensive Transportation Plan Study (2011). Of these plans, the most common recommendation is for increased regional bus service for efficient connection to regional employment centers. Each of these plans recognized the need to encourage transit-supportive land uses such as increased densities and mixed-use development in key areas that will complement future transit investments.

The transit recommendations incorporated feedback from the land use scenarios created for the Southwest Area Study (see Module 2) and emphasized targeted growth in fewer but more concentrated nodes of development, and diverse development patterns in Wake and Harnett Counties.

Recommendations are divided into two phases.

"The transit element of this study evolved throughout the planning process. The resulting strategy builds upon previous plans and provides a blueprint for a vision developed through numerous conversations and exercises with local residents, community stakeholders, staff, and elected officials."

Phase I

Phase I incorporated the short-term bus elements in the Wake County Transit Plan (WCTP) (www.wakegov.com/transportation/transitplan.htm) with the Bus Enhancement Plan year of 2017. Phase II included longer-term concepts developed through the Southwest Area Study planning process and it will become feasible as land use is changed to create the preferred development scenario with appropriate densities. The suggested elements of Phase I included:

- Three Commuter Services connecting to the Triangle
- A Flex Service route between Apex, Holly Springs, and Fuquay-Varina
- Two Minor Transfer Locations in Fuquay-Varina and in Holly Springs
- A Major Transit Center in Veridea

Phase II

While Phase I included only elements from the fiscally-constrained WCTP Bus Enhancements for 2017, it reflected the outcome of the scenario planning process that indicated a stronger preference for a transit market in Holly Springs and Fuquay-Varina. The suggested elements included:

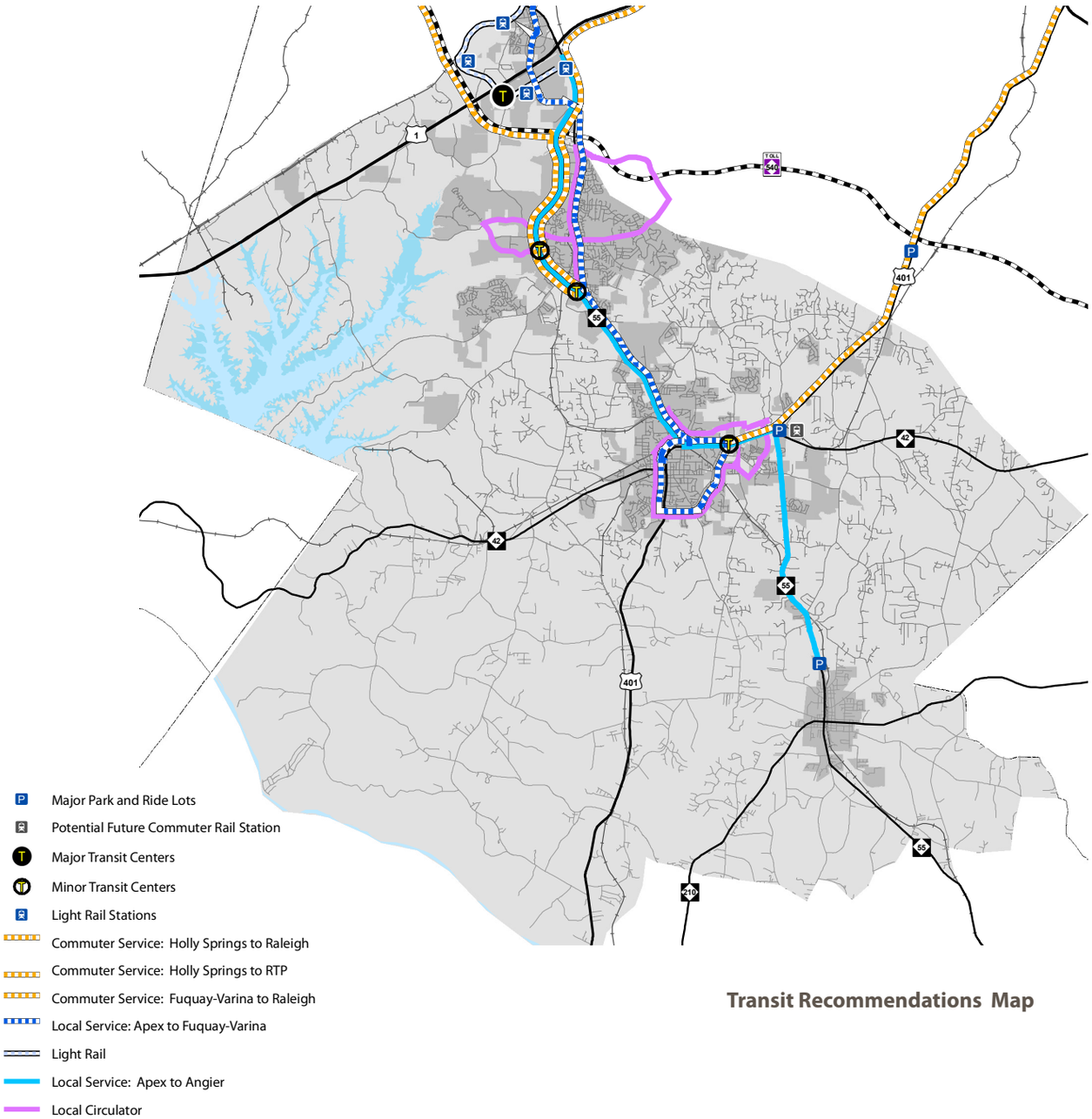
- Two Circulators in Holly Springs and Fuquay-Varina
- A local service connecting Apex to Angier
- Park-and-rides in Fuquay-Varina and in Angier

The chart below shows the potential funding sources that could be used to finance transit projects described in Phases 1 and 2.

	Funding				Operator(s)				
	Federal	State	Local (Wake County Transit Plan*)	Local (Municipal funds)	Triangle Transit	CAT	Town of Cary	NCDCOT	Local Municipality
Phase 1 - Wake County Transit Plan									
Three commuter routes	x	x	x		x				
Apex-Fuquay Flex	x	x	x		x		x		
Two transfer points, 1 transit center	x	x	x		x				x
Phase 2									
Holly Springs Circulator**	x	x		x	x	x			x
Fuquay-Varina Circulator**	x	x		x	x	x			x
Apex-Angier Route	x	x			x				x
Park and Rides		x		x	x			x	x

* Includes 1) 1/2-cent Wake County Transit Sales Tax and 2) $10 increase for vehicle registration fees - Holly Springs now $25 (up from $15), Fuquay-Varina now $20 (up from $10), unincorporated Wake County now $15 (up from $5)

** Circulator operating assumptions based on precedent in Wake Forest.



Transit Recommendations Map

Typically, the recommended population density threshold for regular local bus service is four dwelling units per acre. Though the station areas in Holly Springs and Fuquay - Varina are slightly lower than this threshold, uniquely branded circulator services connecting to regional transit are still viable options for connecting local destinations. Such services have proven succesful in other communities such as Hackettstown, NJ, Broward County, FL, and Middlebury, VT. Factors such as the mix of activities at stops/stations and marketing can strongly influence the success of a local loop in small urban and rural communities.

Victoria Transportation Policy Institute, 2010 (Based on Pushkarev and Zuppan 1997) & TCRP Report 55 - Guidelines for Enhancing Suburban Mobility Using Public Transportation: Miami-Dade MPO Local Municipal Transit Circulator Policy Study; US Census 2010

Local Service Between Apex and Angier

Scenario E estimated that the population of Angier would be nearly 8,000 by the plan year of 2035. Combined with the growing commuting population in Harnett County, service connecting an Angier park-and-ride to the Triangle is justified.

Holly Springs Circulator

Population projections for Scenario E indicated that an estimated 14,274 residents and 12,472 jobs would be located within a 1/4 mile of the route. Average population density along the route will be 2,409 people per square mile. These densities can support local transit service.

Fuquay-Varina Circulator

Population projections for Scenario E indicated that an estimated 15,345 residents and 11,912 jobs would be located within a 1/4 mile of the route. Average population density along the route will be 3,772 per square mile. These densities are comparable to densities needed to support local transit service.

Angier Park-and-Ride

Though population and job projections within a 1/4 mile walking distance of the transit stop were the lowest of the region - with an estimated 165 individuals and 152 jobs - this transit stop would be a park-and-ride located over a mile from Downtown Angier. Transit riders from Angier as well as points south would drive to the park-and-ride to access service.

Several transit elements beyond the study area influenced the recommendations, including:

- The regional light rail connecting Veridea to the RTP (WCTP)
- The park-and-ride located at Wake Tech (WCTP)
- Potential future commuter rail station in Fuquay-Varina

Along the NC 55 corridor in the major nodes of Holly Springs and Fuquay-Varina, designated transit lanes should be considered to ensure minimum transit speeds and reliability. South of Fuquay-Varina, where NC 55 is only two or three lanes, traffic levels may not demand the designation of a lane for transit. In all nodes (Veridea, Holly Springs, Fuquay-Varina and Angier), signal priority with queue jumping lanes should be considered at major intersections.

Local Service between Apex and Angier

Express service between Veridea and Angier is recommended along NC 55. This service would serve Apex, Holly Springs, Fuquay-Varina, and Angier. Service in Wake County would operate on 30-minute headways during peak periods (6:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 p.m.) and 60-minute headways during the remainder of the service span (9:00 a.m. to 3:00 p.m.). Service in Harnett County would operate on 60-minute intervals during the entire service span.

While the service is best suited for bus rapid transit or similar technology for 2035, utilizing other technologies during the interim years—specifically vanpools—can help build ridership and help residents rely on transit rather than driving alone.

