US 64 NC 49 Corridor Study

Charlotte and Statesville to Raleigh

Phase I Report

North Carolina Department of Transportation
Transportation Planning Branch

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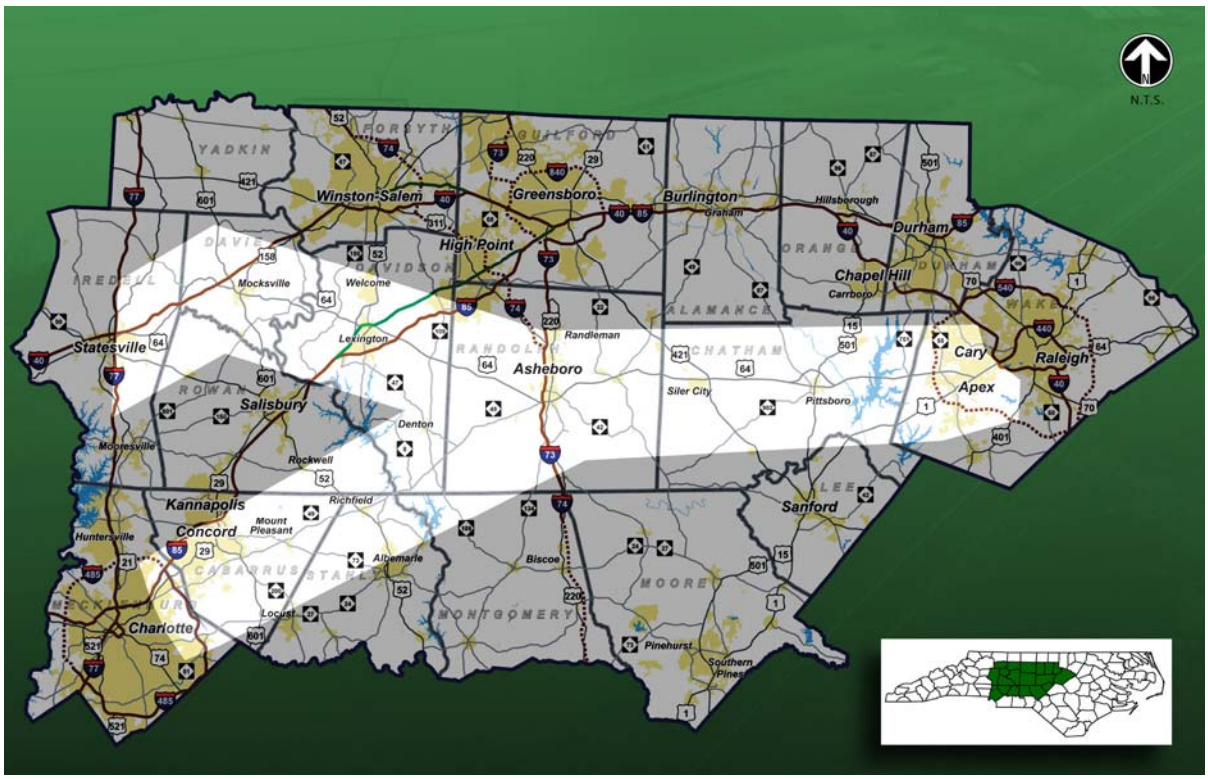
The North Carolina Department of Transportation (NCDOT) is conducting a comprehensive study of the US 64 and NC 49 corridors from Statesville to Raleigh (US 64) and Charlotte to Raleigh (NC 49 and US 64), herein referred to as the US 64–NC 49 Corridor. The 19-county study area is shown in **Figure ES.1**. The intent of the US 64–NC 49 Corridor Study is to develop an improvement master plan that will enhance the long-term mobility of passengers and freight, foster economic growth and development, relieve congestion on I-40 and I-85, and optimize transportation funding.

Figure ES.1: US 64–NC 49 Corridor Study Area



Phase I of the study consists of a regional assessment of transportation needs and the evaluation of a broad range of alternative roadway investment strategies to meet those needs. The product of Phase I is a corridor vision that defines the improvement design concept (major features and characteristics) and scope (range or extent of the proposed action). Subsequent study phases will address location specific improvements.

North Carolina Strategic Highways Corridor Concept

The North Carolina Strategic Highway Corridors (SHC) concept represents the first major implementation step to be advanced under the update of the state's Long-Range Multimodal Statewide Transportation Plan. The concept, developed in partnership with the North

Carolina Department of Environment and Natural Resources and the North Carolina Department of Commerce, defines a new focus for NCDOT to improve, protect, and maximize the capacity of existing highway corridors deemed critical to statewide mobility and regional connectivity. The SHC concept represents an opportunity for NCDOT in partnership with corridor stakeholders to create a long-range corridor vision. This vision encompasses decision-making consistency, land use and transportation relationships, and roadway design and operational elements.

NCDOT has identified the US 64–NC 49 Corridor as a Strategic Highway Corridor. The US 64–NC 49 corridor is considered to possess the following characteristics consistent with Strategic Highway Corridors criteria:

- Potential to carry significant traffic, including substantial truck traffic.
- Connect existing major activity centers.
- Connect existing and planned Interstate facilities.
- Potential to serve as an Interstate reliever.
- Part of the National Highway System (NHS).

US 64–NC 49 Corridor Study Goals and Objectives

The US 64–NC 49 Corridor Study goal and objectives were derived from the broader purpose and goals of the NCDOT Strategic Highway Corridors concept. They were drafted through collaboration between the Study Team and the Corridor Development Team. The Corridor Development Team (CDT) is an advisory committee developed to oversee both technical and non-technical matters. The CDT was comprised of NCDOT staff-level individuals with a comprehensive knowledge of the regional study area, Metropolitan Planning Organization (MPO) and Rural Planning Organization (RPO) staff who work closely within the corridor study area, and local elected/appointed officials and staff who represent a specific municipality along the corridor.

Study Goal
"To develop a transportation system consistent with the Strategic Highway Corridors concept definition that will serve the mobility needs of people and freight to and through Central North Carolina while addressing the environmental and economic development opportunities of the public."

Study Objectives

1. Enhance transportation connectivity and mobility.
2. Serve as a reliever to I-40 and I-85.
3. Improve safety.
4. Support regional and local transit plans.

5. Support economic development.
6. Support local land use plans.
7. Optimize costs and benefits to system users and funding agencies.
8. Be sensitive to environmental and social factors.

The intent of the US 64–NC 49 Corridor Study is to develop a facility "master plan" improvement strategy for the enhancement and long-term preservation of passenger and freight mobility. Phase 1 of the study defines the corridor "vision" (Chapter 8, Phase 1 Report) with a broad implementation concept to achieve the vision. Definition of the corridor vision was conducted in five major steps as outlined below and described in the sections that follow:

- Definition of Need
- Definition of Alternatives
- Development of Evaluation Criteria
- Evaluation of Alternatives
- Recommended Corridor Vision

In addition to the corridor vision, Phase 1 of the study also produced the following products, which will support future project phases and continued stakeholder involvement:

- A Problem Statement that describes the need for improvements to the US 64–NC 49 Corridor as they relate to the corridor's function as a Strategic Highway Corridor. (Chapter 4, Phase 1 Report)
- A description of land use policy guidelines that address land use/mobility issues and may be used to balance land use and transportation objectives in support of the corridor vision. (Chapter 9, Phase 1 Report)
- A description of corridor preservation methods that may be helpful in controlling project costs. (Chapter 10, Phase 1 Report)

Definition of Need

The factors and conditions that substantiate the need for a corridor improvement vision are based on an extensive evaluation and assessment of existing and anticipated conditions (Chapter 3, Phase 1 Report) within the immediate US 64–NC 49 Corridor and within the 19-county study area. The existing conditions evaluation included an assessment of demographics, land use, environmental features, and the multimodal transportation system. The factors and conditions have been organized based on the purposes of the Strategic Highway Corridors concept as well as the Strategic Highway Corridors selection criteria as developed by NCDOT and adopted by the North Carolina Board of Transportation.

Criterion - Mobility

Long-distance east-west mobility across the central portion of North Carolina is compromised by the limited number of available high-speed facilities. I-40 and I-85 are the only full control of access facilities traversing east-west across the central portion of the state, which is the most heavily populated and urbanized area of North Carolina. These Interstates carry large numbers of commercial vehicles, short-distance local travelers, and long-distance travelers. Extended periods of congestion are prevalent in the urbanized areas through which I-40 and I-85 pass. The US 64–NC 49 Corridor is the most direct alternative corridor to I-40 and I-85. Origin and destination surveys show that some travelers making long-distance interstate and intercounty trips in and through the central portion of North Carolina appear to be consciously diverting to US 64 and NC 49 as an alternative to using I-40 and I-85. Freight carriers and travelers could benefit from more efficient route options between Raleigh and Charlotte and Raleigh and Statesville.

Criterion - Connectivity

Existing activity centers served either directly or indirectly (via US 421) by the US 64–NC 49 Corridor include Charlotte, Concord, Kannapolis, Greensboro, High Point, Winston-Salem, Burlington, Durham, Chapel Hill, Cary, and Raleigh. The Corridor also serves the major airports in Charlotte, the Triad, and the Triangle areas.. US 64 and NC 49 provide east-west connectivity between north-south Interstate routes in the regional study area. Improvements to the US 64 and NC 49 Corridor would improve connectivity between the major activity centers along and in the vicinity of these routes and to the north-south oriented Interstate routes in the region.

Criterion – Interstate Reliever

Although I-40 and I-85 provide access to numerous cities and activity centers in the region, Interstate mobility from the Raleigh area west to Charlotte and Statesville is hindered by congestion through the urban centers. Presently, I-85 in Mecklenburg County experiences heavy congestion throughout much of the day, with LOS E or F conditions observed during peak travel periods. Heavy congestion levels also were identified along the portion of I-40 between Winston-Salem and Greensboro and along the I-40/I-85 overlap section to the east. Similar high congestion levels are prevalent in the Raleigh/Durham area on I-40.

Travel demand forecasts for the year 2030 anticipate substantial increases in both locally generated and through travel demands on I-40 and I-85. It is unlikely that significant improvements to these facilities will occur beyond those identified in the 2004-2010 NCDOT Transportation Improvement Program (TIP). Over the long term, improvements to alternative travel corridors such as US 64 and NC 49 will be needed to ensure the continuation of adequate regional and statewide mobility. Origin-destination surveys indicate that US 64 and NC 49 are already are being used by some travelers for long distance trips, and that drivers appear to be consciously diverting to US 64 and NC 49 as an alternative to using the more heavily traveled I-40 and I-85.

Purpose – Foster Economic Prosperity
Many communities within the US 64–NC 49 Corridor believe that transportation alternatives are vital to their prospective economic initiatives and development needs and serve as the means to becoming more self-supporting with a mixture of residential and commercial/service growth available to encourage a viable tax base. The Yadkin-Pee Dee Lakes Project, also known as the "North Carolina Central Park Project," is a formal effort to develop the region as a major tourism/recreational and cultural/historic destination. With this area lying at the junction of US 64 and NC 49, any improvements to these facilities would serve to further enhance and strengthen the development of the region.

Purpose – Protect the State's Transportation Investment
There are finite funds available for transportation system improvements throughout North Carolina. Prioritizing needs and having a clear vision of the ultimate function of the US 64–NC 49 Corridor will help direct funds for projects beyond the timeframe of the state's TIP more efficiently and could help preserve the functioning of the corridor as a major travel facility for the longer term.

Purpose Promote Environmental Stewardship
The NCDOT Environmental Stewardship Policy (February 7, 2002) states NCDOT is "committed to planning, designing, constructing, maintaining and managing an interconnected transportation system while striving to preserve and enhance our natural and cultural resources." Early planning and an overall vision for the entire corridor, along with the early involvement of local communities and state and federal resource agencies, can provide opportunities for long-term collaboration on preserving and enhancing natural resources in the corridor area and for consideration of how the corridor's overall vision and the development of individual projects can help preserve the cultural and social values of communities along the corridor.

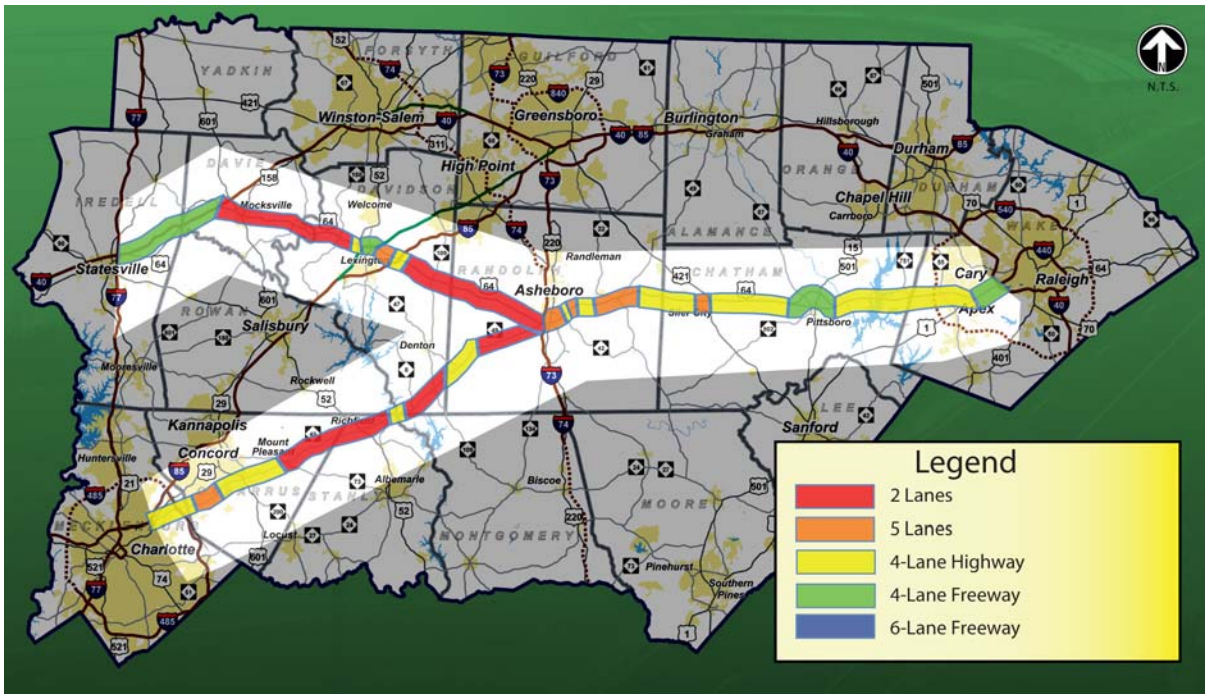
Definition of Alternatives

A No-build (Baseline) alternative and four Build Alternatives were defined and evaluated during the course of this study. These alternatives address the project's goal and objectives and encompassed a range of investment options. Each of the alternatives was defined in terms of its primary physical and operational characteristics. Summary descriptions of the alternatives are provided below.

No-build (Baseline) Alternative
Typically, a No-build Alternative is defined as an alternative that incorporates "planned" improvements that are included in the fiscally constrained long-range plan, and/or "committed" improvements such as those in the state DOT's transportation improvement program (TIP) or local agency's capital improvement program (CIP). However, the US 64–NC 49 Corridor Study is evaluating the compilation of all of the currently "planned" and "committed" improvements to US 64 and NC 49 as an investment alternative. Therefore, for

the purposes of this study, the No-build Alternative is defined as only the "existing" facility for US 64 and NC 49, which consists of the present physical and operational condition of the facility, plus those improvements that were under construction at the time of the analysis. The remaining transportation network within the study area includes committed and planned improvements as defined previously. **Figure ES.2** shows the existing number of lanes and general facility type on US 64 and NC 49.

Figure ES.2: Existing Number of Lanes on US 64 and NC 49



Existing Plus Committed (E+C) Alternative

This alternative includes those improvements for US 64 and NC 49 contained in the financially constrained long-range transportation plans of the study area Metropolitan Planning Organizations, the NCDOT TIP, and local government capital improvement programs. Descriptions of these projects are provided in **Table ES.1**.

Figure ES.3 shows the number of lanes and general facility types that would result across the study corridor following implementation of all defined elements of the E+C Alternative. Characteristics of the E+C Alternative are provided in **Table ES.2**.

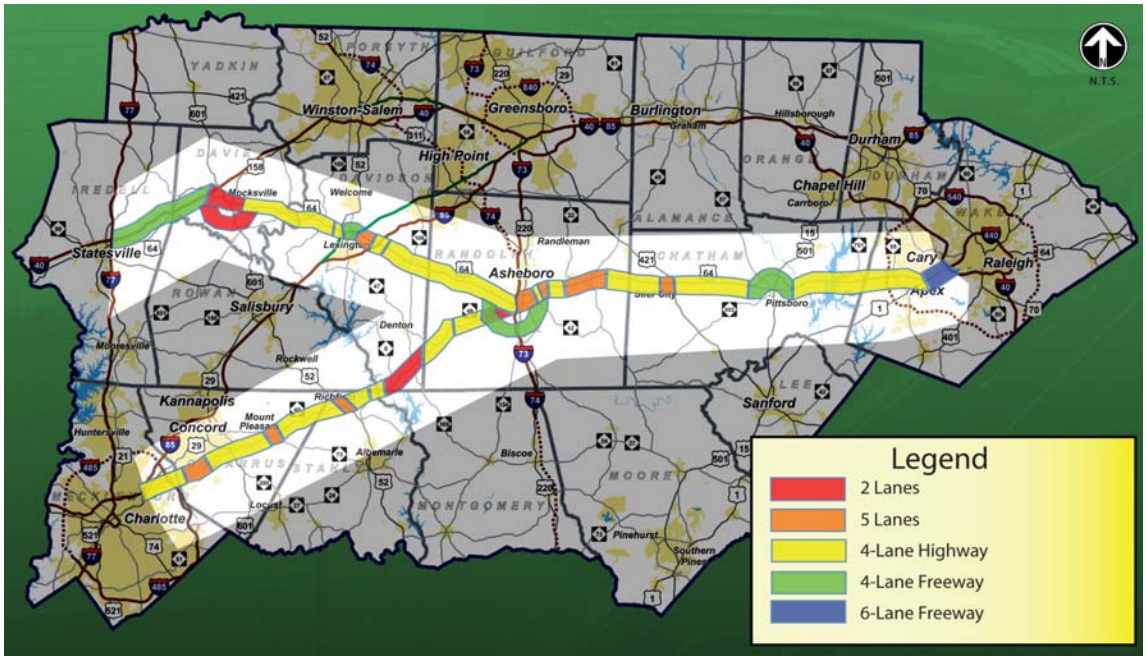
Table ES.1: US 64 and NC 49 NCDOT TIP (2004-2010) Projects

ROUTE	TIP #	LIMITS	LENGTH	IMPROVEMENT
NC 49	R-2533	Harrisburg to Yadkin River	29.3 mi.	Widen to multi-lanes.
NC 49	R-2535	SR 1174 West of Farmer to Asheboro Bypass (R-2536) West of SR 1193	9.7 mi.	Widen to four-lane, divided facility.
US 64	R-2220	East of I-85 Bus. in Lexington to US 220 in Asheboro	28.5 mi.	Widen to four-lanes
US 64	R-3111	US 64 East of Mocksville to US 601 West of Mocksville.	6.1 mi.	Two-lane Bypass on four-lane R/W.
US 64	R-3602	US 601 South of Mocksville to US 52 in Lexington.	14.0 mi.	Widen to multi-lanes and upgrade interchange at US 52.
US 64	R-2536	US 64 West to US 64 East.	13.5 mi.	Four-lane freeway on new location with interchanges at US 220, NC 49, and zoo access at NC 159.
US 64/ US 1	U-3101	US 64 to South of SR 1313 (Walnut Street).	2.6 mi.	Rehabilitate pavement, additional travel lanes, and modify SR 1313 interchange.

Table ES.2: E+C Alternative Characteristics

Operating Speed	Less than 55 mph
Right-of-way	Varies
Type of Access	• Interchanges. • Signalized intersections. • Unsignalized intersections. • Driveway access.

Figure ES.3: E+C Alternative – Number of Lanes



E+C Enhanced Alternative

An enhancement of the E+C Alternative would provide for a continuous four-lane, divided facility from Charlotte to Asheboro and from Statesville to Asheboro and on to Raleigh. Major improvement elements of the E+C Enhanced Alternative include the following:

- Implement all TIP projects.
- Upgrading all remaining two-lane segments to four-lane, divided roadways. (Mocksville Bypass (A) and two-lane segment of NC 49 (B) in Davidson County)
- New location of four-lane, divided segments with full control of access around urban areas now planned to have or presenting having five-lane sections. (Harrisburg (C), Mount Pleasant (D), Richfield (E), Ramseur (F), Siler City (G), and Lexington (H) between I-85 Business and I-85)
- Enhancement of the four-lane, divided section of US 64 through Lexington (I) to improve safety and operations.
- Freeway-to-freeway interchanges (free-flowing) at other freeways (J).
- Consolidation of driveways along all existing and committed four-lane, divided segments.
- Conversion of signalized intersections with major crossroads to grade-separated interchanges where appropriate along all existing and committed four-lane, divided segments.

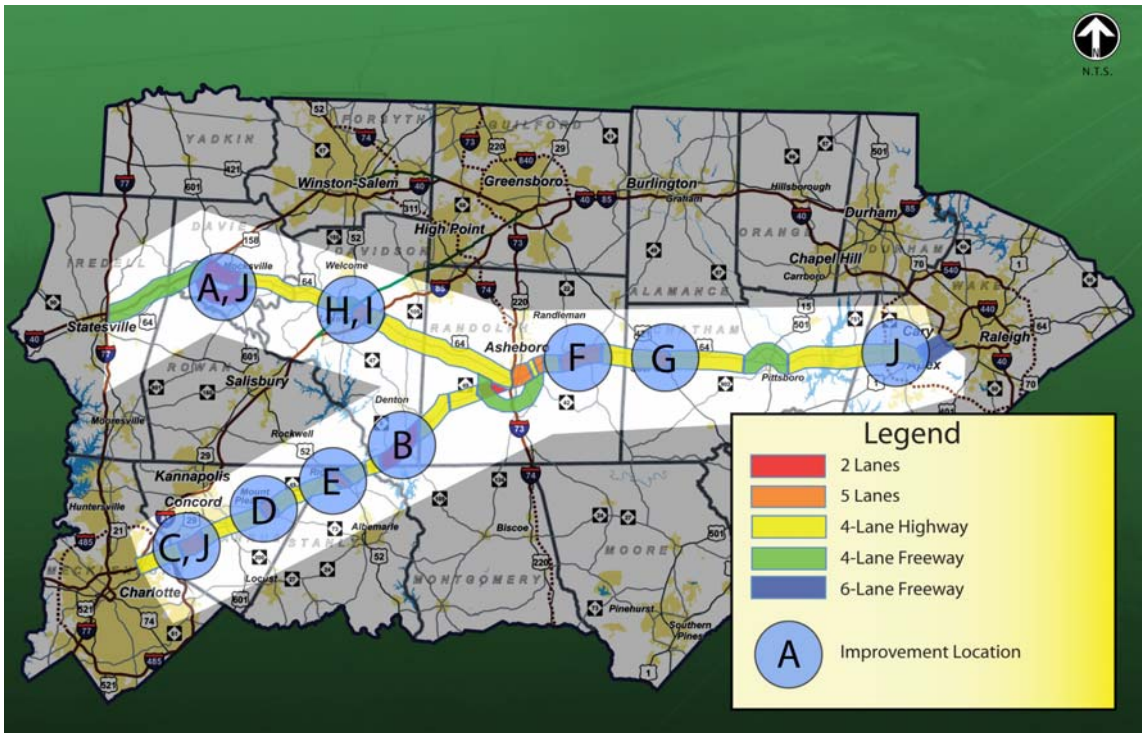
Figure ES.4 identifies where the suggested improvements to the E+C Alternative would be made to create the E+C Enhanced Alternative. The general characteristics of the E+C Enhanced Alternative are described in **Table ES.3.** The E+C Enhanced Alternative improves

the US 64–NC 49 corridor to a combination of a Freeway, Expressway Type-I and Expressway Type-II, as indicated in the NCDOT Facility Type & Control of Access Definitions in **Appendix E**.

Table ES.3: E+C Enhanced Alternative Characteristics

Operating Speed	55 mph +
Right-of-way	250 feet +
Type of Access	• Interchanges. • No new signalized intersections with removal or bypassing of existing signalized intersections. • Consolidated driveway access.

Figure ES.4: E+C Enhanced Alternative Improvement Locations



Expressway Alternative

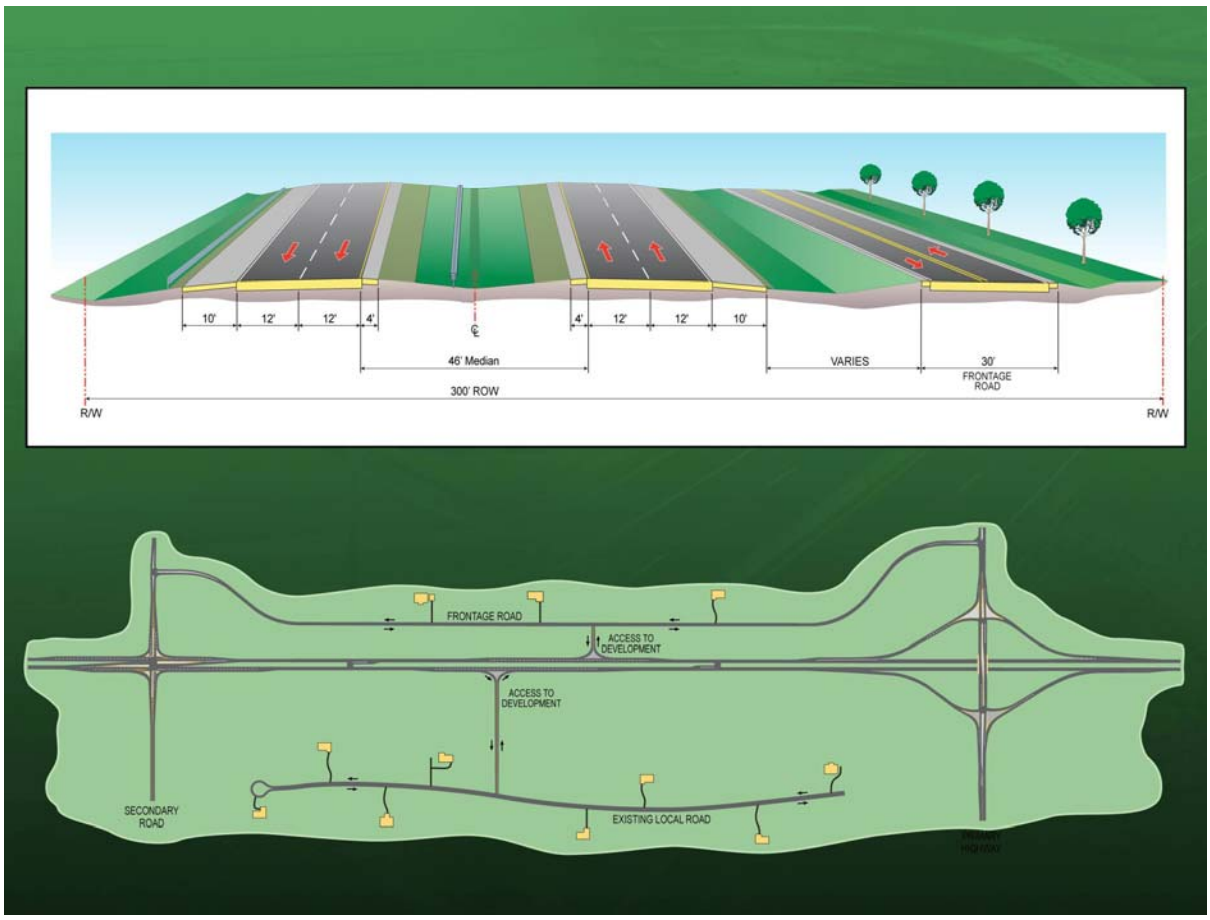
This alternative, consistent with the NCDOT Expressway-Type I facility type definition, would provide a high level of mobility with low to moderate direct access to adjacent land parcels over the entire length of the US 64 and NC 49 corridor. The typical section is a four-lane, divided highway with a frontage or access road along one or both sides, with access to the facility provided via interchanges, unsignalized intersections, or consolidated driveways.

A typical roadway cross section and access plan are shown in **Figure ES.5**. The general characteristics of this alternative are outlined in **Table ES.4**.

Table ES.4 Expressway Alternative Characteristics

Operating Speed	55 mph +
Right-of-way	300 feet
Type of Access	• Interchanges. • Unsignalized intersections • Consolidated driveway access.

Figure ES.5: Expressway Alternative Typical Section and Access Plan



Freeway Alternative

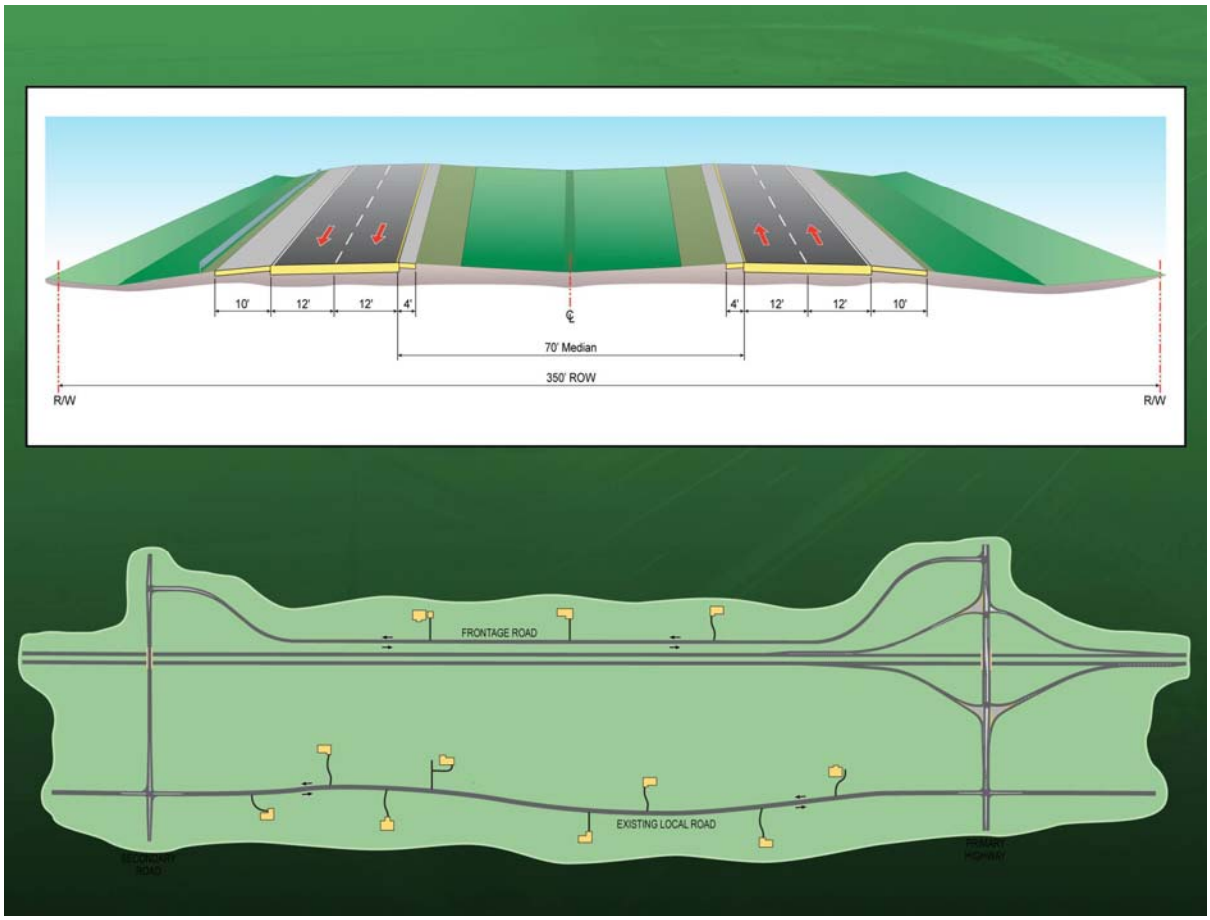
This alternative would provide a high degree of mobility and full control of access over the entire length of US 64 and NC 49, similar to that provided by I-40 and I-85. Access would only be allowed via grade separated interchanges. The typical roadway cross section and

access plan are shown in **Figure ES.6**. The general facility characteristics for this alternative are outlined in **Table ES.5.**

Table ES.5: Freeway Alternative Characteristics

Operating Speed	65 mph +
Right of Way	400 feet
Type of Access	Interchanges only

Figure ES.6: Freeway Alternative Typical Section and Access Plan



Development of Evaluation Criteria

The degree to which the corridor alternatives achieved the project objectives were determined through the application of evaluation criteria that reflected the objectives. Evaluation criteria were developed in coordination with the Corridor Development Team. The evaluation criteria are defined by measures of effectiveness (MOE), which are the actual data against

which the relative performance of each alternative is evaluated. The resulting criteria, and their associated measures of effectiveness, are presented in **Figure ES.7**.

Figure ES.7: Evaluation Criteria and Measures of Effectiveness

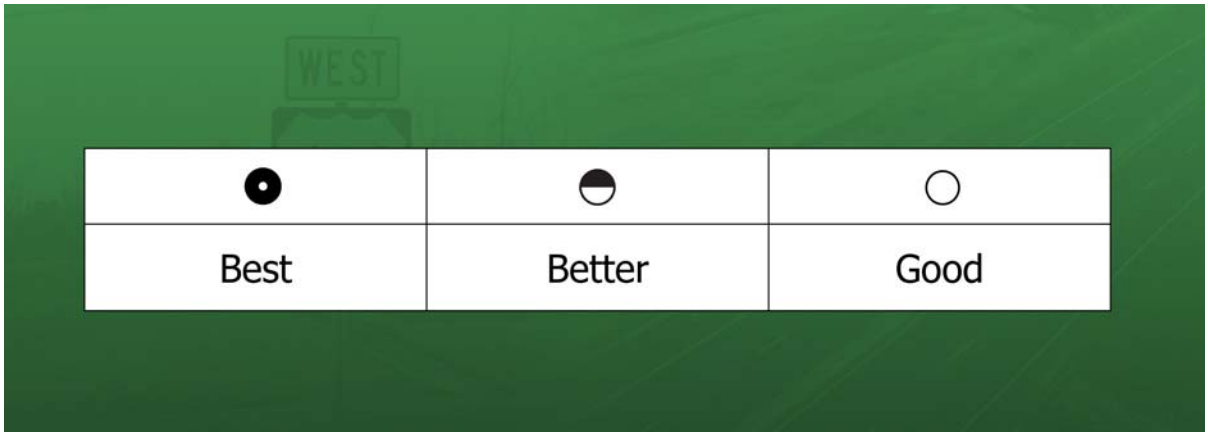
TIER 1 ALTERNATIVES EVALUATION MATRIX

Study Objective Category / Evaluation Criteria	Measure of Effectiveness
MOBILITY BENEFITS	
Travel Time	Percent reduction in travel time from Charlotte and Statesville to Raleigh vs. baseline condition.
Travel Diversion I-85 and I-40	Percent Interstate traffic reduction from baseline condition.
Safety	Reduction in accidents using National (and/or Statewide) average accident rates by facility type vs. baseline condition.
Accommodation of Transit Plans	Alternative's potential to facilitate implementation of transit initiatives.
GROWTH MANAGEMENT BENEFITS	
Development Pattern Impacts	Potential to direct growth consistent with locally desired development patterns and policies.
ECONOMIC BENEFITS	
Accessibility	Percent change in number of jobs or households within specified travel times to specific destinations vs. baseline condition.
Development Opportunity	Potential for improved access to future development that includes major employers.
ENVIRONMENTAL ISSUES	
Sensitivity to environmental factors	Potential for adverse impact based on facility footprint and location.
Sensitivity to social factors	Potential for adverse impact based on facility footprint and location.
COST EFFECTIVENESS BENEFITS	
Transportation User Benefits	Travel time, operating, and safety cost savings relative to the baseline condition.
Capital Cost	Estimate of probable cost.
User Benefits / Capital Costs	Calculated ratio.

Evaluation of Alternatives

As shown in **Figure ES.8**, the performance of each of the four corridor improvement alternatives was rated as "Good", "Better", or "Best" with regard to its degree of satisfaction of each of the defined evaluation criteria. The Build alternatives were compared against the No-build (Baseline) condition. The results of the alternatives evaluation is shown in **Figure ES.9**.

Figure ES.8: Alternatives' Rating Scale



A summary of the conclusions drawn from the evaluation of alternatives in **Figure ES.9** are presented below. These conclusions were utilized in framing the recommendations for the corridor vision:

- The E+C Alternative provides sufficient user benefits compared to the investment level and effectively serves a short-term need for safety improvement and capacity enhancement.
- The E+C Enhanced Alternative provides user benefits similar to the Expressway Alternative, but at a substantially reduced cost.
- The Expressway Alternative substantially improves corridor mobility and diverts a good percentage of traffic from the I-40/I-85 Corridor; however, the capital cost is nearly as much as the Freeway Alternative with less overall user benefit.
- The Freeway Alternative provides the greatest mobility improvement and traffic diversion from the I-40/I-85 Corridor, but at the highest capital cost.

Figure ES.9: Alternatives' Evaluation Matrix

ALTERNATIVES EVALUATION MATRIX

Study Objective Category / Evaluation Criteria	Measure of Effectiveness	Alternative			
		E+C	E+C Enhanced	Expressway	Freeway
MOBILITY BENEFITS					
Travel Time	Percent reduction in travel time from Charlotte and Statesville to Raleigh vs. baseline condition.	○	◒	◒	●
Travel Diversion I-85 and I-40	Percent Interstate traffic reduction from baseline condition.	○	◒	◒	●
Safety	Reduction in accidents using National (and/or Statewide) average accident rates by facility type vs. baseline condition.	○	◒	◒	●
Accommodation of Transit Plans	Alternative's potential to facilitate implementation of transit initiatives.	○	○	○	○
GROWTH MANAGEMENT BENEFITS					
Development Pattern Impacts	Potential to direct growth consistent with locally desired development patterns and policies.	●	◒	◒	○
ECONOMIC BENEFITS					
Accessibility	Percent change in number of jobs or households within specified travel times to specific destinations vs. baseline condition.	○	○	○	○
Development Opportunity	Potential for improved access to future development that includes major employers.	○	●	●	◒
ENVIRONMENTAL ISSUES					
Sensitivity to environmental factors	Potential for adverse impact based on facility footprint and location.	●	◒	○	○
Sensitivity to social factors	Potential for adverse impact based on facility footprint and location.	●	◒	○	○
COST EFFECTIVENESS BENEFITS					
Transportation User Benefits	Travel time, operating, and safety cost savings relative to the baseline condition.	○	◒	◒	●
Capital Cost	Estimate of probable cost.	●	◒	○	○
User Benefits / Capital Costs	Calculated ratio.	●	◒	○	◒

Corridor Vision

The establishment of a consensus-based vision for the US 64–NC 49 Corridor is an important planning step to provide long-term direction for all roadway improvements to US 64 and NC 49 within the defined study area. The vision defines the major characteristics of a substantial financial investment and provides the means to build stakeholder commitment to major facility modifications and enhancements. The vision also provides an implementation strategy through the identification of a logical sequence of facility improvements, outlining the "evolution" of the corridor from the current physical and operational characteristics to the ultimate facility type. The vision is not defined by a year of achievement, but serves as the "beacon on the horizon" to guide and direct the desired physical and operational characteristics of the US 64–NC 49 Corridor.

It is clear from the alternatives' evaluation that the Freeway Alternative best satisfies the purposes and criteria of a Strategic Highway Corridor. Unfortunately, it is also clear that the near term implementation of the Freeway Alternative is not financially feasible. Therefore, it is the Study Team's and Corridor Development Team's recommendation that the Freeway Alternative serve as the ultimate "Corridor Vision" with achievement of the vision occurring through the staged implementation of necessary improvements.

While it is not within the scope of this study to develop specific design guidelines, it is the recommendation of the Study Team that the roadway improvements encompassing the vision be developed in context with the surroundings to take advantage of the corridor's contours and natural beauty. Design elements such as a wide vegetated median, decorative retaining walls and structures, and attractive signing can all be used effectively to blend the facility into its surroundings. Examples of such design elements from the Baltimore-Washington Parkway are shown in **Figure ES.10**.

Implementation steps to achieve the vision are described below.

Step 1

The first step toward the vision is the implementation of the improvements contained in the NCDOT TIP (FY 2004-2010). Although several of these projects, such as the US 64 Asheboro Southern Bypass and the US 1/US 64 improvements through Cary are consistent with the Freeway Alternative definition, the majority of the other projects are multi-lane widenings of existing two-lane highways with no control of access. The TIP projects are in various stages of project development. These projects should be reviewed for opportunities to provide consolidated driveways and allow for the conversion of signalized intersections to interchanges without disruption to established project delivery dates. Such project enhancements have the potential to not only improve safety and traffic operations in the near term, but to advance the facility closer to the ultimate vision of a freeway across the corridor. In addition to proceeding with current NCDOT TIP projects, an access management plan

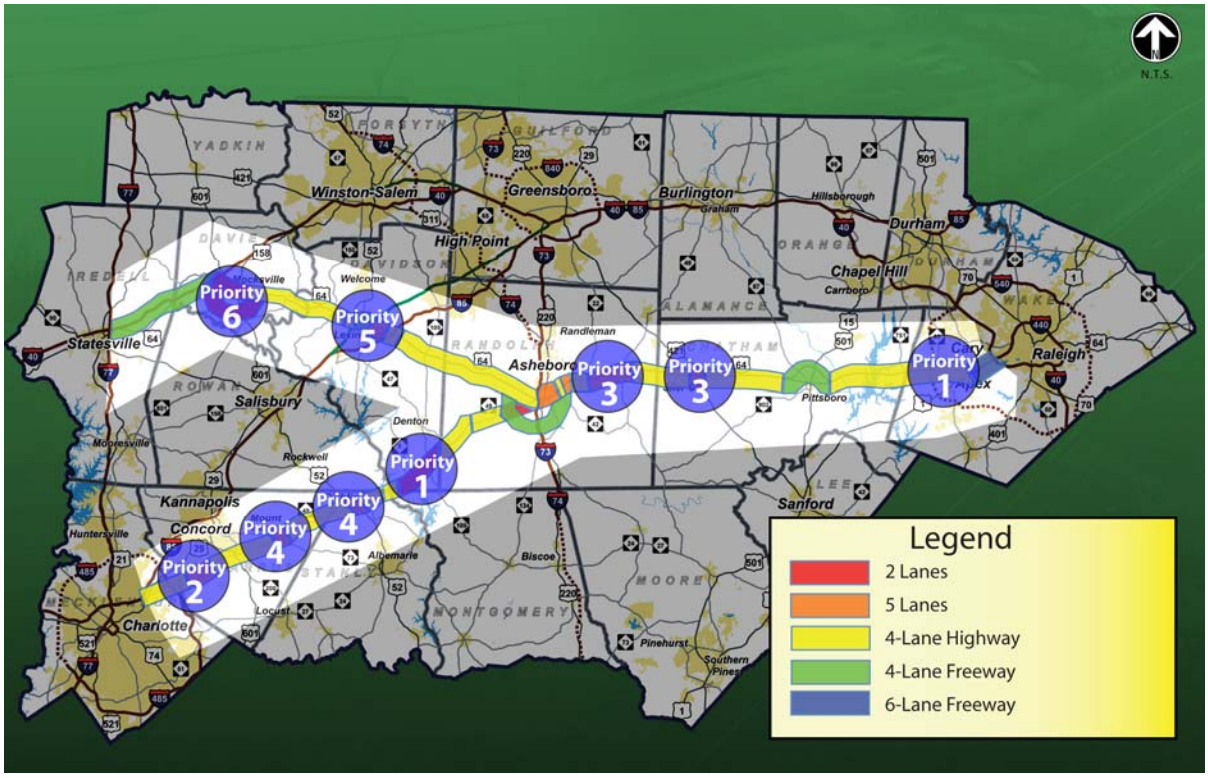
Figure ES.10: Baltimore-Washington Parkway

should be developed and implemented to protect the existing four-lane sections of US 64 and NC 49 between the urban areas from the creation of new driveways and signalized intersections. Where possible, the number of existing driveways should be consolidated into a reduced number of access points.