Signal priority with queue jumping lanes should be considered at these major intersections:

- Veridea (Apex Major Transit Center)
- NC 55 Bypass and Holly Springs Road (New Hill Road, Holly Springs)
- NC 55 Bypass and Ballentine St/Green Oaks Pkwy (Holly Springs)
- NC 55 Bypass and Ralph Stevens Road (Holly Springs Minor Transfer Location)
- NC 55 and NC 42/US 401 (Fuquay-Varina)
- NC 55 and Smithwood St (Fuquay-Varina)
- NC 55 and Sunset Lake Road (Fuquay-Varina Minor Transfer Location)
- NC 55 near Logan Court (Angier Park-and-ride, grocery store parking lot)

The WCTP identified the northern segment of this corridor as appropriate for flex service. The primary difference between the services recommended in the Southwest Area Study is the extension to Angier. With the development of Campbell University's Medical School near Angier and other potential development in the area, extension of the route to Angier has additional opportunities to serve multiple trip demands.

While the local service between Apex and Angier would operate along the same corridor as the commuter services from Holly Springs to RTP and Holly Springs to Raleigh, each service captures a different type of transit market and, they are not considered redundant. The local service route travels only from Apex to Angier, making stops in the towns of Apex, Holly Springs, Fuquay-Varina, and Angier. This service operates all day, at 30-minute headways. By contrast, the commuter services operate only during peak hours and make no stops until they reach their final destination.

Transfers between this service and commuter service likely would be limited due to the schedule (peak hour versus all day) and the extra travel time this connection would cost the rider. The local service captures travel to destinations in these outlying towns rather than regional travel.

Local Circulators

Phase II includes local circulators in Holly Springs and Fuquay-Varina that connect major destinations within the Towns. The best technology for this type of circulator service is a rubber-tire trolley, which is typically smaller than a standard 54-passenger bus and allows unique branding to identify the service as local and specialized.

Holly Springs Circulator - Holly Springs has a preliminary concept for the "Holly Trolley" that is envisioned as a specialized local service with a distinct brand. Service along the loop is expected to operate on 60-minute headways, between 7:00 a.m. and 7:00 p.m.

Fuquay-Varina Circulator - Similar to Holly Springs Circulator, this route will offer circulator service and allow the Town to create a unique type of branding for the service. Service would operate at 60-minute headways, initially between 8:00 a.m. and 5:00 p.m. The more conservative span of service reflects the slightly lower level of support for the service from the existing local plans.

Fuquay-Varina Park-and-Ride

Along with the Minor Transfer Location located in Fuquay-Varina in Phase I, Phase II included a second park-and-ride lot at the potential commuter rail station located at the easternmost intersection of US 401 and NC 55. A commuter rail station was not part of the WCTP butwould be a potential future condition of this site if housing and employment densities increased at this location.

Angier Park-and-Ride

The final transit element of the recommended scenario is a proposed park-and-ride facility in Angier on NC 55 north of Downtown. The park-and-ride would initially be co-located within the grocery store parking lot near Logan Court on NC 55. This park-and-ride would allow residents from the area to access the bus service to Apex.

The Angier park-and-ride facility was not part of any prior regional transit plans. However, the Harnett County Comprehensive Transportation Plan displayed a park-and-ride location in Angier on the CTP map. Members of the Technical Advisory Committee representing Harnett County and Angier recommended a park-and-ride facility for inclusion in this plan. Population densities in Angier will warrant a park-and-ride facility by 2035.

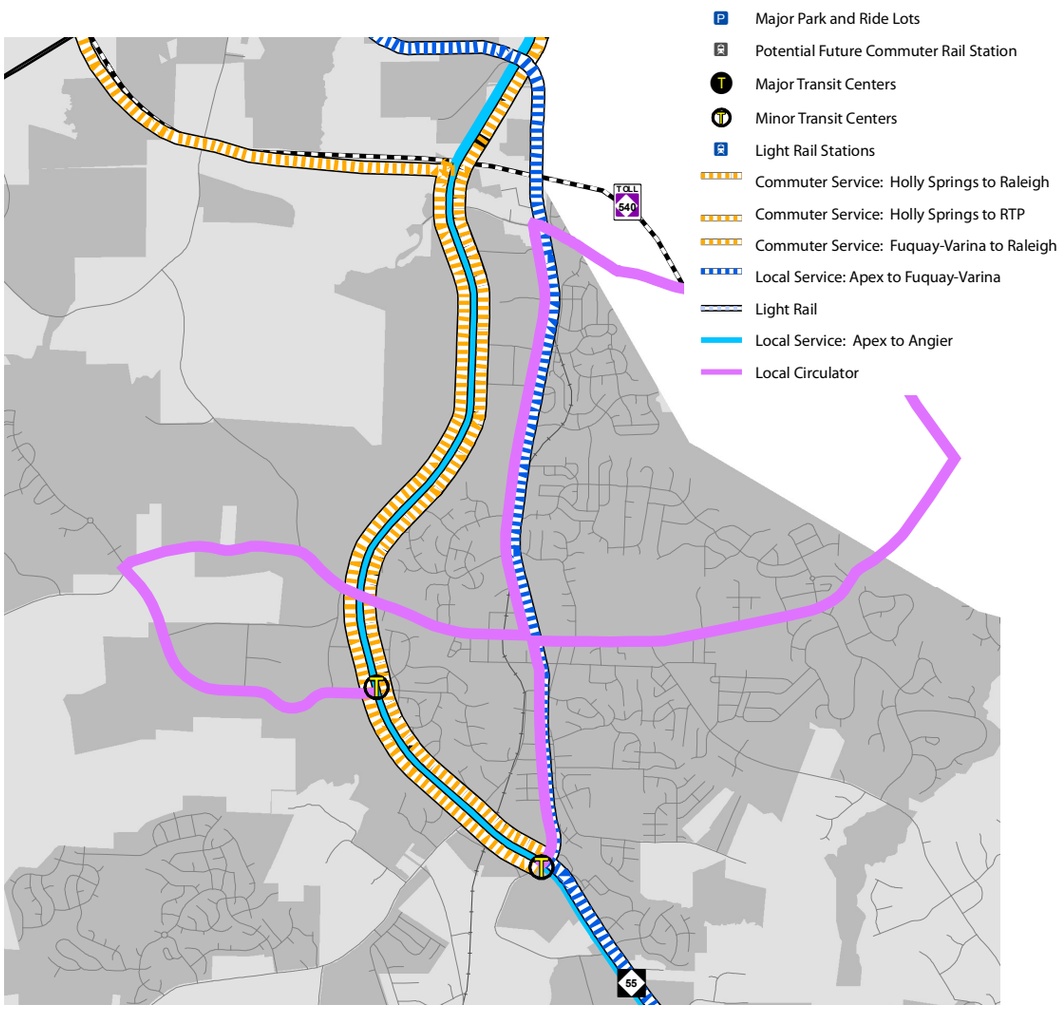
Community Insets

Recommendations for Holly Springs and Fuquay-Varina are shown on the following pages in more detail.

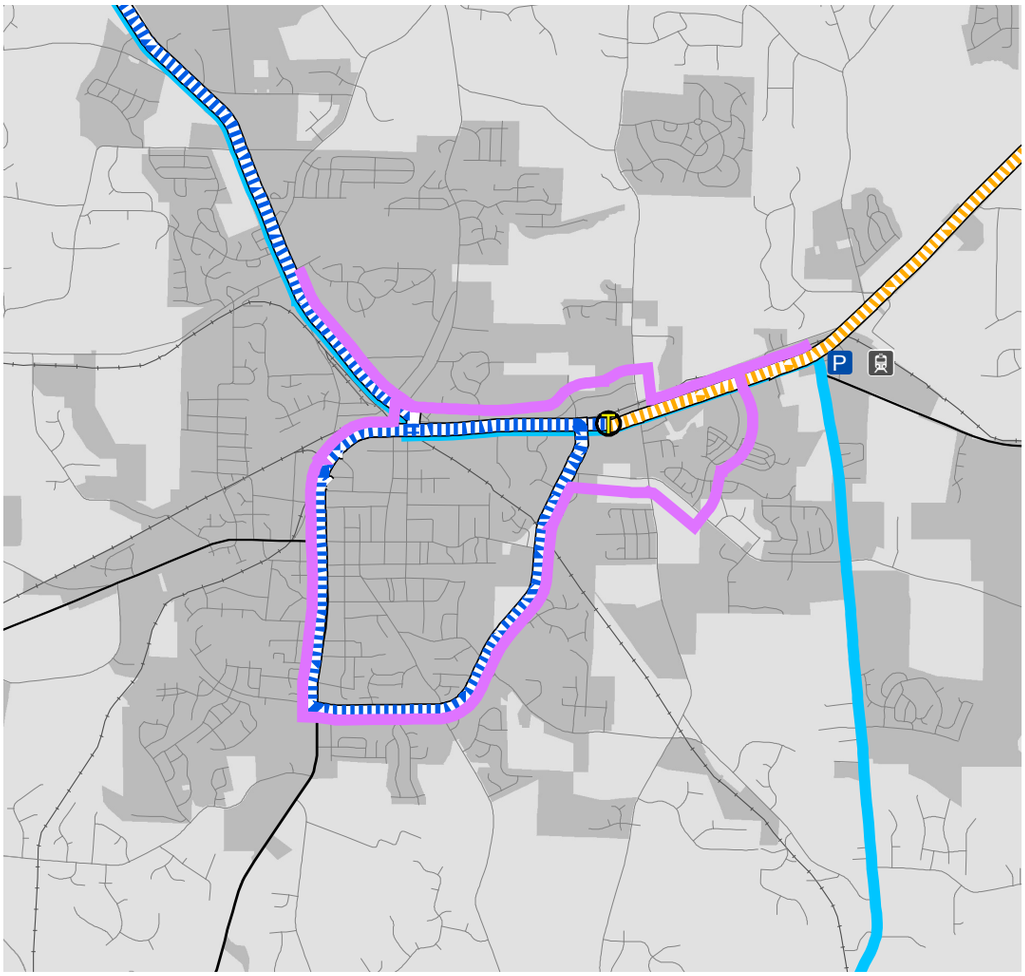
Holly Springs Circulator

The service would connect Downtown Holly Springs with major destinations such as the medical center, New Hill Place, Holly Springs Business Park, South Park Village, Sunset Lake Commons, and the Minor Transfer Location. The trolley generally is assumed to attract local shoppers and shorter trips. Riders wishing to connect to regional service likely would drive to the Minor Transfer Location rather than use the trolley.

This local circulator was not in the WCTP, which largely focused on regional connections from outlying towns rather than connections within the towns themselves. The WCTP investigated local service provision but determined there would be insufficient ridership to support a local circulator in 2017. The Holly Springs Comprehensive Transportation Plan recommended the loop, and members of the Technical Advisory Committee encouraged inclusion of the loop in the Southwest Area Study to further support other recommendations in the WCTP.



Holly-Springs Circulator Route Map



Fuquay-Varina Circulator Route Map

Fuquay-Varina Circulator

Like the Holly Springs Circulator, the Fuquay-Varina Circulator was not part of the WCTP. However, with the nodal growth advocated in the Blended Scenario, sufficient density would be present in Fuquay-Varina to support a specialized, local circulator by 2035.

The Technical Advisory Committee supported this local service. Members of the public also suggested a local circulator during the public outreach process for the Fuquay-Varina Comprehensive Transportation Plan, but this recommendation was not part of the Plan's final recommendations.

More Information

Additional detail on the transit recommendations can be found in supporting documents to the Southwest Area Study, including the Transit Supportive Policies and the Project Inventory, found under separate covers.

Roadway

The roadway network in the study area will continue to be heavily relied upon by its residential and employment populations. Improvements must be made in order to accommodate the orderly growth of the area.

Background

The guiding principles developed for the Southwest Area Study are intended to address the needs of the travel modes and land use considerations. When identifying the proposed roadway recommendations for this area, the guiding principles were addressed in the following way:

Livability

The roadway recommendations were developed to support the preferred growth scenario (see Module 2: Scenario Planning). Proposed roadway facility types are sensitive to the future growth or preservation of the area, and incorporate amenities for multimodal travel.

Mobility

Recommended roadway improvements satisfy future travel demands by reducing congestion. New facilities such as strategic arterial corridor enhancements and beneficial collector street linkages were identified that could make the system function more effectively.

Environmental Character

Environmental and social features were considered when recommending improvements. By identifying sensitive areas through public feedback and data analysis, recommendations were structured to avoid these areas or minimize impacts.

Economic Vitality and Development

The proposed roadway network supported the vision for development in the area. The unique character of each member municipality was respected in recommendations development.

Regional Collaboration

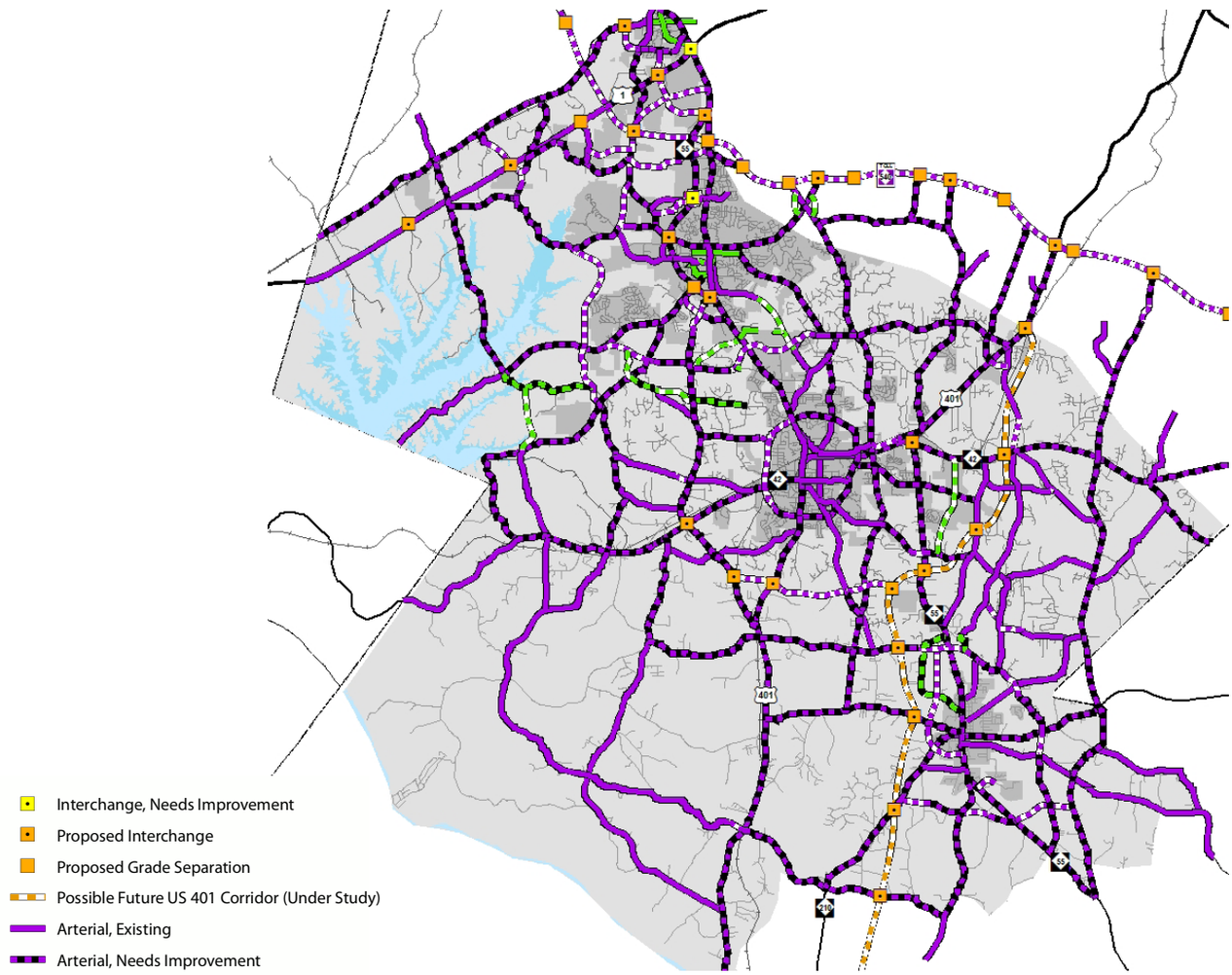
The Southwest Area Study's extensive outreach process resulted in a set of proposed roadway recommendations supported by all jurisdictions. Consistency across boundaries promoted improvements that best serve the entire area.

Methodology

Developing roadway recommendations required consideration of public and committee feedback, the Triangle Region Travel Demand Model, previous planning efforts, multimodal priorities, connectivity, and land use integration. Public outreach, CTT/OC meetings, and worksessions with individual jurisdictions were used to understand the issues and opportunities facing the region. To supplement this qualitative understanding of transportation challenges, the socioeconomic data developed during the scenario planning process was used as an input to the Triangle Regional Model. The travel demand model forecasted congestion patterns and determined performance measures such as vehicle miles traveled, delay, congested corridors, and travel times.

In addition to the analysis of current and future conditions, previous planning documents were also examined. Referenced plans include the Apex Comprehensive Transportation Plan, the Holly Springs Comprehensive Transportation Plan, the Fuquay-Varina Comprehensive Transportation Plan, the Harnett County Comprehensive Transportation Plan, the CAMPO Long Range Transportation Plan, 2012-2018 Metropolitan Transportation Improvement Program, and the CAMPO 2040 Comprehensive Transportation Plan.

The recommended roadway system had to be sensitive to the needs of bicycle, pedestrian, and transit traffic. Incidental bicycle and pedestrian projects could be constructed alongside roadway improvements to reduce overall cost. Freight mobility needs in the area also needed to be addressed through clear arterial routing and alternative corridors. These considerations furthered the objectives of the NCDOT Complete Street Design Guidelines. The efficiency with which the roadway network addresses the needs of all the travel modes depends on making the best use of the existing system. To do this, the design and future characteristics of roadways in the SWAS area will need to make use of state of the practice technologies such as intelligent transportation systems, signal prioritization, and other travel demand management techniques. Issues such as bus stop placement (e.g. curbside, bus bays, or nubs) can have significant impacts on the operation



Thoroughfare Plan

of strategic corridors and will need to be evaluated on a case-by-case basis to balance out costs and benefits of each treatment.

Growth in the southwest area has generally been suburban in character and focused on an automobile-based transportation system with larger lots, increased parking demand, and lower building densities. Suburban roadway networks typically do not form a grid network, which tends to serve shorter trips and affords users several route options with similar travel times. Instead, suburban networks tend to facilitate longer trips between fragmented development patterns. Less connectivity causes greater reliance on a select group of roads, and with inadequate capacity the system often breaks down. Poor connectivity can have several unintended negative results including:

- Increased susceptibility to delays caused by bottlenecks from traffic accidents, road closures, etc.
- Reduced mobility for alternative modes (reduced connectivity means longer distances for pedestrians and cyclists which in turn also makes transit service less efficient)
- Few alternative routes for emergency vehicles

The recommended roadway network addressed this issue through collector street planning and key arterial connection enhancements.

Recommendation Types

The recommended roadway improvements addressed the needs of the study area by using several different recommendation types.

Roadway Widening

Roadway widening is the primary measure by which facilities in this area will be improved. Widening projects take advantage of existing corridors and rights-of-way, and are typically less cost-intensive than new location facilities. Through these widening efforts, consideration must be given to potentially impacted land uses, type of bicycle and pedestrian accommodations, and promotion of a regional system that allocates resources most effectively. Sensitivity was used in determining the most appropriate locations so that local character in municipal centers or other unique locations could be preserved.