Step 2

The second step in achieving the ultimate corridor vision would be to implement those improvements identified as elements of the E+C Enhanced Alternative. All of these projects would be consistent with the ultimate Freeway Alternative. **Figure ES.11** identifies these improvement projects along with a suggested implementation priority ranking. Project 1 (near Raleigh) and Project 2 (near Charlotte) should be implemented as soon as possible as they are the most critical in making the US 64–NC 49 route between Charlotte and Raleigh an attractive alternative to I-40 and I-85. Implementation of these projects would improve the corridor to a combination of a Freeway, Expressway-Type I, and Expressway-Type II. Through careful monitoring of traffic volume, traffic operations, and accidents, the sequence of the remaining projects 3 through 6 may be adjusted as appropriate.

Figure ES.11: E+C Enhanced Improvements with Priority Ranking



Step 3

The final step in achieving the vision entails connecting all of the "freeway" portions of the corridor. Such improvements may consist of an upgrade of the facility on existing alignment, or may require the construction of a new location facility. As defined by the Study Team, there are three major segments of the study corridor. Given what is presently known with regard to safety, traffic volume, traffic operations, and land development patterns, the Study Team envisions the following priority for segment improvement:

- Asheboro to Raleigh
- Charlotte to Asheboro
- Statesville to Asheboro

Conclusion

NCDOT has recognized the limitations of continuing to widen the Interstates and constructing new roads to facilitate regional mobility and freight carrying capacity that often result in a great expense to the environment and urban structure. With the update to the state's Long-Range Statewide Multimodal Transportation Plan, NCDOT has a new emphasis on targeted mobility improvements. The Strategic Highways Corridors concept promotes the need to improve, protect, and maximize the capacity of existing highways deemed critical to

statewide mobility and regional connectivity. It represents an opportunity for NCDOT in coordination with stakeholders to consider long-term visions, decision-making consistency, land use partnerships, and overarching design/operational changes.

It is within this context that NCDOT initiated a corridor study of the US 64–NC 49 Corridor in September 2003 with Phase 1 conducting a regional assessment of transportation needs and evaluating broad alternative roadway investment strategies to meet those needs. The principal products include the following:

- Problem Statement
- Consensus-Based Vision
- Land Use Policy Guidelines
- Corridor Preservation Methods

These four products provide a solid foundation upon which future project development phases can build. Continuing beyond Phase I, NCDOT will use these products to:

- Support the need for improvements to US 64 and NC 49 as they relate to the corridor's function as a Strategic Highway Corridor.
- Promote continued stakeholder involvement.
- Ensure that improvements are consistent with the overarching corridor vision in terms of design characteristics, operations, and esthetics.
- Work with local agencies to develop land use plans that are consistent with and support the corridor vision.
- Develop a corridor preservation plan specific to US 64 and NC 49.
- Serve as a preface and supporting documentation for improvement projects that enter the environmental document phase.

Chapter 1 INTRODUCTION

The North Carolina Department of Transportation (NCDOT) is conducting a comprehensive study of US 64 and NC 49 from Statesville to Raleigh (US 64) and Charlotte to Raleigh (NC 49 and US 64), herein referred to as the US 64–NC 49 Corridor. The US 64–NC 49 Corridor is identified in the state's Strategic Highway Corridors (SHC) concept[1] as a corridor of significance in preserving transportation mobility and connectivity within the central region of North Carolina. The intent of the corridor study is to develop an improvement master plan that will enhance the long-term mobility of people and goods, foster economic growth and development, and relieve congestion on I-40 and I-85, and optimize transportation funding.

The corridor study is being conducted in phases. Phase 1, the subject of this report, consists of a regional assessment of transportation needs and the evaluation of broad alternative roadway investment strategies to meet those needs as well as satisfy the objectives of a Strategic Highway Corridor. The product of Phase 1 is a corridor vision that defines the improvement design concept (major features and characteristics) and scope (range or extent of the action). Subsequent study phases will transition the corridor vision to location specific alternatives and evaluation.

1.1 Purpose of Report and Report Organization

The purpose of this report is to:

- Describe the corridor study methodology.
- Present the study goal and objectives.
- Describe existing and anticipated study area conditions, which contribute to the need for corridor transportation improvements.
- Define broad investment alternative strategies that address the need for transportation improvements.
- Present the results of comparing the alternative investment strategies against the evaluation criteria developed from the study objectives.
- Define a recommended corridor vision and implementation strategy based on the results of the alternatives' evaluation.
- Describe land use policy guidelines and corridor preservation methods that may be used in implementing the corridor vision.
- Outline next steps for corridor planning.

This report is organized as follows:

- Chapter 1 provides an overview of the NCDOT Strategic Highway Corridors concept and the parameters in which this study was conducted.
- Chapter 2 describes the public involvement program for the study.

[1] http://www.ncdot.org/planning/tpb/shc/

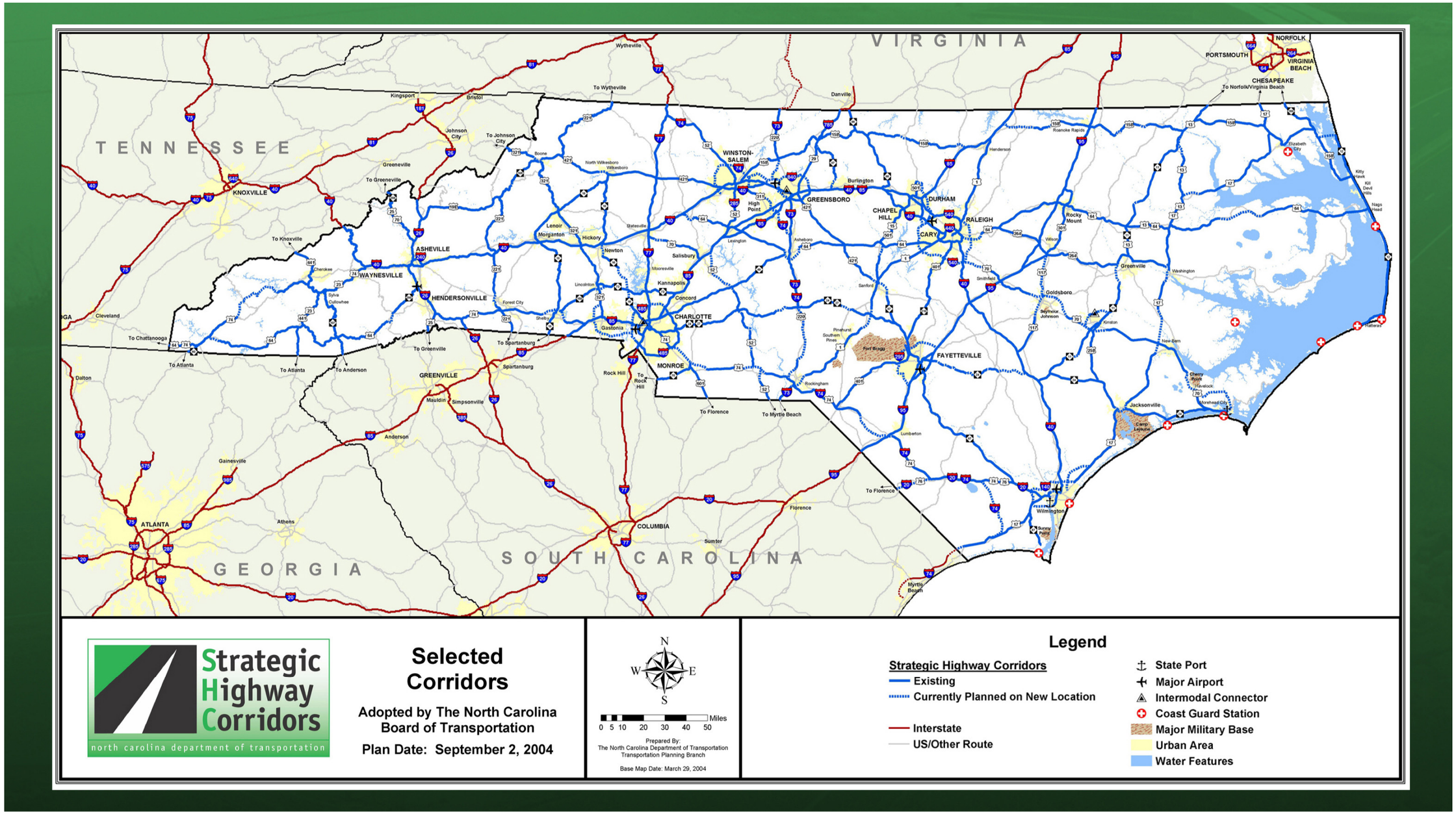
- Chapter 3 provides an overview of existing and anticipated conditions within the project study area.
- Chapter 4 presents the overall need for transportation improvements to US 64 and NC 49 within the study area.
- Chapter 5 defines the alternative roadway investment strategies that were examined.
- Chapter 6 describes the travel demand forecasting process and results.
- Chapter 7 presents the results of the alternatives' evaluation.
- Chapter 8 presents the recommended corridor vision.
- Chapter 9 provides an overview of corridor preservation methods at the local and state level.
- Chapter 10 presents example land use guidelines that may be used by the state and local governments to implement the corridor vision.
- Chapter 11 outlines next steps for the corridor study.

1.2 North Carolina Strategic Highway Corridors Concept

The North Carolina Strategic Highway Corridors concept represents the first major implementation step to be advanced under the update of the state's Long-Range Multimodal Statewide Transportation Plan. The concept, developed in partnership with the North Carolina Department of Environment and Natural Resources and the North Carolina Department of Commerce, represents a timely initiative to protect and maximize the mobility and connectivity on a core set of highway corridors, while promoting environmental stewardship through maximizing the use of existing facilities to the extent possible, and fostering economic prosperity through the quick and efficient movement of people and goods. The concept offers NCDOT and its stakeholders an opportunity to consider long-term vision when making land use decisions and design and operational decisions on the highway system. The creation of a long-term vision identifies the ultimately desired facility type (freeway, expressway, boulevard, or thoroughfare) for each corridor. A tri-agency policy statement endorsing the SHC concept was signed by the Secretaries of the three agencies on December 2, 2004

Figure 1.1 identifies the Strategic Highway Corridors as adopted by the North Carolina Board of Transportation (NCBOT) in September 2004. The following general criteria along with input from the public, NCBOT, and NCDOT staff guided the Strategic Highway Corridors selection process.

Figure 1.1: Strategic Highway Corridors



- **Mobility:** Corridor currently serves or has the potential to expeditiously move large volumes of traffic.
- **Connectivity:** Corridor provides a connection between activity centers including cities, airports, military bases, seaports, etc.
- **Interstate Connectivity:** The corridor provides connectivity between existing and/or planned Interstates.
- **Interstate Relief:** Corridor serves or has the potential to serve as a reliever route to an existing Interstate facility.
- **Hurricane Evacuation Routes:** Corridor represents a major route within North Carolina's Emergency Management's Coastal Evacuation Route Map
- **Cited in Prominent State Report:** For example, the Rural Prosperity Task Force Report.
- **Part of a National, Statewide, Economic, or Military Highway System**: For example, the National Highway System or STRAHNET

The purpose of the Strategic Highway Corridors concept is to create a consensus–based vision for each identified corridor. Goals of the corridor vision are to improve mobility and connectivity, foster economic prosperity, promote environmental stewardship, and protect the state's transportation investment. The Strategic Highway Corridors concept will influence key policy decisions related to funding, project planning, design, facility type, and local land use.

1.3 US 64–NC 49 as a Strategic Highway Corridor

NCDOT has identified the US 64 and NC 49 corridors within the central portion of the state as Strategic Highway Corridors. The US 64 and NC 49 corridors are considered to possess the following characteristics consistent with Strategic Highway Corridors criteria:

- Potential to carry significant traffic, including substantial truck traffic.
- Connect existing major activity centers.
- Connect existing and planned Interstate facilities.
- Potential to serve as an Interstate reliever.
- Part of the national highway system.

An assessment of the extent to which the US 64 and NC 49 corridors meet these criteria is provided in **Table 1.1**.

Table 1.1: Satisfaction of Strategic Corridors Criteria by US 64–NC 49 Corridor

Statewide Strategic Corridors Criteria	Degree of Satisfaction of Criteria
Part of a National, Statewide, Economic, or Military Highway System.	The segments of US 64 from Statesville to Asheboro and from Asheboro to Raleigh, and the segment of NC 49 from Charlotte to Asheboro are all on the North Carolina portion of the NHS. **Criterion is fully satisfied**.
Connects an existing major activity center to another major activity center, seaport, major airport, or major military base.	Existing major activity centers served directly by the US 64–NC 49 Corridor include Charlotte, Concord, Cary, Raleigh, and the major airports in Charlotte and Raleigh. **Criterion is fully satisfied**.
Connects an existing Interstate facility to another existing or planned Interstate facility.	US 64 between Statesville and Asheboro connects I-40, I-85, and I-73/I-74. NC 49 between Charlotte and Asheboro connects I-85, I-485, and I-73/I-74. US 64 between Asheboro and Raleigh connects I-73/I-74, I-540, I-440, and I-40. **Criterion is fully satisfied**.
Currently serves or has the potential to serve as a reliever route to an existing Interstate facility.	I-40 links Statesville with Greensboro/High Point/Winston-Salem. I-85 links Charlotte with Greensboro/High Point/Winston-Salem, where it joins I-40. The combined I-40/I-85 Corridor then links Greensboro/High Point/Winston-Salem with Raleigh/Durham/Chapel Hill. Since the same major urban regions are also interconnected by the US 64–NC 49 Corridor, there is clearly an opportunity to serve as a reliever route for the I-40/I-85 Corridor. **Criterion is fully satisfied.**

1.4 Corridor Study Goal and Objectives

The study goal and objectives for the US 64–NC 49 Corridor Study are a derivative of the purpose and goals of NCDOT's Strategic Highway Corridors concept. They provide study direction as well as the measure for determining how well improvement alternatives fulfill the criteria of a Strategic Highway Corridor. The study goal and objectives were drafted through collaboration between the Study Team and the Corridor Development Team (see Section 2.2.2.1).

Study Goal
"To develop a transportation system consistent with the Strategic Highway Corridors concept definition that will serve the mobility needs of people and freight to and through Central North Carolina while addressing the environmental and economic development opportunities of the public."

Study Objectives

1. Enhance transportation connectivity and mobility.
2. Serve as a reliever to I-40 and I-85.
3. Improve safety.
4. Support regional and local transit plans.
5. Support economic development.
6. Support local land use plans.
7. Optimize costs and benefits to system users and funding agencies.
8. Be sensitive to environmental and social factors.

1.5 Corridor Study Process

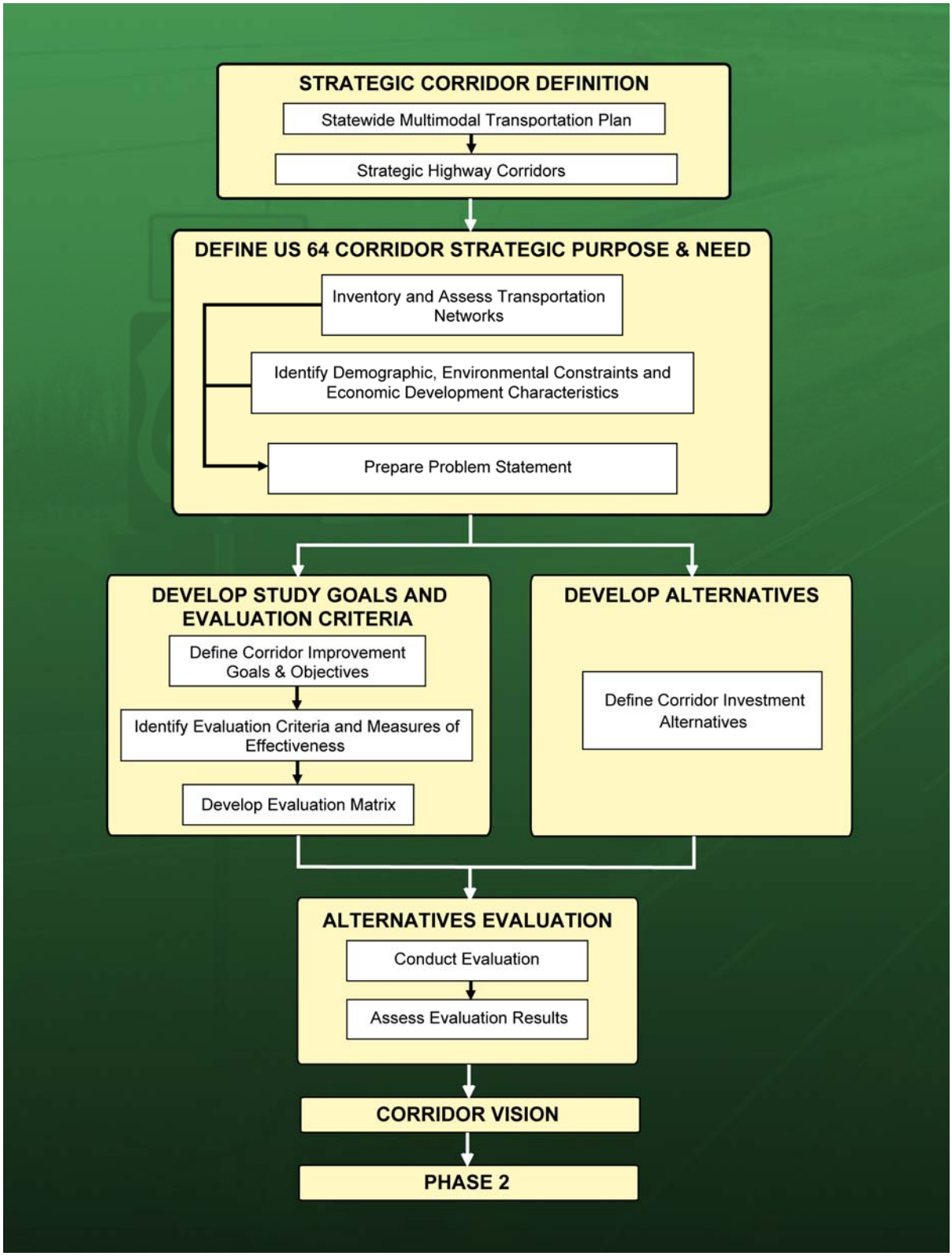
As noted in Section 1.2, it is the goal of the Strategic Highway Corridors concept to support the creation of a consensus-based vision for each corridor. The resulting vision would then be used to influence key decisions related to design, location, access, local land use decisions, project planning, and funding. Phase 1 of the US 64 -NC 49 Corridor Study establishes such a vision.

The intent of the corridor study is to develop a facility "master plan" improvement strategy for the enhancement and long-term preservation of passenger and freight mobility. Such studies are typically conducted in phases and/or tiers with successively more refined alternative definitions and evaluation. The first phase of the US 64–NC 49 study addresses broad investment strategy alternatives, which are defined by typical roadway cross section, type of access, and operational characteristics. The product of the first phase is a corridor vision along with an implementation concept to achieve the vision. Subsequent corridor study phase(s) transition the broad investment strategy vision into a concept design that more precisely defines alignment location, access type and location, facility details, and operations.

The evaluation process for Phase 1 of the US 64–NC 49 Corridor Study is shown in **Figure 1.2**. The process consists of five steps:

1. Definition of Need
2. Definition of Alternatives
3. Development of Evaluation Criteria
4. Evaluation of Alternatives
5. Recommended Corridor Vision (Design Concept and Scope)

Figure 1.2: Phase 1 Study Process



1.5.1 Definition of Need

As a first work element of the corridor study, the Study Team prepared a Problem Statement, which provides support for the purpose and need of corridor improvements. While improvements to the corridor have not yet entered into the environmental clearance phase of project development, in which a formal, project-specific Purpose and Need Statement would be prepared consistent with the requirements of the National Environment Policy Act, the preparation of a Problem Statement supports planning phases of the project. In addition, the Problem Statement allows an early opportunity for state and federal resource agencies to advise NCDOT on concerns that they might have regarding roadway improvements in the corridor. The Problem Statement has been prepared with the intent of demonstrating the extent to which US 64 and NC 49 meet the Strategic Highway Corridors' criteria and exhibit a need for improvement.

As part of the Problem Statement, the Study Team conducted an assessment of the ability of the existing and planned transportation system to meet mobility and land accessibility needs. This resulted in the creation of a Transportation Profile for the study area. This assessment also reviewed state and local economic development and land use initiatives, and demographic characteristics for the study area, to identify the need for additional transportation system improvements. It also examined environmental characteristics to identify major constraints to large-scale construction.

1.5.2 Definition of Alternatives

The objective of the Phase 1 definition of alternatives activity is to establish a level of facility improvement that addresses the mobility needs of the US 64–NC 49 Corridor and is consistent with the overall general objectives of Strategic Highway Corridors in North Carolina. Alternative definitions define an investment strategy characterized by conceptual typical section, access plan, and operational elements.

1.5.3 Evaluation Criteria

The degree to which the alternatives achieve the study goal and objectives is determined through the application of evaluation criteria corresponding to those objectives. The eight study objectives can be summarized into the following study objective categories:

- Mobility Benefits
- Growth Management Benefits
- Economic Development Benefits
- Environmental Issues
- Cost Effectiveness

Evaluation criteria were developed for each study objective. Evaluation criteria are defined by measures of effectiveness (MOEs), which are the actual data upon which each alternative is evaluated. MOEs can be either qualitative or quantitative. For some criteria, there were no quantitative measures available for assessing criteria satisfaction. In such cases, collective Study Team experience was used as the basis for evaluation.

1.5.4 Evaluation of Alternatives

An alternatives' evaluation matrix was developed that reflects the broad nature of the analysis at this stage of study. Alternatives were assessed based on the degree to which they satisfy the criterion. The matrix provides a comparison of facility type characteristics comprising the investment strategy alternatives. An interpretation of the evaluation results provides the basis for defining the corridor vision.

1.5.5 Corridor Vision

From the results of the alternatives evaluation, a corridor vision is established. The vision may be a single investment strategy definition or a combination of definitions. The vision sets the ultimate desired improvement strategy for the corridor and outlines an approach for improvement implementation. The vision is not location specific, nor does it address facility characteristic details such as access locations. However, it is essential for establishing stakeholder consensus and commitment to substantial facility modifications and enhancements.

Chapter 2 PUBLIC INVOLVEMENT PROGRAM

The Study Team recognized the potential for competing visions among the various stakeholders throughout such a large corridor study area. The intent of the public involvement program was to initiate discussions with corridor stakeholders to determine respective perceptions of existing and future corridor conditions, and to gauge opinions on various broad improvement strategies. This collaborative approach encouraged early and open dialogue and provided a means to ensure broad corridor stakeholder representation.

The public involvement program for the US 64–NC 49 Corridor Study reached and involved a wide-range of corridor stakeholders, encompassing those who may be impacted by future improvements, who represent others who may be impacted by improvements, or who have a casual interest in the corridor through their respective area. The Study Team identified and involved local elected officials, organizations, agencies, area citizens, and transportation providers.

2.1 Public Involvement Plan

The objective of the public involvement program was to identify, inform, and involve stakeholders in an effort to develop study recommendations that are not based exclusively on technical information. As outlined in the study's *Public Involvement Plan (December 2003)*, the Study Team participated in special forums, techniques, and methods to meet the public involvement objective. During the study, the Study Team employed the following guidelines in meeting the public involvement objective:

- Soliciting participation throughout the study.
- Identifying and reaching groups who might be most impacted by potential roadway improvements.
- Encouraging a two-way communication (i.e. open dialogue of information, ideas, and values) between the Study Team and the stakeholders.
- Maintaining study update and findings through the media and project web site.
- Considering all reasonable and promising suggestions.
- Following up promptly on any study inquiries.
- Documenting public involvement activities and input.
- Providing opportunities and outlets for public information and input.

2.2 Public Involvement Plan Implementation

The approach for meeting the public involvement program objectives incorporated multiple components.

- Information gathering and documentation.

- Stakeholder identification.
- Database development and maintenance.

Activities and tools associated with each of these components are described in the following sections.

2.2.1 Information Gathering and Documentation

2.2.1.1 Stakeholder Identification

The Study Team developed a list of major stakeholders through research, meetings with agencies, and community contacts. Key stakeholders from businesses, special interest groups, and political jurisdictions were identified. Following the identification of the stakeholders, the Study Team initiated mechanisms in pursuit of information and feedback through stakeholder interviews and group outreach presentations, which are both described in Section 2.2.2.2 and 2.2.2.3, respectively.

2.2.1.2 Database Development and Maintenance

A project database of public and private sector interest groups and key stakeholders was developed. Stakeholder outreach and the resulting feedback obtained through brochure return cards and the study web site was documented in the project database. It is recommended that this database be used to disseminate project information in future phases of project development and continue to serve as a public interaction tracking mechanism.

2.2.2 Stakeholder Involvement

2.2.2.1 Corridor Development Team

The Corridor Development Team (CDT) was an advisory committee developed to oversee both technical and non-technical matters. The CDT was comprised of NCDOT staff-level individuals with a comprehensive knowledge of the regional study area, Metropolitan Planning Organization (MPO) and Rural Planning Organization (RPO) staff who work closely within the corridor study area, local elected/appointed officials, and local staff who represent a specific municipality along the corridor.

CDT members represented the following organizations:

- NCDOT Transportation Planning
- NCDOT Roadway Design
- NCDOT Traffic Engineering

- NCDOT Project Development and Environmental Analysis
- NCDOT Program Development
- Capital Area Metropolitan Planning Organization
- Town of Cary
- Town of Apex
- Wake County
- Town of Siler City
- Chatham County
- Town of Pittsboro
- Piedmont Triad Regional Planning Organization
- NW Piedmont Regional Planning Organization
- Lake Norman Regional Planning Organization
- Cabarrus-Rowan Metropolitan Planning Organization
- Mecklenburg-Union Metropolitan Planning Organization
- Triangle Area Regional Planning Organization
- Rocky River Regional Planning Organization
- Federal Highway Administration (NC Division Office)

CDT members aided the Study Team in meeting the study objectives through their willingness to:

- Assist in developing the study goal and objectives.
- Review and comment on regional transportation objectives and priorities for the study.
- Use their knowledge of the study area to help generate viable alternatives.
- Act as a technical "sounding board" for potential strategies to be evaluated.
- Assist in developing measures and methodologies for testing strategies.
- Review and comment on the results of alternative evaluations.
- Assist in framing issues, alternatives, and next steps for stakeholders.
- Foster regional cooperation.
- Raise and discuss issues of concern.
- Help to anticipate community reactions.
- Reflect the range of affected interests.
- Help the Study Team establish a working relationship with communities affected by the project.
- Communicate project information and findings back to their respective organizations.

CDT meetings provided opportunities for the Study Team to present and discuss major work items, including problem identification, alternatives identification and evaluation, and overall study recommendations. The CDT meetings provided a forum to present findings and to solicit feedback on the viability and acceptability of key decisions and recommendations.

Brief descriptions of the CDT meetings are provided below with meeting summaries provided in **Appendix A**.

CDT Meeting # 1

CDT Meeting #1 was held on November 12, 2003 in Asheboro. This meeting served as a kick-off to the study and included a presentation and open discussion of the NCDOT Strategic Highway Corridors concept, the US 64–NC 49 Corridor Study scope and schedule, purpose of the CDT Committee, and draft study goal and objectives. The Study Team and CDT also discussed public involvement materials and activities, including CDT suggestions for potential stakeholder interview participants.

CDT Meeting # 2

CDT Meeting #2 was held on August 23, 2004 in Harrisburg. An open question and answer dialogue between the CDT members and the Study Team followed a formal presentation regarding study activities, including stakeholder interview results; demographics, land use, and economic development findings; environmental constraints; the transportation profile and travel demand findings; and alternatives identification and evaluation. The Study Team presented results of the preliminary alternatives evaluation.

CDT Meeting # 3

CDT Meeting #3 was held on November 10, 2004 in Mocksville. This meeting focused on an update of the description and evaluation of the study alternatives presented at CDT Meeting #2. The Study Team presented and discussed with the CDT committee members a recommended corridor vision based on the alternatives' evaluation results. The Study Team also presented information on the contents of the Problem Statement (see Chapter 4), current development patterns in the corridor study area, and models and precedents with regard to land use policy guidelines for the protection of long-term corridor mobility.

CDT Meeting # 4

CDT Meeting #4 was held on January 14, 2005 in Cary. The Study Team continued the discussion of the corridor vision and outlined a vision implementation strategy. The Study Team also presented land use policy guidelines and corridor preservation methods that may be used to support the corridor vision.

2.2.2.2 Stakeholder Interviews

Stakeholder interviews were conducted as one of the first outreach activities for the US 64–NC 49 Corridor Study. The intent of these interviews was to ensure that study recommendations were sensitive to the concerns and issues of the corridor stakeholders.

These interviews were designed to do the following:

- Gather critical information on potential concerns, opinions, and issues of targeted groups.

- Obtain feedback on potential study options.
- Establish a connection with key individuals and groups.
- Identify key issues, opportunities, and concerns related to US 64–NC 49 Corridor Study improvement options.
- Identify additional groups/individuals that should be made aware of and/or involved in the process.

These interviews provided an opportunity to assess initial perceptions and opinions from a geographically and philosophically diverse sample of stakeholders along the corridor. It is anticipated that such stakeholders will play a key role in subsequent phases of the planning and project development process for this corridor. Interview participants included representatives from the following organizations:

- Chatham County Board of Commissioners
- Haw River Assembly
- Town of Apex
- Leith Management
- Town of Siler City
- Sierra Club, Orange-Chatham Group
- Chatham County Economic Development Corporation
- Saint Julia Catholic Church (Siler City)
- Asheboro City Council
- North Carolina Zoological Park
- Asheboro/Randolph Chamber of Commerce
- Klaussner Furniture
- Davie County Board of Commissioners
- Yadkin-Pee Dee Lakes Project
- Davidson County Board of Commissioners
- Statesville Chamber of Commerce
- Town of Mt. Pleasant
- Town of Harrisburg
- Stanly County Planning/Zoning Department
- Uwharrie National Forest

These 20 stakeholder interviews were conducted during a six-week period during January and February of 2004. The format of the interview was one-on-one sessions (except for two interviews with a request for an additional participant). Two members of the Study Team attended each interview, with one conducting the actual interview, and the other documenting key issues.

The following sections summarize the feedback obtained from these interviews. A complete summary and abstracts from these interviews can be found in the *US 64–NC 49 Corridor Study Stakeholder Interviews Summary Report (May 2004).*

Feedback on Existing Corridor Conditions

Nearly all interview participants were familiar with the NCDOT Strategic Highway Corridors concept and the significance of US 64 and NC 49 in this planning initiative. There were key issues that emerged with regard to the perception of existing and future corridor conditions, as well as key issues confronting planning along the corridor. Feedback was similar among participants within each delineated public involvement cell.

Nearly all participants agreed that an increasing number of people are using the corridor for long distance travel. Participants agreed that the corridor is heavily used for local, commuting, and trucking travelers. Furthermore, most of the participants stated that the county or municipality they lived in or represented serves as a "bedroom community" for these regional commuters.

Although nearly all participants have noticed an increase in traffic on the corridor, not all said that this contributes to existing safety or mobility problems in their respective areas. A few general comments were made about high-speed travelers in specific areas of the corridor, including through Chatham County. A few participants attributed existing safety and mobility issues to truck conflicts, narrow and winding sections along some sections of US 64 and NC 49, and the presence of numerous driveways along the routes.

Some participants identified existing "hot spots" in their respective areas. They identified the following specific needs as critical:

- US 1/US 64 in Wake County was identified as an interchange that needs improvements.
- US 64 in Davie County (Mocksville) has major safety issues associated with heavy truck and vehicle conflicts.
- US 64 through Asheboro is heavily congested.
- Siler City has local and through traffic conflicts.
- The NC 49/NC 8 intersection was identified as “dangerous.”
- The NC 49 intersection with Roberta Road deteriorates mobility through Harrisburg.
- The section of US 64 between Lexington and I-85 was noted as being "dangerous.”
- NC 49 through Mount Pleasant has a school bus route along the corridor, raising safety concerns for school children.

Feedback on Future Corridor Conditions

While most participants stated that development in the region is inevitable, there were a number of differences expressed with respect to the nature of this desired growth. Nearly all participants noted that they are looking to expand their employment opportunities outside of manufacturing, including trying to attract larger companies. Nearly all participants stated that US 64 (NC 49 in the case of Harrisburg and Mount Pleasant) is a vital corridor for their future growth plans. While most of the participants said that areas along the corridor will continue to serve as "bedroom communities" for regional commuters, some participants

would like to see their county or municipality become more self-supporting with a mixture of residential and commercial/service growth available to encourage a reasonable tax base.

A few participants noted a strong desire to see the region as a whole become a major player in terms of being a tourism/recreational and cultural/historic destination. Although the region already possesses a number of major features (i.e. Badin Lake, Seagrove Pottery, Uwharrie National Forest, North Carolina Zoo, Jordan Lake, etc.), there is a strong desire to promote the concept of the area as a distinct region in terms of its geographic and economic significance. The Yadkin-Pee Dee Lakes Project, also known as the "Central Park Project", seeks to take advantage of the central portion of the area spanning Charlotte to Raleigh/Durham. The plan is to protect the natural, cultural, and historic resources of the region, while expanding the economic base by using these resources for "sustainable tourism" and recreation development. The idea is not to replace existing industries, but to supplement them with this type of tourism as a major economic industry for the region. The idea is to generate lifestyle jobs that attract hospitality resources for overnight visitors, not just day visitors.

Feedback on Study Options

Nearly all participants agreed that US 64 should be improved to a high-speed facility with full or limited control of access (these terms were explained to the participants). The majority opinion of the participants was that the corridor should be upgraded to a facility with full control of access, although they acknowledged that they had mixed feelings about the potential impacts of this facility type on smaller towns, such as Ramseur and Richfield.
A few participants favored a new alignment roadway for their long-term needs, as they felt it will be needed to improve mobility through their respective city/town. For example, those interviewed in Asheboro consider the planned bypass as a welcome improvement. Participants in Pittsboro agreed that the Pittsboro Bypass has helped the historic downtown area by alleviating truck and vehicle conflicts in the area and by taking a significant amount of through traffic out of the central business district. Several participants noted that they liked the visual quality of the Pittsboro Bypass.

One participant felt strongly that improvements should only take the form of minor safety enhancements at strategic locations. A couple of participants indicated their desire not to see recommendations for improvements that would further restrict access through their respective area.

2.2.2.3 Group Outreach Presentations

A series of presentations about the US 64–NC 49 Corridor Study were given at selected local government or other committee meetings along the study corridor. Presentations consisted of a PowerPoint presentation, followed by a question and answer session. The presentation focused on introducing the concept of corridor planning studies, and presented the specific elements to be undertaken as NCDOT and its partners develop a long-term mobility vision for the US 64–NC 49 corridor.

Presentations were given to the following:

- Chatham County Commissioners
- Mecklenburg-Union County MPO
- Piedmont Triad RPO
- Davie County Commissioners
- Apex Town Council
- Cabarrus-Rowan MPO
- Northwest Piedmont RPO
- Rocky River RPO
- Siler City Town Council

2.2.3 Public Information Component

2.2.3.1 Study Brochure

A brochure that described the study scope, schedule, and process was produced at the beginning of the study. This brochure served as a partnering piece to the study's first PowerPoint presentation made at group outreach meetings and to the CDT. The brochure was provided in bulk to CDT members for their distribution to their staff and/or other interested parties within their community. The brochure offered the reader a "return card" to become part of the study database and highlighted contact information for the study project manager.

2.2.3.2 Media Relations Plan

The study's media relations plan served as a planning tool for NCDOT Public Information staff as they crafted messages and scheduled the timing of media relation activities for the study. Study media relations actions were intended to heighten general public awareness and understanding of long-range corridor studies in general and the US 64–NC 49 Corridor Study. Because the US 64–NC 49 Corridor Study was comprised almost entirely of technical information gathering and analysis, it was intended that public information (as opposed to public involvement) in the form of media relations would be used to play a pivotal general public information role.

2.2.3.3 Web Site

A project web site for the US 64–NC 49 Corridor Study[1] was linked to NCDOT's Strategic Highway Corridors site. Information provided on the web site includes the following:

[1] http://www.ncdot.org/planning/tpb/shc/cs/studies/64_49/

- Description of the 19-county study area with a downloadable map.
- Overview of study activities.
- Summary of study conclusions for Phase 1.
- Description of public involvement activities conducted as part of the study.
- Project management contact information.
- Mailing list enrollment form.
- All project documentation and presentation materials.

2.3 Future Public Involvement

The collaborative approach used in the US 64–NC 49 Corridor Study was welcomed and embraced by the project's partners: members of the Corridor Development Team, participants in the stakeholder interviews, and audiences in local presentations. Their expectation of a process that continues this collaborative approach must be honored as NCDOT moves forward with the next phase of planning. The following are suggested guidelines to encourage consensus of desired outcomes on corridor improvements:

- Corridor(s) municipalities and NCDOT should continue to coordinate and maintain an open dialogue with respect to land use and transportation objectives for these corridors.
- Public involvement activities should include tools and methods to connect with other corridor stakeholders who are not familiar with the vision for the corridor.
- Once there is buy-in on the concept and location of specific alternatives, public involvement should incorporate ways to reach and involve other corridor citizens/stakeholders through all project stages.

2.4 Environmental Justice

In 1994, concern that minority populations and/or low-income populations bear a disproportionate high and adverse human health or environmental effects led President Clinton to issue Executive Order 12898. The Executive Order directed federal agencies, including the FHWA, to make Environmental Justice (EJ) part of their mission by identifying and addressing the effects of all programs, policies, and activities on minority and low-income populations. Executive Order 12898 and the subsequently developed USDOT and FHWA Orders on Environmental Justice address persons belonging to any of the following groups:

- Black - a person having origins in any of the black racial groups of Africa.
- Hispanic - a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.

- Asian - a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent.
- American Indian and Alaskan Native - a person having origins in any of the original people of North America and who maintains cultural identification through tribal affiliation or community recognition.
- Low-Income - a person whose household income (or in the case of a community or group, whose median household income) is at or below the U.S. Department of Health and Human Services (HHS) poverty guidelines.
- Native Hawaiian or Other Pacific Islander - a person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

As part of the US 64–NC 49 Corridor Study, Environmental Justice populations as defined above were identified along the corridor. Detailed results of the EJ analysis are documented in the *US 64–NC 49 Corridor Study Environmental Justice Technical Memorandum, December 2004.* Special attention to Environmental Justice populations will be needed in future project development phases. Summaries of the characteristics of the minority and ethnic populations and low-income populations identified within the US 64–NC 49 Corridor are provided below along with specific public outreach technique recommendations based on these population characteristics.

2.4.1 Minority and Ethnic Populations

The following describes characteristics of the minority and ethnic populations identified within the US 64–NC 49 Corridor:

- The three primary minority and ethnic Environmental Justice populations within the US 64–NC 49 corridor are Blacks, Asians, and Hispanics.
- Notable concentrations of blacks reside in the Charlotte metropolitan area and the smaller urbanized areas of Lexington, Asheboro, Siler City, Cary, and Pittsboro.
- Hispanics populations are widespread throughout the corridor with the largest concentrations located in Siler City and Asheboro.
- All of the Asian concentrations of greater than five percent were located in Mecklenburg and Wake Counties in the urbanized areas of Charlotte, Cary, and Apex.
- There are very few Native Americans within the corridor.

A successful public involvement program that would mitigate potential Environmental Justice impacts is one that would target participation from Blacks, Hispanics and, to a lesser degree, Asians. Potential strategies to reach these populations include the following:

- In recognition that these populations may have low-literacy and limited English proficiency, appearing on minority radio and television programs.

- Advertising within the racial and ethnic print and electronic media. Advertisements targeting Hispanic participation would need to be in Spanish.
- Soliciting speaking engagements at local churches, civic groups, and neighborhood associations.
- Piggybacking on existing community events, fairs, and sporting activities.
- Working with local merchants to set up project input stations at business establishments frequented by these communities such as grocery stores, discount stores, barber shops, etc.
- Working with local schools to distribute information about the project to students for them to bring home to their parents or guardians.
- Conducting public meetings at convenient times (such as weekends) and places where these populations feel comfortable.
- Including Spanish-speaking staff to assist Hispanic attendees and make them feel welcome at public outreach events.
- Creating presentations that are predominantly graphic and not written.

2.4.2 Low-Income Populations

The following describes characteristics of the low-income populations identified within the US 64–NC 49 Corridor:

- The corridor has a lower concentration of persons living at or below the poverty level than the state as a whole.
- The distribution of persons living below the poverty level along the US 64–NC 49 corridor is fairly widespread. The largest concentrations of low-income population along the corridor are located in Mecklenburg, Iredell, Wake, Davidson, and Randolph counties.
- Only one of the census tracts characterized by notable concentrations of low-income populations was not also characterized by a notable minority population, which would indicate the presence of low-income Whites. This tract is located in Davie County.

Because nearly all of the low-income areas within the corridor are located within minority or ethnically populated areas, all of the public involvement strategies targeting minorities would likely apply to the low-income populations within the corridor. Potential public involvement strategies specifically targeted to attract low-income persons include the following:

- Working with local schools to identify low-income populations through the free and reduced price meals program.
- Working with social service agencies to understand the social and employment trends within a given area and to validate the identification of low-income populations.

- In recognizing that many low-income persons work nontraditional work hours, have limited personal transportation, do not own computers, or subscribe to newspapers, public outreach events should be scheduled accordingly to reach the greatest percentage of these populations.
- Offering or raffling free giveaways at public outreach activities to draw interest.

Chapter 3 EXISTING AND ANTICIPATED CONDITIONS

3.1 Study Area Description

One of the most important early activities associated with a large scale, regional transportation corridor study is the development of a clear and understandable description of the geographic area within which the analysis is to be conducted. The definition of a study area requires a balance between the need to account for the majority of traffic flows that would be affected by a significant transportation investment and the resources available for the study.

In this study, "study area definition" refers to the geographic extent over which findings are presented and recommendations made. However, various elements of the study, and especially the travel demand analysis, extend beyond the boundaries of the study area definition. For example, the geographic extent of the demand analysis actually encompasses the entire state, so that major external travel flows affecting the study area can be considered.

The original Request for Proposals (RFP) for this project issued by NCDOT in December 2002 defined the general corridor study limits as follows:

> *"US 64 from Raleigh to Asheboro with spurs along US 64 to Statesville (connecting to I-40 in both locations) and NC 49 to Charlotte (connecting to I-85)"*

The RFP went on to note that *" … US 64 with both spurs provides a logical relief route for the I-40/I-85 corridor due to the fact this corridor is expected to experience capacity problems within the next 20 years. US 64 also provides connections to the three major urban areas in the state (Triangle, Triad, and Metrolina)."* The study area definition builds upon this initial definition.

3.1.1 Regional Study Area

One of the first aspects of defining the study area is determining how best to define the regional travel shed for the US 64–NC 49 Corridor. Clearly, many of the current travel movements along the existing I-40/I-85 Corridor through the central portion of the state have origins and destinations that extend beyond the boundaries of the US 64–NC 49 study area as defined in NCDOT's RFP. Therefore, the regional study area was defined to capture both the local and intra-regional travel patterns as well as longer distance intrastate and interstate travel movements within the primary study area. The regional study area as defined for the US 64–NC 49 Corridor Study is shown in **Figure 3.1**.

The regional study area encompasses a total of 19 counties in central North Carolina. By using entire counties as the basic geographic area for the definition of the regional travel shed, it was possible to include all of the potentially effected urban areas as well as all of the important junctions along the Interstate and primary state highway systems in this portion of the state. By including both geographic areas (counties) and important highway facilities

such as I-77 that do not directly connect with the defined segments of the US 64–NC 49 Corridor, it is possible to account for decisions that drivers in these "external" areas might make relative to their potential diversion to use US 64 or NC 49, as opposed to other routes serving common destinations.

This latter consideration is particularly important since one of the primary criteria used to define a Statewide Strategic Highway Corridor is its current or potential ability to serve as a reliever route to an existing Interstate facility. It was thus necessary to include a more comprehensive description of the regional and statewide highway network in order to be able to account for all reasonable diversion paths through the study area that might be used by current travelers along I-40 and I-85 and their major feeder routes.

3.1.2 US 64–NC 49 Corridor Study Limits

Figure 3.2 highlights the US 64–NC 49 Corridor within the study area boundaries. No set width surrounding the existing roadways was established. It varied depending on the type of analysis and typically extended one mile or more on either side of the existing highways. The US 64–NC 49 Corridor is approximately 200 miles in total length, traversing ten counties.

The US 64 Corridor extends from I-77 (including I-40 from I-77 to Mocksville) in Statesville (Iredell County) to I-40 in Raleigh (Wake County). The NC 49 Corridor extends from I-85 in Mecklenburg County northeast to US 64 in Asheboro (Randolph County).

The corridor limits build upon the connectivity and Interstate relief criteria established for Strategic Highway Corridors. The US 64–NC 49 Corridor connects three major urban areas in the state including the Triangle, Triad, and Metrolina. Furthermore, US 64 and NC 49 within the corridor limits could provide a logical relief route for I-40 and I-85.

3.1.3 Corridor Overview

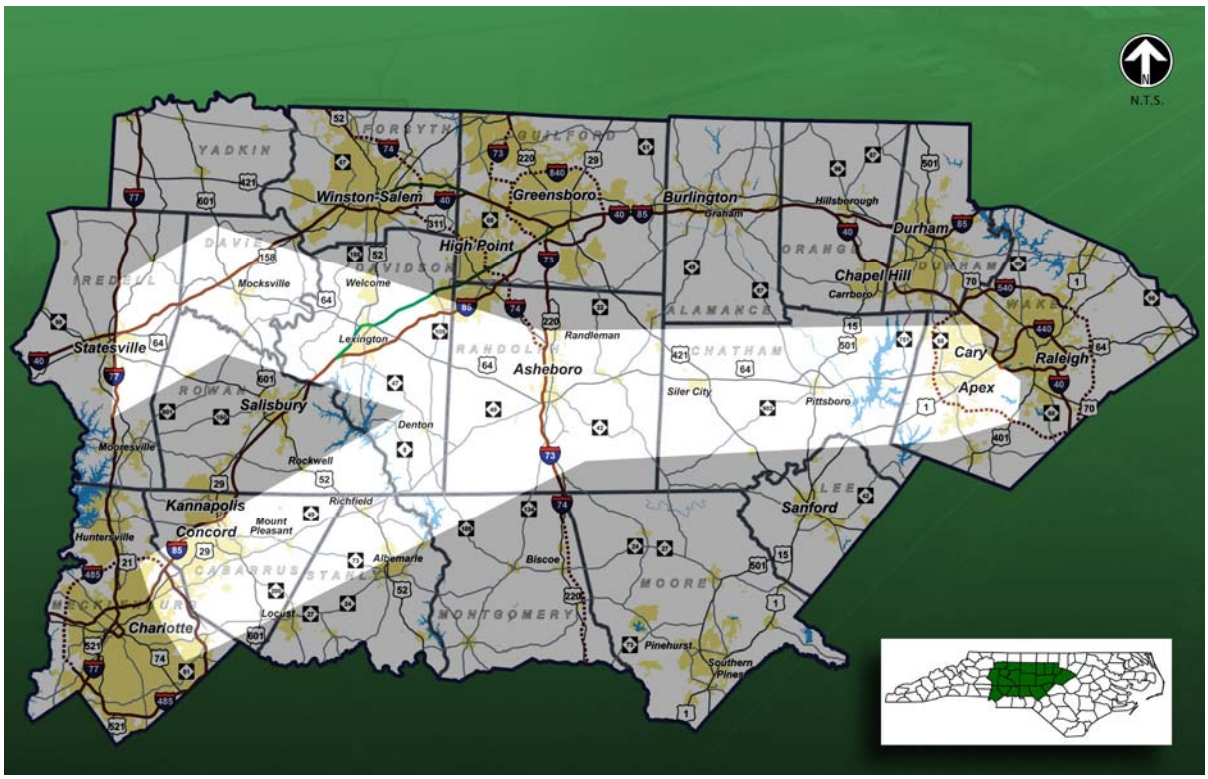
The US 64–NC 49 Corridor was segmented into areas with consistent transportation characteristics. For Phase 1 of the study, five segments were identified as described below:

- Statesville to Lexington: I-40 from Statesville to Mocksville and US 64 from Mocksville to just west of Lexington.
- Lexington to Asheboro: US 64 from west of Lexington to NC 49 in Asheboro.
- Asheboro to Pittsboro: US 64 from NC 49 to west of Pittsboro.
- Pittsboro to Raleigh: US 64 from west of Pittsboro to I-440 in Raleigh.
- Charlotte to Asheboro: NC 49 from I-85 in Charlotte to US 64 in Asheboro.

Figure 3.1: Regional Study Area

The following sections provide a general overview of US 64 and NC 49 in terms of facility type and surrounding area.

Figure 3.2: US 64–NC 49 Corridor Study Limits



3.1.3.1 US 64 – Statesville to Lexington

This segment of the corridor begins in Statesville and passes through the town of Mocksville, the small community of Fork, ending at the west side of the city of Lexington. From Statesville to Mocksville, the corridor, as defined for this study, utilizes I-40. I-40 from I-77 to the I-40/US 64 Interchange (Exit 168) is a four-lane, rural freeway with a posted speed limit of 65 mph.

US 64 through Mocksville

Outside the municipal areas of Lexington and Mocksville, the surrounding land use consists of agricultural and forested land with pockets of commercial and large parcel residential use. In the cities, the corridor is developed with commercial and residential uses typical of small to medium sized towns.

From the I-40/US 64 interchange (Exit 168), US 64 heads east to Mocksville as a two-lane, rural road with a 55 mile per hour (mph) posted speed limit.

Through Mocksville, US 64 is a three-lane, winding section with a posted speed limit of 35 to 45 mph.

In the historic district of Mocksville, the posted speed limit is 35 mph. There are safety issues along US 64 in the Mocksville area with its narrow, winding section and numerous access points in historic downtown Mocksville.

East of the US 601 intersection, US 64 transitions to 45 mph, then to 55 mph. From the east side of Mocksville, through Fork, to the west side of Lexington, US 64 is a two-lane, rural roadway through rolling terrain.

3.1.3.2 US 64 – Lexington to Asheboro

This segment of the corridor extends from just west of Lexington to the US 64–NC 49 intersection west of Asheboro. Between the municipal areas of Lexington and Asheboro, the surrounding land use consists of agricultural and forested land with pockets of commercial and large parcel residential use. In the municipal areas, the corridor is heavily developed with commercial and residential uses typical of small to medium sized towns. This segment of US 64 primarily serves as a connector between Asheboro (US 220) and Lexington (I-85).

US 64 through Lexington

Through Lexington, US 64 is a variety of facility types: a four-lane roadway with no access control, partial access control, and full access control; and a five-lane roadway. US 64 overlaps with a section of Business I-85 through Lexington.

US 64 between Lexington and Asheboro

From east of Lexington to west of Asheboro, US 64 is a two-lane, rural highway in hilly terrain with a 55 mph posted speed limit. There are areas of poor sight distance and safety concerns with high-speed travel.

3.1.3.3 US 64 – Asheboro to Pittsboro

This section of the corridor extends from just west of Asheboro to the US 64 Pittsboro Bypass just west of Pittsboro. In between, it passes through small commercial areas associated with Franklinville, the town of Ramseur and the town of Siler City. Through

Asheboro, Franklinville, Ramseur, and Siler City, US 64 serves as a primary commercial corridor. Outside the towns, the land uses primarily are agricultural and forest.

Access is critical to towns and communities that are not directly on, but adjacent to US 64, such as Cedar Falls, Franklinville, and Silk Hope. Although commuter congestion is currently not an issue in this section, safety, speed, and trucking concerns are important.

In general, US 64 is a five-lane roadway through the towns and communities with a posted speed limit of 35 to 45 mph.

US 64 through Asheboro

Through Asheboro, US 64 is a five-lane section with a 45 mph posted speed limit. US 64 is a primary commercial corridor for Asheboro, with uses such as public schools, large shopping centers, automobile sales, hotels, and restaurants having numerous driveways along both sides of the roadway. There are also numerous at-grade intersections, many with traffic signals.

Outside the towns, US 64 is a four-lane, divided highway with generally no control of access and a 55 mph posted speed limit. Crossroads outside the towns are infrequent and are primarily controlled by stop signs. The driveways outside the town areas are widely spaced and provide access to rural residences.

US 64 east of Asheboro

US 64 through Siler City

3.1.3.4 US 64 - Pittsboro to Raleigh

This section of the corridor extends from the western terminus of the Pittsboro Bypass to I-40 in Raleigh. There is significant development in the Wake County portion of this section compared to other sections of the corridor. This section of US 64 is a heavily used commuter corridor with peak-hour directional travel. Approximately 11 percent of the workers who live in Chatham County commute to Wake County based on the 2000 US Census. Existing and planned development will increase weekday congestion and a lengthening of peak-periods on the weekdays. Also, there is some recreational traffic associated with the Jordan Lake state recreational area, especially on summer weekends.

Pittsboro Bypass

The Pittsboro Bypass is a recently constructed four-lane freeway with full control of access around the north side of Pittsboro. It is designated as US 64. The old US 64 through the center of Pittsboro is now US 64 Business. Currently, there are few developed areas along this new freeway, but land use plans for Pittsboro indicate future commercial and/or office development at the Bypass termini and the interchange with US 15-501.

US 64 near Jordan Lake

East of the Pittsboro Bypass, the corridor crosses over the Haw River and Jordan Lake and continues into Wake County. US 64 is a four-lane roadway with a grass median, and no access control. The posted speed limit is 55 mph.

In Wake County, US 64 is an important commercial strip for Cary and Apex. Land uses adjacent to US 64 are primarily commercial with some larger residential subdivisions. Commercial uses include a car dealership mall (Cary Auto Park), strip shopping centers, and offices. There are traffic signals at major cross streets, with the exception of NC 55 and Salem Street, which have interchanges. Most of this section is four-lane, divided with a grass median and partial access control.

US 64 through Apex

US 64 connects to US 1 via an interchange in Cary. From there, the corridor extends north to I-40 in Raleigh. This segment is a four-lane freeway with full control of access and a posted speed limit of 55 mph. The study corridor terminates at the US 64/US 1/I-40/I-440 interchange.

3.1.3.5 NC 49 – Charlotte to Asheboro

This segment of the corridor extends from I-85 in the northern fringes of Charlotte to US 64 just west of Asheboro. In between, NC 49 passes near the University of North Carolina - Charlotte, through the city of Harrisburg, the eastern fringe of the city of Concord, the town of Mount Pleasant, through the town of Richfield, over Badin Lake on the Yadkin River, and past the northwestern edge of the Uwharrie National Forest.

Badin Lake, Tuckertown Reservoir and the Uwharrie National Forest all attract recreational traffic.

Outside the municipal areas, the surrounding land use consists of agricultural and forested land with occasional pockets of commercial, industrial and large parcel residential use. In the

municipal areas, the corridor is developed with commercial and residential uses typical of small to medium sized towns. One area of industrial uses is on NC 49 west of Asheboro (Klaussner Furniture, Matlab, and a plastics corporation).

From I-85 to I-485, NC 49 is a four-lane, divided roadway with driveways and turn lanes. The posted speed limit is 45 mph. The connection of NC 49 to I-85 is via directional ramps to and from the south.

From east of I-485 to just west of Harrisburg in Cabarrus County, NC 49 is a four-lane, divided roadway with turn lanes and a posted speed limit of 55 mph. NC 49 is one of the main connecting roads between Cabarrus and Mecklenburg County and it carries significant commuter traffic. About 34 percent of Cabarrus County's approximately 66,000 workers commute to Mecklenburg County (2000 US Census).

NC 49 through Harrisburg

In Harrisburg, NC 49 is the main artery of the town, serving businesses in the town as well as commuter and truck traffic. East of town, NC 49 is presently being widened to a five-lane urban roadway (curb and gutter and sidewalk) with a posted speed limit of 35 mph and numerous driveways and signalized intersections.

East of Harrisburg to west of Mount Pleasant, NC 49 is presently being widened to a four-lane, divided roadway with no control of access as part of TIP Project R-2533. From Mount Pleasant east, NC 49 is generally a two-lane road with a 55 mph posted speed limit. Exceptions are described below.

In Mount Pleasant and Richfield, NC 49 has a posted speed limit of 45 mph. There is an interchange with NC 73 in Mount Pleasant.

NC 49 changes to four-lane, divided highway near the intersection with NC 8 just west of the Yadkin River. The posted speed limit is 55 mph. East of the River, NC 49 is a two-lane road to NC 109. From NC 109 to the interchange with Old Highway 49 (just west of Asheboro), NC 49 is a four-lane, divided highway. East of the interchange with Old Highway 49, NC 49 is a two-lane roadway to US 64.

3.2 Population

3.2.1 Existing Population (Year 2000)

Population growth in the study area has been rapid over the last few years. According to the 2000 US Census estimates, growth between 2000 and 2003 has been highest in Charlotte and

Raleigh where the corresponding metropolitan statistical areas have grown at rates of 7.6% and 11.3%, respectively. As **Figure 3.3** indicates, population density (persons per square mile) in the year 2000 was highest in these same metropolitan areas. As of 2000, the population of all of the counties in the study area totaled over 3.5 million; Charlotte and Raleigh, with a combined population exceeding 1,300,000 at the time, made up 38% of that total. This growth has been attributed to a number of factors, including new job opportunities in banking sector in Charlotte and technology sector in Research Triangle Park (RTP). The growth in these sectors is accompanied by growth in the service sector, particularly services that support the other two sectors.

3.2.2 Forecasted Population (Year 2030)

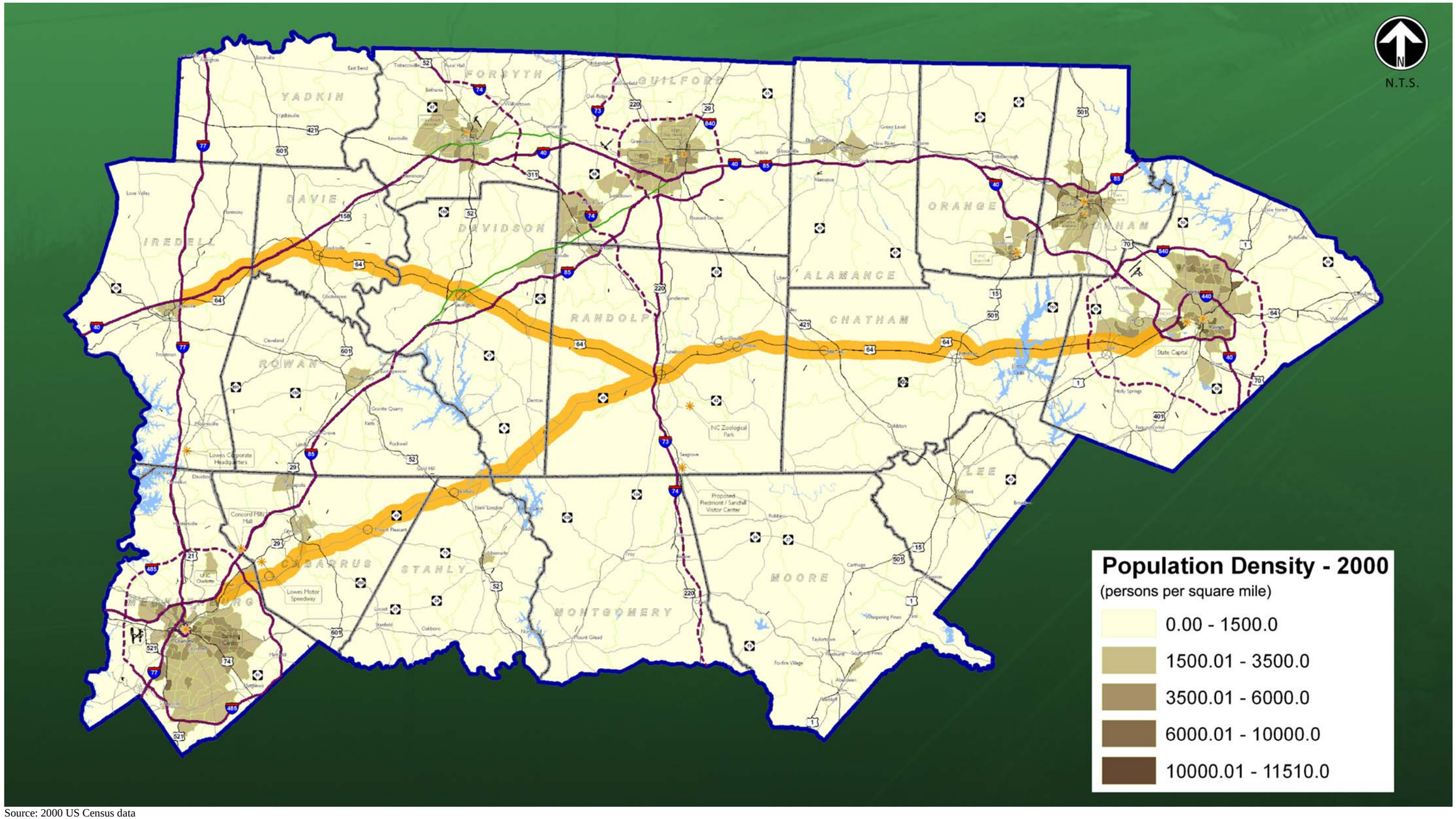
Figure 3.4 shows the population density forecast for the year 2030 in the regional study area, according to census tract demographic forecasts prepared by Global Insight, a commercial forecasting company, in January 2004. The forecast reflects expectations for economic growth, industrial composition, migration patterns and birth rates at local levels of geography. **Figure 3.5** shows the percent population change from the year 2000 to 2030.

The greatest population changes throughout the regional study area are projected to occur in Mecklenburg, Cabarrus, Chatham, and Wake Counties. Increasing employment growth from the Charlotte metropolitan area and the Research Triangle region will continue to have an impact on nearby cities and counties.

In portions of northeastern Mecklenburg County, a significant change (an increase of 80 percent or more) in population is projected, increasing population density to over 10,000 persons per square mile in some places. Consistent with recent growth patterns, some of this growth is expected to spill over growth into the western portion of Cabarrus County. While the resulting population densities are expected to be relatively low in this area by the year 2030 (up to 3,500 persons per square mile), the change from rural-agricultural land with only a few residents to suburban residential subdivisions with many residents is a dramatic one. For this reason, western Cabarrus County is also anticipating an increase in population of 80 percent or more. Much of this growth will be in response to the availability of relatively large parcels of less expensive, developable land near some of the region's major destinations, such as UNC-Charlotte, Concord Mills Mall, Lowe's Motor Speedway, and the Concord Regional Airport.

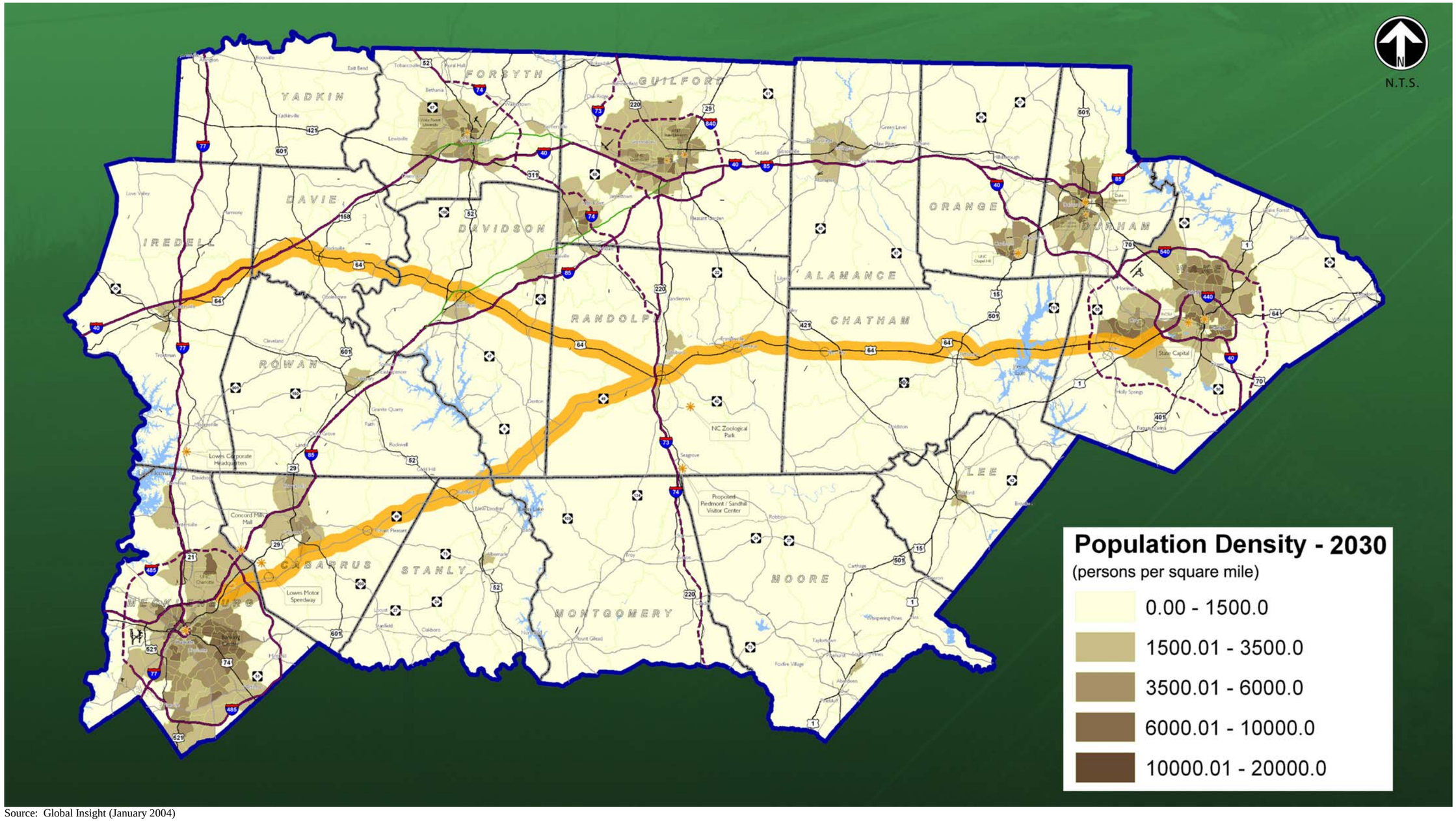
The city of Concord is projected to have a large net population increase, mostly from anticipated future annexations coupled with new residential development.

Figure 3.3: 2000 Population Density



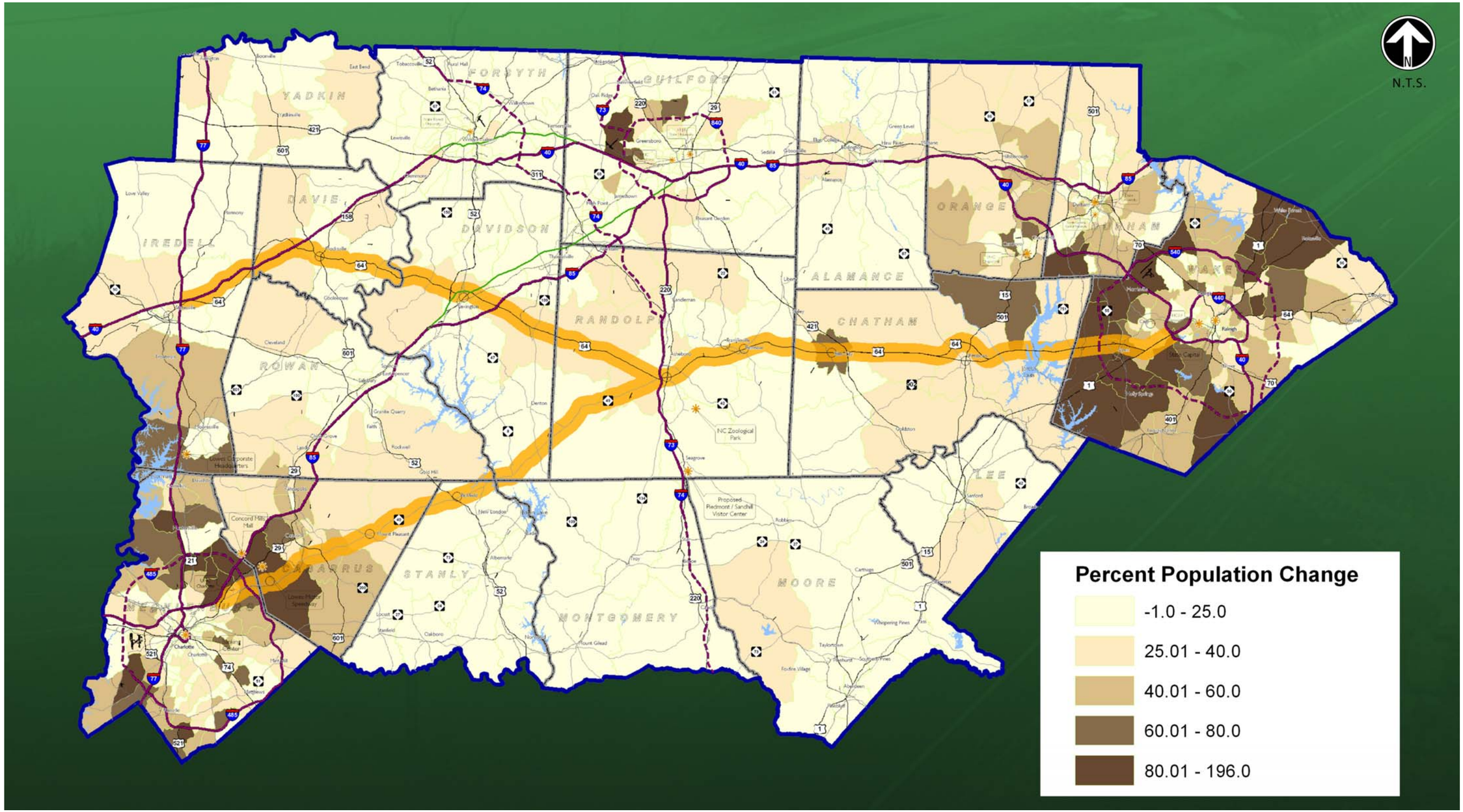
Source: 2000 US Census data

Figure 3.4: 2030 Population Density



Source: Global Insight (January 2004)

Figure 3.5: Projected Percent Population Change (2000-2030)



The city of Harrisburg is projected to have a significant increase in population growth due to its close proximity to both Concord and Charlotte. The central portion of Cabarrus County will have growth rates comparable to those projected for the state, or on the order of approximately 45.5 percent. Increases in this area where the percent change in population is lower will occur in currently developing areas that, today, are almost built out.

Wake County is expected to experience a major population increase by the year 2030, especially in the southwestern portion of the county where I-540, also known as the Western Wake Freeway, will be constructed. As the Research Triangle Park expands in population. and employment, areas to the south will continue to see new growth pressures. Morrisville, Cary, Apex, and Holly Springs, the four towns situated in this part of Wake County, are all bracing for population increases projected to be at least 80 percent by 2030.

Chatham County, which has been described as a "modest growth" area based on recent US Census estimates, is expected to experience a 60 percent to 80 percent increase in residential population in this 30-year period. Two areas in particular are expected to be the recipients of the growth: Siler City and the portion of the county that lies immediately to the south of the Orange County line and which flanks the US 15-501 corridor. Based on discussions with local planning staff, Siler City projects growth to be due to its continuing development as a bedroom community to Chapel Hill, Greensboro, and the Research Triangle Park. The availability of large parcels of relatively inexpensive land, good regional highway connectivity, and small town charm contribute to Siler City's growth, while the US 15-501 corridor growth is due to current and future spillover growth from Chapel Hill where UNC-Chapel Hill, a long-time catalyst of growth in Orange County, is located.

Modest population gains are anticipated to occur in the other counties along the US 64–NC 49 Corridor, but not at the rates expected for areas within Wake, Chatham, Mecklenburg, and Cabarrus Counties. Three areas that will have stable growth rates (meaning a growth rate roughly comparable to the state's projected rate between 2000 and 2030 of 45 percent) include Iredell, Davie, and Randolph Counties. Iredell and Davie Counties are projected to experience a 25 percent to 40 percent population increase, respectively, by 2030. Davie County, although largely a rural county in 2000, will gradually be urbanizing as new development is anticipated in the northeastern portion of the county, stemming from Mocksville toward Winston-Salem along I-40. Randolph County is predicting an influx of both urban and suburban residential growth. Relocations to Randolph County from other areas of the Piedmont Triad region are likely to result as incoming residents seek lower tax and utility rates, more modest housing prices, and a lower overall population density.

Relatively low population increases are anticipated in Stanly County (6.8 percent), Davidson County (17 percent), and the northern portion of Iredell County (18 percent). This projected lack of growth is due in part to the existing and anticipated future local economy of each jurisdiction. The decline of manufacturing has had a significant impact on these counties.

Places like Lexington, the county seat of Davidson County, which had a strong furniture manufacturing base in the past are now finding themselves having to reinvent their economic base.

3.3 Household and Employment Growth

A significant proportion of the state's current economic activity is centered in the US 64–NC 49 Corridor. Household and employment forecasts for the next 30 years confirm that this trend will continue well into the future. The corridor encompasses the state's two largest metropolitan areas which are national centers for banking, insurance, and higher education. Other infrastructure-related factors, which support growth, such as the regional commercial airports, rail, and highway infrastructure systems are discussed in other sections of this text. Many in the business community regard the state as "business friendly" and North Carolina's relatively low taxes and temperate climate are viewed as factors that have attracted households from other regions in the United States.

3.3.1 Household Growth

Between 1990 and 2000, the number of households in the US 64–NC 49 regional study area grew by 22 percent. As **Table 3.1** shows, Wake County and Mecklenburg County experienced the highest levels of growth in the US 64–NC 49 regional study area during the 1990s.

Table 3.1: Household Growth (1990 and 2000)

COUNTY	1990	2000	Change	COUNTY	1990	2000	Change
Alamance	42,652	51,584	21%	Iredell	35,573	47,360	33%
Alexander	10,331	13,137	27%	Lee	15,689	18,466	18%
Cabarrus	37,515	49,519	32%	Lincoln	18,764	24,041	28%
Catawba	45,700	55,533	22%	Mecklenburg	200,219	273,416	37%
Chatham	15,293	19,741	29%	Montgomery	8,290	9,848	19%
Davidson	48,944	58,156	19%	Moore	23,827	30,713	29%
Davie	10,785	13,750	27%	Orange	36,104	45,863	27%
Durham	72,297	89,015	23%	Randolph	41,096	50,659	23%
Forsyth	107,419	123,851	15%	Rowan	42,512	49,940	17%
Gaston	65,347	73,936	13%	Stanly	19,747	22,223	13%
Guilford	137,706	168,667	22%	Wake	165,743	242,040	46%
Harnett	25,150	33,800	34%	Yadkin	12,068	14,505	20%
Total					1,238,771	1,579,763	22%

Source: 2000 US Census

The 2030 Household Forecast used for the transportation analysis shows a continued upward trend in household growth. In the US 64–NC 49 regional study area, an additional 1.2 million households are forecast. As shown in **Table 3.2**, this will bring the total number of households to 2.8 million, near the current number of households in the entire state, which, according to the 2000 US Census, totals 3.1 million.

Table 3.2: Forecast Household Growth (2000 and 2030)

COUNTY	2000	2030	Change	COUNTY	2000	2030	Change
Alamance	51,584	91,526	77%	Iredell	47,360	80,829	71%
Alexander	13,137	23,389	78%	Lee	18,466	28,840	56%
Cabarrus	49,519	83,853	69%	Lincoln	24,041	42,804	78%
Catawba	55,533	91,583	65%	Mecklenburg	273,416	534,498	95%
Chatham	19,741	30,484	54%	Montgomery	9,848	14,588	48%
Davidson	58,156	97,806	68%	Moore	30,713	52,194	70%
Davie	13,750	23,644	72%	Orange	45,863	77,240	68%
Durham	89,015	169,146	90%	Randolph	50,659	87,599	73%
Forsyth	123,851	194,675	57%	Rowan	49,940	85,799	72%
Gaston	73,936	118,557	60%	Stanly	22,223	39,864	79%
Guilford	168,667	267,659	59%	Wake	242,040	498,762	106%
Harnett	33,800	53,074	57%	Yadkin	14,505	24,566	69%
Total					1,579,763	2,812,979	78%

Source: 2000 US Census, Global Insight, and Cambridge Systematics

While the counties encompassing the Charlotte and Raleigh urban areas are forecast to experience high levels of growth in households (95 percent in Mecklenburg County, 106 percent in Wake County, and 90 percent in Durham County), Forsythe and Guilford counties in the Triad are also anticipated to experience significant increases as well.

3.3.2 Employment Growth

Between 1990 and 2000 employment grew at a slightly slower pace than households. Employment growth by county is illustrated in **Table 3.3**. According to the 2000 US Census, employment in the US 64–NC 49 regional study area grew by about 22 percent with the largest employment generation occurring in Mecklenburg County and Wake County, which grew by 43 and 31 percent, respectively.

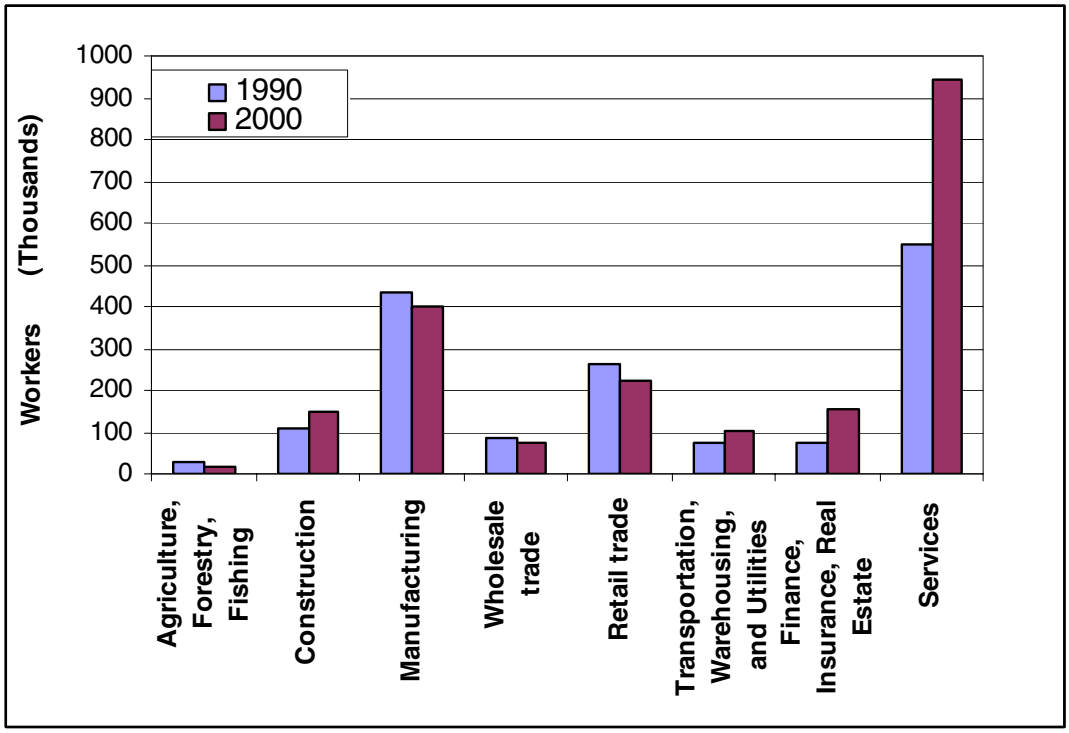
Figure 3.6 presents industry employment changes from 1990 to 2000. Of industries that lost jobs, manufacturing, wholesale and retail trade, and agriculture industries saw the steepest decline, with an over 50 percent drop in employment. By contrast, the service industries gained the most workers, over 51 percent, between 1990 and 2000.

Table 3.3: Employment Growth (1990 and 2000)

COUNTY	1990	2000	Change	COUNTY	1990	2000	Change
Alamance	57,514	64,895	13%	Iredell	48,907	61,204	25%
Alexander	15,084	18,223	21%	Lee	19,590	23,012	17%
Cabarrus	51,808	66,970	29%	Lincoln	26,148	32,331	24%
Catawba	66,768	75,192	13%	Mecklenburg	281,201	369,275	31%
Chatham	20,878	25,095	20%	Montgomery	11,205	11,830	6%
Davidson	68,344	74,150	8%	Moore	26,342	32,051	22%
Davie	14,623	16,947	16%	Orange	50,671	62,509	23%
Durham	96,658	114,375	18%	Randolph	59,463	67,150	13%
Forsyth	136,304	150,831	11%	Rowan	54,730	61,687	13%
Gaston	89,280	91,354	2%	Stanly	26,260	27,977	7%
Guilford	188,433	217,104	15%	Wake	240,692	343,426	43%
Harnett	29,629	39,096	32%	Yadkin	15,301	17,687	16%
Total					1,695,833	2,064,371	22%

Source: 2000 US Census

Figure 3.6: Service Industry Employment Changes (1990 to 2000)



Presently, and likely well into the future, employment is most highly concentrated along I-40 and I-85 between Raleigh and Winston-Salem, and in the Charlotte region. Agricultural employment is the exception and is more dispersed throughout the regional study area

relative to transportation facilities. **Figure 3.7** presents the distribution of service employment with each employee displayed as a dot on the map. This illustration clearly shows the alignment of transportation capacity with population and employment centers between Raleigh and Charlotte.

Employment between 2000 and 2030 is forecast to increase by 69 percent, according to data prepared for this study by InfoUSA and Cambridge Systematics, as shown in **Table 3.4**. Growth forecasts show similar patterns to household forecasts with the counties around the Greensboro, Winston-Salem, Raleigh, and Charlotte urban centers leading the growth. Total employment in Mecklenburg County and Wake County are projected to increase by approximately 93 percent and 96 percent, respectively over this time period. Similarly, employment growth in Forsyth County and Guilford County is projected to increase by 38 percent and 62 percent, respectively.

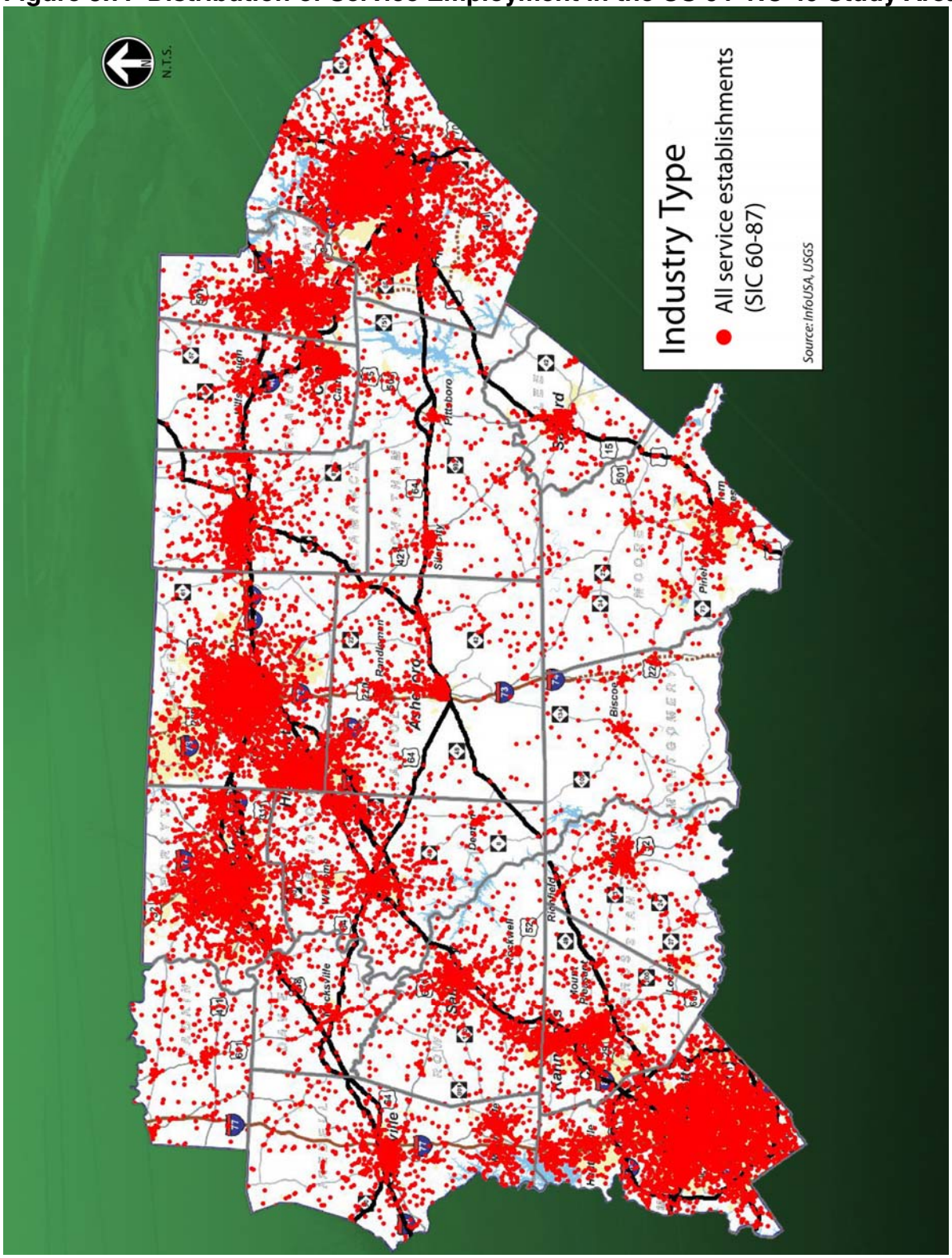
Table 3.4: Forecast Employment Growth (2000 and 2030)

COUNTY	2000	2030	Change	COUNTY	2000	2030	Change
Alamance	58,960	81,219	38%	Iredell	53,850	70,706	31%
Alexander	10,171	12,535	23%	Lee	26,434	36,888	40%
Cabarrus	57,648	96,215	67%	Lincoln	18,877	23,631	25%
Catawba	89,195	125,450	41%	Mecklenburg	499,468	962,297	93%
Chatham	15,666	21,665	38%	Montgomery	10,974	10,150	-8%
Davidson	46,500	58,422	26%	Moore	30,768	60,406	96%
Davie	10,223	12,120	19%	Orange	57,209	93,785	64%
Durham	160,299	284,545	78%	Randolph	46,800	73,638	57%
Forsyth	174,910	242,180	38%	Rowan	44,769	68,261	52%
Gaston	68,164	105,617	55%	Stanly	19,229	29,020	51%
Guilford	262,865	425,964	62%	Wake	371,821	727,378	96%
Harnett	21,202	29,062	37%	Yadkin	9,659	15,692	62%
Total					**2,165,661**	**3,666,846**	**69%**

3.4 Land Use

The way in which a roadway or any other transportation facility serves and functions within particular areas varies depending on the nature of the development in those areas. An analysis of existing and future development patterns, zoning, and population distribution is required to fully understand the importance of any transportation facility in terms of how adequately it connects activity centers along its route, the access it provides to various land uses, and, perhaps most importantly, how it will serve the future demand for the movement of people and goods. The analysis of the US 64–NC 49 Corridor began with the study of local land use projections as determined by each county and municipality and expressed in adopted land use plans, population data, zoning data, and land cover data. Data was collected and

Figure 3.7: Distribution of Service Employment in the US 64–NC 49 Study Area



Source: InfoUSA.

analyzed only for the counties through which the defined corridor passes, namely, Mecklenburg, Cabarrus, Stanly, Iredell, Davie, Davidson, Randolph, Chatham, and Wake. *(Note: Rowan County is going through a comprehensive planning process therefore land use information for the county was not available at the time of data collection. The process is scheduled to be completed by late 2005 or early 2006.)* Once mapping had been prepared, interviews with the planning staff and officials of the municipalities and counties in the study area were conducted to verify and supplement the information revealed through the analysis. The results of the land use analysis are described in the following sections.