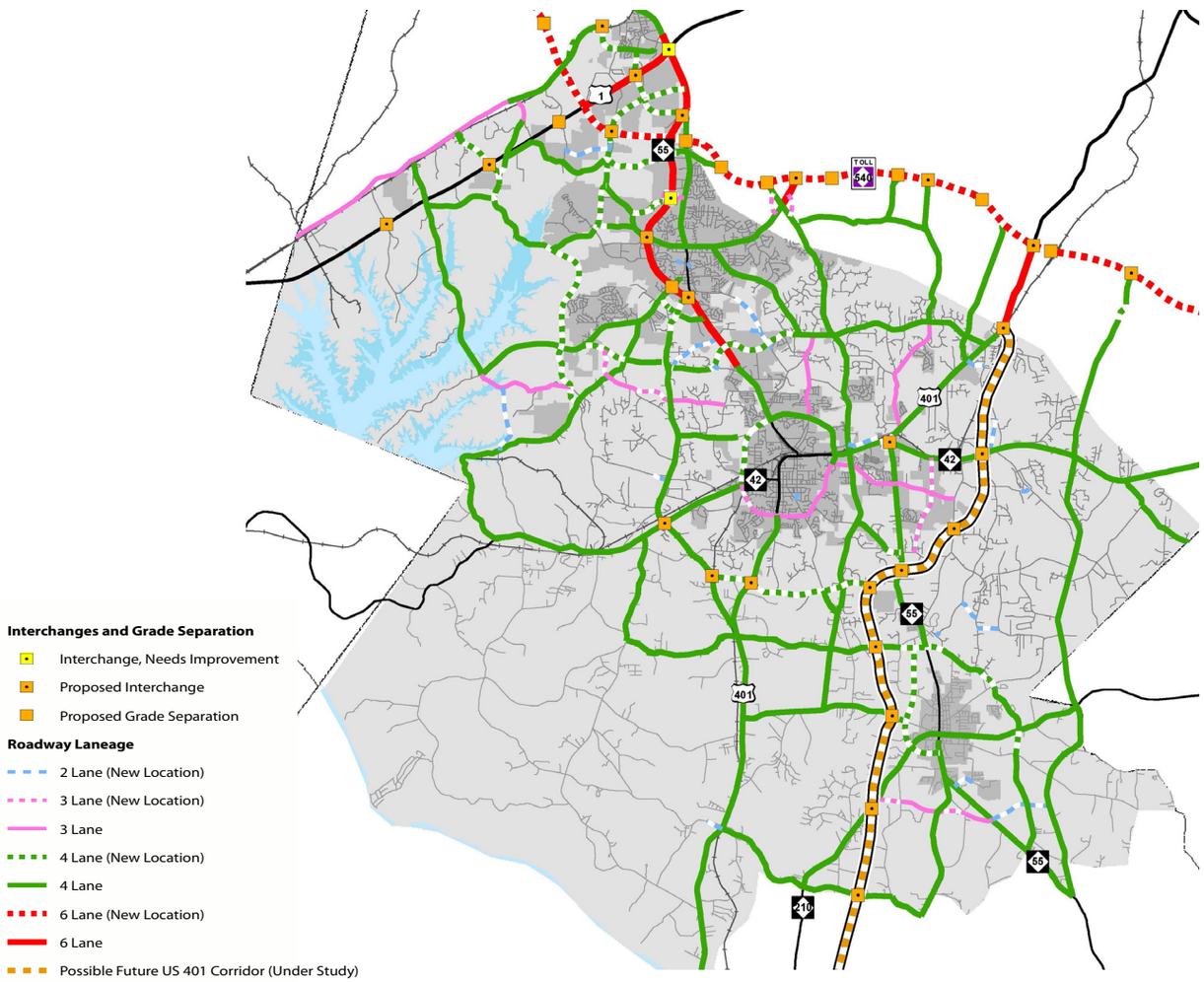
New Location Facilities

There are a few strategic multilane new location facilities recommended for the study area. The intent of these roadways is to serve needs that cannot be effectively addressed through roadway widening or other improvements. Examples include US 401, the Fuquay-Varina southern bypass, the final section of Judd Parkway, the Buckhorn Duncan Road extension, and the western Angier

bypass. Smaller multilane new location facilities are recommended throughout the study area, mostly as a means to realign problematic intersections or to create a continuous east-west or north-south corridor.

Collector Streets

Collector streets provide a balance between roadway mobility and access needs. They support the higher order of thoroughfares by offering enhanced connectivity between groupings of local streets to major arterials. As such, their presence in the roadway network is essential to serving growth while reducing congestion on major roads. The Holly Springs and Fuquay-Varina CTPs offered recommendations for collector street facilities. These recommendations were expanded upon by providing recommended facilities in Angier and Harnett County. Proposed collector street locations were chosen to minimize environmental and cultural impacts. However, the final locations for these roadways would be determined through a collaborative process between the jurisdiction and potential developers. Collector Streets are often constructed incrementally as development occurs or through public-private partnerships at the local level.



Roadway Laneage Map

Interchanges

Interchanges are often the last resort response to growing intersections because of their cost and amount of space required. They also have the greatest amount of access control of any intersection type making development in their immediate vicinity challenging. Finally, they are best suited for automobiles and are often barriers to safe walking and bicycling unless successful designs or alternatives are included. Despite these characteristics some high-level roadway facilities in the area will require intersection treatments that are grade-separated in order to maintain traffic flow and safety. These future interchanges address new development along existing roadways (US 1), increased pressures on existing roadways necessitating grade separated facilities (NC 55 in Holly Springs, intersection of US 401/NC 55/NC 42), and new roadways that are expected to function as freeways or expressways (e.g., future US 401, southern Fuquay-Varina bypass).

Roadway Laneages

In order to provide additional detail about the recommended roadway projects, roadway laneages (an expression of roadway capacity) were proposed for each corridor. Laneages are specific to the needs of the area, and varied in different corridor sections. Since this planning exercise was oriented toward a 2040 horizon year, roadway laneages were proposed to help address the needs at that time. However, improvements to certain corridors may come incrementally (e.g. constructing a 2-lane road on a 4-lane cross-section, and then widening the road when congestion levels indicate the need).

The NC 55 Bypass in Holly Springs is shown as a recommended six-lane facility. The six-lane cross-section is recommended to continue all the way to the Magnolia Ridge neighborhood area in Fuquay-Varina. However, the section of NC 55 between Magnolia Ridge and Judd Parkway will need to be studied closely in future planning years to ensure a four-lane cross-section is still adequate in that area.

US 401 was also closely scrutinized during the recommendations development process. In order to maintain the local character in the area of this corridor leading into Fuquay-Varina, it was recommended the corridor not expand beyond a four-lane section. Improvements such as a higher-level intersection treatment at US 401/NC 55/ NC 42 and the future US 401 corridor (see additional information on the following page) would improve the corridor's future operation.

More Information

Additional detail on the recommended roadway network is located in several different locations. Module 2 highlights the performance measures used to determine the effectiveness of roadway recommendations. Module 4 provides a series of

representative cross-sections for consideration in the area, discusses complete street principles, and describes the corridor and intersection locations that were identified for closer study within the concept designs. The Concept Designs document describes each of these locations in more detail and graphically displays the proposed improvements. The Project Sheets contain the recommendations for each roadway being added or improved within the southwest area. This document provides information such as project purpose and need, probable construction cost, LRTP horizon year, facility type, crash rate, existing and future volumes and capacities, and inventory of multimodal facilities.

Future US 401 Corridor

The concept for a freeway-level new location facility for US 401 in the southwest area is one that has been discussed for years. The Consultant team collaborated with member jurisdictions, NCDOT, and CAMPO to put forth an alignment for this roadway. This alignment includes a series of proposed interchanges, spaced appropriately and located to serve key intersecting roadways along the corridor. Other roadway crossings would be dealt with using grade separations.

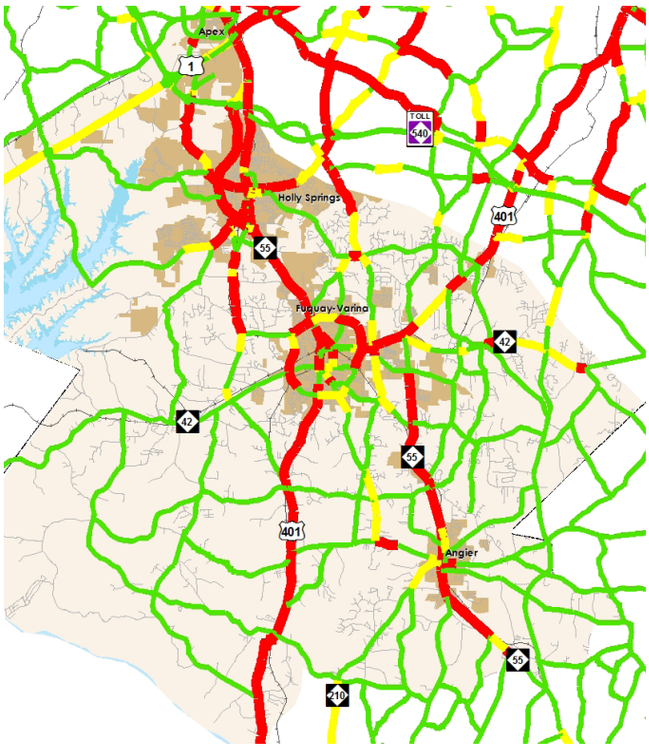
By its very nature, this roadway will be one of the most cost-intensive projects in the study area. However, phased construction could break up the project into manageable sections with independent utility. This process could include improvements to neighboring roadways that would be needed to help the partial US 401 facility to function without the full corridor being constructed. More detail on the phased construction concept is provided in the Project Inventory.

The alignment proposed here is merely one of many different possibilities being considered. Additional study will be needed to determine the final alignment of this corridor.

Network Performance

To have a realistic and implementable set of recommendations for the study area, proposed roadway projects were vetted through the Triangle Regional Model. This process helped to minimize redundant or overbuilt recommendations while ensuring critical congestion issues were addressed.