3.4.1 Zoning Patterns

Examining the pattern of zoning districts reveals each county or municipality's intentions for development patterns within its jurisdiction, even if that development has not yet occurred or non-conforming development currently exists. Existing zoning for the study area is shown in **Figure 3.8**. The entire US 64–NC 49 Corridor is subject to zoning by either a county or a municipality, although some parts of the Existing Zoning Map show no data. In many cases, this lack of data is within a municipality that has its own zoning, but is not near enough to the study area for the pattern of that zoning to be relevant. However, no zoning information is shown for Chatham County, which does have an adopted zoning ordinance, but does not have digital zoning data available. Even where data was available to create the Existing Zoning Map, the quality of the digital information was a limiting factor. *Therefore, the map should only be used to identify the general pattern of zoning, not the specific zoning of individual parcels*.

The portions of the corridor that are zoned for the most intense development are at the western terminus of NC 49 in Mecklenburg County and Cabarrus County, and at the eastern end of US 64 in Wake County. In Mecklenburg County and the western half of Cabarrus County, the zoning pattern closely resembles the pattern of existing development, since much of NC 49 is already developed. A large portion of the urbanized sections of NC 49 in Mecklenburg County and Cabarrus County is zoned for "Urban Residential," with a few exceptions. Near the western terminus of the study area where NC 49 meets US 29, some commercial and industrial parcels surround the large area of Office and Institutional zoning in the University of North Carolina at Charlotte area. Just north of NC 49 near the western border of Cabarrus County, Concord Mills and Lowe's Motor Speedway lie at the middle of a very large area of Industrial, Commercial, and Office and Institutional zoning, which also extends north along I-85 and east along US 29 and the rail line. Industrial zoning is also located along the southern side of NC 49 near the city of Harrisburg. In Wake County, urban and suburban residential zoning makes up the majority of the parcels along the US 64–NC 49 Corridor. Exceptions include Commercial parcels clustered around the interchange with I-40, along with some Office and Institutional zoned parcels; a large amount of Office and Institutional zoned area with some Industrial parcels forming a wedge between US 64 and US 1; commercial parcels extending north and south along NC 55; a large amount of Industrial

property south of US 64 near the NC 55/US 1 intersection; and loosely clustered Rural/Agricultural parcels forming a ring around Apex.

The remainder of the corridor follows a fairly consistent pattern: Rural/Agricultural zoning is prevalent, with the largest clusters of other types of zoning located at the municipalities. Some counties, such as Davidson and Randolph, have small pockets of residentially zoned parcels scattered throughout the county, while others, notably Cabarrus, Stanly, and Iredell, avoid this dispersion in favor of consolidating the urbanized parcels in and near the municipalities. In general, municipalities within the corridor consist mostly of Urban and Suburban Residential zoning, with large pockets of Industrial zoning and smaller pockets of Commercial and Office and Institutional zoning. These non-residential parcels sometimes lie near the downtown, but are most often located along important roadways, at key intersections, and around airports.

3.4.2 Existing Land Use Patterns

Existing land use is that which is actually in place. Such patterns may or may not be consistent with zoning patterns, which as mentioned in Section 3.4.1 represent development intentions. The existing land use pattern for the US 64–NC 49 Corridor is shown in **Figure 3.9**. Existing (2004) land use was only available for Mecklenburg County, the Lexington area of Davidson County, Randolph County, the town of Pittsboro in Chatham County, and Wake County (only data for the relevant quadrants of Wake County is shown). For the remaining corridor area, 1996 land cover data from the North Carolina Center for Geographic Information and Analysis (NCCGIA) is shown to create an illustration of the probable development pattern. *As such, **Figure 3.9** should not be considered to be a reliable source of information with regard to current land use or development.* However, it is useful in portraying the broad development patterns of the corridor. The general pattern of existing land use is similar to that of existing zoning, with residential and vacant land in outlying portions of the counties and more non-residential uses clustered in and near towns and cities. Similar to the zoning patterns, the most urbanized portions of the study area lie at the western end of NC 49 in Mecklenburg County and at the eastern end of US 64 in Wake County. The western terminus features commercial development as well as a large amount of institutional development in and surrounding the University of North Carolina at Charlotte. The rest of the Mecklenburg County section of NC 49 is surrounded by residential development, as well as a pocket of industrial development.

US 64 through Lexington is bordered mainly by scattered residential and vacant parcels, mixed with a few commercial and institutional parcels. The exceptions to this pattern lie near the center of Lexington where there are concentrations of industrial and governmental/institutional uses. Some larger pockets of commercial development surround the intersection of US 64 and US 52, and the scattered commercial, institutional, and industrial parcels become more common along US 64 between US 52 and I-85.

Figure 3.8: Existing Zoning in the US 64–NC 49 Corridor

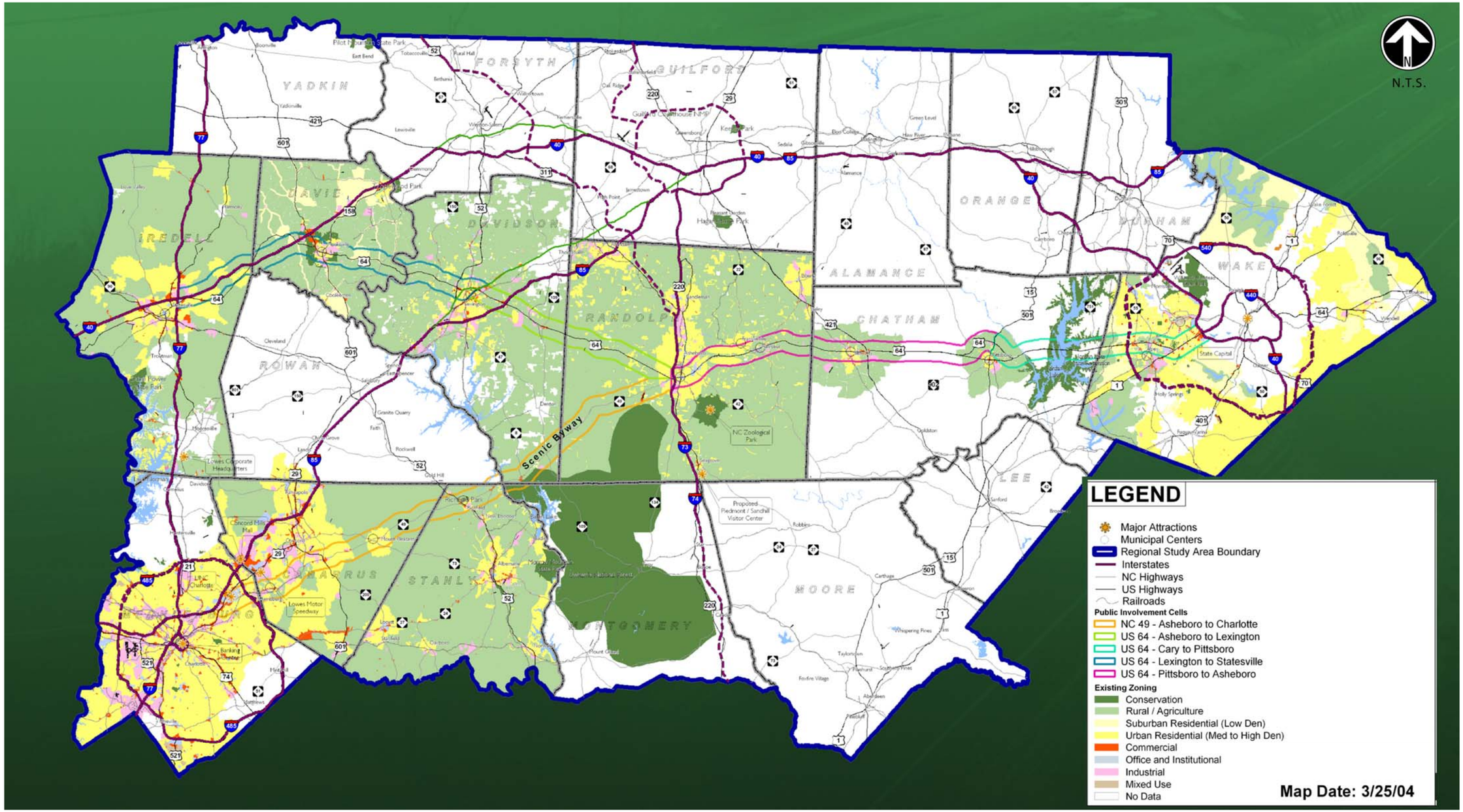
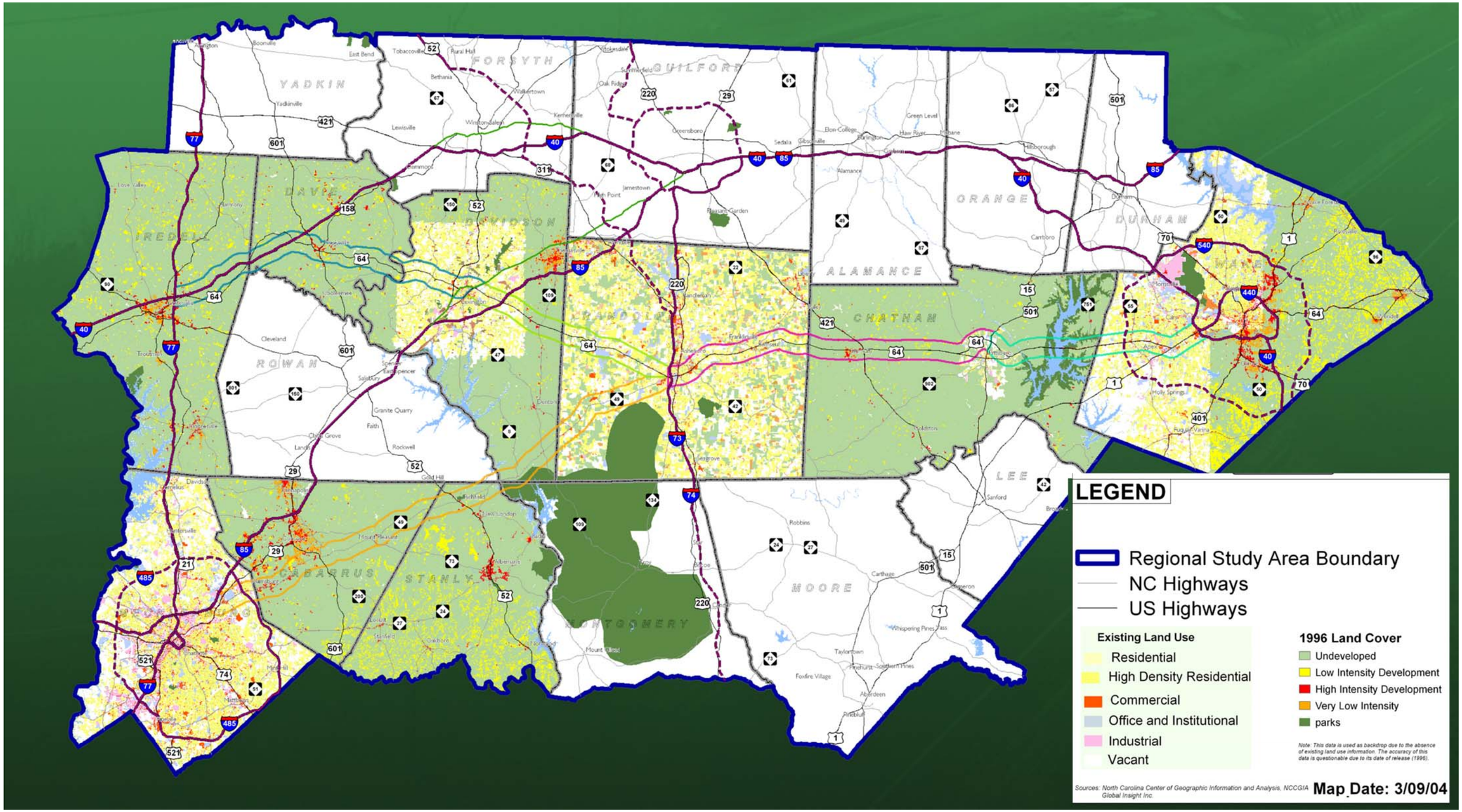


Figure 3.9: Existing Land Use



Near the center of Randolph County, NC 49 joins US 64 in the city of Asheboro. In this area, commercial uses with pockets of institutional and industrial uses line the highway, especially at the important intersections. Commercial, office and institutional and industrial uses form a north/south spine along US 220 (I-73/I-74) in Asheboro. The North Carolina Zoo is located about five miles south of US 64 to the east of US 220 (I-73/I-74), and is an important tourist destination in Randolph County.

Pittsboro remains largely rural/agricultural or undeveloped, with residential uses and some small pockets of non-residential development concentrated near US 64 and other historical regional highways such as US 15-501.

Western Wake County is characterized by a large amount of residential uses throughout the areas in and near US 64. Industrial and commercial uses are found mainly at key intersections, including at NC 55 in Apex and, to a greater extent, at US 1 in Cary, where major employment and institutional facilities are located.

3.4.3 Future Land Use Patterns

Not all counties and municipalities have future land use plans available. In the absence of a formal plan, future land use was determined using an examination of existing zoning, watershed protection ordinances, and/or growth management plans. To create a common set of land use categories throughout the entire corridor, each jurisdiction's land use categories were matched to a set of land uses specifically defined for this process. Land use category definitions and the Land Use Conversion Table developed for this study are provided in **Appendix B**. The future land use map for the US 64–NC 49 Corridor is shown as **Figure 3.10**.

Land use changes are anticipated to occur due to the expanding economies of Charlotte and the area encompassing the Research Triangle Park. Increasing growth pressures from the two metropolitan areas are expected to greatly transform adjacent cities and counties. Most city and county governments have prepared plans for managing anticipated growth for the next 20 to 30 years. Each plan expresses a vision for future land use based on assumptions about future growth patterns informed by a wide range of data including projections for population, employment, and infrastructure availability. These local land use plans document anticipated land use changes. Brief land use descriptions are provided below by county.

3.4.3.1 Iredell County

The eastern portion of Iredell County is expected to primarily remain a rural setting with very low density residential uses. Growth is foreseen to occur in the southern portion of the County, close to Mecklenburg County.

3.4.3.2 Davie County

The Davie County Land Use Plan recommends that the county moderate the overall rate of population growth and preserve its quality of life. The agricultural base is giving way to more areas for industrial development and service employment. However, both the town of Mocksville and Davie County have a vision of becoming a leading distribution center due to their strategic location in the larger Triad region. To this end, their plans include the designation of a large amount of land for industrial development. Situated with good access to Interstates 40, 85, and 77, this area is attractive to industrial development.

3.4.3.3 Davidson County

Minor land use changes are foreseen to occur in Davidson County by 2030. Davidson County projects an 11 percent per decade increase in population growth and has produced a guiding growth plan. It has identified locations for new growth in accordance with the desired density, character of development and extent of services that can be provided. Medium and high density residential growth is planned to locate within and around the City of Lexington.

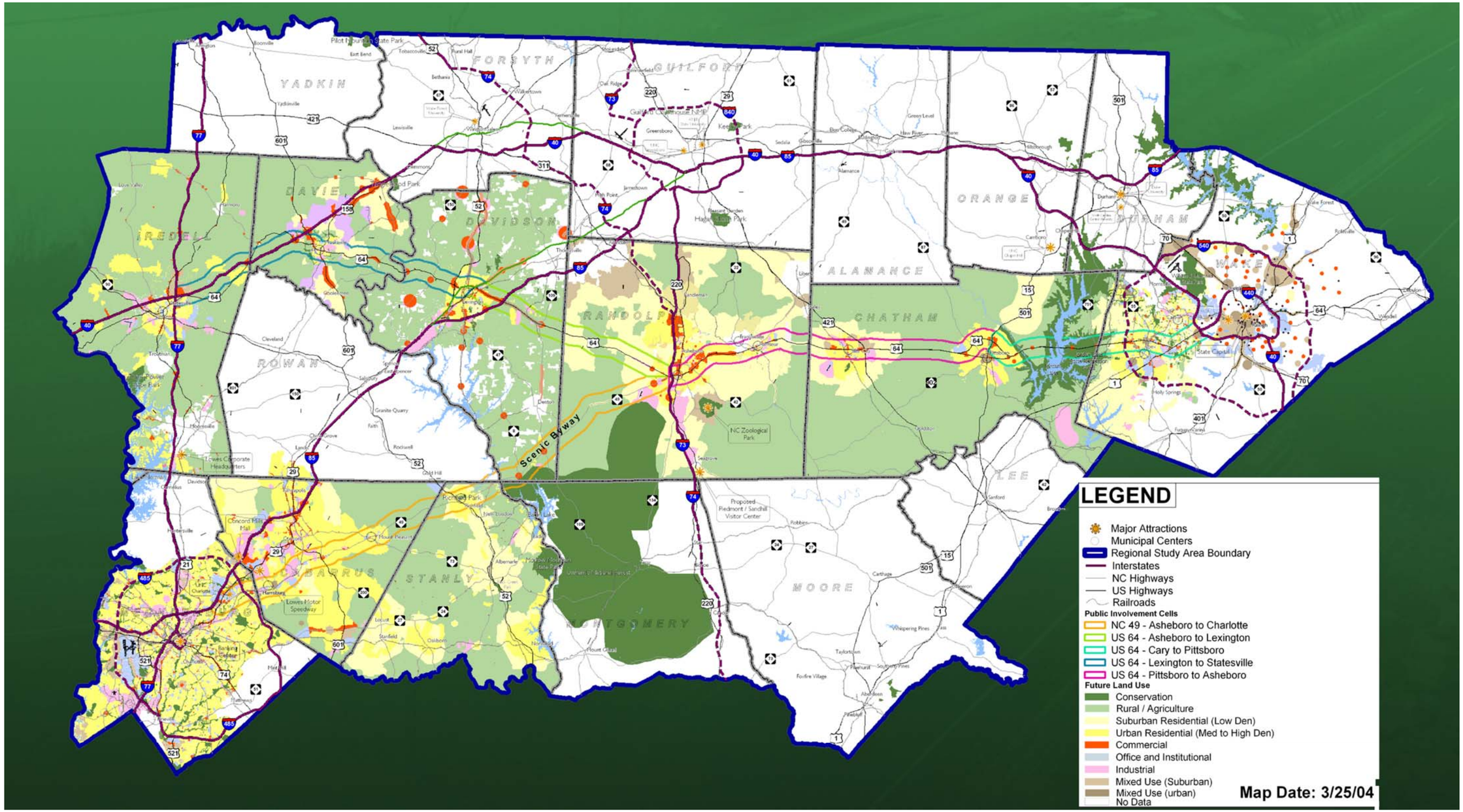
3.4.3.4 Randolph County

Randolph County's excellent regional access, provided by numerous major highways, have put urban centers such as Greensboro and Winston-Salem within commuting distance. As a result, Asheboro and Randolph County are predicting an influx of both urban and suburban residential growth. The residential growth is anticipated to spread outwards from the core of Asheboro to the northern, western, and eastern boundaries of Randolph County. A future Interstate highway corridor (I-73/I-74) along the current routing of US 220 and Asheboro's Southern Bypass (TIP Project R-2536) will change land use patterns in the southern part of the county by attracting high intensity uses (retail and employment) at major intersections.

3.4.3.5 Chatham County

The Chatham County comprehensive plan anticipates more residential growth pushing down from Chapel Hill along the US 15-501 corridor, and the town of Pittsboro anticipates that suburban residential development will extend north of US 64 along US 15-501, allowing this corridor to be flanked with thousands of new housing units by 2030. Significant residential growth is also anticipated in Siler City, mainly due to its continuing evolution into a bedroom

Figure 3.10: Future Land Use



community for the regional employment centers in Greensboro, Chapel Hill and Research Triangle Park. Relatively inexpensive land, good regional highway connectivity, and small-town charm will contribute to its continued growth. Poor soils and environmental restrictions are expected to limit growth elsewhere in the county.

3.4.3.6 Wake County

Three regional centers are identified for new growth to occur by the Raleigh Comprehensive Plan, including downtown Raleigh, the Northeast District Area, and the Northwest/Research Triangle Area. Raleigh plans to expand residential and employment uses through redevelopment and infill development in its downtown. The Northeast Area has large undeveloped land tracts, developing infrastructure, and the Neuse River making the area attractive for new development. In the Northwest Area, employment-generating land uses are planned for corridor transition areas and existing employment areas.

The town of Cary is located at the heart of the Triangle region with an economy highly interconnected to the Triangle. The proximity of the RTP and Raleigh-Durham International Airport places Cary in a favorable position to receive supporting and spin-off high-technology, and service industry, and office uses.

The Apex 2025 Vision Plan has called for a clearly defined development area, delineated by an urban growth boundary (UGB). Urban development uses are planned right up to the UGB, with very low intensity uses occurring outside the boundary. Major retail development around US 64 and the NC 55 interchange is anticipated to change land use patterns in the northwest part of town.

3.4.3.7 Mecklenburg County

One of the major goals identified in the Charlotte Northeast District Plan is to encourage development of commercial and mixed-use centers along its thoroughfares. There is an ample amount of undeveloped land that will provide an opportunity for new employment growth to occur, including light industrial and office uses. The Northeast District Plan supports the expansion of research uses to the north and east of the University Research Park boundaries. A major area of expansion of business park development is planned to be located around the future interchange of I-485 and NC 115, northwest of the I-485/NC 49 interchange.

Spillover growth from Mecklenburg County and Charlotte will continue to create demand for land in Cabarrus County. New Interstate and highway improvements such as I-485 in Mecklenburg County will increase access to western Cabarrus County and create new development possibilities in this area. With the expansion of I-485 and NC 49, growth moving from the northeast of Charlotte is anticipated to include residential, office and industrial uses.

3.4.3.8 Cabarrus County

In recent years, Cabarrus County has experienced tremendous growth in the tourism industry. Attractions such as Lowes Motor Speedway and Concord Mills retail center have brought an increasing number of visitors to Concord. The City of Concord expects to see strong growth and demand for local retail businesses, restaurants, and lodging in conjunction with the continued success of these two destinations.

Harrisburg's close proximity to Concord and Charlotte has helped spur residential and industrial growth in recent years and will likely continue. Harrisburg's proximity to the Interstate Highway System and the Norfolk Southern rail line is expected to continue to attract industrial development. The Town of Harrisburg is looking to create a prime industrial employment corridor for the southwest portion of Cabarrus County with the future provision of water and sewer utilities.

Mount Pleasant anticipates its desirable rural town setting will bring additional growth in the future. Suburban residential growth is identified to stretch from Mount Pleasant along NC 49 to a locally defined Future Urban Service Boundary.

The Town of Richfield anticipates growth in the form of residential development along US 52.

3.4.3.9 Stanly County

According to the Stanly County Land Use Plan (2002), the county is anticipating growth of 10 percent per decade through 2020. Residential growth is the predominant form of development that is foreseen to occur in the county by 2020. Also according to the plan, primary growth areas are going to attract a higher density development of approximately 3 to 4 dwelling units per acre. However, secondary growth areas will have lower density development. Future development along the US 52 corridor is expected to impact NC 49 by attracting higher intensity development near the intersection of the two major roads.

3.4.4 Land Use Plans Compared to Population Projections

Land use projections shown in **Figure 3.10** suggest the intensification of specific areas within the corridor that are not consistent with the high growth areas identified in the population projections **(see Figure 3.4)**. Likewise, some areas that are expected to experience significant increases in population are not envisioned as areas where a notable change in land use will occur. The following comparison provides more specific information about where those discrepancies have been identified.

- Randolph County (around Asheboro) and Stanly County (around Richfield) are projected to have a low to moderate growth rate as shown in **Figure 3.5**, though the

corresponding local land use plans reflect an expectation for greater rates of growth and higher intensity uses.

- Apex and Pittsboro are projected to have a high growth rate as shown in **Figure 3.5**, although the corresponding local land use plans reflect a desire and/or expectation of limited growth and lower intensity uses. Although Wake County is projected to attract a high population increase throughout most of the western portion of the county, Apex has incorporated an urban growth boundary into its Comprehensive Plan that will prevent development from extending as far beyond the town limits as the countywide population projections predict will take place.

The reason for the discrepancies is directly related to the sources of information collected. Population projections are made at a regional level, whereas land use projections are made at the local level. Regional population projections do not take into account local growth management policies.

3.4.5 Economic Development

Economic development activity is occurring at the state and local levels, mostly in response to the dramatic loss of manufacturing jobs in the last decade. The success of economic development initiatives could greatly influence the location and size of employment centers in the US 64–NC 49 Corridor over the next 25 years. The following is a brief summary of such initiatives.

3.4.5.1 Statewide Initiatives

The following is an overview of the current State Economic Development Programs within North Carolina. They include:

- Tax Credits
- State Development Zone Program
- Job Development Investment Grant
- One North Carolina Fund
- Industrial Revenue Bonds
- Community Development Block Grants
- Community Economic Development Strategy

Tax Credits

To further improve the business climate in North Carolina, the William S. Lee Quality Jobs and Expansion Act was passed during the 1996 legislative session and was enhanced in 1998, 1999, and 2000. This program allows for qualifying new and expanding companies in North Carolina to take advantage of tax credits for job creation, investment in machinery and

equipment, worker training, research and development, and investment in business property. Information about who is taking advantage of this program is not currently available.

State Development Zone Program

North Carolina's State Development Zone (SDZ) program offers incentives for businesses that locate in designated development areas. The intent of the SDZ is to stimulate investment and job creation to improve conditions in high poverty areas. Companies that meet the minimum requirements in a SDZ can receive higher tax credits for job creation, worker training, and investments in equipment. Businesses qualify if they are in one of six categories, including warehousing, manufacturing/processing, air courier service, distribution, data processing, and central administration office.

There are currently six municipalities along the US 64–NC 49 Corridor that have defined SDZ, including Asheboro, Charlotte, Concord, Lexington, Raleigh, and Statesville.

The SDZ in Concord contained mostly industrially zoned land. The zone, which included land adjacent to NC 49, expired in December 2004. Success is difficult to measure; the city does not currently keep track of the number or type of jobs created or any private benefits. However, interest in the program increased with more companies contacting the city of Concord to see if a particular piece of property was in the SDZ.

Job Development Investment Grant

The state of North Carolina recently implemented a Job Development Grant Program for major investment/job creation projects considering the state. The program will rebate a portion of "new employees" personal income tax withholdings back to the county in which these jobs are created for a period of up to 12 years. The program is limited to 15 projects per year statewide. Projects that create a minimum of 20 new full-time positions may apply for a grant.

One North Carolina Fund

The One North Carolina Fund may provide financial assistance to those businesses or industries deemed by the Governor to be vital to a healthy and growing state economy and are making significant efforts to expand in North Carolina. The fund is a competitive fund and the location or expansion must be in competition with another location outside of North Carolina. No information is available at this time regarding the allocation of funds, and the impact of this fund is not known as it is in its infancy and it is too early to measure success.

Industrial Revenue Bonds

Industrial Revenue Bonds (IRBs) have a variety of names, such as Industrial Development Bonds (IDBs) or qualified small issue bonds, but essentially are of three basic types: tax exempt, taxable, and exempt facility/solid waste disposal bond. The state's principal interest in these bonds is in assisting new and expanding industry while ensuring that North Carolinians attain higher wage jobs. The regulations governing bond issuance are a combination of federal regulations and North Carolina statutes. The amount each state may

issue annually is determined by population. In 2003, $20.8 million in IDB funds was distributed in North Carolina. Since 2000, five companies in Mecklenburg County have been awarded IRBs, creating 116 new jobs. In Randolph County, 70 new jobs have been created since 2000 through this program.

Community Development Block Grants

The Community Development Block Grant (CDBG) program of the US Department of Housing and Urban Development (HUD) has been administered by the state of North Carolina since 1982. The funds may be accessed by a local government applicant (municipal or county, excluding entitlement cities or designated urban counties). Proposed projects must involve a specific business that will create new jobs (or sometimes retain existing jobs). Assisted project activities must benefit persons (60 percent or more) who were previously (most recent 12 months) in a low or moderate family income status, based on income levels published for the state annually by the U. S. Department of Housing and Urban Development (HUD). The town of Mocksville received $976,000 in CDBG money in 2003 to support expansion of the Ingersoll Rand and VentLab/Comfort Bilt facilities.

Community Economic Development Strategy

A Community Economic Development Strategy (CEDS) is the result of a local planning process designed to guide the economic growth of an area. A CEDS process is used to help create jobs, foster more stable and diversified economies, and improve living conditions. It provides a mechanism for coordinating the efforts of individuals, organizations, local governments, and private industry concerned with economic development. To date, no counties within the US 64–NC 49 Corridor have been the subject of a CEDS study, and none is expected to have a CEDS study in the foreseeable future.

3.4.5.2 Local and Regional Initiatives

Of the nine counties through which the US 64–NC 49 Corridor passes, six have taken specific steps in recent years to stimulate local economic development. These economic development programs are at varying levels of maturity and have had varying degrees of success. Below are brief descriptions of the programs.

Mecklenburg County

Charlotte/Mecklenburg Investment Grant Program. The City of Charlotte and the County of Mecklenburg have adopted a Business Investment Program (BIP) to encourage new and expanding businesses to locate in identified areas where economic stimulus is a community priority. This has been successful along with properties adjacent to Charlotte-Douglas International Airport and for major thoroughfares such as Wilkinson Blvd. It is intended to work closely with the State Development Zone.

Large Project Investment Grants. If a project will create 300 new jobs and will invest a minimum of $10 million, an investment grant may be available from local government. The

City of Charlotte and Mecklenburg County have adopted a policy that allows them to consider projects on an individual basis and determine if the project warrants the offer of an incentive grant.

Cabarrus County

Cabarrus County and its largest municipalities offer a unique Industrial Grant Program for qualified new and expanding companies. This program provides a cash grant calculated on the tax-appraised value of the client's investment and the annual amount of property taxes paid to the county and the city.

Stanly County

Companies looking to relocate to Stanly County enjoy a low tax rate and a strong economic aid package that includes low interest rates for facility renovations and the purchase of equipment as well as the provision of a tax credit for every newly created job. Employers also benefit from investment, job creation, and worker training tax credits. Many companies are able to realize a credit of up to 50 percent against state income or franchise taxes. Information about which businesses along the corridor, if any, have taken advantage of this was not available during this study.

Chatham County

The Chatham County Land Development & Conservation Plan envisions the creation of Economic Development Centers to provide the elements necessary to recruit new business and industry in an increasingly competitive market. These centers would be planned in advance for development, with allowable activities specified and uses subject to performance standards and design criteria.

Wake County

Wake County participates in the William S. Lee Quality Jobs and Expansion Program of North Carolina. A portion of Wake County has been designated a State Development Zone. Companies eligible for tax credits under the William S. Lee Act gain additional tax credits when located in the SDZ.

Randolph County

Businesses that locate or expand an industrial or office enterprise in Randolph County may qualify for incentives such as economic development grants, utility and energy assistance, transportation access and workforce assistance. These are in addition to incentives offered by the State of North Carolina.

Randolph County and its individual municipal governments support and encourage the location and expansion of manufacturing, distribution, and office enterprises within the county. Businesses may be eligible for economic development grants that are structured to meet project specific needs and take into consideration approximately three to five years of prospective property tax revenues.

Local governments work in partnership with state and private allies to improve and extend utility access to service the needs of companies that are locating or expanding in the county. Companies may be eligible for discounted energy rates if they meet certain usage and job creation thresholds. Discounted rates are also available for eligible businesses that locate or expand into industrial buildings that have been vacant for two months.

Assistance may be provided by Randolph County to improve and extend road access to an eligible business that locates or expands in the county. Assistance is available to construct rail spur tracks to service new or expanding businesses.

Yadkin-Pee Dee Lakes Project

The Yadkin-Pee Dee Lakes Project is a formal effort to develop the region as a major player in the tourism/recreational and cultural/historic destination. Although the region already possesses these features (i.e. Badin Lake, Seagrove Pottery, Uwharrie National Forest, North Carolina Zoo, etc.), there is a strong desire to promote the concept of the area as a distinct region in terms of its geographic and economic significance. The Yadkin-Pee Dee Lakes Project, also known as the "Central Park Project," seeks to take advantage of the area spanning Charlotte to Raleigh/Durham.

The Yadkin-Pee Dee Lakes region is located in the Piedmont of North Carolina, and consists of the following seven counties: Anson, Davidson, Montgomery, Randolph, Richmond, Rowan, and Stanly. It was initiated approximately 12 years ago as a nonprofit organization to develop and promote the concept of the area as a distinct region. Recognizing the geographic and economic significance of the region, the goal of the Yadkin-Pee Dee Lakes Project is to "provide a foundation for sound economic growth while maintaining the environmental integrity of the area." It is hoped that the Yadkin-Pee Dee Lakes Project will generate lifestyle jobs that attract hospitality resources for overnight visitors, not just day visitors.

Some of the existing attractions in the region include Badin Lake Recreational Area, High Rock, Lake Tillery, Pee Dee National Wildlife Refuge, the North Carolina Zoo, and Seagrove Pottery. Significant projects planned include the Village of Misenheimer/Pfeiffer University cycling center, which will attract the large population of cycling enthusiasts in the region. Another project is known as *Chautauqua* in Badin, which will somewhat emulate the western NY Chautauqua, which is a lakeside community that focuses on arts, education, religion and recreation with various programs, classes, and events for residents and visitors to attend. Accommodations for visitors at Chautauqua, NY range from rental houses and condos to hotels and bed and breakfasts. Other projects include possible use of freight lines (around Aberdeen) for dining and lodging.

Proponents of the Yadkin-Pee Dee Lakes Project maintain that appropriate transportation infrastructure, with consideration to the "visual integrity and scenic protection is key to implementing the "Central Park" strategy. Proponents also noted the importance of the US 64 and NC 49 corridors to the Project's existing and future endeavors, and propose that the seven-county area be a destination, not populated with "drive-by" businesses.

3.5 Major Environmental Features

Figure 3.11 (Sheets 1 through 13) shows major environmental features in the vicinity of the study corridor. Data on environmental features was obtained on a county-wide scale from the NCDOT GIS Unit. The data was current as of February 2004. NCDOT is a partner with the NC Center for Geographic Information and Analysis (NCCGIA). The NCCGIA database contains information on the following:

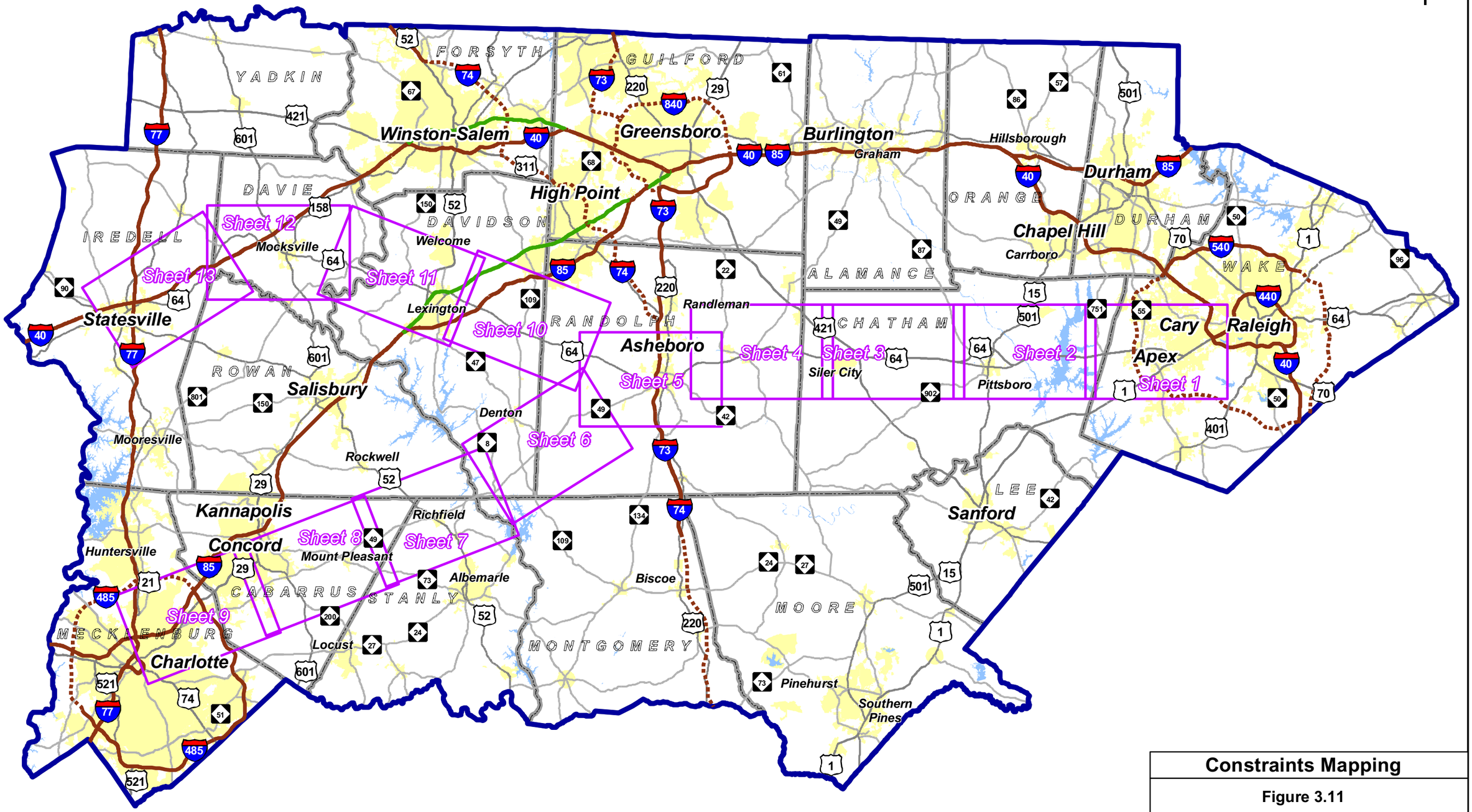
- Wetlands on the National Wetlands Inventory
- Streams and Water Bodies
- Outstanding/High Quality Waters
- Impaired Waters (EPA's 303d list)
- Watershed Areas
- Natural Heritage Program sites
- State and Federally Owned Lands
- Hazardous Materials/Superfund Sites
- Historic Resources

A limited windshield survey was conducted along US 64 and NC 49 to review the features shown in the database.

The Natural Heritage Program elements, parks, and hazardous materials/Superfund sites located on or near the US 64–NC 49 Corridor are numbered from 1 to 91 on **Figure 3.11**. **Table 3.5** contains a description of each numbered resource.

3.5.1 Water Resources

Wetlands, streams, and open waters (Waters of the United States) are regulated by the US Army Corps of Engineers (USACE) pursuant to Section 404 of the Clean Water Act. The North Carolina Department of Environment and Natural Resources – Division of Water Quality (NCDWQ) also has regulatory input through Section 401 Water Quality Certification. Wetlands, as defined in 33 CFR 328.3, are those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Any action that proposes to place fill into these areas falls under the jurisdictional of the USACE under Section 404 of the Clean Water Act (33 USC 1344).



Constraints Mapping

Figure 3.11

Index

Legend

N

- Study Corridor
- Creeks & Streams
- Impaired Water (303d Listed)
- High Quality Outstanding Resource Water Zones
- Critical Watersheds
- Major Water Bodies
- NWI
- Counties
- Municipal Limits

Natural Heritage Element Occurance

- Vertebrate Animal
- Invertebrate Animal
- Special Animal Habitat
- Regulated Hazardous Waste Facilities
- Unregulated Hazardous Sites (Superfund)
- Historic Points
- 20 Environmental Inventory Number

- Superfund Areas
- Parks
- Historic Sites
- Historic Study List Districts
- Federally Owned Land
- Significant Natural Heritage Areas

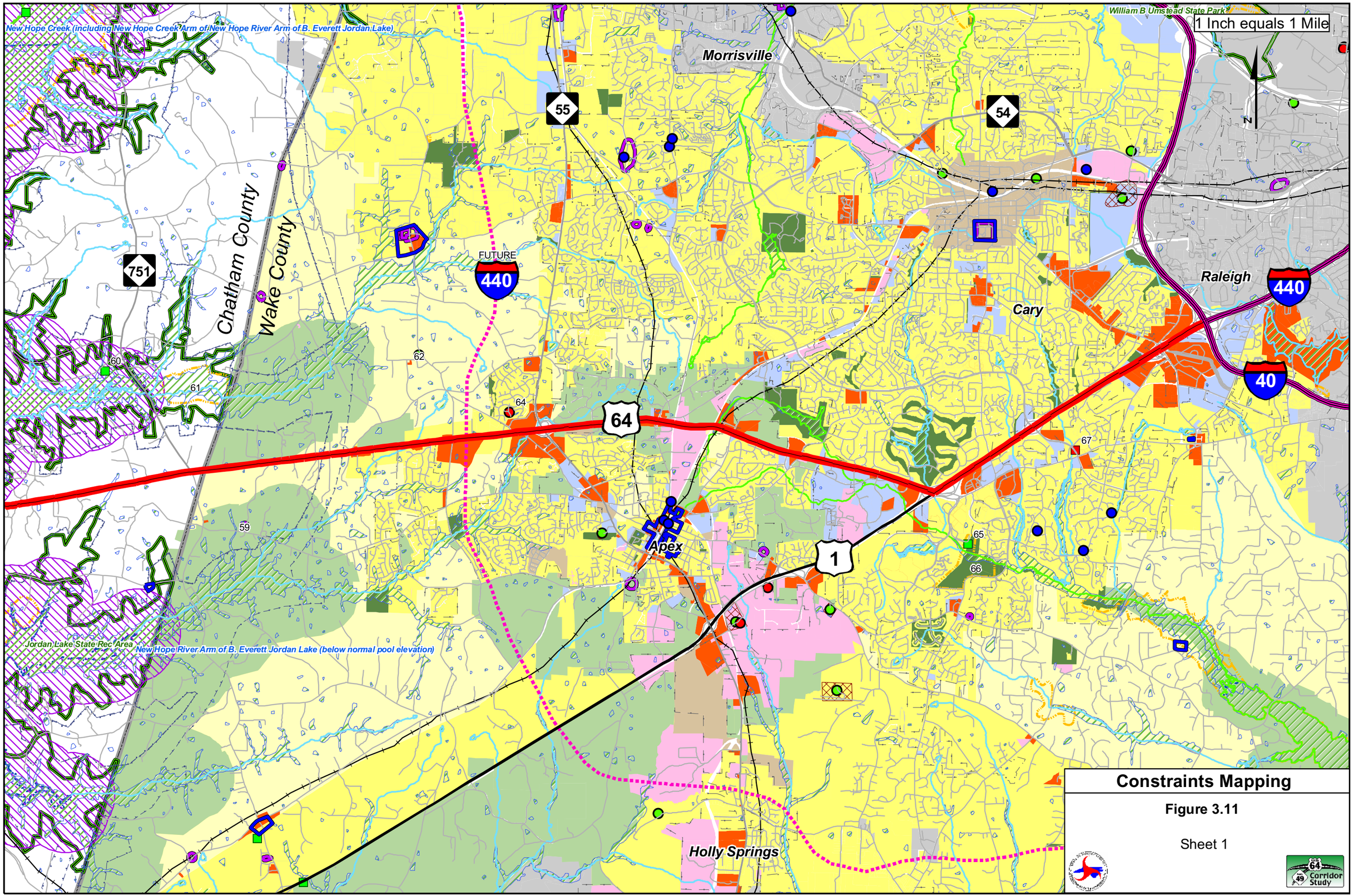
Zoning

- Conservation
- Rural Agriculture
- Suburban Residential (Low Den)
- Urban Residential (Mid to High Den)
- Commercial
- Office and Institutional
- Industrial
- Mixed Use
- Other
- No Color — No Zoning

Constraints Mapping

Figure 3.11

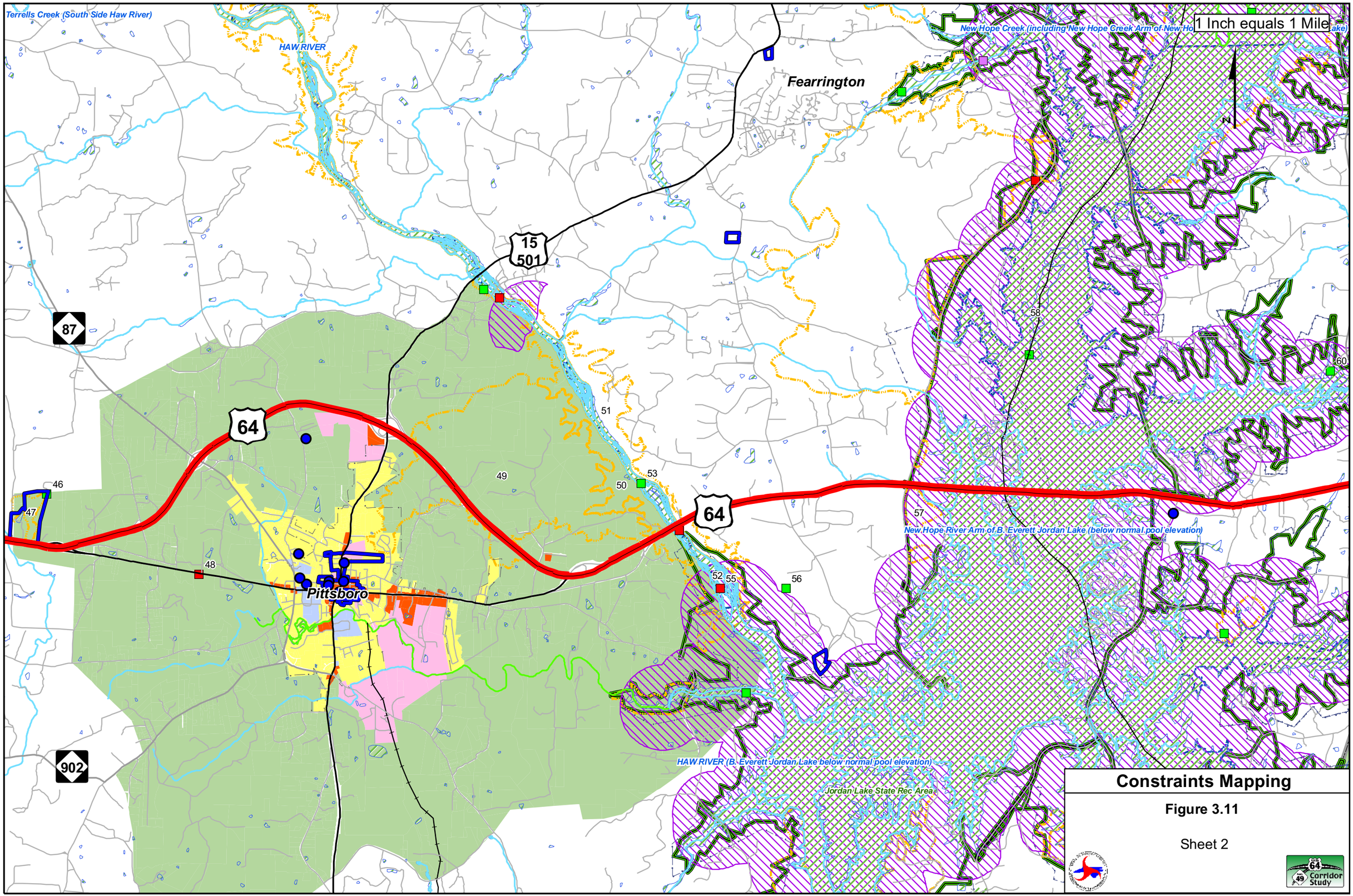
Legend



Constraints Mapping

Figure 3.11

Sheet 1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HAW RIVER
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New Hope Creek (including New Hope Creek Arm of New Ho
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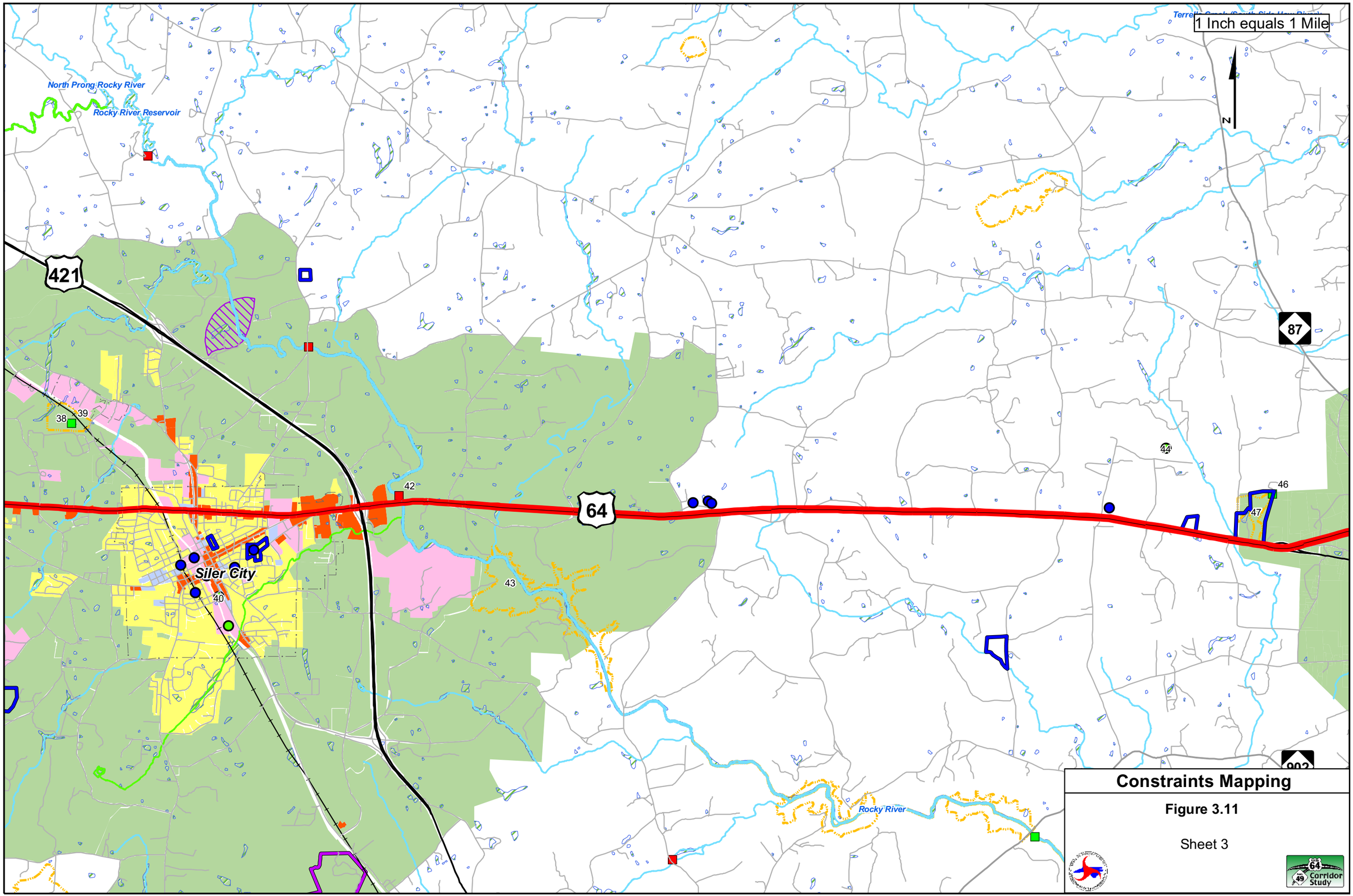
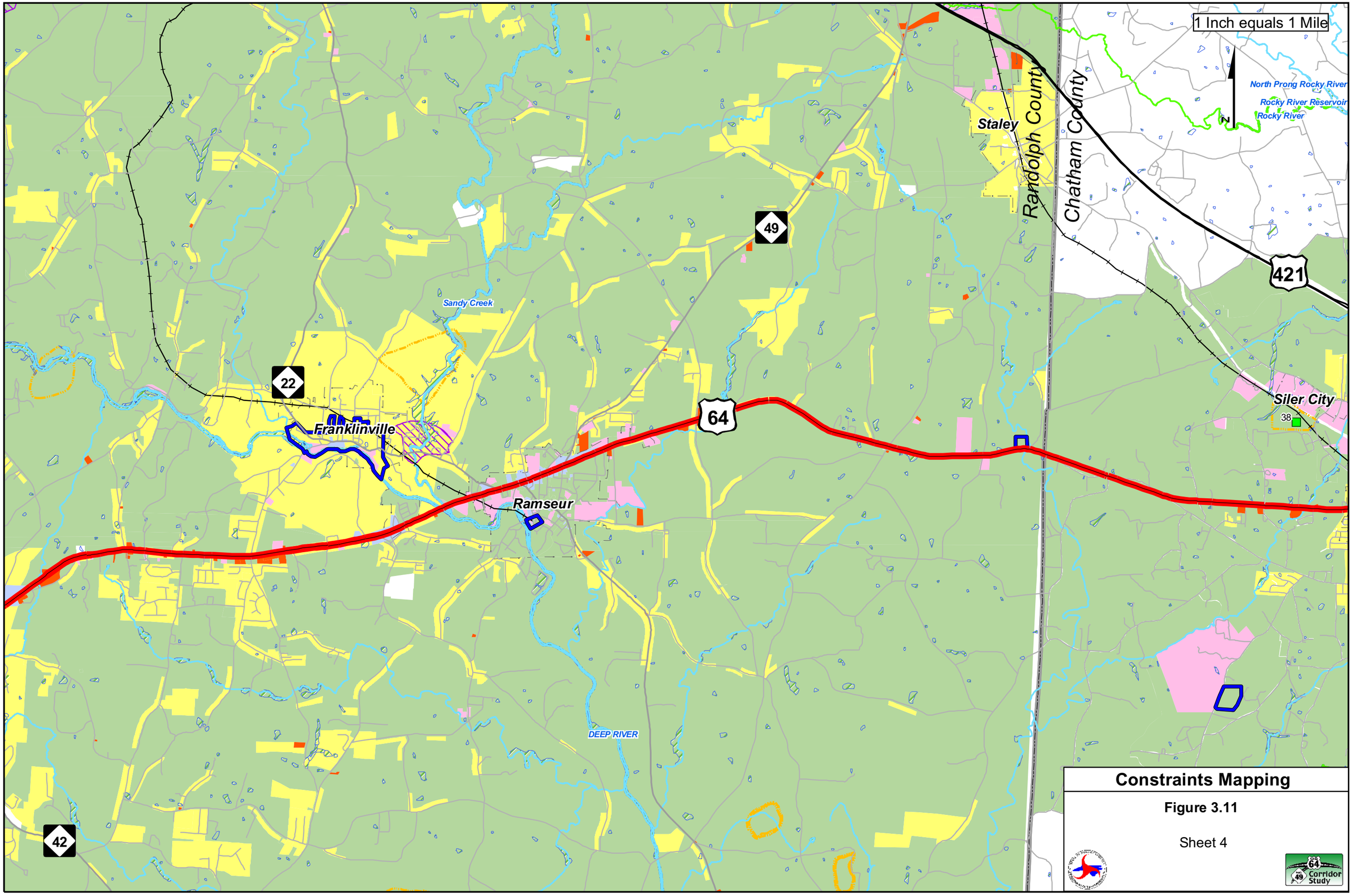
58
60
New Hope River Arm of B. Everett Jordan Lake (below normal pool elevation)
HAW RIVER (B. Everett Jordan Lake below normal pool elevation)
Jordan Lake State Rec. Area
Constraints Mapping
Figure 3.11
Sheet 2
Corridor Study

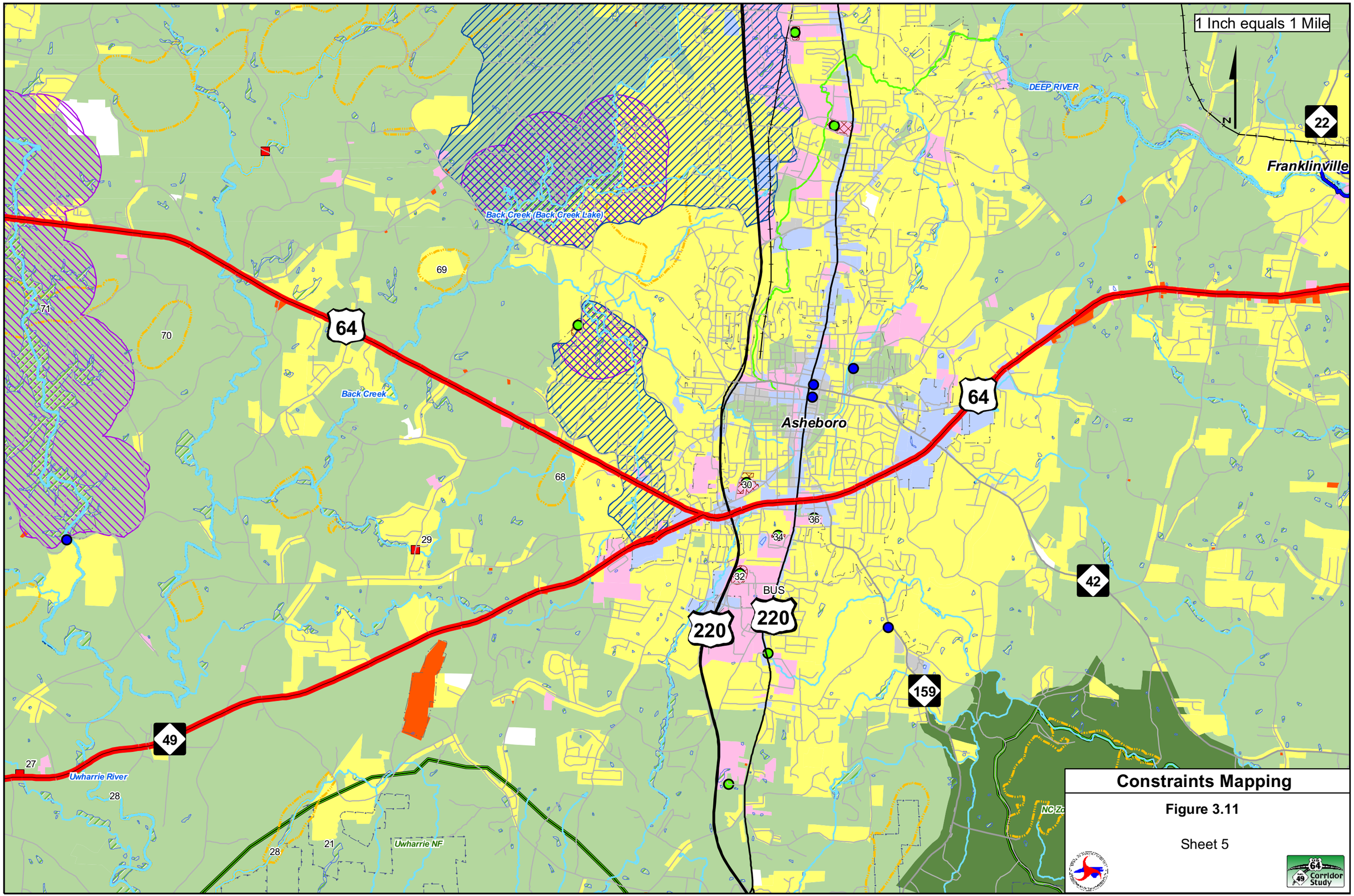


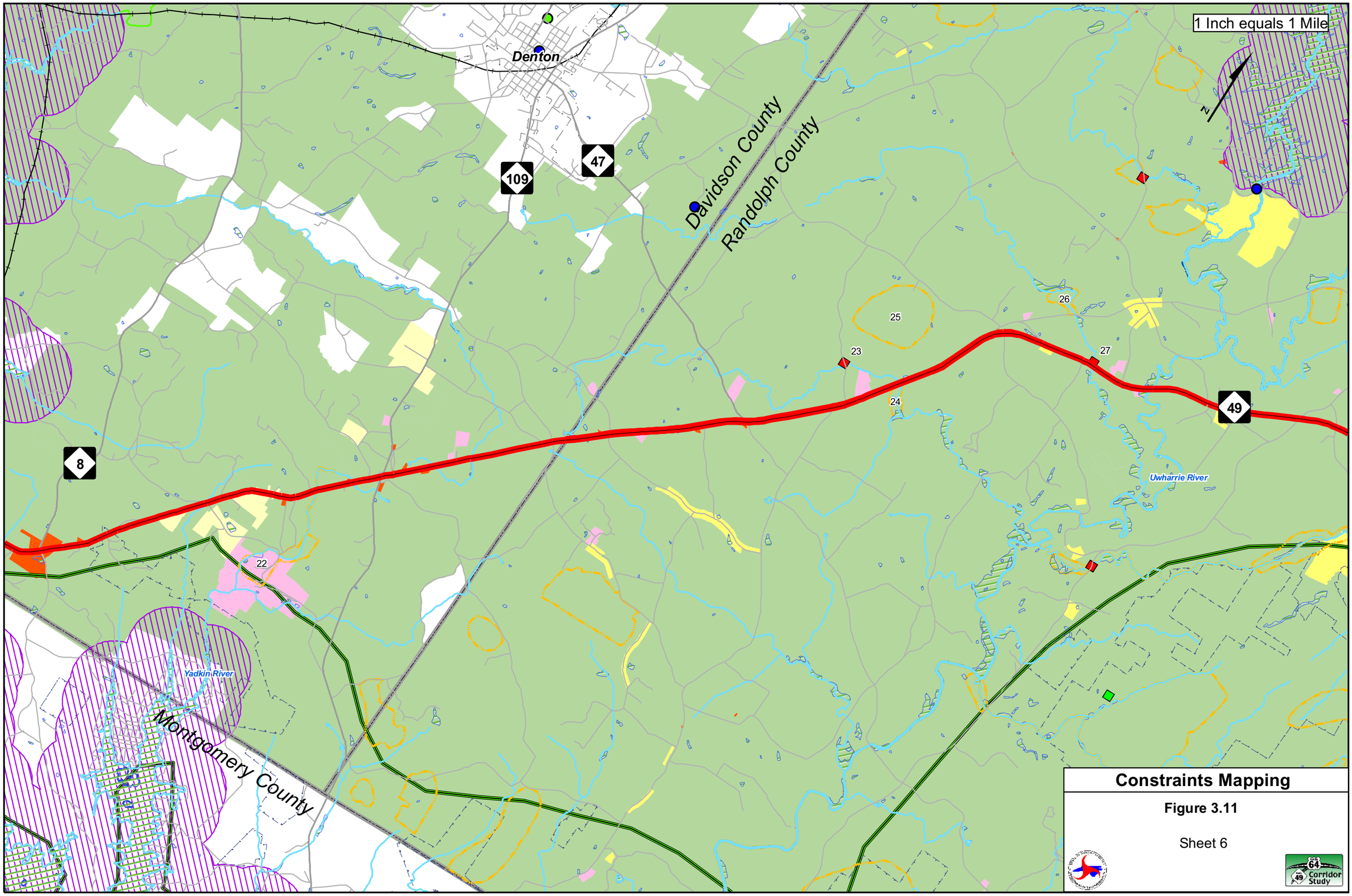
Constraints Mapping

Figure 3.11

Sheet 3


1 Inch equals 1 Mile
N
North Prong Rocky River
Rocky River Reservoir
Rocky River
Staley
Randolph County
Chatham County
421
49
Sandy Creek
22
Franklinville
64
Ramseur
Siler City
38
DEEP RIVER
42
Constraints Mapping
Figure 3.11
Sheet 4
US 64
US 49
Corridor Study

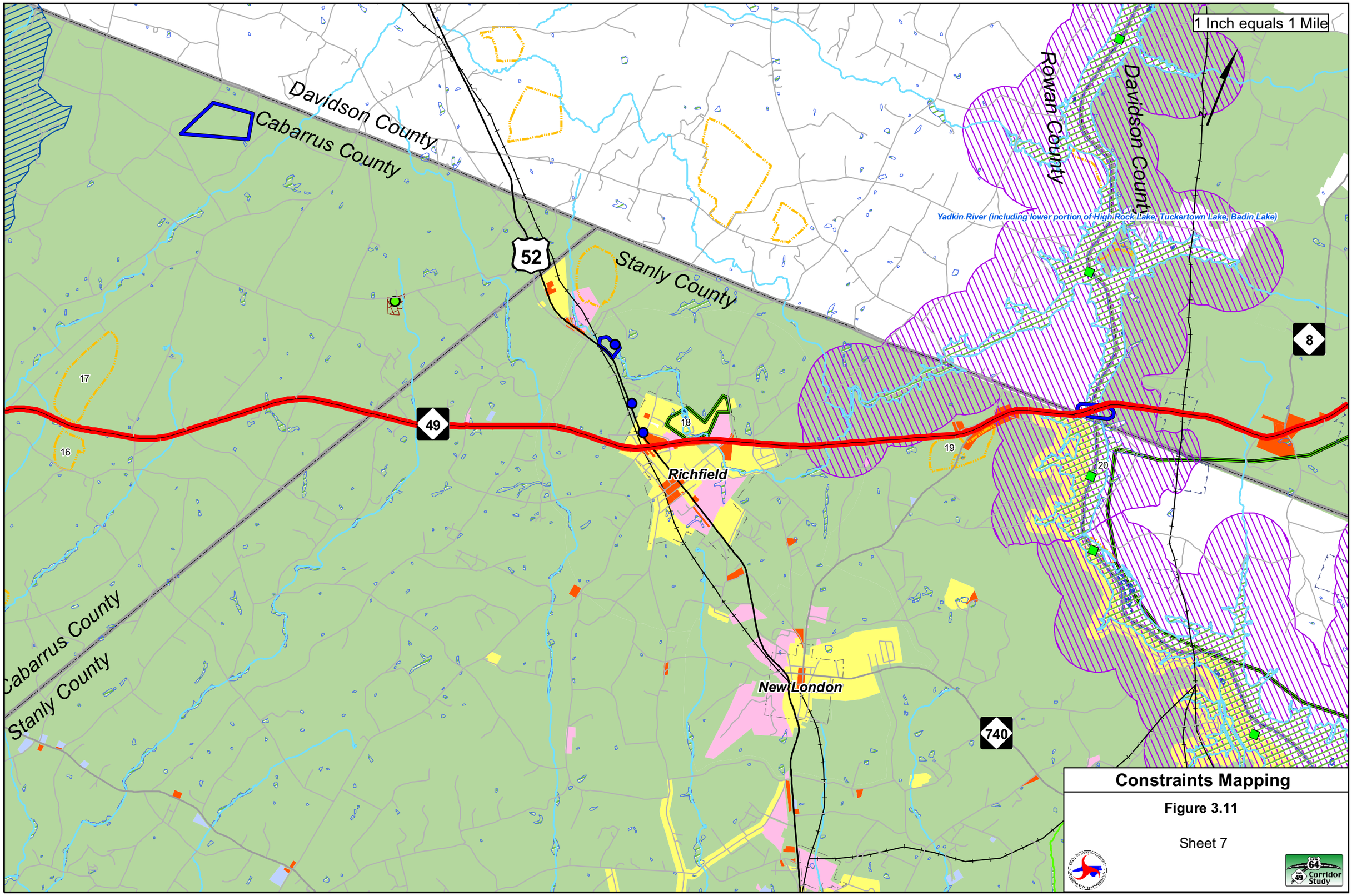

1 Inch equals 1 Mile
N
DEEP RIVER
22
Franklinville
Back Creek (Back Creek Lake)
69
71
70
64
Back Creek
64
Asheboro
68
30
36
34
29
32
BUS
220
220
42
159
49
27
Uwharrie River
28
28
21
Uwharrie NF
Constraints Mapping
Figure 3.11
Sheet 5
64
49
Corridor
Study

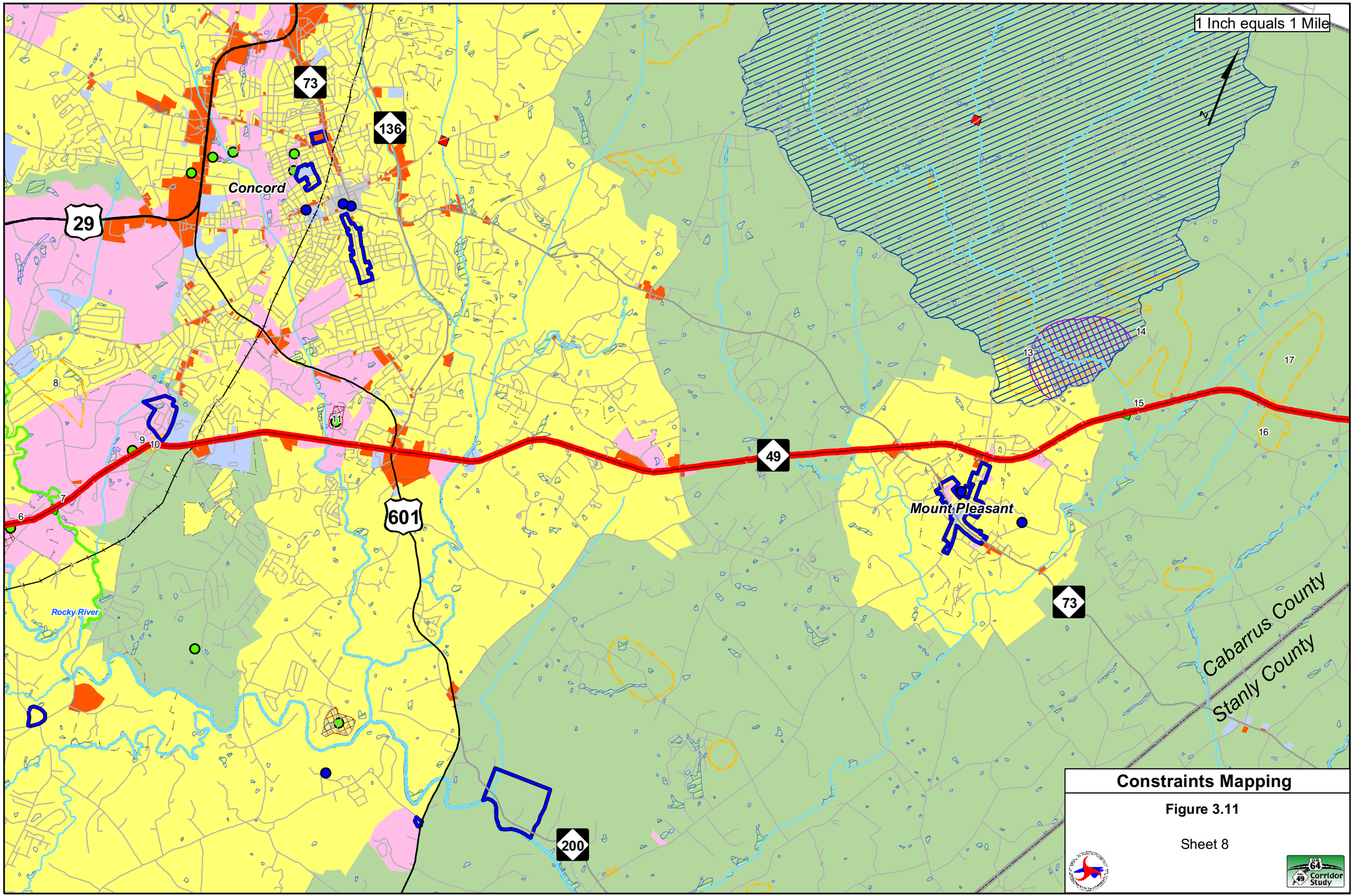


Constraints Mapping

Figure 3.11

Sheet 6

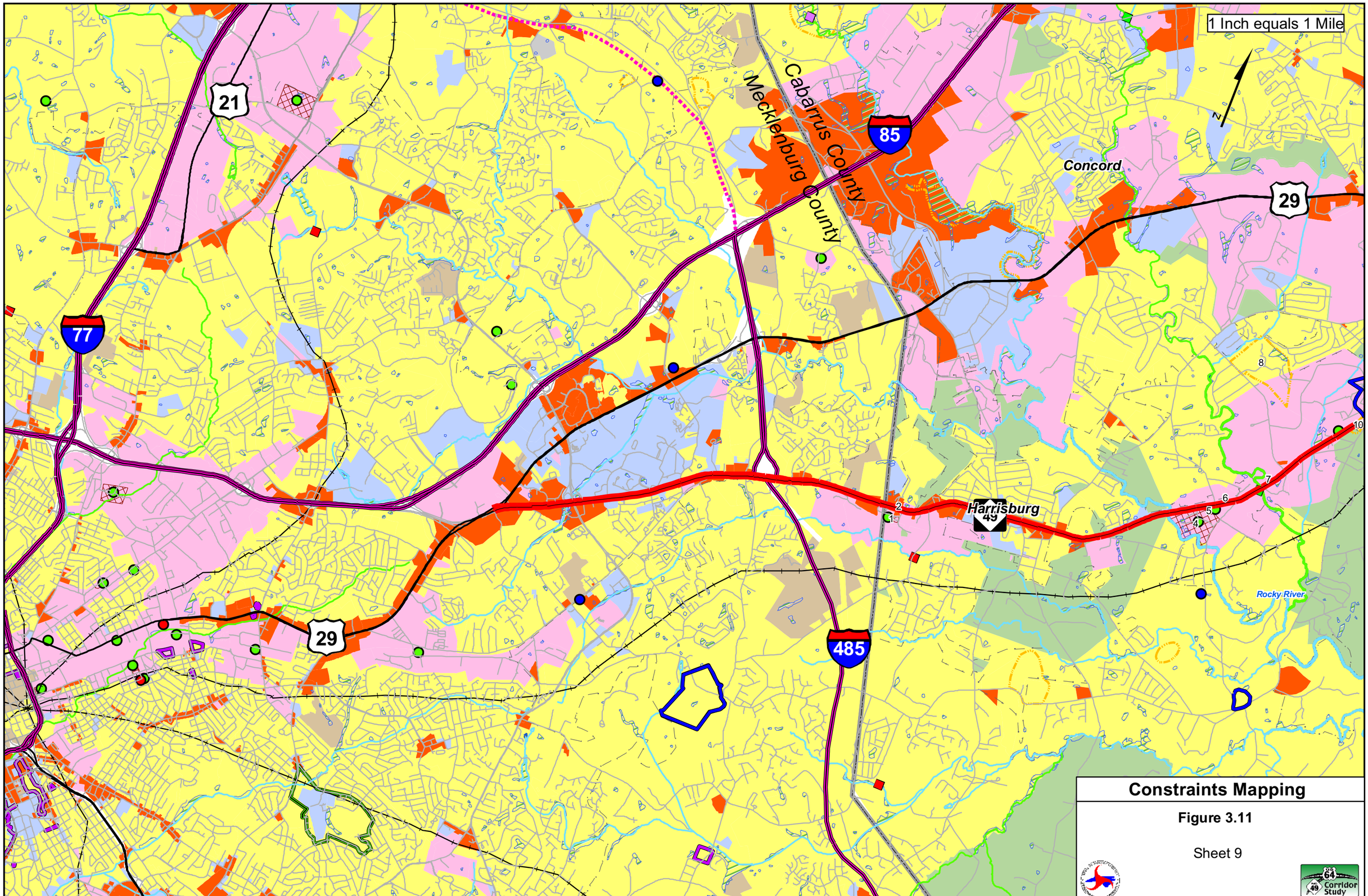

1 Inch equals 1 Mile
Davidson County
Cabarrus County
Stanly County
Rowan County
Davidson County
Yadkin River (including lower portion of High Rock Lake, Tuckertown Lake, Badin Lake)
52
49
8
740
Richfield
New London
16
17
18
19
20
Cabarrus County
Stanly County
Constraints Mapping
Figure 3.11
Sheet 7



Constraints Mapping

Figure 3.11

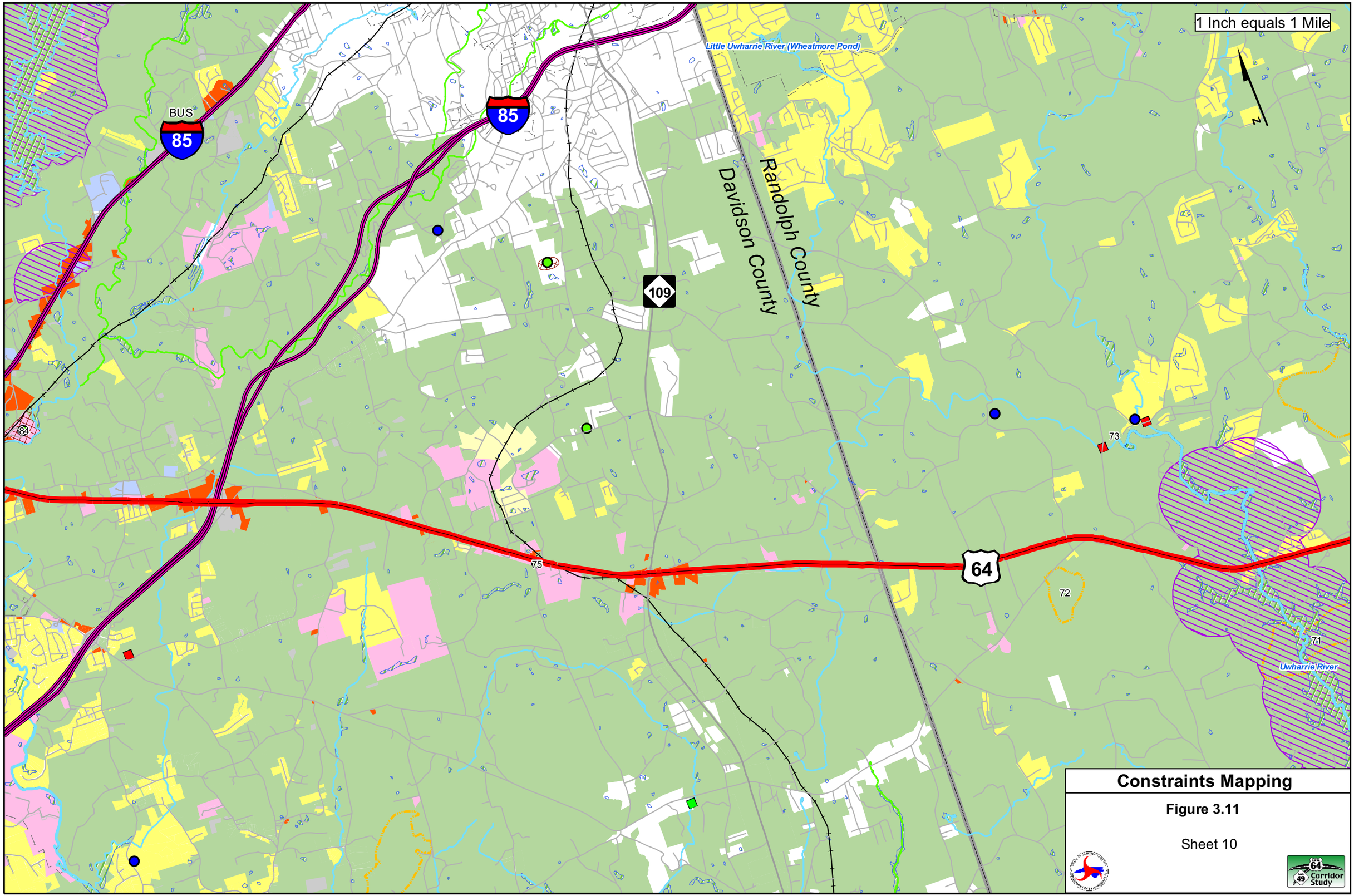
Sheet 8



Constraints Mapping

Figure 3.11

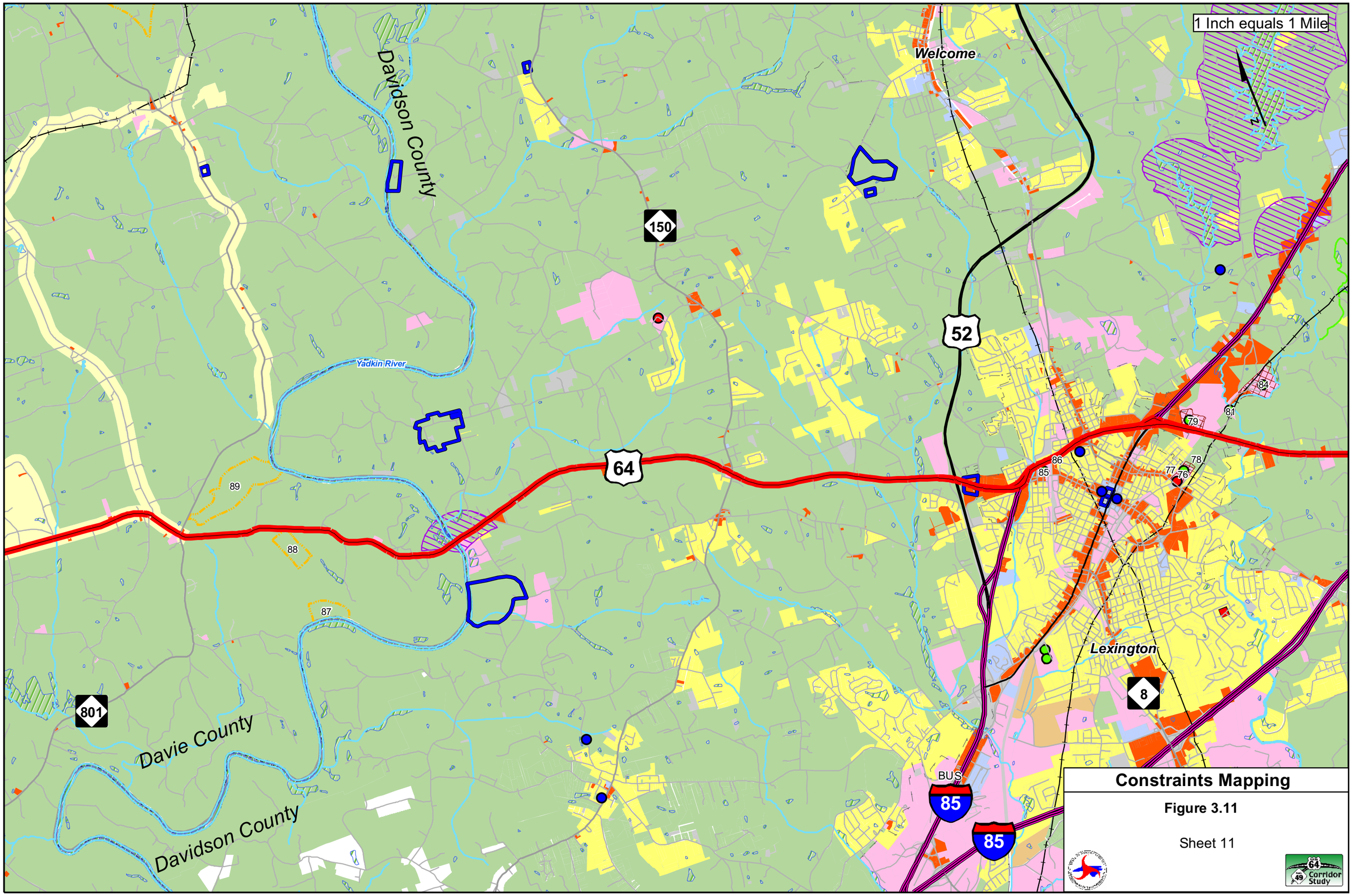
Sheet 9



Constraints Mapping

Figure 3.11

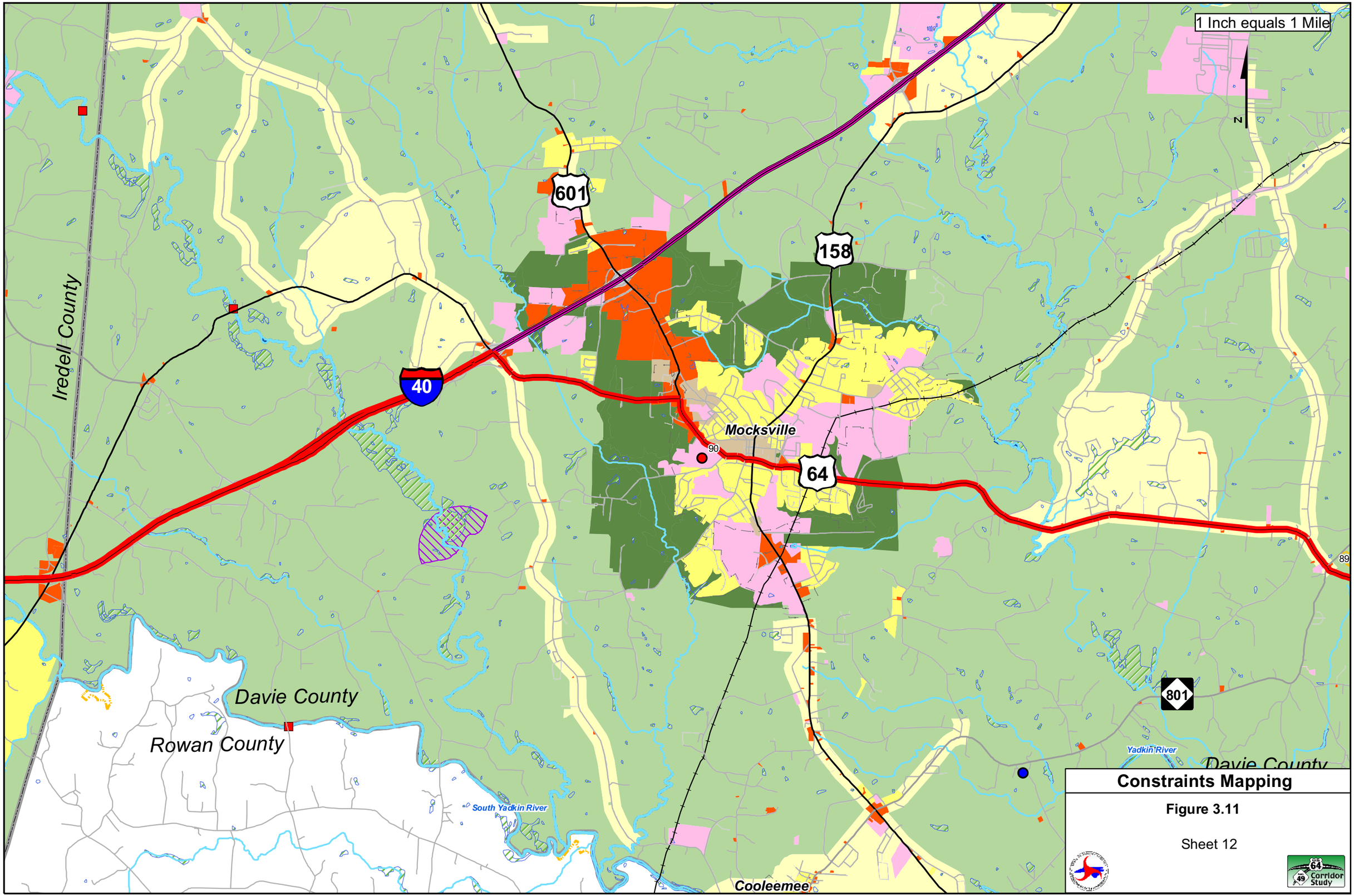
Sheet 10



Constraints Mapping

Figure 3.11

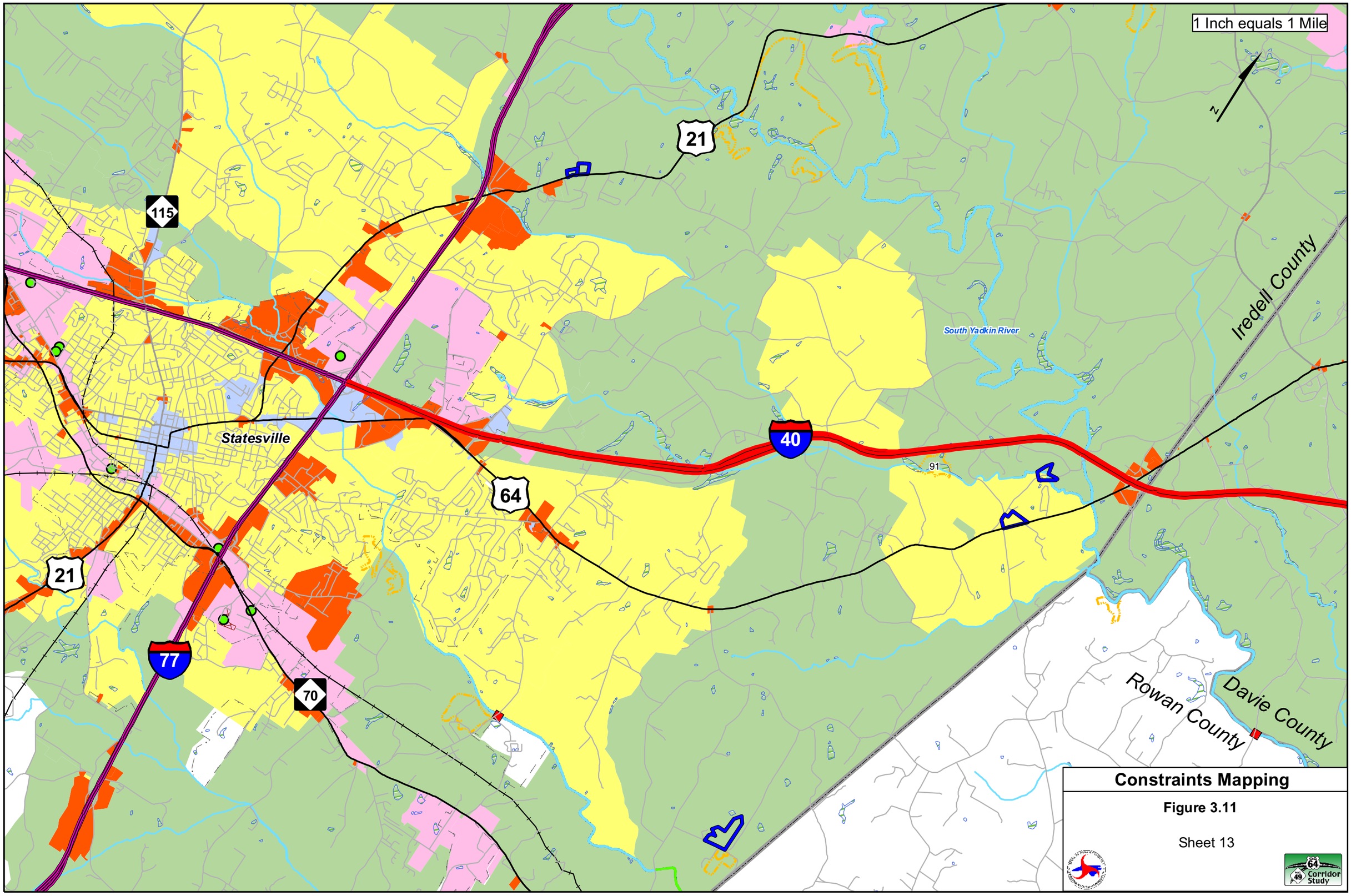
Sheet 11



Constraints Mapping

Figure 3.11

Sheet 12



Constraints Mapping

Figure 3.11

Sheet 13

Table 3.5: Environmental Constraints Map – Descriptions of Numbered Features

Feature Number on Figure 3.11	Feature Type	Description	Federal/State Status (Where Applicable)*
1	Superfund Areas	Galvin Industries, Inc.	
2	Unregulated Hazardous Sites (Superfund)	Olin Corp. Ecusta Paper & Film Group	
3	Natural Heritage Element Occurrence	Villosa Vaughaniana (Carolina Creekshell – Mollusk)	E
4	Superfund Areas	Mineral Research and Development Corp.	
5	Unregulated Hazardous Sites (Superfund)	Harrisburg Battery	
6	Unregulated Hazardous Sites (Superfund)	FL Steel Corp.	
7	Natural Heritage Element Occurrence	Etheostoma Collis Population 1 (Carolina Darter [Central Piedmont Population] – Fish)	SC
8	Significant Natural Heritage Areas	Frank Lisk Park	
9	Unregulated Hazardous Sites (Superfund)	Lee County Landfill	
10	Significant Natural Heritage Areas	Concord Ring Dike/Jackson School Natural Area	
11	Superfund Areas	Brey McNar Wastewater Treatment Plan (WWTP)	
12	Unregulated Hazardous Sites (Superfund)	Goldsboro Coal and Gas Plant #1	
13	Significant Natural Heritage Areas	Charity Church Hardwood Forest	
14	Significant Natural Heritage Areas	Dutch Buffalo Creek Dam	
15	Natural Heritage Element Occurrence	Etheostoma Collis Population 1 (Carolina Darter [Central Piedmont Population] – Fish)	SC
16	Significant Natural Heritage Areas	Butcher Branch Forest	
17	Significant Natural Heritage Areas	Lower Butcher Branch Depression Swamps	
18	Parks	Richfield Park	
19	Significant Natural Heritage Areas	New London Ridges	
20	Natural Heritage Element Occurrence	Haliaeetus Leucocephalus (Bald Eagle – Bird)	T
21	Parks	Uwharrrie National Forest	
22	Significant Natural Heritage Areas	Beaverdam Creek/Grassy Fork Creek	
23	Natural Heritage Element Occurrence	Alasmidonta Varicosa (Brook Floater – Mollusk)	E