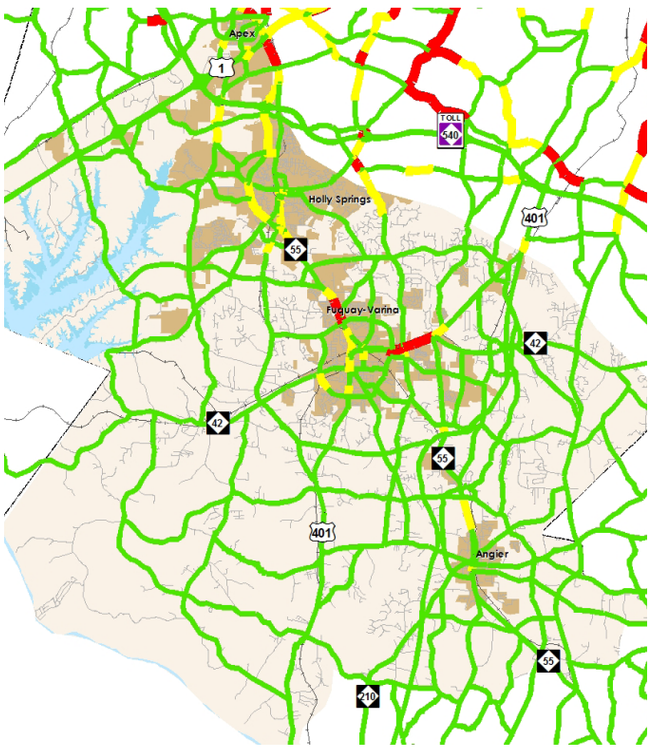
The 2040 existing plus committed roadway network was compared with the 2040 recommended projects network. Most congestion issues shown in the E+C condition have been addressed through the recommended projects. The only remaining segments above capacity in 2040 are small portions of NC 55 and US 401, where community preference or barriers to construction result in a smaller preferred cross-section.



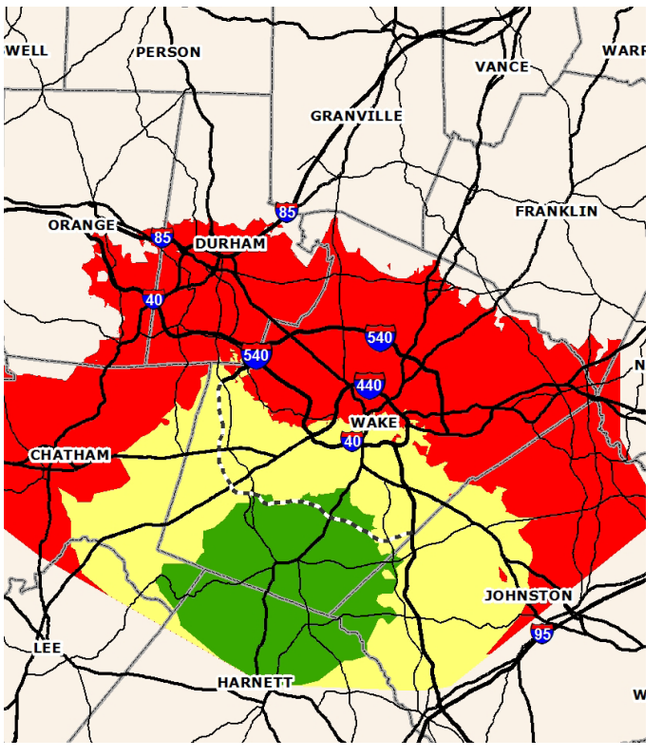
2040 Existing+Committed Congestion Map

2040 Congestion (SWAS Recommendations)

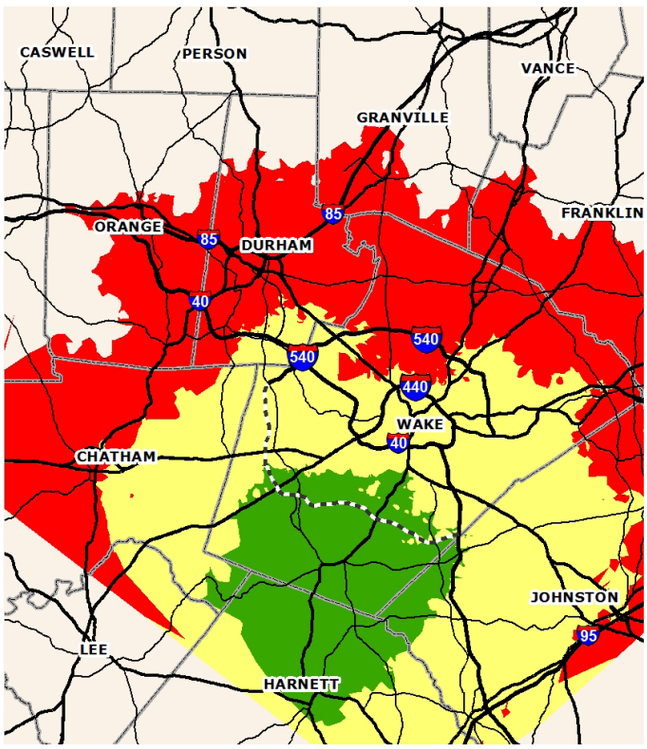
- Below Capacity (V/C less than 0.80)
- At Capacity (V/C between 0.80 and 1.00)
- Above Capacity (V/C greater than 1.00)



2040 Recommendations Congestion Map



2040 Existing+Committed Travel Time Map



2040 Travel Time Recommendations Map

Travel Time

- 1 to 20 Minutes
- 21 to 40 Minutes
- 41 to 60 Minutes

Travel time conditions also were evaluated for the E+C and recommended network conditions. By the year 2035, the proposed improvements in the roadway network will substantially reduce the travel time to major destination points such as downtown Raleigh and RTP. Both of these areas should remain accessible within a 20- to 40-minute travel timeframe from Fuquay-Varina. In fact, the recommended roadway projects should help the transportation network in the southwest area serve the increased future year volumes to a level similar to traffic operations in 2005.

A copy of the aforementioned documents can be obtained through the Capital Area MPO Website as well as the project website:

www.campo-nc.us
www.southwestareastudy.com

module 4

design

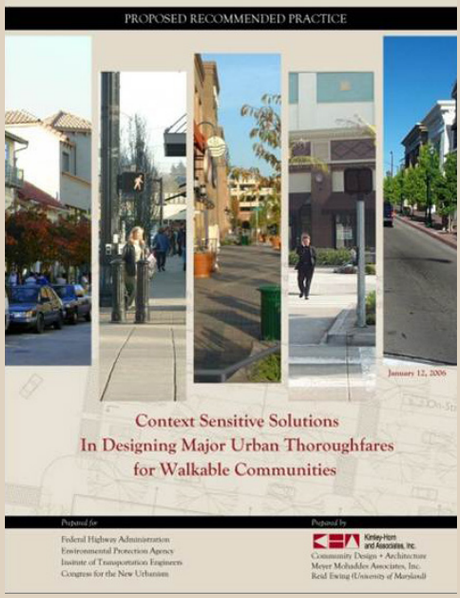
Design

As most communities' largest collection of public space, streets need to reflect the values of the community and reinforce a unique "sense of place" to be enjoyed by citizens — whether in urban, suburban, or rural contexts. This is especially true for a suburban street system that serves as the backbone for local mobility, property access, and non-vehicular transportation modes.

Recently, municipalities across the country have embraced the notion of context based street design decision making. This philosophy is an acknowledgment that street design should be specific to the places that they serve. This change in mindset replaces the one-size fits all approach that has dominated roadway design manuals for years. Context based design is often organized around a generalized spectrum of zones representing the diversity of development types and intensity from rural to suburban to urban and all places in between. This same concept has been applied in the Southwest Area Study using the more specific organization of development place types (see Module 2: Scenario Planning).

Rendering from Duany-Plater Zyberk & Company depicting the rural to urban transect.

Engineers and planners also began implementing "complete streets" as one way to transform their transportation corridors from vehicle-dominated roadways into community-oriented streets that safely and efficiently accommodate all modes of travel — not just motor vehicles. The complete streets movement recognizes a context based decision making process, noting that a complete street in an urban area may look quite different from a complete street in a more rural area. However, both facilities are designed to balance mobility, safety, and aesthetics for everyone using the travel corridor. Furthermore, design considerations supportive of complete streets include elements in both the traditional travel corridor (i.e., the public realm) as well as adjacent land uses (i.e., the private realm) for reinforcing the desired "sense of place."

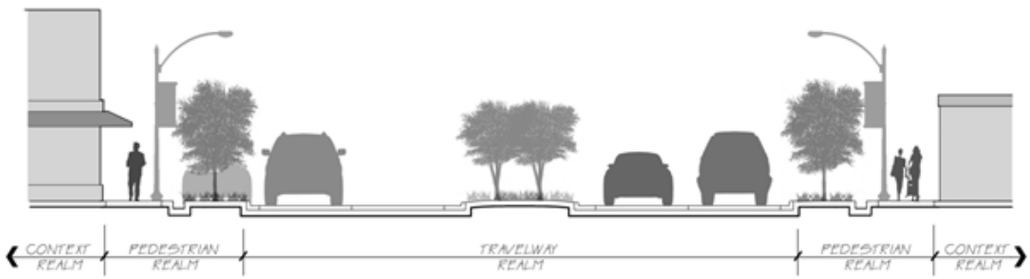


The N.C. Department of Transportation adopted a "Complete Streets" policy in July 2009. The policy directs the Department to consider and incorporate several modes of transportation when building new projects or making improvements to existing infrastructure. More information can be found at www.nccompletestreets.org.

Implementing Complete Streets

Transforming arterials into complete streets is complicated and requires a diverse range of skill sets and broad support from the community. Fortunately, other metropolitan areas have success stories that have been translated into guiding documents. The most detailed guidance comes from a joint effort of the Institute of Transportation Engineers and Congress for the New Urbanism. With funding from the USDOT and the U.S. Environmental Protection Agency, best practices have been published as *Context-Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities*.

Successful complete street transformations require community support and leadership as well as coordination between various disciplines. Common goals for complete streets are economic revitalization, business retention and expansion, and public safety. Typical skill sets needed to retrofit complete streets include urban planning, urban design, landscape architecture, roadway design, utility coordination, traffic engineering, transportation planning, transit planning, architecture, graphic art, and land redevelopment.



Linking Transportation and Context

Four distinct street realms foster interaction between different modes of travel and adjacent land uses. The built environment and the ways people travel through it both influence the livability of a corridor. As described on the following pages, there are four components of a complete street: the context, pedestrian infrastructure, the travelway, and intersection realms. Bridge design is also becoming important when planning for complete streets.

Context Realm

The context realm of a complete street is defined by the buildings that frame the major roadway. Identifying distinct qualities of the context realm requires focusing on four areas: building form and massing, architectural elements, transit integration, and site design. Consideration should be given to all of the following, with modifications as appropriate to fit the specific context of the area.

Building Form and Massing

To enhance an already high-quality street design and help create a complete street, new buildings should be located close enough to the street that they frame the public space enjoyed by pedestrians. In more urban areas, these buildings should be located directly behind the sidewalk. Buildings with stairs, stoops, or awnings may even encroach into the pedestrian realm to provide visual interest and access to the public space. Suburban environments that must incorporate setbacks for adjacent buildings should limit this distance to 20 feet or less and avoid off-street parking between buildings and the pedestrian realm.

Larger setbacks in these suburban areas will diminish the sense of enclosure afforded to the pedestrian and move access to the buildings farther away from the street. In both environments, new building heights should measure at least 25% of the corridor width. For example, a 100-foot wide roadway right-of-way should be framed by new buildings that are at least 25 feet high (a typical two-story building) on both sides with facades that are at most 20 feet from the edge of right-of-way.

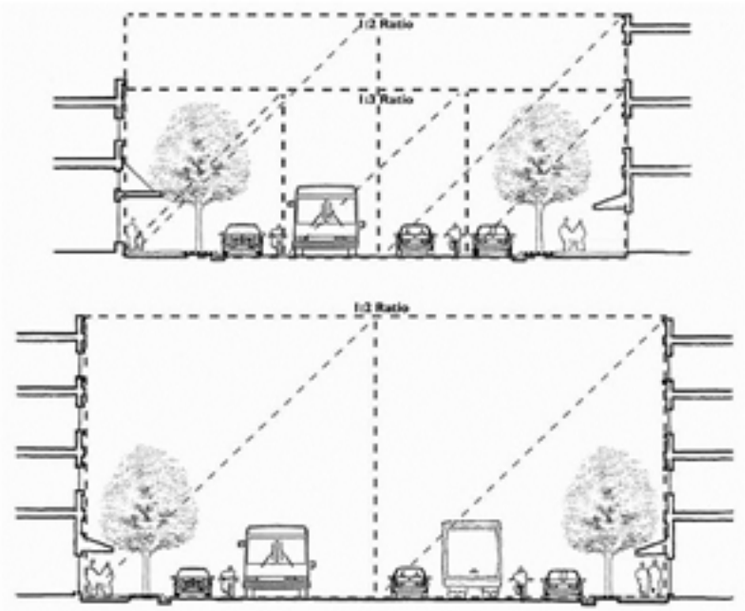


Image depicting the ratio of street width to building height from the Context-Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities.

Pedestrian Realm

The pedestrian realm of a complete street extends between the outside edge of sidewalk and the face-of-curb located along the street. Safety and mobility for pedestrians within this realm relies on the presence of continuous sidewalks along both sides of the street built to a sufficient width for accommodating the street's needs as defined by the environment. For example, suburban settings will require different widths than downtown settings. The quality of the pedestrian realm also is greatly enhanced by the presence of high-quality buffers between pedestrians and moving traffic, safe and convenient opportunities to cross the street, and consideration for shade and lighting needs.

Recommended design elements for promoting a healthy pedestrian realm generally focus on one of four areas of concentration: pedestrian mobility, quality buffers, vertical elements, and public open space. Together, these best practices (as described in Context-Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities) can be implemented in both urban and suburban environments, to varying degrees, for promoting healthy pedestrian environments.

Travelway Realm

The travelway realm is defined by the edge of pavement or curb line that traditionally accommodates the travel or parking lanes needed to provide mobility for bicycles, transit, and automobiles sharing the transportation corridor. Recommended design elements incorporated into the travelway realm encourage balance between travel modes sharing the corridor and promote human scale for the street by minimizing pedestrian crossing distance. Recommendations for the travelway realm focus on modes of travel and the use of medians.

Multimodal Corridors

Balance between travel modes within the same transportation corridor reduces congestion on major roadways and creates a healthier citizenry. On a complete street, safe and convenient access to the transportation network for bicycles, transit, and automobiles is afforded within the travelway realm. Travel lanes for automobiles and transit vehicles should measure between 10 and 11 feet wide, depending on the target speed, to manage travel speeds and reinforce the intended character of the street. Parking lanes incorporated into the travelway realm should not exceed 8 feet in width (including the gutter pan) and may be protected by bulb-outs evenly spaced throughout the corridor. Bus stops located along the corridor should be well-designed to include benches and shelters that comfort patrons waiting for the bus. On-street bicycle lanes

(typically 4 feet wide) should be considered when vehicle speeds range from 35 to 45 miles per hour. Wide outside lanes may be preferred on other streets. To avoid situations where citizens with only basic bicycle skills may be attracted to a corridor, designated bicycle routes on parallel corridors may be the best option when speeds on the major street exceed 45 mph. According to state law, bicyclists are considered vehicles and are permitted on all corridors except freeways and access-controlled highways.

Median Treatments

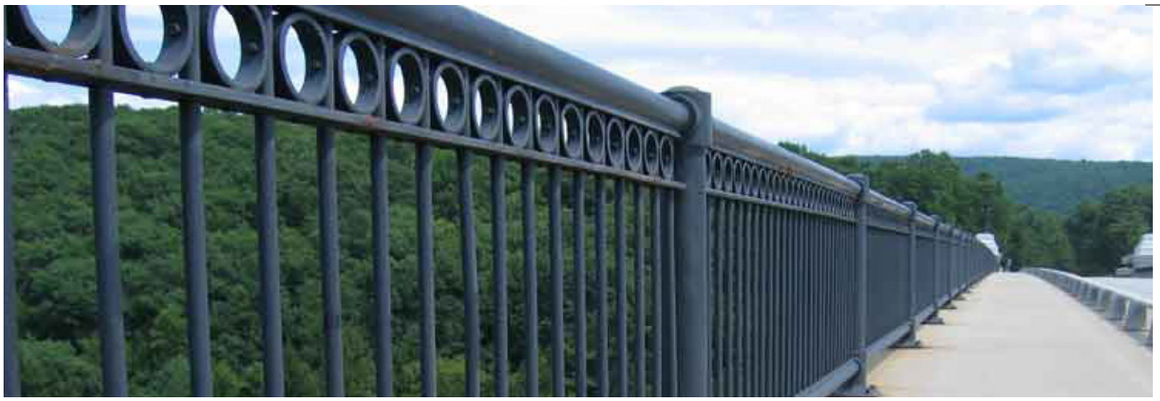
Medians often are incorporated into the travelway realm to provide dedicated left-turn lanes, opportunities for landscaping, and pedestrian refuge at crossings. Medians generally vary between 8 and 16 feet wide, depending on their intended application and the limitations of the surrounding built environment. Medians also reinforce other access management solutions provided within the travelway to reduce the number of conflict points and maintain the human scale intended for the complete street.

In addition to center medians, other access management solutions incorporated into the travelway realm should limit the number of individual driveways along the corridor and avoid the use of right-turn deceleration lanes. Together, these improvements will reduce the overall pedestrian crossing distance for the travelway and improve the safety for pedestrians traveling inside the pedestrian realm.

Bridges and Interchanges

Bridges and highway interchanges have been constructed as a result of intolerable traffic conditions, the need to improve vehicular safety and/or the need to provide improved mobility over natural or man-made features. This emphasis on accommodating vehicles historically has left pedestrians and bicycles with a gap in the transportation network where they need it most. The result is a barrier that can lead to reduced choices or trip decisions that are less than favorable for the non-motorized public. Today these trends are reversing themselves as planners and engineers are working together on the design of infrastructure that is responsive to the need to accommodate all users. Similar to complete

The image to the left is an example of a community gateway design of in interchange bridge located in Cornelius, NC.



streets, successful designs of bridges and interchanges include a clearly defined travel realm with the addition of enhanced accommodations for pedestrians and bicycles.

In addition, structures tend to have the greatest visual impact on transportation corridors given their unparalleled visibility over the landscape. Therefore, these same structures are opportunities to serve as community gateways or an expression of community vision. With greater frequency communities throughout the country are identifying key pieces of infrastructure (like bridges and interchanges) to serve as an announcement to travelers through the use of design. Features like decorative railings, lighting, landscaping and public art are welcome additions that enhance the visual interest of the structure.

This trend is has caught on in North Carolina as local communities are partnering with NCDOT on enhanced design for new structures that are prominent community features. The Creative Corridors Coalition in Winston-Salem is a great example of a local Arts Council partnering with the community and NCDOT to design and fund the use of public art on replacement bridges across Business-40 that were originally constructed in the 1950's (www.creativecorridors.org).

On a smaller scale, suburban communities like the Town of Cornelius are using local funds to enhance the landscaping, lighting, and railings of a new diverging diamond interchange at Exit 28. This design is also intended to bridge the gap in the transportation network providing enhanced connectivity for pedestrians and bicycles across Interstate-77.

Intersection Realm

Evaluating potential changes for the intersection realm of a street requires careful consideration of multiple travel modes that meet at major intersections. Recommendations for improving the multimodal environment in and around these major intersections tend to focus on geometric design, traffic operations, and special accommodations for pedestrians and bicyclists.