Table 3.5: Environmental Constraints Map – Descriptions of Numbered Features

Feature Number on Figure 3.11	Feature Type	Description	Federal/State Status (Where Applicable)*
24	Significant Natural Heritage Areas	Second Creek Slopes	
25	Significant Natural Heritage Areas	Cody Mountain	
26	Significant Natural Heritage Areas	Toms Creek Basic Forest	
27	Natural Heritage Element Occurrence	Alasmidonta Varicosa (Brook Floater – Mollusk)	E
28	Significant Natural Heritage Areas	Uwharrie River Aquatic Habitat	
29	Natural Heritage Element Occurrence	Villosa Vaughaniana (Carolina Creekshell – Mollusk)	E
30	Superfund Areas	Union Carbide Corp.	
31	Unregulated Hazardous Sites (Superfund)	Sorrell Landfill	
32	Superfund Areas	Jung Corp	
33	Unregulated Hazardous Sites (Superfund)	Ethan Allen Furniture	
34	Superfund Areas	General Electric Co.	
35	Unregulated Hazardous Sites (Superfund)	Harrelson Rubber Co, Inc.	
36	Superfund Areas	Harrelson Rubber Co, Inc.	
37	Unregulated Hazardous Sites (Superfund)	Aycock Property	
38	Significant Natural Heritage Areas	Donnelly Hardpan Bog	
39	Natural Heritage Element Occurrence	Hemidactylium Scutatum (Four-Toed Salamander – Amphibian)	SC
40	Superfund Areas	Harrelson Rubber Co.	
41	Unregulated Hazardous Sites (Superfund)	Grant Creek Regional Wastewater Treatment Plant (WWTP)	
42	Natural Heritage Element Occurrence	Villosa Vaughaniana (Carolina Creekshell – Mollusk)	E
43	Significant Natural Heritage Areas	Rocky River Basalt Bluffs and Levees	
44	Superfund Areas	Chatham County Landfill	
45	Unregulated Hazardous Sites (Superfund)	Gray Farm Site	
46	Natural Heritage Element Occurrence	Hemidactylium Scutatum (Four-Toed Salamander – Amphibian)	SC
47	Significant Natural Heritage Areas	Lessler Montmorillonite Forest	
48	Natural Heritage Element Occurrence	Cambarus Davidi (Carolina Ladle Crayfish – Crustacean)	SR

Table 3.5: Environmental Constraints Map – Descriptions of Numbered Features

Feature Number on Figure 3.11	Feature Type	Description	Federal/State Status (Where Applicable)*
49	Significant Natural Heritage Areas	Pittsboro Firetower Wilderness	
50	Significant Natural Heritage Areas	Duke Forest Haw River Levees and Bluffs	
51	Significant Natural Heritage Areas	Duke Forest Haw River Levees and Bluffs	
52	Significant Natural Heritage Areas	Haw River Aquatic Habitat	
53	Natural Heritage Element Occurrence	Notropis Mekistocholas (Cape Fear Shiner – Fish)	E
54	Natural Heritage Element Occurrence	Alasmidonta Varicosa (Brook Floater – Mollusk)	E
54	Natural Heritage Element Occurrence	Lampsilis Cariosa (Yellow Lampmussel – Mollusk)	E
55	Natural Heritage Element Occurrence	Gomphus Septima (Septima's Clubtail – Insect)	SR
56	Natural Heritage Element Occurrence	Haliaeetus Leucocephalus (Bald Eagle – Bird)	T
57	Significant Natural Heritage Areas	Parkers Creek Ridges	
58	Parks	Jordan Lake State Recreation Area	
59	Historic Study List Districts	HT Lawrence Farm – Circa 1898 Tobacco Farm	
60	Natural Heritage Element Occurrence	Haliaeetus Leucocephalus (Bald Eagle – Bird)	T
61	Significant Natural Heritage Areas	White Oak Creek Floodplain	
62	Superfund Areas	Pierce (Lynn) Property	
63	Unregulated Hazardous Sites (Superfund)	Romarco Ltd	
64	Regulated Hazardous Waste Facilities		
65	Natural Heritage Element Occurrence	Hemidactylium Scutatum (Four-Toed Salamander – Amphibian)	SC
66	Significant Natural Heritage Areas	Hemlock Bluffs State Natural Area	
67	Natural Heritage Element Occurrence	Lampsilis Radiata Radiata (Eastern Lampmussel – Mollusk)	T
68	Significant Natural Heritage Areas	Cable Creek Headwaters	
69	Significant Natural Heritage Areas	Back Creek Ravines	

Table 3.5: Environmental Constraints Map – Descriptions of Numbered Features

Feature Number on Figure 3.11	Feature Type	Description	Federal/State Status (Where Applicable)*
70	Significant Natural Heritage Areas	Ridges Mountain	
71	Significant Natural Heritage Areas	Camp Woodfield Forests	
72	Significant Natural Heritage Areas	Westfield Church Basic Forest	
73	Natural Heritage Element Occurrence	Villosa Delumbis (Eastern Creekshell – Mollusk)	SR
74	Unregulated Hazardous Sites (Superfund)	Burke County School Property	
75	Superfund Areas	Burlington Furniture/Lumber Plant #1	
76	Superfund Areas	Burlington Furniture/Cent Main	
77	Regulated Hazardous Waste Facilities		
78	Unregulated Hazardous Sites (Superfund)	Southern Resins	
79	Superfund Areas	Battery Tech	
80	Unregulated Hazardous Sites (Superfund)	Lexington Municipal Landfill	
81	Superfund Areas	Lexington Coal Gas Plant	
82	Unregulated Hazardous Sites (Superfund)	Edgecombe County Landfill	
83	Unregulated Hazardous Sites (Superfund)	Martins Creek Road	
84	Superfund Areas	Lexington Municipal Landfill	
85	Superfund Areas	Raleigh Road Furniture Corp.	
86	Unregulated Hazardous Sites (Superfund)	Howard Johnsons/Crabtree Valley	
87	Significant Natural Heritage Areas	Cooleemee Plantation/Adkin River Slopes	
88	Significant Natural Heritage Areas	Cooleemee Plantation/Orbicular Diorite Area	
89	Significant Natural Heritage Areas	St. Johns School Bluffs	
90	Regulated Hazardous Waste Facilities		
91	Significant Natural Heritage Areas	Cool Springs Fen	

* E=Endangered (federal), T=Threatened (federal), SC=Species of Special Concern (federal) SR=Significantly Rare (state).

Source: North Carolina Center for Geographic Information and Analysis Database (February 11, 2004)

3.5.1.1 Wetlands

The National Wetland Inventory (NWI) is a program administered by the US Fish and Wildlife Service (USFWS) of the US Department of the Interior (DOI). The NWI program produces information on the characteristics, extent, and status of the Nation's wetlands and deepwater habitats. The National Wetlands Inventory information is used by federal, state, and local agencies; academic institutions; US Congress; and the private sector. Congressional mandates in the Emergency Wetlands Resources Act require the USFWS to map wetlands, and to digitize, archive, and distribute the maps.

The NWI provides information on wetlands on a regional scale. As shown in **Figure 3.11**, NWI wetlands are relatively small and scattered throughout the US 64–NC 49 study area, and are generally associated with stream courses. This distribution pattern is typical of the Piedmont region. There are no large areas of known wetlands along US 64 or NC 49.

When individual projects along US 64 and NC 49 are identified for development, field surveys and delineations of wetland areas and streams, and an evaluation of impacts and mitigation, will be required for permitting under Section 404 of the Clean Water Act.

3.5.1.2 Streams, Water Bodies, and Watersheds

Rivers, lakes and major streams are shown on **Figure 3.11**. The figure does not show minor perennial and intermittent tributaries.

US 64 and NC 49 are primarily in the Cape Fear and the Yadkin-Pee Dee River Basins. A small portion of the eastern end of the study corridor is in the Neuse River Basin. In the Cape Fear River Basin, US 64 crosses the following rivers and their tributaries: the Jordan Lake portion of the Cape Fear River, the Haw River, the Rocky River, and the Deep River. These rivers are, from east to west, in subbasins 03-06-05, 03-06-12, and 03-06-09 of the Upper Cape Fear River Basin.

In the Yadkin River Basin, US 64 crosses the Uwharrie River, the Yadkin River, and the South Yadkin River and their tributaries. These rivers are, from east to west, in sub basins 03-07-09 of the Lower Yadkin-Pee Dee River Basin and 03-07-07, 03-07-04, 03-07-05, and 03-07-06 of the Upper Yadkin-Pee Dee River Basin. US 49 crosses the following rivers and their tributaries: the Uwharrie River, the Yadkin River just north of Badin lake, and the Rocky River. These rivers are, from east to west, in subbasins 03-07-09, 03-07-08, 03-07-13, 03-07-12, and 03-07-11 of the Lower Yadkin-Pee Dee River Basin.

Critical watershed areas along US 64 and NC 49 are found at Jordan Lake (US 64 in Chatham County), the Uwharrie River (US 64 in Randolph County), and Badin Lake (NC 49 at the boundary of Rowan County and Davidson County). "Critical watershed area" is defined as land within one-half mile upstream and draining to a river water supply intake or within one-half mile and draining to the normal pool elevation of water supply reservoirs.

3.5.1.3 Water Quality

There are three major lakes along the corridors: Jordan Lake, Badin Lake, and High Rock Lake. Jordan Lake is currently supporting its designated uses and there are no public health advisories for swimming, fish consumption, or drinking water use. However, water quality standards related to eutrophication are not consistently achieved.[1] Eutrophication is the process by which a water body becomes rich in dissolved nutrients, often leading to algae blooms, low dissolved oxygen, and changes in community composition.

High nutrient concentrations have been a concern in High Rock Lake and Badin Lake. Potential sources of nutrient loading to Badin Lake include development in the immediate watershed and the inflow of nutrient-rich water from High Rock Lake upstream. [2]

There is one High Quality Water area along the US 64–NC 49 Corridor. This area is along an unnamed tributary to Back Creek just west of Asheboro (**Figure 3.11,** Sheet 5).

Section 303(d) of the Clean Water Act requires states to identify waters not meeting standards set by the US Environmental Protection Agency (EPA). A list of waters not meeting these standards is submitted to the EPA every two years. The EPA reviews and approves the listed waters. Waters placed on this list require the establishment of total maximum daily loads (TMDLs) intended to guide the restoration of water quality.

The US 64–NC 49 Corridor crosses two streams included on the 303(d) list and they are near and upstream of two other streams on the 303(d) list. The first stream, in the upper reaches of Swift Creek, is located just west of the US 64/US 1 interchange in Wake County (**Figure 3.11**, Sheet 1) and this stream is crossed twice by US 64. The second stream is Coddle Creek, a tributary of Rocky River located just north of Harrisburg (**Figure 3.11**, Sheet 8). It is crossed by NC 49. Roberson Creek is located just south of US 64 in Pittsboro (**Figure 3.11**, Sheet 2) and Loves Creek is located just south of US 64 in Siler City (**Figure 3.11**, Sheet 3).

3.5.2 Natural Heritage Program Sites

The NCDENR Natural Heritage Program (NHP) maintains a database of rare species and unique habitat that is included in the county-wide GIS data obtained from the NCDOT GIS Unit. NHP elements are shown in **Figure 3.11**. These areas represent unique or rare habitats and/or known occurrences of federal or state protected species.

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[1] Cape Fear River Basin Plan, NC DWQ, August 2000

[2] Yadkin Pee Dee River Basin Plan, NC DWQ, March 2003

The known occurrences of federally designated Threatened and Endangered species in the US 64–NC 49 Corridor vicinity are freshwater mussels, a fish (Cape Fear shiner), and the American bald eagle. Individual projects along US 64 and NC 49 would require field surveys for federally protected species and their habitats.

3.5.3 State and Federally Owned Lands

State and federally owned land along the US 64–NC 49 Corridor includes land owned by the federal government surrounding Jordan Lake (US Army Corps of Engineers) and in the Uwharrie National Forest (US Forest Service of the US Department of Agriculture). State-owned lands include the North Carolina Zoo in Randolph County. County-owned land includes Richfield Park in Richfield, north of NC 49.

Any individual project proposed along US 64 or NC 49 that involves the potential for impact on federal funds would be subject to Section 4(f) of the Department of Transportation Act of 1966 (49 USC § 303) and 23 CFR § 771.135. In accordance with this Act, the FHWA may not approve the use of land from a significant publicly owned park, recreation area, or wildlife and waterfowl refuge, or any significant historic site unless a determination is made that: (i) there is no feasible and prudent alternative to the use of land from the property; and (ii) the action includes all possible planning to minimize harm to the property resulting from such use.

3.5.4 Hazardous Materials and Superfund Sites

Known regulated and unregulated (Superfund) hazardous materials sites are located throughout the corridor, with concentrations in urbanized areas. Road construction through these types of sites can require remediation of the site, and can result in increased construction costs. The following are sites located on or immediately adjacent to US 64 or NC 49.

Galvan Industries and Olin Corporation/Ecusta Paper and Film Group. These two sites are Superfund sites located on the south side of NC 49 in south Harrisburg (Feature Numbers 1 and 2 on **Figure 3.11**, Sheet 9).

FL Steel Corporation. This Superfund area is located on the south side of NC 49 north of Harrisburg and north of the Rocky River (Feature Number 6 on **Figure 3.11**, Sheet 9).

Lee County Landfill. This Superfund area is located on the north side of NC 49 north of Harrisburg and north of the Rocky River (Feature Number 9 on **Figure 3.11**, Sheet 9).

Burlington Furniture/Lumber Plant #1. This Superfund area is located on the north side of US 64 in Davidson County, just west of NC 109 (Feature Number 75 on **Figure 3.11**, Sheet 10).

Battery Tech and Lexington Municipal Landfill. These Superfund sites are located in the northeast quadrant of the US 64/US 29/I-85 junction (Feature Numbers 79 and 80 on **Figure 3.11,** Sheet 11).

3.5.5 Historic Resources

The records on file at the State Historic Preservation Office (SHPO) were reviewed in October 2004 to identify known historic resources that are either presently listed on or that have been determined to be eligible for listing on the National Register of Historic Place (NRHP) that are located within a four-mile wide corridor centered around US 64 and NC 49.

Based on the file search conducted at the SHPO, there are 78 historic resources within two miles of the US 64–NC 49 Corridor that are on file at the State Historic Preservation Office (SHPO). As shown in **Figure 3.11**, these are scattered throughout the corridor study, with concentrations in the older communities along the roadways. There are seven resources that are adjacent to US 64 or NC 49. These resources are listed in **Table 3.6**.

Any individual project proposed along US 64 or NC 49 that involves the use of federal funds would be subject to Section 4(f) of the Department of Transportation Act of 1966 (49 USC § 303) and 23 CFR § 771.135, as described in Section 7.8.3, which includes protection for significant historic sites. Section 106 of the National Historic Preservation Act of 1966 and the *Advisory Council on Historic Preservation Regulations for Compliance with Section 106*, codified as 36 CFR Part 800, would apply to all proposed roadway projects along US 64 or NC 49.

Table 3.6: Historic Properties Adjacent to US 64 and NC 49

SHPO Site Number	Site Name	Status	Location	Figure 3.11 Sheet Number
CH-1	Alston-DeGraffenreid House and Plantation	On the NRHP	North side of US 64, just west of western junction of US 64 Pittsboro Bypass and US 64 Business.	Sheets 2 and 3
CH-9	Aspen Hall	On the NRHP	North side of US 64, just west of Site CH-1.	Sheet 3
CH-392	--	Determined eligible for the NRHP	North side of US 64, just west of CH-1 and CH-9.	Sheet 3

Table 3.6: Historic Properties Adjacent to US 64 and NC 49

SHPO Site Number	Site Name	Status	Location	Figure 3.11 Sheet Number
RD-21	Marley House	On the NRHP	North side of US 64, just west of the Randolph/Chatham County line.	Sheet 4
RW-653	Bridge over Yadkin River	Determined eligible for the NRHP	Old NC 49 bridge over the Yadkin River near Rowan/Davidson County line.	Sheet 7
CA-45	Stonewall Jackson Training School	On the NRHP	North side of NC 49, west of the railroad tracks that cross NC 49 west of US 601.	Sheet 8
DV-342	Henry Shoaf Farm	On the NRHP	Both sides of US 64, between the US 64/I-85 Business interchange and the US 64/US 52 intersection in west Lexington.	Sheet 11

Source: North Carolina State Historic Preservation Office (SHPO)

3.5.6 Air Quality

Air pollution originates from various sources with emissions from industrial processes and internal combustion engines being the most prevalent sources. Other sources of outdoor air pollution include (1) solid waste disposal and combustion and (2) any form of fire. The impacts resulting from highway construction can range from intensifying existing air pollution problems to improving the ambient air conditions.

The Federal Clean Air Act of 1970, as amended (42 USC 750(c)), was enacted for the purposes of protecting and enhancing the quality of the nation's air resources to benefit public health, welfare, and productivity.

The US Environmental Protection Agency (EPA) has established primary and secondary National Ambient Air Quality Standards (NAAQS) for six criteria air pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), ozone (O_3), particulate matter, and lead (Pb). For ozone, North Carolina adopted the 8-hour standard on April 1, 1999.

Table 3.7 lists the National Ambient Air Quality Standards (EPA Web Site, March 2005). The primary standards are set at a limit intended to "*protect the public health with an adequate margin of safety*," and the secondary standards are set at a limit intended to "*protect the public welfare from known or anticipated adverse effects (effects to aesthetics, crops, architecture, etc.).*"[3] The primary standards are established with a margin of safety, and

[3] Federal Clean Air Act 1990: Section 109

consider long-term exposures for the most sensitive groups in the general population (i.e., children, senior citizens, and people with breathing difficulties).

Table 3.7: National Ambient Air Quality Standards

Criteria Pollutant	Averaging Time	Standard	Standard Type
Carbon Monoxide	8-hour Average	9 ppm	Primary
	1-hour Average	35 ppm	Primary
Nitrogen Dioxide	Annual Arithmetic Mean	0.053 ppm	Primary and Secondary
Ozone	1-hour Average	0.12 ppm	Primary and Secondary
	8-hour Average	0.08 ppm	Primary and Secondary
Lead	Quarterly Average	1.5 mg/m^3	Primary and Secondary
Particulate < 10 micrometers (PM_{10})	Annual Arithmetic Mean	50 mg/m^3	Primary and Secondary
	24-hour Average	150 mg/m^3	Primary and Secondary
Particulate < 2.5 micrometers ($PM_{2.5}$)	Annual Arithmetic Mean	15 mg/m^3	Primary and Secondary
	24-hour Average	65 mg/m^3	Primary and Secondary
Sulfur Dioxide	Annual Arithmetic Mean	0.03 ppm	Primary
	24-hour Average	0.14 ppm	Primary
	3-hour Average	0.50 ppm	Secondary

Source: US EPA Website*: http://www.epa.gov/oar/oaqps/greenbk/, March 2005*

Figure 3.12 and Table 3.8 shows the NAAQS attainment status of the 19 counties in the US 64–NC 49 regional study area. A designation of "attainment" for a pollutant means the county is meeting the National Ambient Air Quality Standards for that pollutant. A designation of "non-attainment" means the county currently is violating the NAAQS for that pollutant. "Maintenance" means the county was previously designated non-attainment for a pollutant, but is now meeting the standard.

Most of the counties in the regional study area, and all the counties that US 64 and NC 49 pass through, do not currently meet the 8-hour ozone standard. The Triad area (counties include Surry, Stokes, Rockingham, Caswell, Yadkin, Forsyth, Guilford, Alamance, Davie, Davidson, and Randolph) has entered into an Early Action Compact (EAC) with the EPA to aid in achieving the 8-hour ozone standard[4].

The EPA is working with communities like the Triad to achieve the 8-hour ozone standard as soon as possible by entering into EACs that will reduce ground-level ozone, commonly known as smog. Communities close to or exceeding the 8-hour ozone standard that have elected to enter into an EAC will start reducing air pollution at least two years sooner than

[4] US EPA Web Site: www.epa.gov/ttn/naaqs/ozone/eac/index.htm, March 2005

required by the Clean Air Act. Communities participating in the EACs must submit plans in 2004 for meeting the national 8-hour ozone air quality standard, rather than waiting until 2007, which is the plan submittal deadline for other areas not meeting the 8-hour ozone standard. EACs require communities to:

- Develop and implement air pollution control strategies.
- Account for emissions growth.
- Achieve and maintain the national 8-hour ozone standard.

EPA designated these areas as "non-attainment" in April 2004. However, as long as EAC areas meet agreed upon milestones, the impact of non-attainment designation for the 8-hour ozone standard will be deferred. On September 24, 2004, the NC DENR Division of Air Quality submitted *North Carolina's 8-hour Ozone Attainment Demonstration* for all four EAC's in North Carolina, including the Triad EAC. As of March 2005, the Triad EAC has met the milestones and the non-attainment designation is deferred.

Figure 3.12: NAAQS Attainment Status

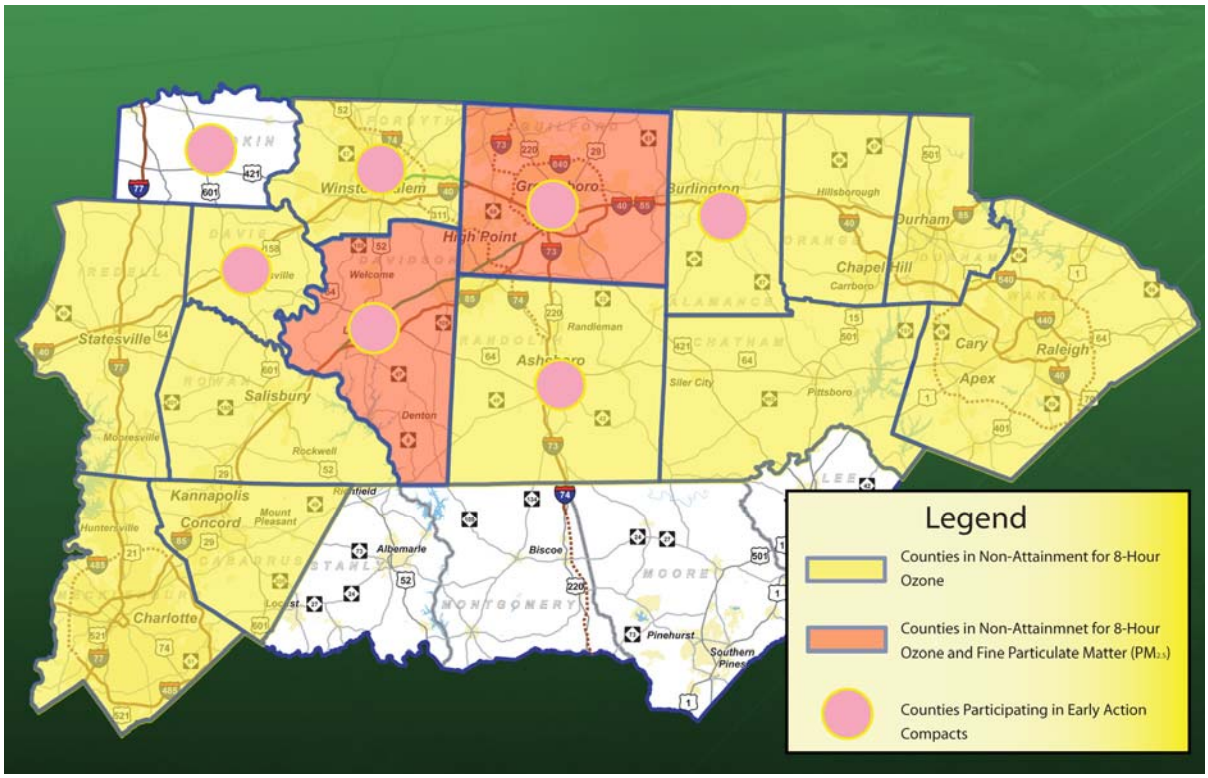


Table 3.8: US 64–NC 49 Study Area NAAQS Attainment Status

County[1]	Carbon Monoxide[2]	Nitrogen Dioxide[2]	Ozone 1-hour[2]	Ozone 8-hour[2]	Lead[2]	Particulate Matter – 10 micron[2]	Particulate Matter – 2.5 micron[2,3]	Sulfur Dioxide[2]
Alamance				NonAtt (EAC)				
Cabarrus				NonAtt				
Chatham				NonAtt(P)				
Davidson			Maint	NonAtt (EAC)			NonAtt	
Davie			Maint	NonAtt (EAC)				
Durham	Maint		Maint	NonAtt				
Forsyth	Maint		Maint	NonAtt (EAC)				
Guilford			Maint	NonAtt (EAC)			NonAtt	
Iredell				NonAtt(P)				
Lee								
Mecklenburg	Maint		Maint	NonAtt				
Montgomery								
Moore								
Orange				NonAtt				
Randolph				NonAtt (EAC)				
Rowan				NonAtt				
Stanly								
Wake	Maint		Maint	NonAtt				
Yadkin				(EAC)				

Source: EPA's Green Book: www.epa.gov/oar/oaqps/greenbk, March 2005.

1. If cell is blank, the County is in attainment for that pollutant
2. Maint = Maintenance area for pollutant (an area that was previously not in attainment but is now)
   NonAtt = Non attainment area for pollutant. (P) means only a portion of the county is non attainment.
   EAC means that the county is a member of an Early Action Compact and impacts of a non-attainment designation are deferred.
3. PM-2.5 – EPA final determinations. EPA Web Site www.epa.gov/pmdesignations/finaltable.htm, March 2005.

3.6 Transportation Profile

The transportation profile presents an overview of the existing multimodal transportation system within the defined US 64–NC 49 study area. This system includes major commercial airports; Class I freight rail lines; Interstates, primary and local highways; and a wide variety of local and intercity public transportation services. The sections that follow summarize the principal characteristics of the system's major transportation componenets.

3.6.1 Existing Roadway Network

The defined regional study area contains many of North Carolina's most important highway facilities, including some of the highest volume sections of the state's Interstate Highway System. **Figure 3.1** (page 3-3) illustrates the major highway facilities in the study area. Interstate facilities in the study area include I-40, I-73, I-74, I-77, I-85, I-440, I-485, and I-540. Other significant routes include US 1, US 64, US 220, US 421, NC 49, and NC 24/27.

All of the public roadways in the state of North Carolina are owned and maintained by NCDOT, other than those owned and maintained by cities and towns. There is thus a large network of local roads within the study area over and above these primary Interstate, US, and NC designated routes. As would be expected from such a large geographic area, a significant percentage of the state's total highway system is contained within these 19 counties. **Table 3.9** illustrates the roadway centerline mileage of primary, secondary, and urban system routes in each of the study area counties for the entire 19-county study area and for the entire state in the study base year of 2002. As shown in **Table 3.9**, the state-maintained highway system in the study area consists of approximately 2,082 miles of primary routes, 3,153 miles of urban

Table 3.9: North Carolina Roadway Mileage by Facility Type

	State Highway System Mileage			
County	**Secondary System**	**Urban System**	**Primary System**	**Total System**
Alamance	702.98	129.22	101.85	934.05
Cabarrus	543.47	179.68	71.76	794.91
Chatham	887.50	33.53	153.29	1,074.32
Davidson	1,191.53	136.44	167.68	1,495.65
Davie	400.33	14.24	99.61	514.18
Durham	455.67	224.82	53.25	733.74
Forsyth	638.62	314.95	86.65	1,040.22
Guilford	1,098.38	496.96	138.90	1,734.24
Irdell	1,210.98	97.17	184.62	1,492.77
Lee	347.88	80.27	53.71	481.86
Mecklenburg	432.63	512.88	72.29	1,017.80
Montgomery	506.33	37.18	123.64	667.15
Moore	834.44	103.21	143.84	1,081.49
Orange	648.33	64.99	106.11	819.43
Randolph	1,398.21	117.16	182.34	1,697.71
Rowan	948.63	112.18	104.90	1,165.71
Stanly	671.64	82.19	92.28	846.11
Wake	1,584.93	387.61	64.73	2,037.27
Yadkin	597.08	28.52	80.21	705.81
Study Area Totals	15,099.56	3,153.20	2,081.66	20,334.42
State System Totals	59,320.56	7,243.89	11,925.75	78,490.20
Percent of State System Within Study Area	*25.5%*	*43.5%*	*17.5%*	*25.9%*

Source: Adapted from Table NC 106 TL, North Carolina DOT 2002 Highway and Road Mileage Report.

routes, and 15,100 miles of secondary routes for a total of about 20,334 centerline miles, according to 2002 highway data provided by NCDOT. This represents 17.5 percent of the total of 11,926 miles of primary system in the state, 43.5 percent of the total urban system mileage, and 25.5 percent of the total secondary system mileage. Overall, the study area contains 25.9 percent of the total state-maintained highway system mileage in North Carolina.

The following sections provide a description of the primary Interstate, US, and NC routes that facilitate regional travel in the study area. These facilities (or sections thereof) provide important connections to major activity centers in the study area

3.6.1.1 Interstate Highways

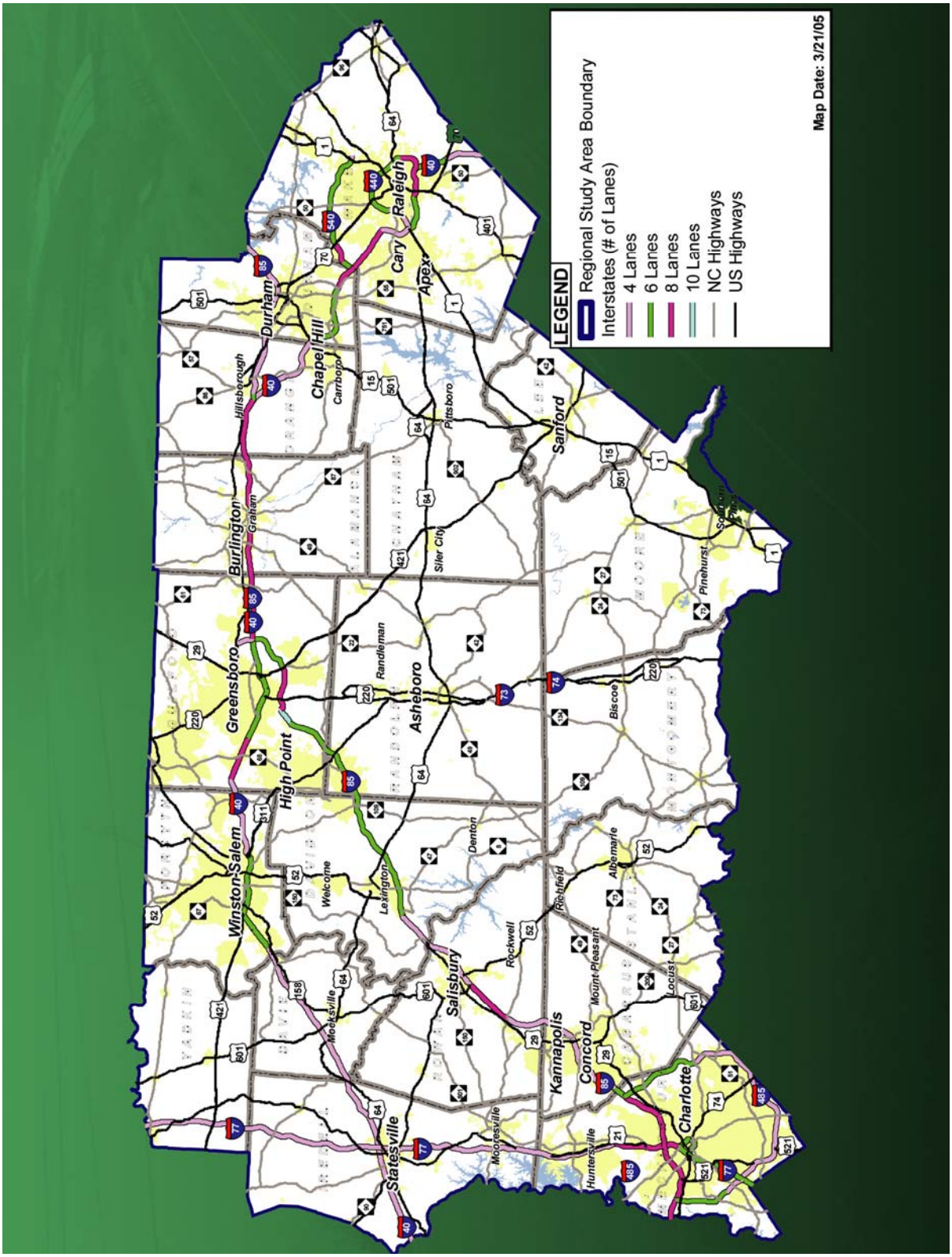
Figure 3.13 illustrates the number of mainline travel lanes along the Interstate System within the study area. While short segments of the study area's Interstate Highway System in the urban areas may have a somewhat greater number of additional mainline travel lanes, the number of lanes shown on **Figure 3.13** is illustrative of the basic roadway cross sections along these facilities as they existed in March 2005.

Interstate 40 (I-40)

I-40 is a national east-west Interstate corridor beginning in Barstow, CA and terminating in Wilmington, NC. The facility traverses the study area for approximately 180 miles through Iredell, Davie, Forsyth, Guilford, Alamance, Orange, Durham, and Wake Counties, connecting cities such as Statesville, Mocksville, Winston-Salem, Greensboro, Burlington, Chapel Hill, Durham, Cary, and Raleigh. The general cross-sections are as follows:

- From the Catawba/Iredell County line to just east of the Davie/Forsyth County line: Four-lane rural freeway (except near Statesville, where it is more urbanized)
- From just east of Davie/Forsyth County line to US 311: Six-lane suburban/urban freeway
- From US 311 in Forsyth County to Business I-40 in Guilford County: four-lane suburban freeway
- From Business I-40 to the future Greensboro Western Loop: eight-lane urban freeway
- From the future Greensboro Western Loop to I-85 in eastern Guilford County: six-lane urban freeway
- From I-85 in Guilford County to I-85 in Orange County: eight-lane suburban freeway (I-40 and I-85 are co-signed along this section)
- From I-85 in Orange County to US 15-501: four-lane rural/suburban freeway

Figure 3.13: Interstate Lanes



- From US 15-501 to NC 147: six-lane urban freeway
- From NC 147 to Wade Ave: eight-lane urban freeway
- From Wade Ave to I-440/US 1/US 64: four-lane urban freeway
- From I-440/US 1/US 64 to Lake Wheeler Road: six-lane urban freeway (co-signed with US 64)
- From Lake Wheeler Road to I-440/US 64: eight-lane urban freeway (co-signed with US 64)
- From I-440/US 64 to US 70: six-lane suburban freeway
- From US 70 to Wake/Johnston County line: four-lane suburban freeway

Interstate 85 (I-85)

I-85 is primarily a southeast Interstate facility, stretching from Birmingham, AL to Petersburg, VA. The facility traverses the study area for approximately 137 miles through Mecklenburg, Cabarrus, Rowan, Davidson, Randolph, Guilford, Alamance, Orange, and Durham Counties, connecting cities such as Charlotte, Concord, Kannapolis, Salisbury, Lexington, High Point, Greensboro, Burlington, and Durham. The general cross-sections are as follows:

- From the Gaston/Mecklenburg County line to I-485 in eastern Mecklenburg County: eight-lane urban freeway
- From I-485 to Concord Mills Blvd: six-lane suburban freeway
- From Concord Mills Blvd to NC 152: four-lane suburban freeway
- From NC 152 to US 601 (Jake Alexander Blvd): eight-lane suburban freeway
- From US 601 to I-85 Business/US 52 in Davidson County: four-lane suburban/rural freeway (part under construction)
- From I-85 Business/US 52 in Davidson County to I-85 Business in Guilford County: six-lane rural freeway
- From I-85 Business to Greensboro Loop/I-85 Business: ten-lane urban freeway
- From I-85 Business to US 421: eight-lane urban freeway
- From US 421 to I-40 in eastern Guilford County: six-lane suburban freeway
- From I-40 in Guilford County to I-40 in Orange County: eight-lane suburban freeway (I-40 and I-85 are co-signed along this section)
- From I-40 in Orange County to Orange/Durham County line: four-lane rural freeway
- From Orange/Durham County line to US 15-501: six-lane suburban freeway
- From US 15-501 to Durham/Granville County line: four-lane freeway (part under construction)

Interstate 77 (I-77)

I-77 is a north-south interstate facility traversing the Ohio Valley and Appalachian Mountain areas of the US. This facility begins in Columbia, SC and terminates in Cleveland, OH. Of importance to the study area are the sections located in Mecklenburg and Iredell Counties, connecting Charlotte, Mooresville, and Statesville. The general cross-sections are as follows:

- From the South Carolina/North Carolina State line to I-277 (north): six-lane urban freeway
- From I-277 north to future I-485: eight-lane urban freeway (includes HOV lanes)
- From future I-485 to Iredell/Yadkin County line: 4 lane suburban/rural freeway

Interstate 73 (I-73)

I-73 is a recently designed Interstate route, added to the Interstate System in 1991 by the Intermodal Surface Transportation Efficiency (ISTEA). This facility is designated to begin in the Myrtle Beach region in South Carolina and traverse northward to Sault Ste. Marie, MI. Sections of I-73 are proposed to be co-signed with I-74 in North Carolina and West Virginia. Of importance to the study area is the section through Asheboro in Randolph County to I-40 in Guilford County. Through Randolph County the facility is primarily a four-lane rural freeway, with the section near Asheboro more urbanized. This section is also co-signed with I-74 and US 220. North of the future I-74 connection to High Point to I-40 is primarily a four-lane rural freeway, with the section near Greensboro more urbanized.

Interstate 74 (I-74)

I-73 is also a recently designed Interstate route, added to the Interstate System in 1991 by ISTEA. This facility is designated to begin in the Myrtle Beach region in South Carolina and traverse north and westward to Davenport, IA. Sections of I-74 are proposed to be co-signed with I-73 in North Carolina and West Virginia. Of importance to the study area is the section through Asheboro in Randolph County to Winston-Salem in Forsyth County. Through Randolph County the facility is primarily a four-lane rural freeway, with the section near Asheboro more urbanized. This section is also co-signed with I-73 and US 220. From I-73 north of Asheboro to I-40 in Winston-Salem, the facility is combination of a suburban and rural four-lane freeway, with the section through High Point more urbanized. This section includes the segment from I-73 to Business I-85, which is not built at this time.

3.6.1.2 Non-Interstate Routes

An extensive network of US and NC routes connect with the Interstate System and provide access to all of the communities within the defined study area. Routes of primary importance for this study include US 421, US 1, US 15/US 501, and NC 24/NC 27, all of which are Strategic Highway Corridors.

US 421

US 421 traverses the study area through Lee, Chatham, Randolph, Guilford, Forsyth, and Yadkin Counties connecting such cities as Sanford, Siler City, Greensboro, and Winston-Salem. Of particular importance to the study area is the section located between US 64 in Chatham County and I-40/I-85 in Guilford County. The general cross-sections are as follows:

- From US 64 in Chatham County to the Chatham/Randolph County line: four-lane rural freeway
- From the Chatham/Randolph County line to the Randolph/Guilford County line: four-lane expressway
- From the Randolph/Guilford County line to I-40/I-85: four-lane divided highway with traffic signals (Boulevard)

The aforementioned sections of US 421, in combination with US 64 between Siler City and Raleigh are sometimes used as an alternate to I-40 from the Raleigh to Greensboro. Future improvements to US 64 and US 421 will further enhance this route as a high-speed alternate to I-40.

US 1

US 1 traverses the study area through Moore, Lee, and Wake Counties connecting such cities as Pinehurst, Southern Pines, Sanford, Cary, and Raleigh. Of particular importance to the study area is the section located between NC 24/NC 27 in Moore County and I-40 in Wake County. The facility is primarily a four-lane rural freeway, with more urbanized sections in Sanford and Cary. The one exception is the section that is a four-lane divided and five-lane highway with traffic signals in southern Lee County. The aforementioned sections of US 1 in combination with NC 24/NC 27 from Mecklenburg County to Moore County are sometimes used as an alternate route between the Charlotte and Raleigh areas.

US 15/US 501

US 15/US 501 traverses the study area through Moore, Lee, Chatham, Orange, and Durham Counties connecting such cities as Pinehurst, Southern Pines, Sanford, Pittsboro. Chapel Hill, and Durham. Of particular importance to the study area is the section located between US 64 in Chatham County and I-40 in Durham County. This facility is primarily a four-lane urban and suburban divided highway with traffic signals, with more urbanized sections in Orange and Durham Counties. The aforementioned sections of US 15/US 501 in combination with the US 64-NC 49 Corridor from Pittsboro to Charlotte are sometimes used as an alternate to the existing interstate facilities for travel between the Chapel Hill and Charlotte areas.

NC 24/NC 27

NC 24/NC 27 traverses the study area through Moore, Montgomery, Stanly, Cabarrus, and Mecklenburg Counties connecting such cities as Pinehurst, Southern Pines, Albemarle, and Charlotte. Of particular importance to the study area is the section located between US 1 in Moore County and Mecklenburg County. The cross-section for this facility varies from a two-lane rural highway, to a three-lane urban highway, to a four-lane divided and five-lane highway. Projects are planned to improve the facility to at least four lanes throughout this section of importance. This section, in combination with US 1 from Moore County to Wake County is sometimes used as an alternate route between the Charlotte and Raleigh areas.

3.6.2 Existing Traffic Conditions

For this study, existing traffic conditions are described in terms of average annual daily traffic (AADT) volumes, the level of service (LOS) associated with these daily traffic volumes, and the percentage of the total traffic stream consisting of single and multi-unit trucks.

3.6.2.1 Base Year (2002) Average Annual Daily Traffic Volumes

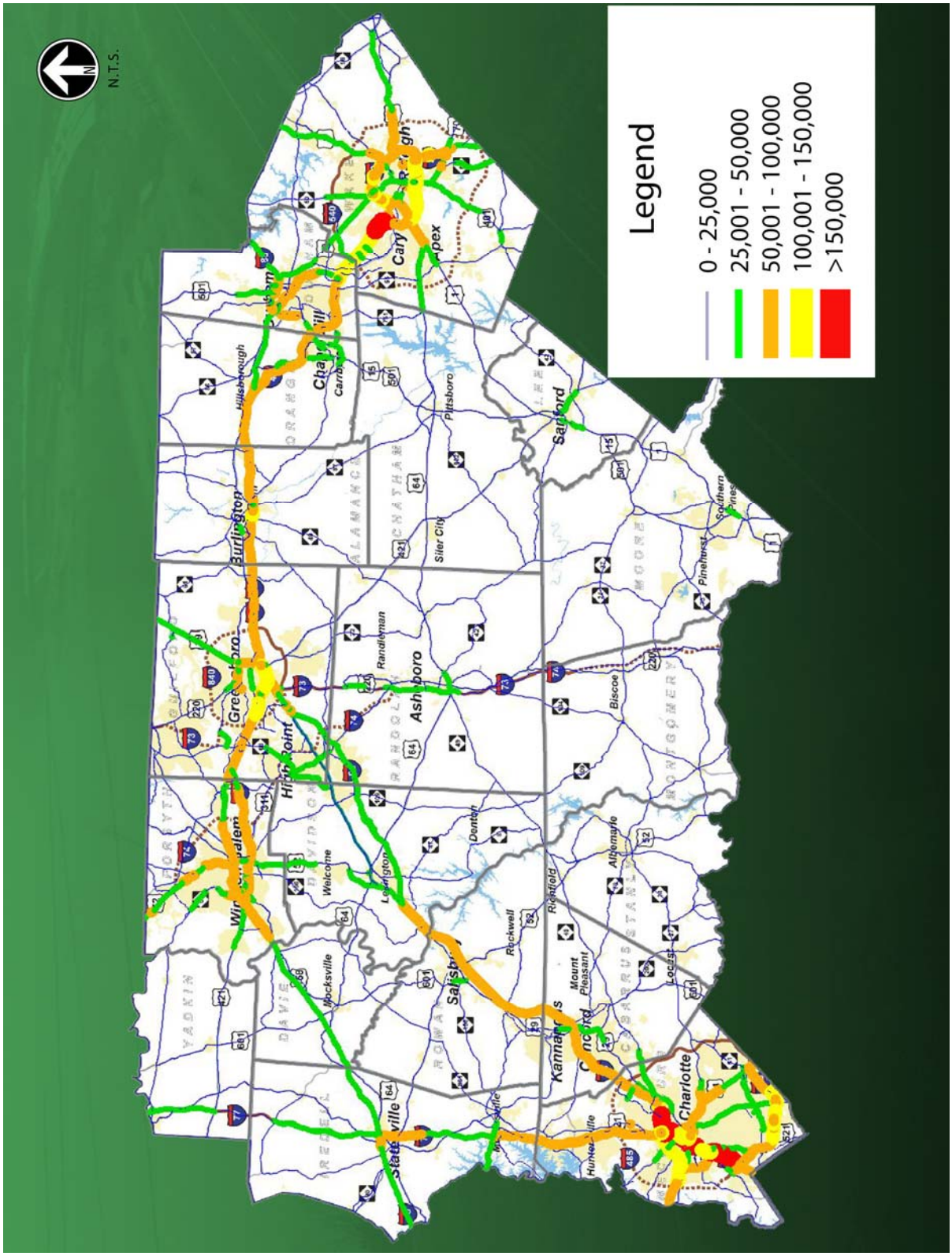
Traffic volume data was obtained from NCDOT files for various locations along the Interstate, US, and NC routes within the US 64–NC 49 study area. Traffic volume data for the study's base year (2002) was used to obtain an understanding of present day travel patterns and to identify where congestion was presently being experienced. This information was also used to assist in the development of the regional travel demand forecasting model described in Chapter 6.

Figure 3.14 presents a summary of year 2002 average annual daily traffic volumes on the major roadways in the study area. It should be noted that these are only representative traffic volumes along each of the roadway segments identified, and that higher or lower volumes would be observed at specific locations between the identified beginning and ending points of each segment.

As illustrated on **Figure 3.14**, the largest AADT volumes are along the Interstate routes traversing the study area. Volumes along I-40 range from about 30,000 vehicles per day (vpd) between I-77 and the Forsyth County line in the more rural western portion of the study area, to 80,000 and 100,000 vpd between Greensboro and Burlington along the section co-signed with I-85, and are in excess of 130,000 vpd on sections of I-40 between Durham and Raleigh. Similarly, AADT volumes along the I-85 corridor range from about 155,000 vpd just east of I-77 in Charlotte to about 60,000 vpd in the vicinity of Business I-85/US 52 near Lexington.

AADT volumes along the primary routes of interest to this corridor study, US 64 and NC 49 are much lower than those observed on the parallel Interstate corridors and tend to exhibit much higher variations in volume. Along the US 64 corridor, for example, the average daily volumes in the Lexington area were approximately 25,000 vpd, while just a few miles to the east in Randolph County volumes along a rural section of US 64 were about 7,500 vpd. From Asheboro east to Pittsboro, average daily volumes on US 64 were typically between 10,000 and 15,000 vpd. East of Pittsboro, traffic volumes along US 64 steadily increase, from about 15,000 vpd at the Chatham/Wake County line, to about 24,000 vpd just west of the of NC 55 in Apex, to about 45,000 vpd just west of US 1 in Cary. Along the section jointly signed as US 1/US 64 in Cary, traffic volumes were approximately 75,000 vpd.

Figure 3.14: Existing AADT Volumes (2002)



Along the length of NC 49 through the study area, traffic volumes exhibit the same type of wide variations as those observed along US 64. In the Charlotte area, for example, volumes were typically on the order of about 25,000 vpd, while through the rural sections of the corridor between Charlotte and Asheboro, volumes were generally in the range of 4,000 to 6,000 vpd.

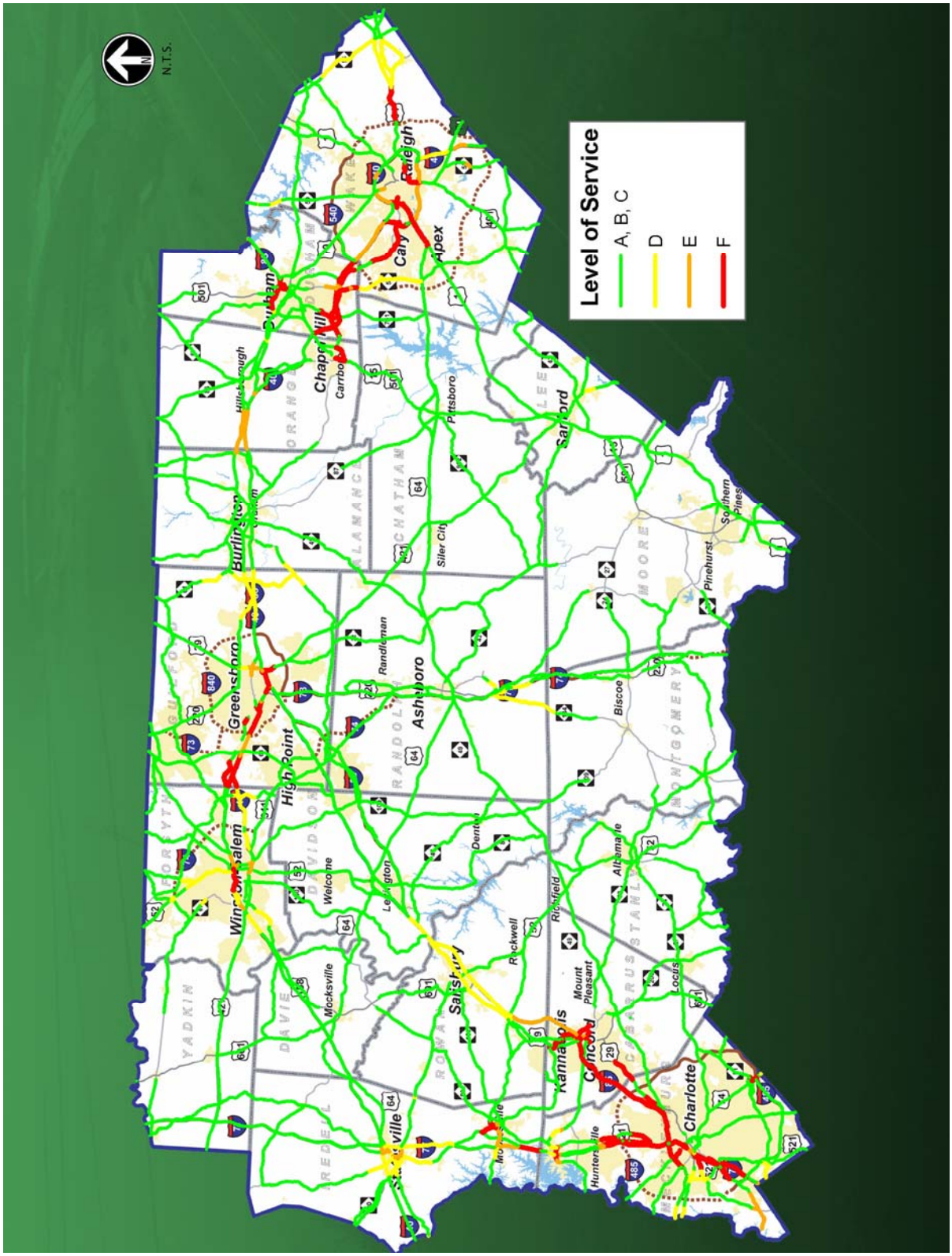
3.6.2.2 Base Year (2002) Roadway Level of Service

An important element of defining the potential need for any roadway improvement is the ability of the facility to adequately accommodate both existing and projected future traffic volumes. Roadway performance is rated on a level-of-service scale of A through F based on a variety of factors including average vehicle operating speed and the freedom to maneuver. Level-of-service (LOS) "A" reflects an ability to travel at the roadway's posted speed limit and complete freedom to change lanes or to pass other vehicles. LOS "F" represents very congested, stop-and-go flow conditions with no freedom to maneuver. LOS "C" is generally considered the desirable minimum acceptable level of performance for rural highways, with LOS "D" generally considered the minimum acceptable level of performance for urban and suburban facilities.

Acceptable values of per lane capacity were defined for the general roadway categories of freeways, expressways, other major arterials, minor arterials, and collector routes which existed in the study area in 2002. These represent all of the facilities of interest in this study. These values were then used to develop estimates of the maximum daily traffic volume that could be accommodated at each level of service A – F on each type of roadway within the study area. The comparison of these maximum daily traffic volumes associated with each level of service to the year 2002 average annual daily traffic volumes allowed for a determination to be made of the relative levels of traffic congestion currently observed on the regional highway network. **Figure 3.15** presents the resulting summary of 2002 traffic congestion levels on the study area highway system.

As illustrated in **Figure 3.15**, the vast majority of mileage on the study area highway system operated at acceptable levels of service (i.e., LOS A, B, or C) on an average daily basis in 2002. This is particularly true along US 64 and NC 49. Along US 64, there are no significant pockets of congestion caused by limited roadway capacity as indicated from daily traffic volumes. However, there are several locations between Raleigh and Statesville that experience significant delay at intersections during peak hours, such as in Asheboro, Lexington, and Mocksville. Likewise, NC 49 operates at acceptable levels of service throughout the corridor, although intersection delays occur in and near the city of Charlotte.

Figure 3.15: Summary 2002 Level of Service Values



In the case of many of the other Interstate and primary routes in the study area, significant areas of moderate to heavy congestion were identified. Not unexpectedly, the majority of I-77 and I-85 in the Charlotte area was determined to be experiencing severe congestion levels (LOS E or F) in 2002. As described elsewhere in this report, a number of major improvement projects are currently underway or are scheduled for implementation in the next five to ten years to address these congestion levels.

Moderate to heavy congestion levels (LOS E/F) were also identified along I-40 between Winston-Salem and Greensboro. It should be noted that in the base year, this section was under construction to improve the facility to a six and eight-lane freeway. Sections of I-40/I-85 through Greensboro and Burlington operated at LOS D in base year as well.

High congestion levels were also observed in the Raleigh/Durham area, particularly along I-40 through Wake and Durham Counties (LOS D/E). However, sections of I-40 throughout this area have been since improved to address the congested conditions that were observed in 2002.

Another important regional highway system element is the section of US 421 between US 64 in Siler City and I-40/I-85 in Greensboro. Base year volumes range from 6,000 vpd in the rural areas in Chatham and Randolph Counties to 15,000 near I-40/I-85. In comparison to the daily capacity associated with this facility, LOS C or better conditions were observed along this section.

3.6.2.3 Base Year (2002) Truck Percentage

One of the defining characteristics of the North Carolina Strategic Highway Corridor network is that the routes which constitute this statewide network connect major activity centers around the state. While total traffic volume is one indication of this degree of connectivity, another important indicator is the portion of the total traffic stream that is made up of trucks, both single-unit and multi-unit vehicles. Particularly in the case of a multi-county, regional corridor study such as this, the identification of those highway facilities with a high percentage of trucks is a factor that can help to define the purpose and need for any potential improvements to those facilities.

Information was obtained from NCDOT on the percentage of the total traffic stream represented by large trucks. This data was supplemented by information obtained from the Federal Highway Administration's (FHWA's) national Freight Analysis Framework (FAF) to identify major truck routes through the study area. This information is summarized in **Figure 3.16**.

As shown in **Figure 3.16**, those study area roadways with a "high" percentage of truck traffic, defined as those routes carrying 15 percent or more trucks in the total traffic stream, tend to be the Interstates and other elements of the state primary highway system. Virtually all segments of the Interstate System in the study area, with the exception of some urban

segments in the Charlotte and Raleigh areas, are carrying at least 15 percent trucks. Along I-40/I-85 in the Greensboro area, this truck percentage translates into about 20,000 trucks per day. In the central portion of the I-85 corridor between Charlotte and Greensboro, about 13,000 vehicles per day are trucks. The lower truck percentages observed on the Interstate routes in the Charlotte and Raleigh metropolitan areas reflect the high level of use of the Interstate System by local traffic, which tends to primarily be private automobiles.

Those segments of the state primary highway system that are freeways or expressways, such as US 421 southeast of Greensboro and US 220 south of Asheboro (the I-73/I-74 corridor), are also carrying in excess of 15 percent trucks on an average daily basis.

Along US 64 , the truck percentage varies considerably as it passes through the defined study area. Near Lexington, less than ten percent of the total traffic volume along US 64 is trucks, representing approximately 1,000 large vehicles per day. Just west of Asheboro, the average daily truck percentage on US 64 is between 10 and 15 percent, representing approximately 1,000 trucks per day. From east of Asheboro through Siler City to Pittsboro, the truck percentage is in excess of 15 percent with the number of trucks estimated to be between 1,500 to 2,000 per day. East of Pittsboro, the percentage of average daily truck traffic decreases to less than ten percent, due to the increase in total traffic near the Raleigh area. However, in this more “urbanized” section of the study area, US 64 is estimated to be carrying approximately 2,500 to 3,000 trucks per day.

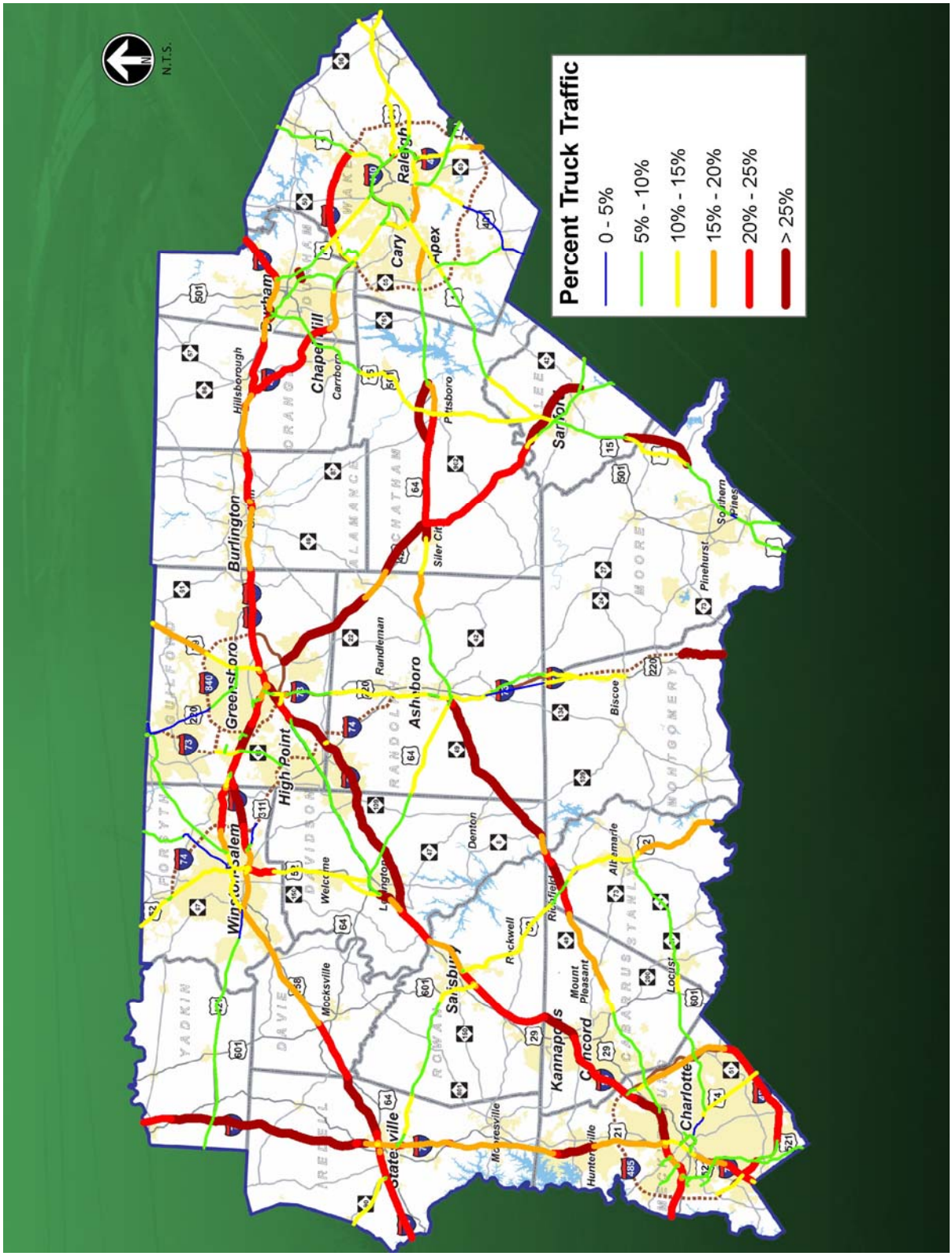
On the NC 49 corridor, similar wide variations in the percentage of trucks were observed. In the Charlotte area, the truck percentage on NC 49 is relatively low (between five and ten percent) because of the high volumes of commuter traffic. This translates into approximately 1,500 to 2,000 trucks per day along this section of NC 49. However, in the rural areas between Harrisburg and Asheboro, more than 15 percent of the total traffic stream is comprised of trucks. This represents about 1,700 trucks per day.

Based on stakeholder interview comments and the results of the roadside interview surveys, it is likely that a significant proportion of the trucks currently using the US 64 and NC 49 corridors are transporting goods to and from nearby agricultural and manufacturing activities located along these corridors.

3.6.3 Existing Travel Patterns and Characteristics

In addition to obtaining an understanding of the total volume of traffic using the study area highway system, it is also important to understand the travel patterns associated with these vehicles. This is particularly important as a major goal of this study is to examine the potential for improvements to the US 64 and NC 49 corridors to divert current and future-year traffic from I-40 and I-85. The determination of existing travel patterns and characteristics was conducted through the analysis of information obtained through a variety of sources. These included:

Figure 3.16: 2002 Truck Percentage



- 2000 US Census journey-to-work data.
- A video license plate origin-destination survey at five sites on I-40 and I-85.
- A postcard origin-destination survey using data obtained in the video license plate survey.
- A series of roadside origin-destination surveys at three sites on US 64 and NC 49.
- A series of travel time surveys on I-40, I-85, US 64, and NC 49.

A summary of the key findings associated with each of these data collection activities is presented below.

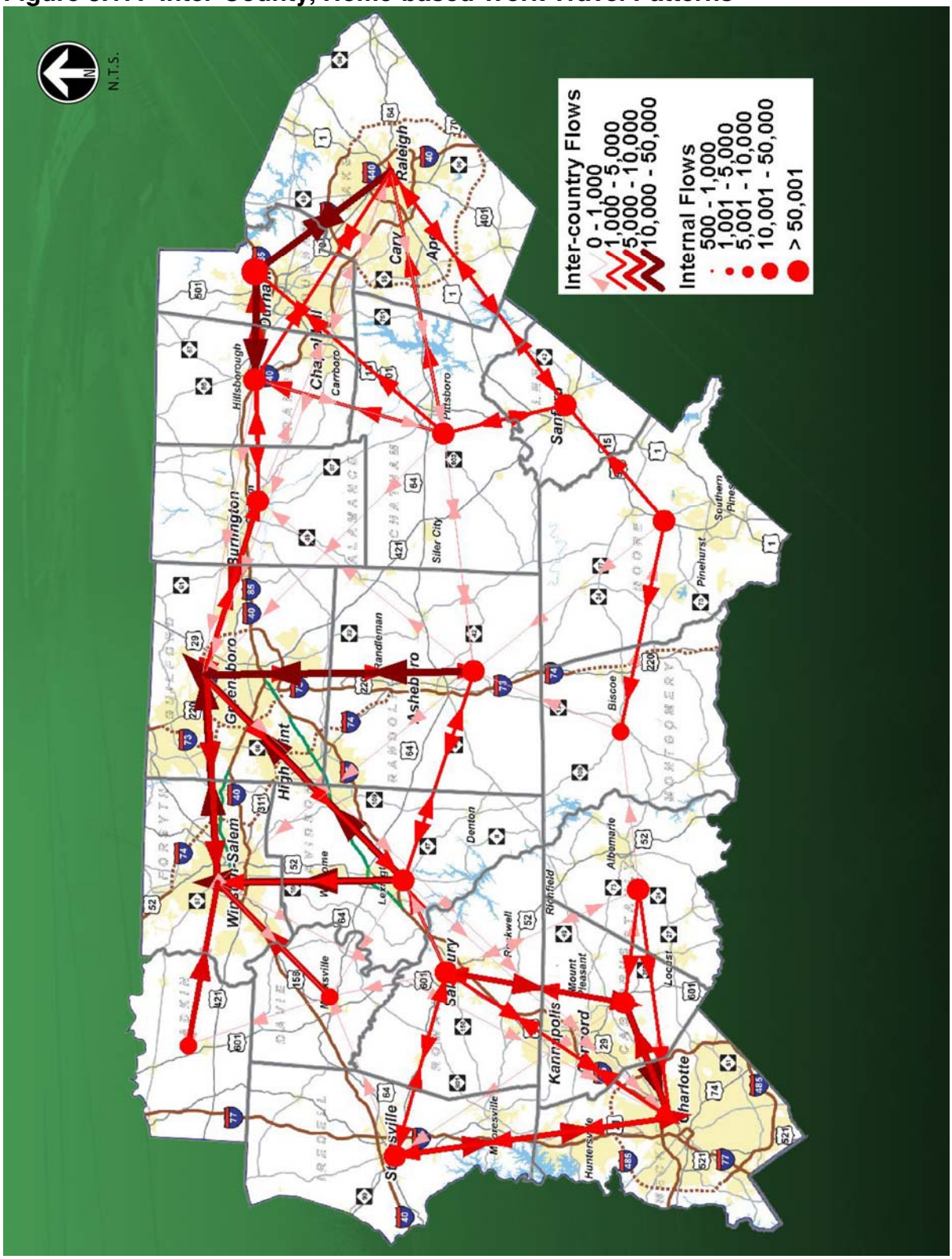
3.6.3.1 Journey-to-work Data

Since 1970, the decennial United States Census has collected information on the origins, destinations, and mode of travel for home-based work trips. The 2000 Census surveyed approximately one in 15 households across the United States using the "long form" that contained these questions. These sample survey results were then factored to represent 100 percent of the households identified by the census. For the purpose of this large scale regional study, 2000 US Census journey-to-work data was aggregated to the county level. **Figure 3.17** presents the resulting inter-county, home-based work travel patterns in the 19-county study area.

As illustrated on **Figure 3.17**, home-based work trip travel patterns tend to be focused on the three major urban areas within the region. In the western portion of the study area, Mecklenburg County is the dominant destination for work trips, both for those trips beginning in Mecklenburg County and those beginning in surrounding study area counties such as Cabarrus, Stanly, Rowan, and Iredell. Within the 19-county study area, the home-based work travel shed for the Charlotte/Mecklenburg County area appears to be generally bounded by the cities of Statesville to the north, Salisbury to the northeast, and Albemarle to the east. Some portion of the interaction between Cabarrus County and Mecklenburg County would be expected to use NC 49.

In the central portion of the study area, the Triad cities of Greensboro, High Point, and Winston-Salem are the primary home-based work trip destinations, with the study area communities of Lexington and Asheboro also being important destination areas. The largest county-to-county travel patterns utilize major corridors such as US 220 between Randolph County (Asheboro) and Guilford County (Greensboro) and I-40 between Forsyth County (Winston-Salem) and Guilford County (Greensboro). There is also a significant movement between Davidson County (Lexington) and Randolph County (Asheboro) that could reasonably be expected to use this portion of US 64.

Figure 3.17: Inter-County, Home-based Work Travel Patterns



Source: Analysis of 2000 US Census data by Cambridge Systematics, Inc.

In the eastern portion of the study area, the Raleigh/Durham/Chapel Hill urban area is the primary home-based work trip destinations. While the majority of work trips appear to take place between these three urban centers and their immediately surrounding suburbs, the 2000 US Census data identified a number of other significant travel patterns of interest to this study. The most significant of these home-based work travel patterns include the following movements:

- Between Chatham County (Pittsboro and Siler City) and Wake County (Raleigh and Cary) that would principally use the US 64 corridor.
- Between Chatham County, Orange County (Chapel Hill), and Durham County (Durham) that would principally use the US 15-501 corridor.
- Between Lee County (Sanford) and Chatham County that would principally use the US 15-501 or US 421 corridors.
- Between Lee County and Wake County that would principally use the US 1 corridor.

Those cities and counties that are currently the largest population and job centers in the study area are anticipated to retain these rankings in the planning horizon year of 2030. Thus, while the absolute magnitude of the 2000 US Census journey-to-work travel patterns can be expected to increase, the basic orientation of these travel patterns can be expected to continue.

3.6.3.2 I-40 and I-85 Video Origin–Destination Survey

As part of the data collection phase of this project, several traffic surveys were conducted to obtain better information on trip origins, trip destinations, and trip purpose of travelers using key routes within the study area. The first of these surveys used high-speed video cameras to capture license plate images of vehicles passing through the study area at one of five locations on I-40 and I-85:

- Site #1: I-40 at Davis Drive in Durham County
- Site #2: I-40/I-85 at Mount Hope Church Road in Guilford County
- Site #3: I-40 at Gallimore Dairy Road in Guilford County
- Site #4: I-40 at Pinebrook School Road in Davie County
- Site #5: I-85 at Centergrove Road in Cabarrus County

Figure 3.18 displays the location of the video survey sites. At each location, a number of high-speed video cameras were placed on a highway overpass, with one camera recording all vehicles passing the location in each lane. Vehicles were recorded in both directions of travel over a 12-hour period. Details on the survey process are contained in the *Video Origin-Destination Survey Technical Report, May 2004*.

Figure 3.18: Video Origin-Destination Survey Sites

The license plate images of vehicles passing the five survey stations in both directions over the course of the 12-hour survey period were obtained from the video survey. The origin, destination, and entry/exit times of these vehicles were recorded by analyzing individual license plate images at each survey station. Thus, for example, a vehicle first observed traveling westbound at Site #1 could be tracked as it traveled past Sites #2, #3, and #4 if it stayed on I-40, or could be tracked past Sites #2 and #5 if it followed I-40 and I-85 between the Raleigh and Charlotte urban areas. It was also possible to account for those vehicles which made only short trips in the corridor, such as being observed traveling both eastbound and westbound at Site #1 but not being observed at any other survey station. On the day of the survey, Wednesday, October 15, 2003, a total of 246,587 license plate images were recorded. This represented 86.5 percent of the total of 285,175 vehicles which passed the survey locations during the 12-hour period.

The successfully read license plate images (sorted by location of observation, classification, time of day, and direction) were then "matched" to create an origin-destination (O-D) matrix for all trips to and from each of the five video survey sites. O-D movement volumes were adjusted using industry accepted statistical methods to provide an estimate of O-D movement volumes for a 100 percent read rate for the survey period.

Figures 3.19 through **3.23** illustrate the distribution of traffic on a percentage basis for those vehicles entering the study area at Sites #1, #2, #3, #4, and #5.

Figure 3.19: Distribution of Traffic Passing Site #1 in Westbound Direction

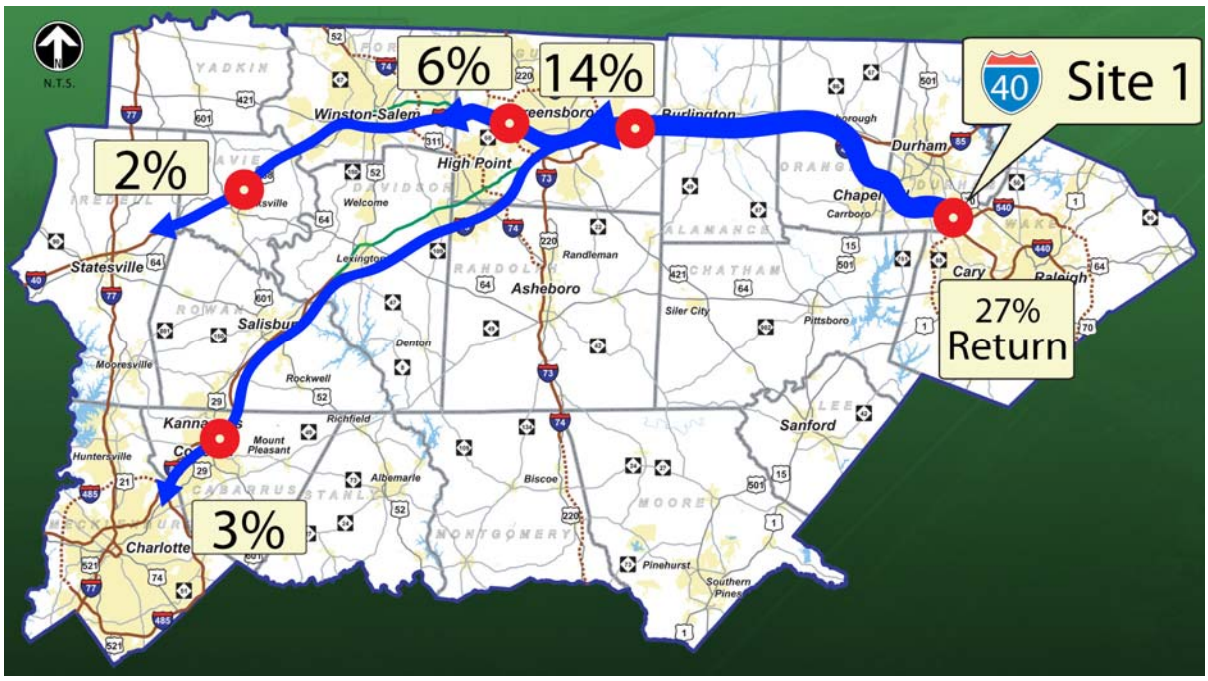


Figure 3.20: Distribution of Traffic Passing Site #2 in Westbound Direction

Figure 3.21: Distribution of Traffic Passing Site #3 in Eastbound Direction

Figure 3.22: Distribution of Traffic Passing Site #4 in Eastbound Direction

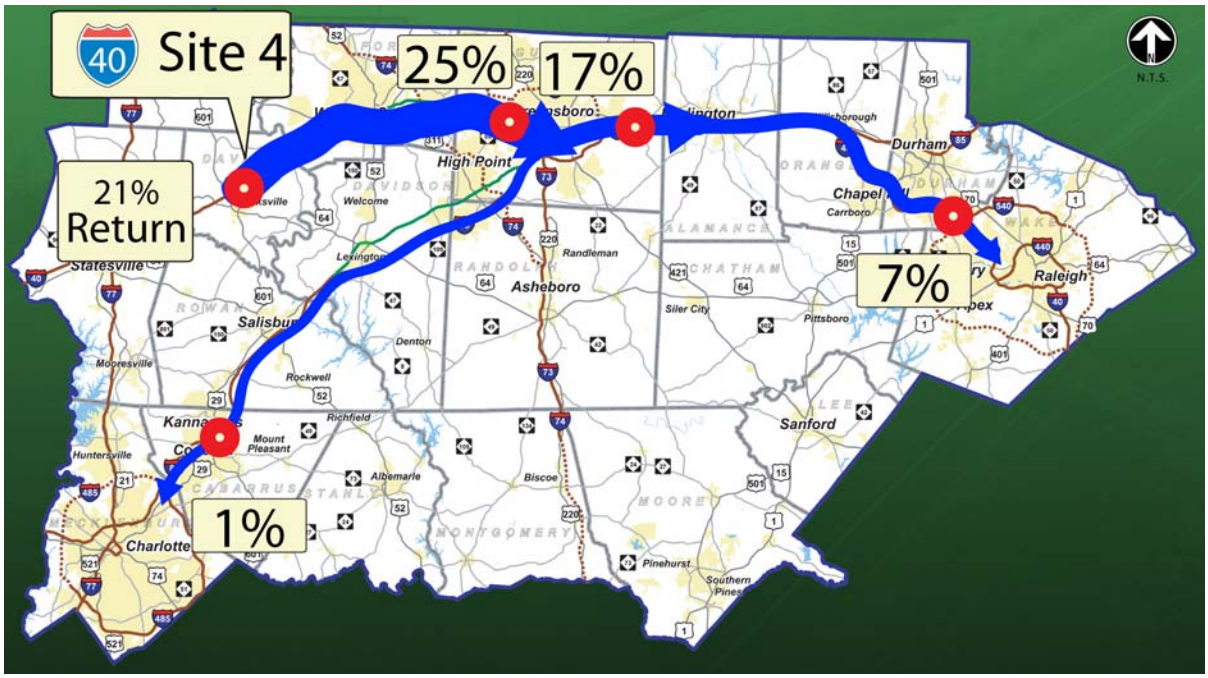
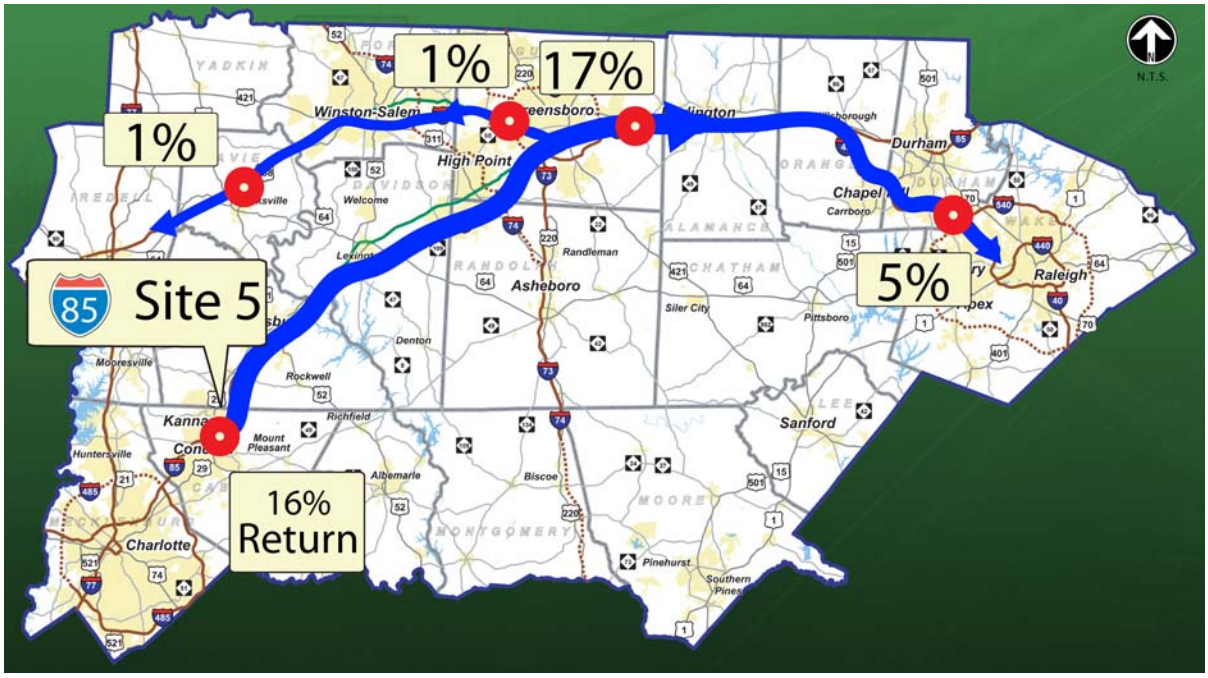


Figure 3.23: Distribution of Traffic Passing Site #5 in Northbound Direction



As illustrated in **Figures 3.19** through **3.23**, the majority of "matched" observations were what could be termed "short-" to "medium-" distance trips within the study area. For example, 27 percent of the vehicles observed heading westbound on I-40 at Site #1 over the course of the 12-hour survey period were observed passing this same location in the eastbound direction later in the day, but were not recorded passing another survey station. Such trips might be those made by residents of the Raleigh area working in the Durham or Chapel Hill areas or local delivery trucks. Conversely, only two percent of the total number of vehicles observed heading westbound on I-40 at Site #1 were observed heading westbound on I-40 near Mocksville (Site #4) and only three percent of the total vehicles observed heading westbound at Site #1 were later observed heading southbound on I-85 at Site #5. Thus, only five percent of the total westbound traffic stream passing Site #1 could be termed a "long" trip; that is, one that traverses the entire length of the study corridor.

Similar results were observed at the other video-license plate survey locations as well. At Site #4 on I-40 near Mocksville, 21 percent of the total eastbound entering traffic was later observed the same day traveling westbound through this site without having passed through another survey station. Such trips would represent travel patterns such as a movement between Statesville and Winston-Salem. Of the total number of trips observed heading eastbound at this site, only seven percent were observed traveling eastbound at Site #1 west of Raleigh.

At Site #5 on I-85 near Concord, 16 percent of the total northbound traffic was observed later the same day traveling southbound through this site without having passed through another

survey station. Such trips would represent travel patterns such as a movement between Charlotte and Salisbury. Of the total number of trips observed heading eastbound at this site, only five percent were observed traveling eastbound at Site #1 west of Raleigh.

One conclusion that can drawn from this analysis is that there may only be a small portion of the total traffic stream along I-40 and I-85 that appears to currently follow either the entire Charlotte–Raleigh or the Statesville–Raleigh routings that are the primary focus of this study. However, even five to seven percent of a large AADT volume can represent a substantial number of vehicles. For example, the base year AADT in the vicinity of Site #2 on the I-40/I-85 overlap section east of Greensboro in Guilford County was on the order of 90,000 vpd. Five to seven percent of this total volume would represent a conservative estimate of approximately 4,500 to 6,300 vpd that could be traveling from one end of the study corridor to the other.