Rural Living

Parks & Open Space
Working Farm
Rural Living
Rural Cross Roads

Suburban Neighborhoods

Parks & Open Space
Mobile Home Park
Large-Lot Residential
Shade Tree Residential
Small-Lot Residential
Multifamily Residential
Mixed-Density Residential

Suburban Centers

Suburban Commercial Center
Suburban Hotel
Suburban Office Center
Regional Employment Center
Light Industrial Center
Heavy Industrial Center

Urban Neighborhoods

Parks & Open Space
Urban Neighborhood
High-Rise Residential
Commercial Center
Mixed-Use Neighborhood
Mixed-Use Center

Urban Districts

Town Center
Metropolitan Center
TOD District - Tier 1
TOD District - Tier 2
TOD District - Tier 3

Special Places

Airport
Civic & Institutional
Healthcare Campus
University Campus

Priority Elements

In order to link transportation and development character, a planning tool was created to serve as a local representation of the complete streets-context sensitive solutions philosophy. Working with the CTT the tool was customized for the study area. The result was a Street Design Priority Matrix. The matrix communicates the elements of each type of street and includes:

Travel Realm

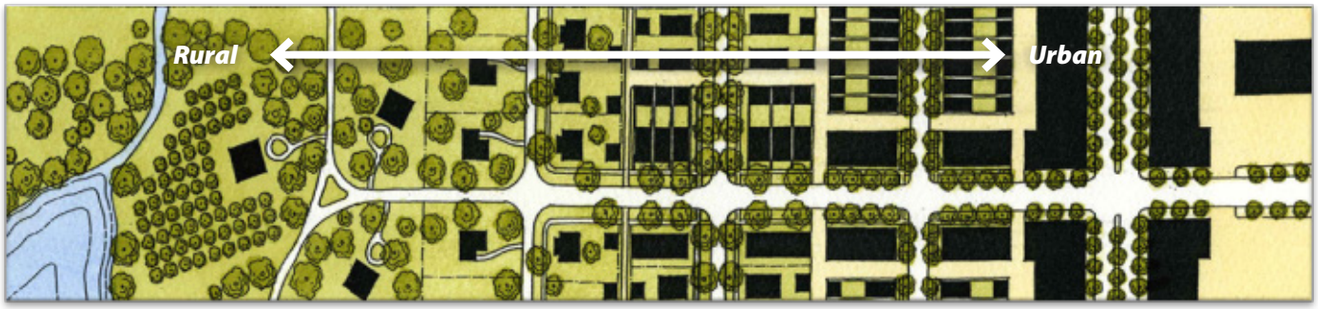
- Number and width of travel lanes
- Traffic operations
- Design for large vehicles
- Access management
- Multi-modal intersection design

Pedestrian Realm

- Wide sidewalks with amenities
- Standard sidewalks with planting strip
- Multi-use paths
- Urban design features

Additional considerations include the need for connectivity and on-street parking and bicycle accommodations.

There are a total of 23 place types for the study area (see Module 2: Scenario Planning). For the purposes of the street design priority matrix these categories have been organized into 6 discrete context areas: Rural Living, Suburban Neighborhood, Suburban Centers, Urban Centers, Urban Districts, and Special Districts.



The context zones are similar to the rural to urban transect shown above. The place types and context zones organized the diverse geography of the SWAS study area.

The resulting priority matrix (shown below) communicates the priorities for each street element as it relates to the place type groupings for the area (Rural Living, Suburban Neighborhood, Suburban Centers, and Urban Districts, and indicates high priority items that should NOT be compromised during the design process. The matrix reinforces the relationship between transportation and land use by adding design and context to each corridor within a place type. The matrix details the multimodal building blocks that form a complete street approach to context based street design. It is are meant to contribute to informed decision-making when agencies are contemplating design related choices. Special districts were not included in the matrix because the context varies wildly across these.

Travel Realm	Rural Living	Suburban Neighborhood	Suburban Centers	Urban Centers	Urban Districts
Number and width of travel lanes	■	●	●	■	■
Intersection vehicular capacity	■	▲	▲	●	●
Design for large vehicles	●	■	●	■	●
Medians	■	●	▲	●	■
Bicycle lanes	■	●	●	●	●
Multimodal intersection design	■	■	●	▲	▲
Pedestrian Realm					
Wide sidewalks with amenities	■	■	■	●	▲
Standard sidewalks with verge	■	▲	▲	▲	●
Multi-use paths	●	●	●	●	■
On-Street parking	▬	■	■	▲	▲
Urban design features	▬	■	■	●	▲
Other Elements					
Interconnected street system	■	●	●	●	▲
Access Management	■	●	▲	●	■
Curb and Gutter	■	●	▲	▲	▲
Ditch Swale Section	●	■	▬	▬	▬
Relative Street Spacing (FT)	2500-5000	1500-3000	1200-1500	600-1500	600-800

High Priority	▲
Medium Priority	●
Low Priority	■
N/A	▬

Cross-Sections & Concept Designs

Cross-Sections

Responding to the need for a broad variety of street design options, a full set of 14 different roadway cross-sections were developed. These cross-sections responded to the diversity of context areas in the study area as well as a spectrum of capacity needs (number of lanes). The resulting 3-dimensional cross-sections will help the local jurisdictions and affected agencies communicate the recommendations and expectations for future roadways. They also represented an expression of the street design priority matrix by graphically representing the different ways in which multiple travel modes could be accommodated in different context areas.

Each roadway project identified in the Southwest Area Study is summarized in the SWAS Project Inventory found on the project website and under separate cover. The summary project sheet uses the cross-sections as one means of conveying the vision for the street.

Concept Designs

One of the most significant products generated during the planning process was a series of conceptual roadway designs. The concept designs represent some of the highest priority transportation projects within the region. Guided by the Core Technical Team (CTT) and supported by the Study Oversight Committee (OC), nine projects were identified representing all four communities in the study area. Each community was asked to identify the top two or three transportation projects for their respective community. The selection of transportation projects ranged from corridor widening, streetscapes, interchange design, and retrofitting existing facilities.

Each project went through an issues identification exercise to determine the problem as well as what was needed. Some of the recommendations required additional data including field review, topography, traffic counts and level of service analysis. The cumulative input received throughout study process was incorporated into the recommendations. Each concept design went through a series of revisions and modifications as directed by the CTT.

The concept designs shown on these pages are an example of how a single roadway can have different design characteristics when passing through different context areas. The image on the following page is the concept design exhibit for the NC 55 Main Street section and interchange in Holly Springs while the bottom image is of NC 55 as it passes through Angier.

Concept Design Locations

- NC 55/Main Street Interchange
- East-West Connector
- Piney Grove Corridor at NC 42
- Judd Parkway
- NC 55 Angier
- US 401 Bypass/NC 210 Interchange

A full inventory of cross-sections and concept designs can be found on the project website and in the Cross Section & Concept Design Notebook found under separate cover.

www.campo-nc.us

www.southwestareastudy.com

module 5

initiatives

Initiatives

The southwest area is changing. New development initiatives are being paired with public services such as transit and infrastructure improvements to create an air of excitement and opportunity. The communities of southwest Wake County and northern Harnett are building on the established momentum in the area. To continue attracting economic development and expanding transportation choices, the communities need to be proactive when addressing needs and issues. The success of the Southwest Area Study relies in part on how well local and regional officials and leaders collaborate. The highest priority initiatives developed as part of the study are summarized in this module along with key projects. It will be up to local and regional decision-makers to identify the most desirable recommendations for implementation.

Regional Initiatives

Successful regional planning requires coordination across all levels of government to ensure that regional studies serve as the basis for future action. Although the SWAS set forth specific key projects and recommendations, it is not without understanding the larger framework of regionalism. Several regional initiatives should continue to build on the analysis and recommendations set forth in this plan. These initiatives are described as they pertain to promoting livability in the southwest area.

Provide More Transportation Choices

Providing a variety of safe, reliable, efficient, and economical transportation choices within the region helps households save money on transportation costs, promotes more environmentally friendly transportation modes and also allows housing to be more affordable and equitable when located near transit stations.

Enhance Economic Competitiveness

Improving existing roadways and constructing new ones will continue to make the southwest area a desirable place to live and work. Providing infrastructure enhancements in a cohesive, regional manner that focuses on connecting the major activity centers of the region, and prioritizing connectivity across municipal boundaries, ensures the region will remain competitive in the future. Even the addition of greenways and bicycle routes can play a role. Many companies consider qualify of life for their employees when making relocation decisions. Attracting new businesses to the southwest area will also help bring the employment/household ratio into balance—thereby reducing congestion in some of the area's main commuter routes.

Promote Equitable, Affordable Housing

Transportation improvements and multi-modal projects help serve other regional goals, including the goal to provide more equitable and affordable housing. When reliable transit is made available to a large geography, residents have increased mobility and a lower cost of housing and transportation. The recommended SWAS projects afford residents choice in transportation and housing location. Recent publications including, "A Model Housing Transportation Plan: Coordinating Housing and Transportation" HUD, Newport Partners LLC and Kimley-Horn and Associates, Inc. June 2012 reinforce the relationship between housing and transportation and may serve as a model for devising strategies as the transportation system continues to evolve.

www.huduser.org/portal/publications/affhsg/model_transportation_plan.html

Support Existing Communities

The SWAS recommended improvements throughout existing communities in the southwest area. Promoting transit and bicycle and pedestrian

projects in Apex, Angier, Fuquay-Varina, and Holly Springs will ensure that these communities remain competitive. In addition, by supporting existing development, the efficiency of infrastructure will be improved. This emphasis on continued investments in the existing communities is consistent with the preferred growth strategy created by the Southwest Area Study participants. In addition to transportation this initiative should also encourage new development to occur within existing service areas. This can be accomplished through procedural incentives to development as well as density credits for infill and redevelopment sites.

Develop Livability Measures and Tools (5 year post study evaluation)

The SWAS provided a solid foundation for the use of livability measures and tools. Specifically, the scenario planning component of SWAS created a report card which summarized how different development scenarios compared across a variety of performance measures that were tied to community values. Maintaining regional accountability to the preferred growth scenario and corresponding transportation strategy will ensure that the tools developed as part of this study remain relevant in the future and offer insight to where additional work needs to be done. A post study evaluation within 5 years of the conclusion of this study will measure how the region's performance compares to the preferred scenario's report card.

Key Projects

A key objective of this study was to develop cost-effective recommendations at a variety of scales that set the stage for additional improvements to the southwest area in the future. With a diminishing return on the dollar and the reality of limited funding opportunities, a set of strategic priorities for highways, transit, and bicycle/pedestrian projects is more important now than ever.

The SWAS identified key projects based on input gathered during the public outreach process, coordination with local governments, and collaboration with the CTC.

The tables that follow break out key highway, transit, and bicycle and pedestrian projects for each municipality in the study area. For more information, please consult the Project Inventory and the Concept Designs, available under separate covers.

Table 5.1 – Highway Action Plan Matrix

Key Projects		
Recommendation	Cost Estimate	Timeframe
Apex Vicinity		
Old Holly Springs Apex Road Realignment/New Location **(Apex)** – from New Hill Road to Jessie Drive, construct 4-lane median-divided section with bike lanes, sidewalks on both sides, an intersection realignment, and include a new interchange at NC 540 (2.2 miles)	To be determined	Long-Term
Perry Road Interchange at US 1 (Apex) – New interchange to be located at Perry Road crossing at US 1.	To be determined	Long-Term
Holly Springs Vicinity		
Friendship Road Realignment (Holly Springs) – from existing Friendship Road to Bosco Road, construct new 4-lane median-divided section with bike lanes and sidewalks on both sides, including new interchange at US 1 (1.2 miles)	To be determined	Short-Term
NC 55/ Main Street Interchange (Holly Springs) – Construct new interchange with bike provisions and sidewalks on both sides (0.2 miles)	$9.9 mill	Short-Term
Holly Springs Road Widening (Holly Springs) – from NC 55 Bypass to Sunset Lake, widen existing 2-lane road to 4-lane median-divided section with bike lanes, sidewalks on both sides, and streetscape improvements (3.5 miles)	To be determined	Short-Term
Avent Ferry Road Widening (Holly Springs) – from New Hill Holleman Road/ Rex Road to NC 55, widen existing 2-lane road to 4-lane median-divided section with bike lanes and sidewalks on both sides. (4.4 miles)	To be determined	Long- Term

Table 5.1 – Highway Action Plan Matrix

Key Projects		
Recommendation	Cost Estimate	Timeframe
Fuquay-Varina Vicinity		
North Judd Parkway Northeast at NC 401 – from Old Honeycutt Road to Broad Street – widen to multilanes, intersection improvements and bike/ped provisions (0.4 miles)	$990,000	Short-Term
N Judd Parkway Northwest – from NC 42 to NC 55 - Construct new 4 lane section with bike lanes and sidewalks on both sides. (1.6 miles)	In progress	Short-Term
Piney Grove Wilbon Road Widening – from US 401 to Ralph Stephens Extension – Widen existing 2-lane road to 4-lane median-divided section with bike lanes, a sidepath, and a sidewalk, and include a new interchange at NC 42 (7.1 miles)	To be determined	Long-Term
NC 55 Widening – from Saunders Road to US 401 - Widen existing 2-lane road to 4-lane median-divided section with a sidepath and a sidewalk. (2.7 miles)	To be determined	Long-Term
Sunset Lake Road Widening – from Bass Lake Road to US 401 / NC 42 / NC 55, widen existing 2-lane road to 4-lane median-divided section with bike lanes and sidewalks on both sides (2.6 miles)	To be determined	Long-Term
Angier Vicinity		
NC 55 Streetscape Improvements – from Kennebec Road to NC 210 (West Depot Street) – construct 2-lane divided/ 3-lane streetscape with bike provisions, sidewalks, street trees and pedestrian lighting, including a 1-lane roundabout at North Broad Street intersection (3.0 miles)	$7.4 mill	Short-Term
Rawls Church Road - NC 55 Connector – from NC 55 to Rawls Church Road Extension - construct new 4-lane median-divided section with paved shoulders and sidewalks on both sides. (2.8 miles)	To be determined	Short-Term
NC 55 Widening – from Rawls Church Road Extension to Saunders Road - widen existing 2-lane road to 4-lane median-divided section with a sidepath and a sidewalk. (1.8 miles)	To be determined	Long-Term
Future US 401 Corridor (Under Study) – from NC 210 to NC 55 - construct new 4-lane median-divided freeway. (5.5 miles)	To be determined	Long-Term
Future US 401/NC 210 Interchange – construct new half-clover interchange at NC 210 (south of Angier). (1.0 mile)	$9.9 mill	Long-Term

Table 5.2 – Transit Action Plan Matrix

Key Projects		
Recommendation	Cost Estimate	Timeframe
Holly Springs to Raleigh Commuter Service — This route would leave the Holly Springs Minor Transfer Location, traveling north to US 1 and continuing into Raleigh. 30-minute headways from Holly Springs from 6:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 p.m.	See Wake County Transit Plan (WCTP)	Short-Term
Fuquay-Varina to Raleigh Commuter Service —This route would leave the Fuquay-Varina Minor Transfer Location and travel along Fayetteville Road (NC 401) to Downtown Raleigh and terminates at Wake Tech. 30-minute headways from 6:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 p.m.	WCTP	Short-Term
Holly Springs to RTP — This route would leave the Holly Springs Minor Transfer Location and travel north to RTP via NC 540 as recommended in the WCTP. The bus will operate on 30-minute headways from Holly Springs from 6:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 p.m.	WCTP	Short-Term
Flex service along NC 55 - between Apex and Fuquay-Varina is recommended along NC 55 with a loop through Fuquay-Varina. The bus will be able to deviate up to 1/4-mile from the fixed route to accommodate passenger requests. 30-minute headways during peak hours (6:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 p.m.) and at 60-minute headways throughout the remainder of the day.	WCTP	Short-Range
Holly Springs Transfer Location — The Southwest Area Study recommends locating the Minor Transfer Location at the intersection of NC 55 and South Main Street. At this location, the flex service and commuter routes intersect. This site currently is being used as a park and ride.	WCTP	Short-Range
Fuquay-Varina Transfer Location — This Minor Transfer Location is recommended for Fuquay Crossing along US 401/NC 55 at Sunset Lake Road. This location allows efficient transit service along a primary corridor for the commuter route.	WCTP	Short-Range

Table 5.2 – Transit Action Plan Matrix

Key Projects		
Recommendation	Cost Estimate	Timeframe
Veridea Major Transit Center — A Major Transit Center will be served by light rail connecting to RTP as well as by local and commuter bus services serving other parts of the Triangle. The Veridea Major Transit Center also is served by the Holly Springs to RTP Commuter Route.	WCTP	Short-Term
Holly Springs Circulator — The "Holly Trolley" is envisioned as a specialized local service with a distinct brand. Service along the loop would connect to local shopping, activity nodes, medical and civic uses. Service would operate on 60-minute headways, between 7:00 a.m. and 7:00 p.m.	To be determined	Long-Term
Fuquay-Varina Circulator — This route will offer circulator service and allow the Town to create a unique type of branding for the service. Service would operate at 60-minute headways, initially between 8:00 a.m. and 5:00 p.m.	To be determined	Long-Term
Local Service (Express) between Apex and Angier - Express service between Veridea and Angier is recommended along NC 55, serving Apex, Holly Springs, Fuquay-Varina, and Angier. Service would generally operate on 30-minute headways during peak periods (6:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 p.m.) and 60-minute headways during midday.	To be determined	Long-Term
Fuquay-Varina Park and Ride - Along with the Minor Transfer Location in Fuquay-Varina programmed for the short-term, a second park and ride lot is recommended at the future commuter rail station located at the easternmost intersection of US 401 and NC 55.	To be determined	Long-Term
Angier Park and Ride - A proposed park and ride facility in Angier on NC 55 north of Downtown would initially be co-located with the Food Lion on NC 55. This park and ride would allow residents from the area to access the bus service to Apex	To be determined	Long-Term

Table 5.3 – Bicycle/Pedestrian Action Plan Matrix

Key Projects		
Recommendation	Cost Estimate	Timeframe
Holly Springs- Apex Vicinity		
Earp Road to existing greenway at Ballentine Road - (0.3 miles)	$210,000	Short-Term
Holly Glen neighborhood at Evergreen View Drive to existing greenway at NC 55 - (1.0 mile)	$700,000	Short-Term
Holly Springs Road to the existing greenway at Vets Pond, and an extension of this greenway to Bridgewater Pond - (0.9 miles)	$630,000	Short-Term
Bass Lake Park loop completion - (0.4 miles)	$280,000	Short-Term
Northern Connection to Bass Lake Park from existing greenway at Stinson Ave - (0.9 miles)	$630,000	Short-Term
Fuquay-Varina Vicinity		
Existing greenway at NC 55 to Academy Street and Judd Parkway - (1.8 miles)	$1,3 mill	Short-Term
Stewart Street to existing greenway - (1.5 miles)	$1.1 mill	Short-Term
Existing greenway to Kennebec Road sidepath - (1.1 miles)	$770,000	Short-Term
Existing greenway to Bass Park Lake (Fuquay-Varina to Holly Springs Connection) - (0.8 miles)	$560,000	Short-Term
Rail Trail from Wagstaff Road to Wake Chapel Road - (2.4 miles)	$1.7 mill	Short-Term
Angier Vicinity		
Broad Street sidepath at North Raleigh Street to downtown Angier - (0.9 miles)	$630,000	Short-Term
Broad Street to park connection along East Smithfield Street - (0.2 miles)	$180,000	Short-Term
Connection from Cross Link Drive to Kennebec Rd at NC 55 along sewer easement - (2.9 miles)	$2.0 mill	Short-Term
NC 210 sidepath from North Cross Street to Harnett Central Road - (4.2 miles)	$2.9 mill	Short-Term
East McIver Street to future street - (0.8 miles)	$560,000	Short-Term

Legacy

The Southwest Area Study is an example of regionalism that was successfully achieved through the use of progressive tools and an unprecedented outreach strategy. Scenario planning was used to establish a more accurate understanding regarding the study area's ability to support additional growth, reinforce the importance of a regional greenprint, and to establish a growth vision prior to the development of a comprehensive transportation strategy. The study was with first to apply the Triangle Region's new place-type palette identified through Imagine 2040: the Triangle Region Scenario Planning Initiative . The resulting regional collaboration helped to bridge the gap between competing values, and individual town plans, and offered community leaders the opportunity to make informed decisions regarding the region's future. The legacy of the study is a set of outcomes that when implemented result in a balanced approach to quality growth including: a sustainable transportation system, continued quality of life for area residents, and economically vibrant communities.

More information regarding the Southwest Area Study can be found at the following:

www.campo-nc.us

www.southwestareastudy.com