3.6.3.3 Postcard Survey

Using the license plate images recorded at Site #2 of the Video Origin-Destination Survey, license plates were matched to the names and addresses of the vehicle owners via the North Carolina Department of Motor Vehicles registration database. Those private and commercial vehicle owners whose vehicle license plates were recorded and matched to the registration data received a survey questionnaire asking them to provide details of their trip that occurred on the day of capture. Details of the postcard survey are documented in the *Postcard Survey Technical Report, May 2004*.

The responses received allowed for the creation of a database detailing the direction of travel, the time that the vehicle was observed passing the survey location, vehicle occupancy, trip purpose, the frequency of the trip, origin and destination location, and type of vehicle (private automobile, local commercial vehicle, over-the-road truck, etc.). This database then provided the means to create a series of county-level maps detailing the trip origin and destination patterns both internal and external to the 19-county study area.

During the day of the video survey (October 15, 2003), approximately 60,563 vehicle license plates, or 86 percent of the total traffic stream passing through the survey station, were able to be read and processed. Of these total observed license plates, 83 percent had North Carolina license plates. Matching these license plate images against the State Department of Motor Vehicles registration database generated a total of 33,000 postcard surveys that were distributed by mail. Of this total sample size, 3,400 surveys, or 10.3 percent of the total number of surveys distributed, were returned with sufficient data to allow for subsequent data processing and analysis. Based on the experience of the Study Team, this response rate is typical of that obtained in the conduct of other travel surveys of this nature.

Figures 3.24 and **3.25** present the origins and destinations of eastbound North Carolina registered vehicles passing Site #2. Similarly, **Figures 3.26** and **3.27** present the origins and destinations of westbound North Carolina registered vehicles passing Site #2.

Figure 3.24: Origins of Vehicles Passing Site #2 in Eastbound Direction

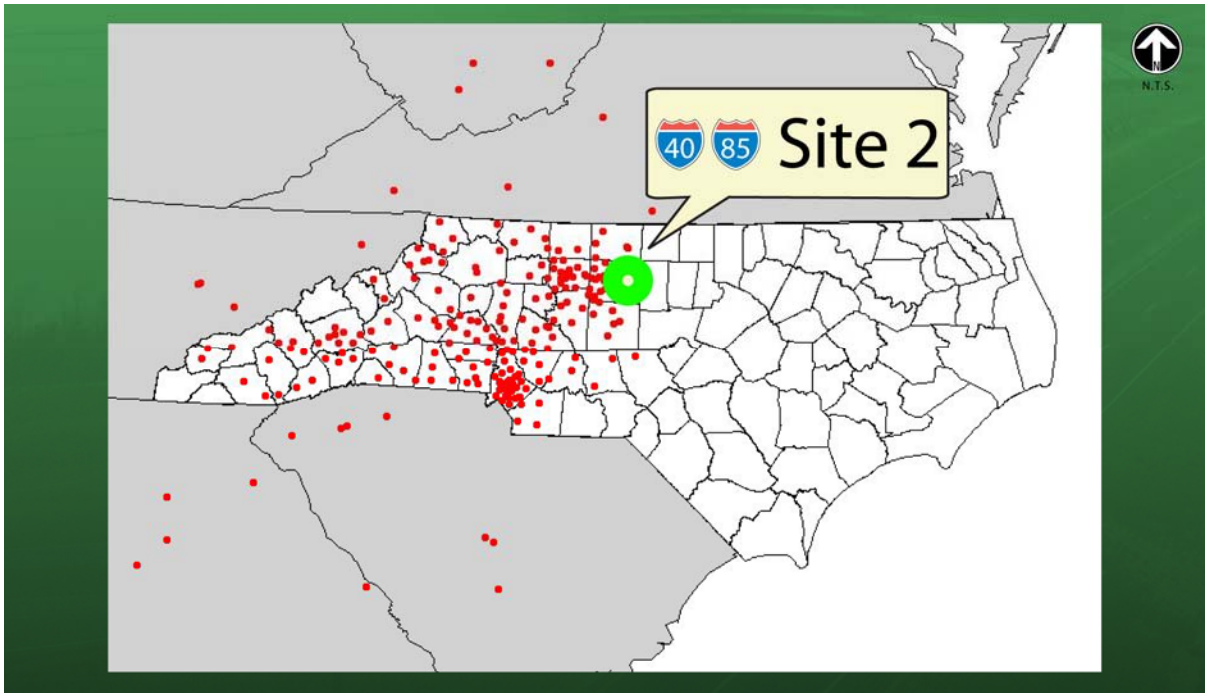


Figure 3.25: Destinations of Vehicles Passing Site #2 in Eastbound Direction

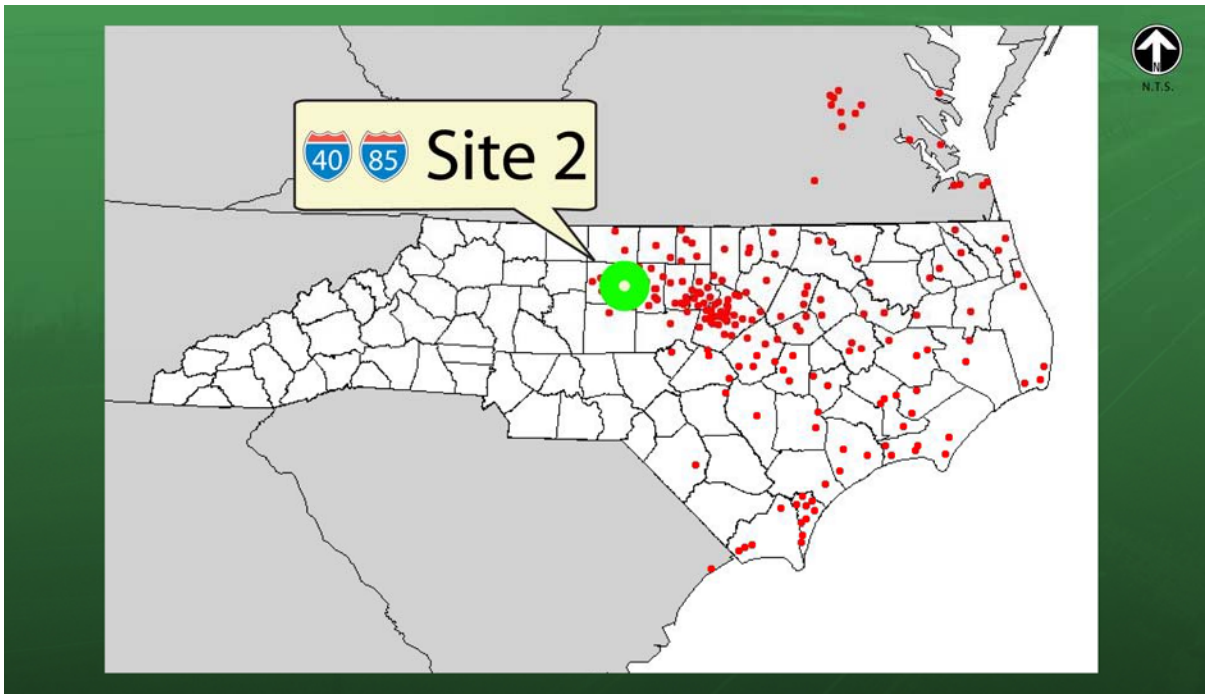


Figure 3.26: Origins of Vehicles Passing Site #2 in Westbound Direction

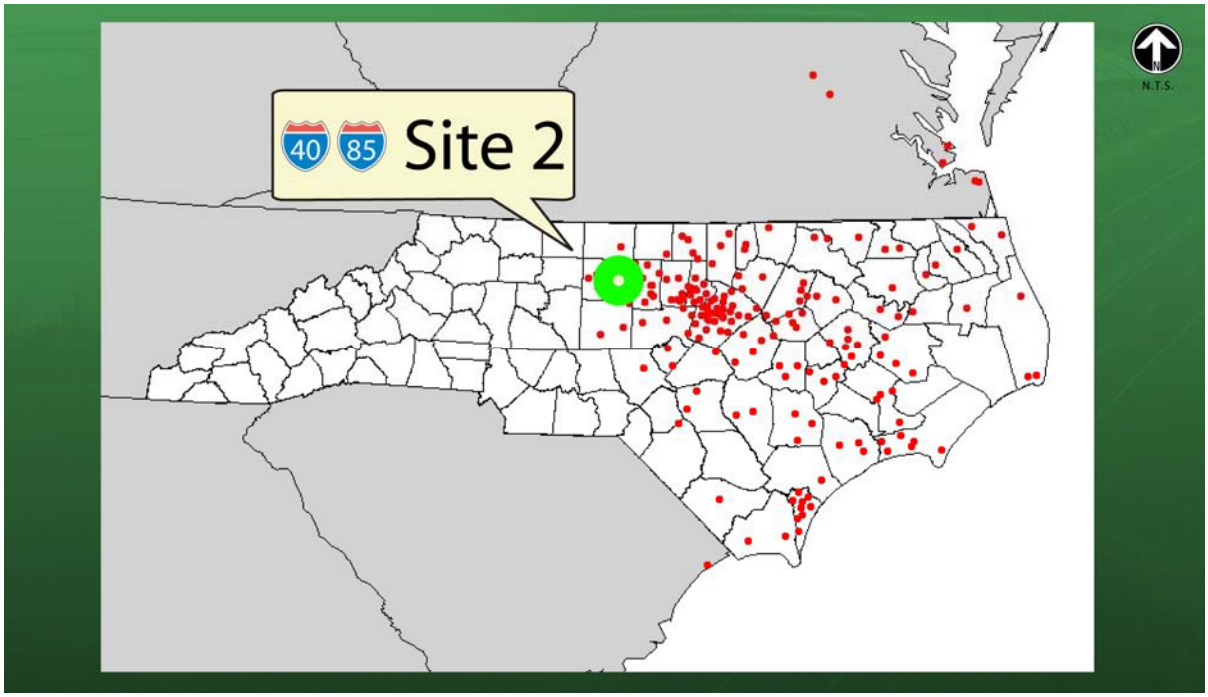
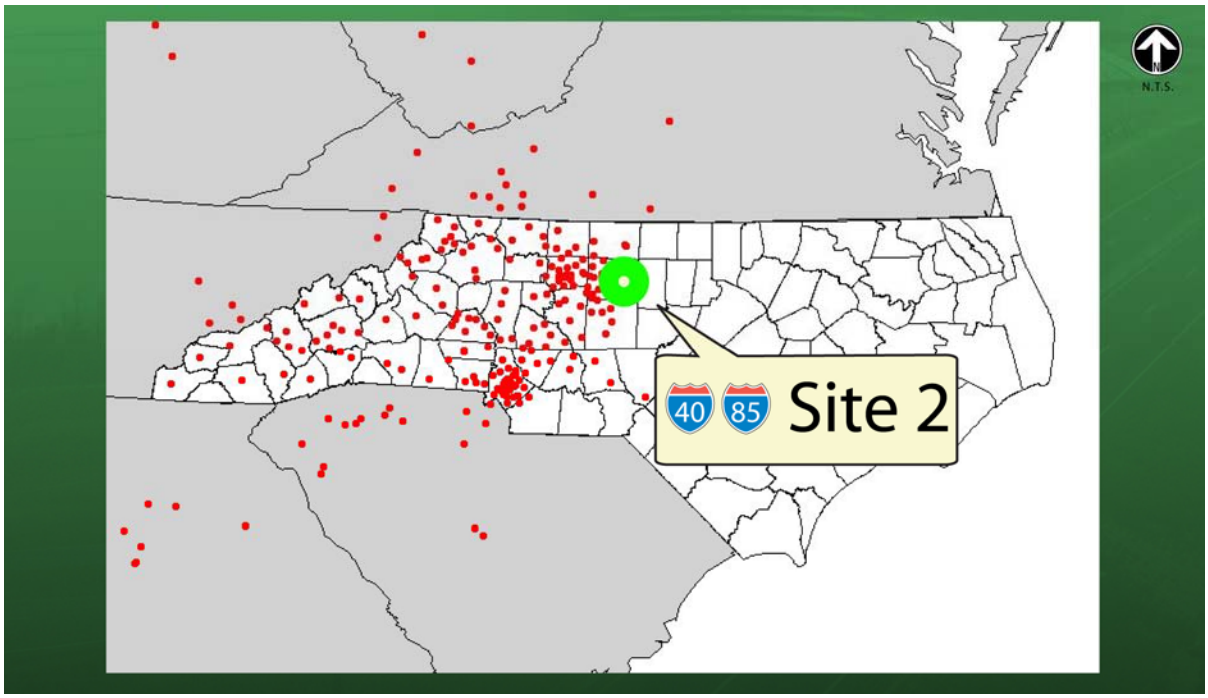


Figure 3.27: Destinations of Vehicles Passing Site #2 in Westbound Direction



As shown on **Figure 3.24**, the eastbound trip origins are concentrated in the Charlotte, Greensboro, High Point, and Winston-Salem urban areas. At the same time, it is interesting to note that there is a very large travel market shed for traffic passing this point. Trips were identified beginning in Tennessee along the I-40 west corridor, through South Carolina and in Georgia along the I-85 south corridor, and into Virginia and West Virginia along the I-77 and US 220 north corridors.

Figure 3.25 illustrates that while the majority of the eastbound trip destinations are concentrated in the Raleigh/Durham/Chapel Hill urban area there is a relatively widespread distribution of travel beyond the survey site through eastern North Carolina and into south central and southeastern Virginia. As would be expected, the terminus of I-40 in North Carolina at the port City of Wilmington has a high concentration of eastbound destinations. Similarly, the Hampton Roads region of southeast Virginia and the Richmond/Petersburg metropolitan areas were also observed as being significant destinations.

Figure 3.26 illustrates the origins of the westbound trips passing Site #2. As would be expected, the largest concentrations of trip origins were in Wake, Orange, Durham, Alamance, and Guilford Counties. Other origins were spread throughout eastern North Carolina, with a noticeable concentration in the Wilmington, NC area. A few westbound trip origins were also observed in the Hampton Roads and Richmond/Petersburg areas of Virginia.

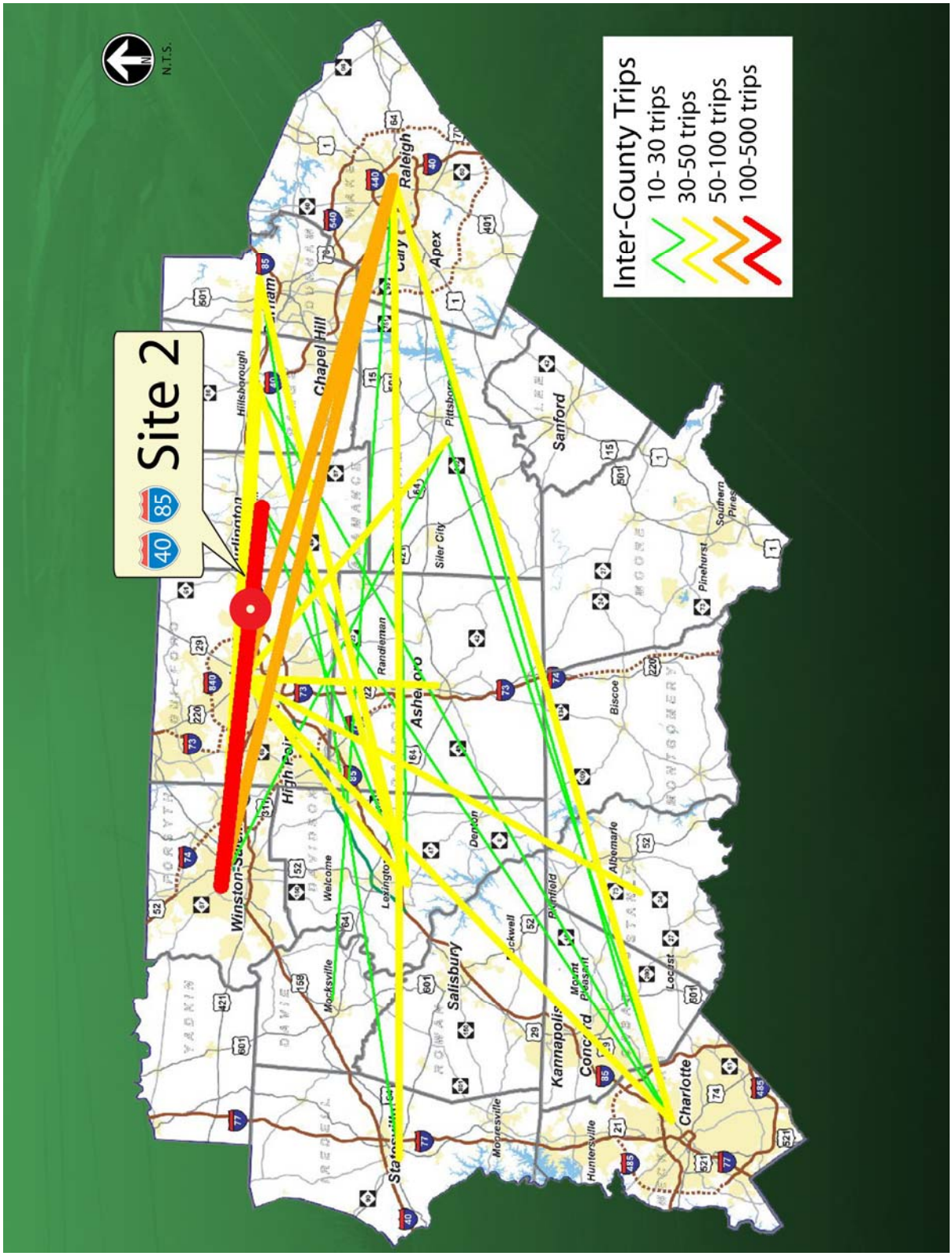
Figure 3.27 highlights the destinations of the westbound trips passing Site #2. While the largest concentrations of destinations were in Guilford, Forsyth, and Mecklenburg Counties, destinations also tended to follow the I-40 corridor through western North Carolina and the I-85 south corridor through South Carolina into the Atlanta, Georgia area and the I-77 south corridor through South Carolina to the Columbia area. Other destinations were scatted across southwestern Virginia and into West Virginia and Kentucky.

The travel pattern data obtained through the postcard survey was combined to create a county-level, origin-destination matrix, which, in turn, was used to develop the illustration of inter-county travel patterns within the primary corridor study area shown in **Figure 3.28**.

As illustrated in **Figure 3.28**, the largest single county-to-county travel pattern identified within North Carolina was, not unexpectedly, between Forsyth County and Alamance County. The survey also identified strong travel patterns between Forsyth County and Wake County and between Guilford County and Wake County. In general, the county-to-county travel patterns tended to follow the routing of I-40 and I-85 through Durham and Orange Counties on the east and north to Mecklenburg and Cabarrus Counties on the west and south.

At the same time, a number of travel patterns were observed currently using I-40 and I-85 that would appear to be high probability candidates for diversion to an improved US 64–NC 49 Corridor. For example, a strong movement was identified between Mecklenburg County and Wake County, and a moderate to light movement was identified between Mecklenburg

Figure 3.28: Inter-county Travel Patterns from Postcard Survey



County and Chatham County. Other major movements that could be expected to use an improved US 64–NC 49 Corridor linked Cabarrus County with Chatham and Wake Counties and Wake County with Iredell County. Thus, it would appear that a significant percentage of the current traffic using the central portion of I-40/I-85 between Charlotte and Raleigh could potentially be diverted to an improved US 64–NC 49 Corridor.

3.6.3.4 US 64 and NC 49 Roadside Origin–Destination Survey

In addition to the video origin-destination survey and the associated postcard survey, roadside origin-destination surveys were conducted at three locations on US 64 and NC 49, with each location being surveyed on a separate weekday during October 2003. **Figure 3.29** illustrates the location of the three roadside survey stations.

At each of these survey locations, vehicles passing in both directions were briefly stopped and the driver was asked a series of questions, which included:

- Trip purpose
- Frequency of the trip
- Trip origin
- Trip destination

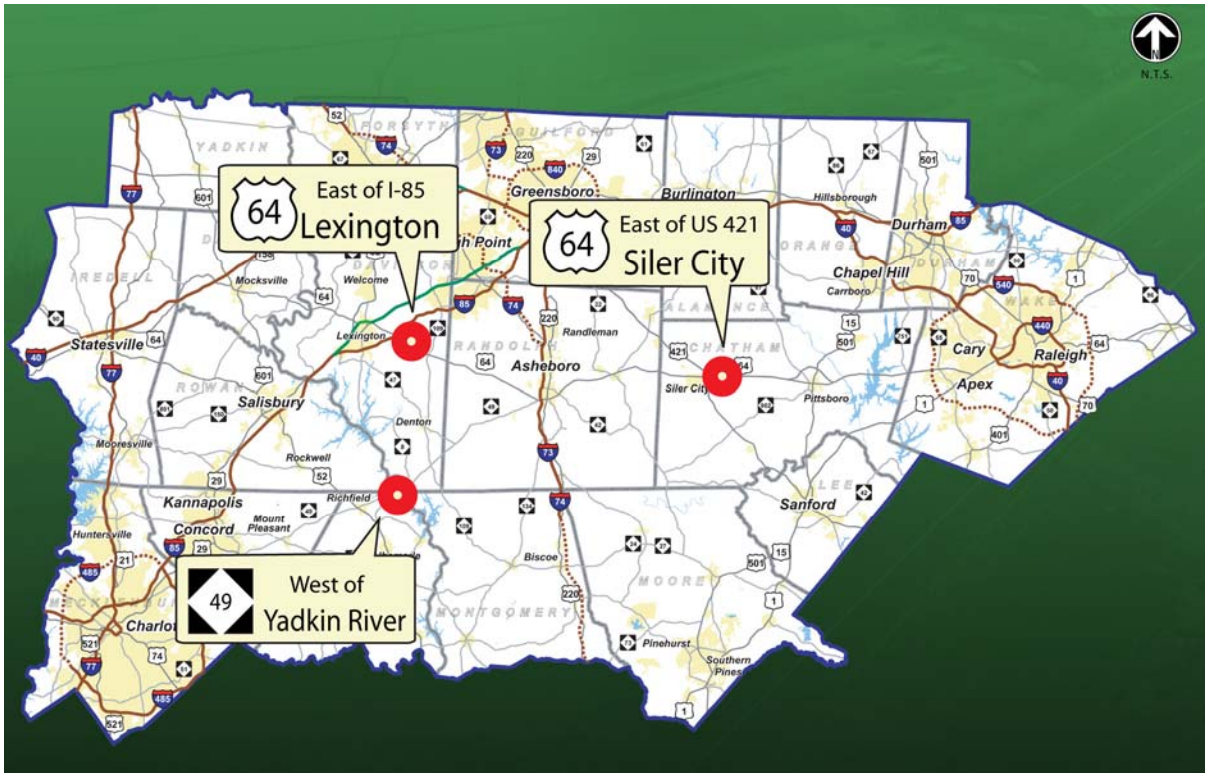
Through observation, the survey staff determined the type of vehicle (private automobile, local commercial vehicle, over-the-road truck, etc.) and the number of persons in the vehicle. An expanded discussion of the roadside survey administration and data analysis process is contained in the *Roadside Origin-Destination Survey Technical Report, May 2004*.

Table 3.10 summarizes the number of vehicles passing each survey station on the day of the survey and the number of observations made. It should be noted that not all vehicles passing through the survey station were stopped. When vehicle queues exceeded five vehicles, stopped vehicles were allowed to proceed without the drivers being questioned.

Table 3.10: Summary of Activity at Roadside Origin-Destination Survey Stations

Roadside Survey Location	Date of Roadside O-D Survey	Total Daily Traffic Volume	No. of Vehicles Surveyed	Percent of Total Traffic Volume Surveyed
US 64 – Lexington	October 15, 2003	10,000	1,554	15.5%
NC 49 – Yadkin River	October 16, 2003	6,600	1,543	23.4
US 64 – Siler City	October 21, 2003	9,000	1,848	20.5

Figure 3.29: Location of Roadside Origin-Destination Survey Stations



The overall results of the three roadside origin-destination surveys on US 64 and NC 49 appear to further validate the findings of the postcard survey; namely, there is significant utilization of US 64 and NC 49 for travel between the Charlotte and Raleigh urban areas. Moreover, there appears to be a potential to divert some portion of the traffic that is now using I-40 and I-85 between the Charlotte and Raleigh onto an improved US 64–NC 49 Corridor.

Summaries of the roadside survey results by location are provided below.

US 64 - Lexington

Figures 3.30 and **3.31** present the origins and destinations of the eastbound US 64 vehicles. Similarly, **Figures 3.32 and 3.33** present the origins and destinations of the westbound US 64 vehicles passing through this survey station.

As shown in **Figure 3.30**, the origins of the eastbound US 64 vehicles are concentrated either in Mecklenburg County and the immediately adjacent counties to the east and west, in Davidson County, or in Forsyth County. A noticeable portion of the trips had their origins in the I-85 south corridor through South Carolina and into Georgia, in the I-40 west corridor through North Carolina, or to the northwest into Virginia and West Virginia in locations served by the I-77 north corridor. **Figure 3.31** illustrates that the destination of the eastbound

Figure 3.30: Origins of Eastbound Vehicles Passing the US 64 – Lexington Roadside Survey Station

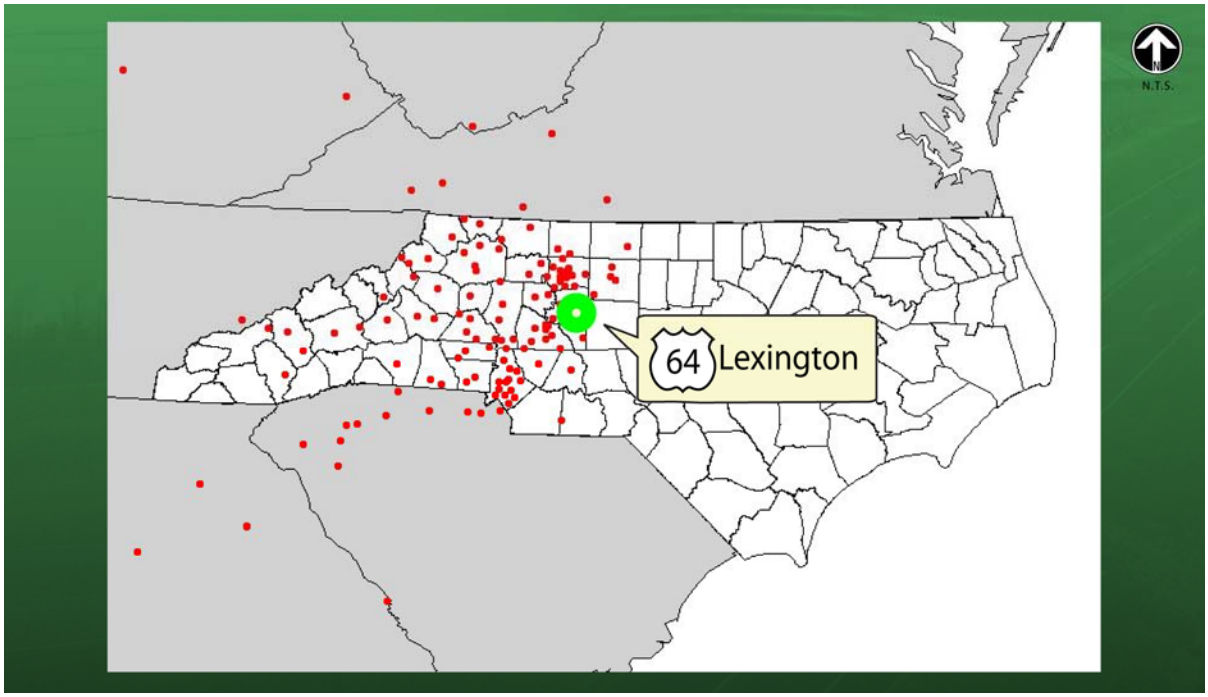


Figure 3.31: Destinations of Eastbound Vehicles Passing the US 64 - Lexington Roadside Survey Station

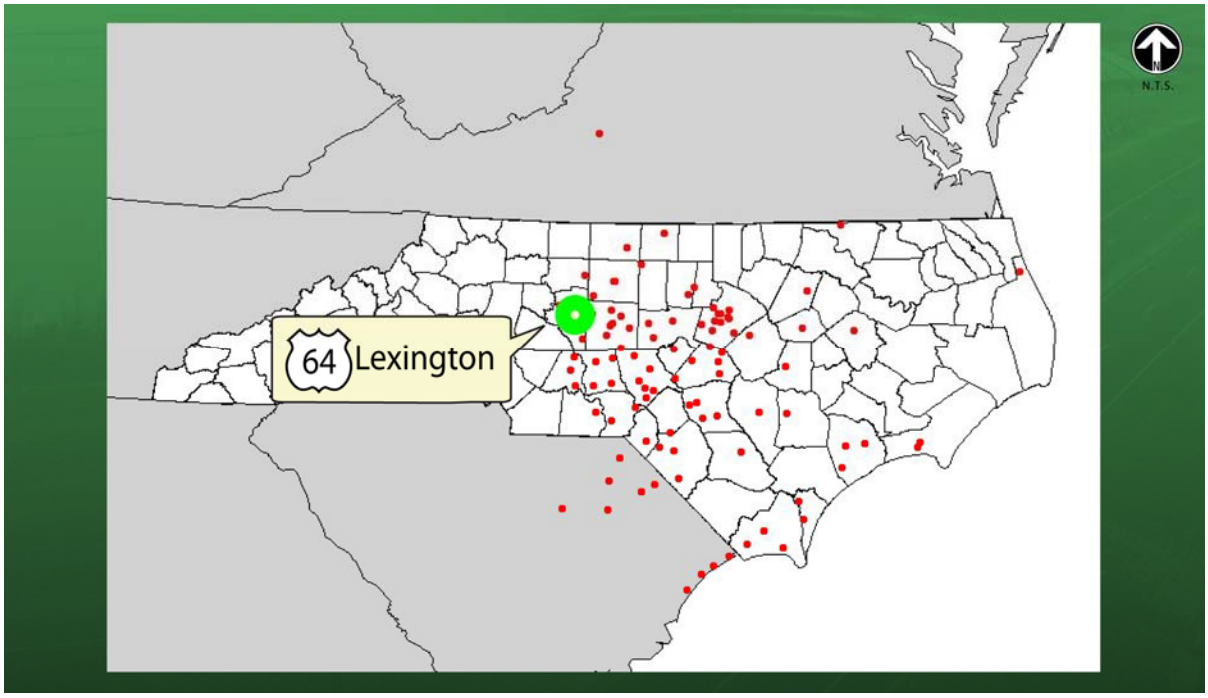


Figure 3.32: Origins of Westbound Vehicles Passing the US 64 – Lexington Roadside Survey Station

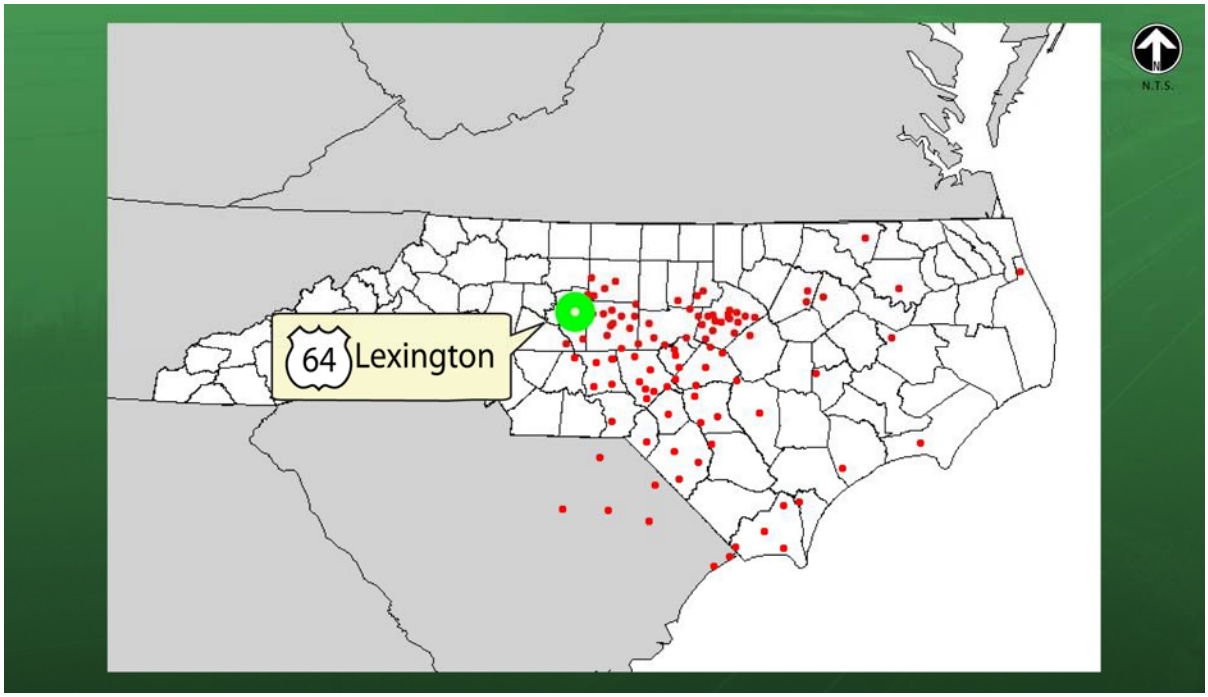
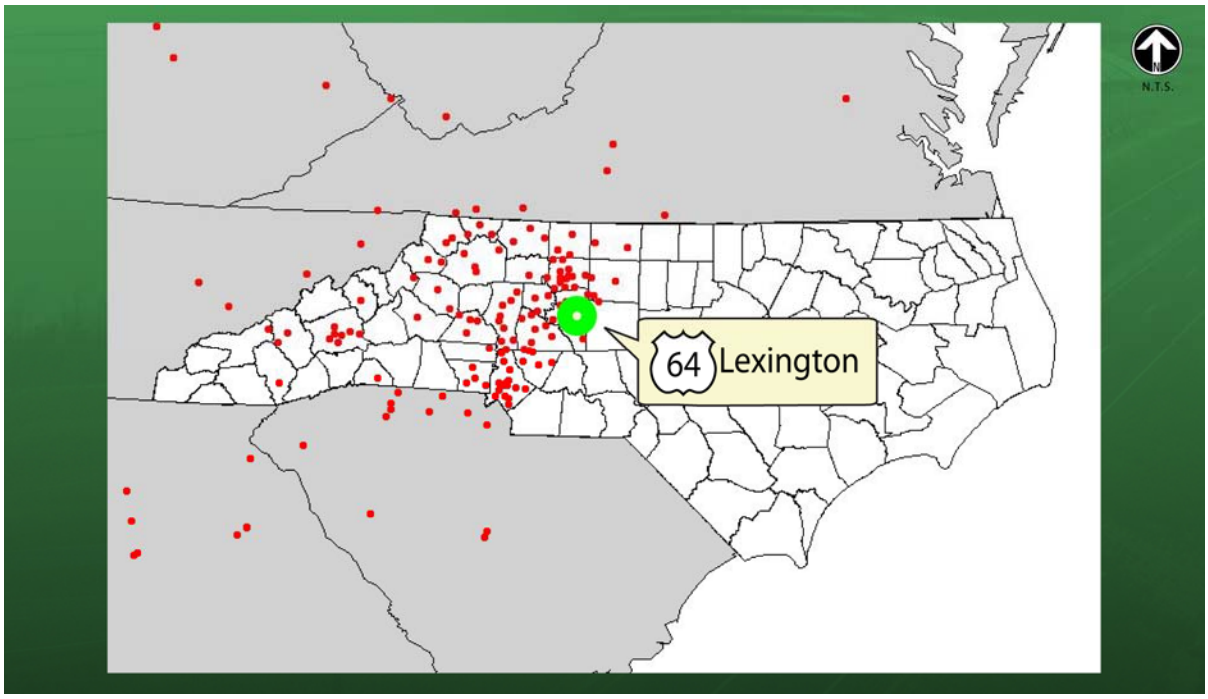


Figure 3.33: Destinations of Westbound Vehicles Passing the US 64 - Lexington Roadside Survey Station



US 64 vehicles are widely dispersed throughout the counties of central and eastern North Carolina, with most of the destinations located to the south of the US 64–NC 49 Corridor. The only immediately obvious concentration of destinations is in Wake County. A small number of trips are destined for locations in northeastern South Carolina and communities along the Atlantic Coast.

Figure 3.32 illustrates the origins of the westbound US 64 vehicles passing through this survey station. While generally concentrated in the counties along US 64 between Asheboro and Raleigh, the trip origins include locations scattered throughout central and eastern North Carolina and adjacent portions of northeastern South Carolina. As was the case with the eastbound destinations, the majority of the westbound origins were observed in the portions of central and eastern North Carolina south of US 64. As shown on **Figure 3.33**, the destinations of the vehicles traveling westbound on US 64 past this roadside survey station appear to be concentrated in the following counties: Cabarrus, Davidson, Davie, Forsyth, Iredell, Mecklenburg, and Rowan. These counties are generally contained within the triangle formed by the junctions of I-40 and I-77 at Statesville, I-40 and I-85 at Greensboro, and I-77 and I-85 at Charlotte. Trip destinations also appear to follow the I-40 west corridor through North Carolina into Tennessee, and the I-85 south corridor beyond Charlotte into South Carolina and Georgia. The destinations of other trips observed passing this survey station along US 64 were scattered across southwest Virginia, the southern portion of West Virginia, and eastern Kentucky.

Figure 3.34 summarizes the eastbound and westbound origin-destination travel data at this US 64 roadside survey station to present a county-level aggregation of traffic flow patterns within the 19-county study area. As shown in this exhibit, a number of significant movements were identified. Not unexpectedly, the largest single movement identified was between Randolph County and Davidson County. Other major movements included links between Randolph and Forsyth Counties, Randolph and Iredell Counties, and Davidson and Forsyth Counties. In addition to these shorter length county-to-county trips, the survey also identified a number of longer travel patterns. Of particular interest here were connections between Randolph County and Mecklenburg County, and Mecklenburg County to Wake County.

NC 49 – Yadkin River

Figures 3.35 and **3.36** present the origins and destinations of the northbound NC 49 vehicles passing through this survey station. Similarly, **Figures 3.37** and **3.38** present the origins and destinations of the southbound NC 49 vehicles passing through this survey station.

Figure 3.34: County-to-County Travel Patterns of Vehicles Passing US 64 – Lexington Roadside Survey Station

Figure 3.35: Origins of Northbound Traffic Passing the NC 49 – Yadkin River Roadside Survey Station

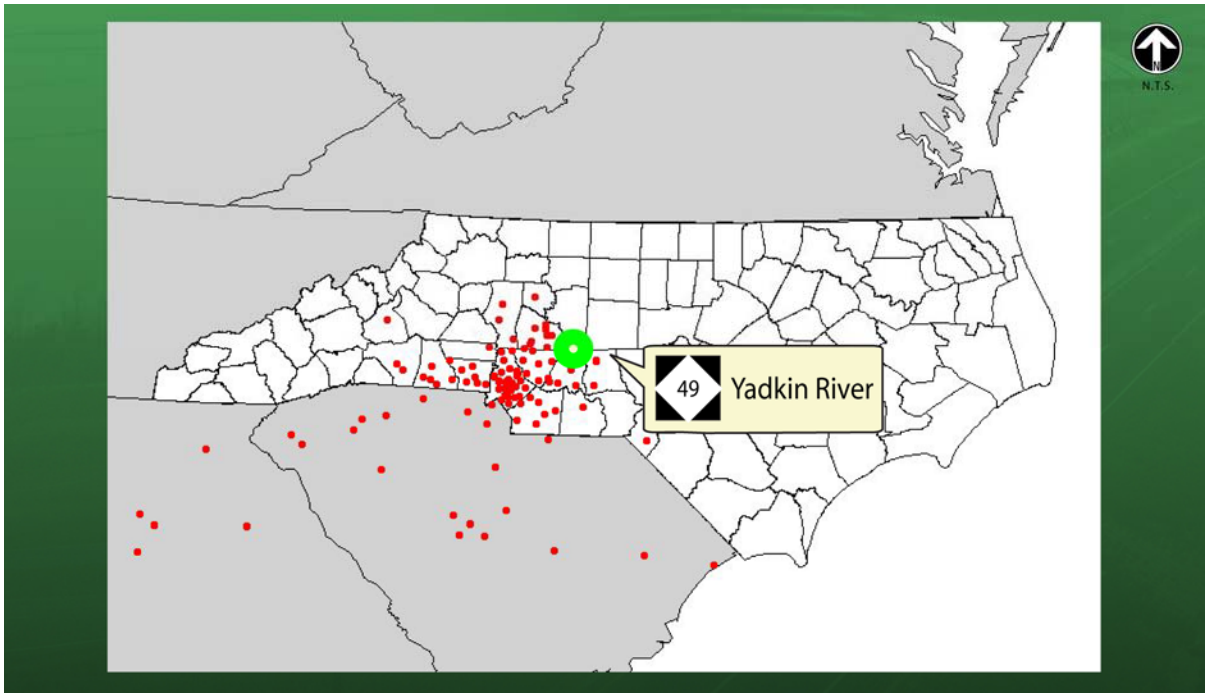


Figure 3.36: Destinations of Northbound Traffic Passing the NC 49 – Yadkin River Roadside Survey Station

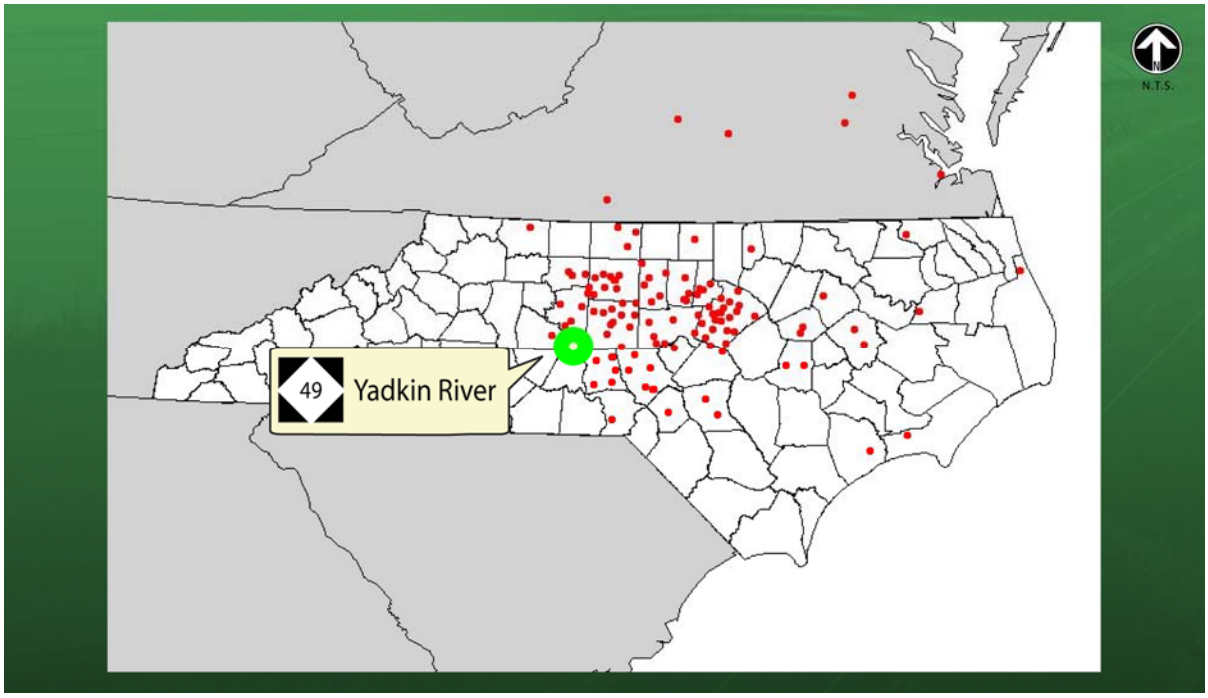


Figure 3.37: Origins of Southbound Traffic Passing the NC 49 – Yadkin River Roadside Survey Station

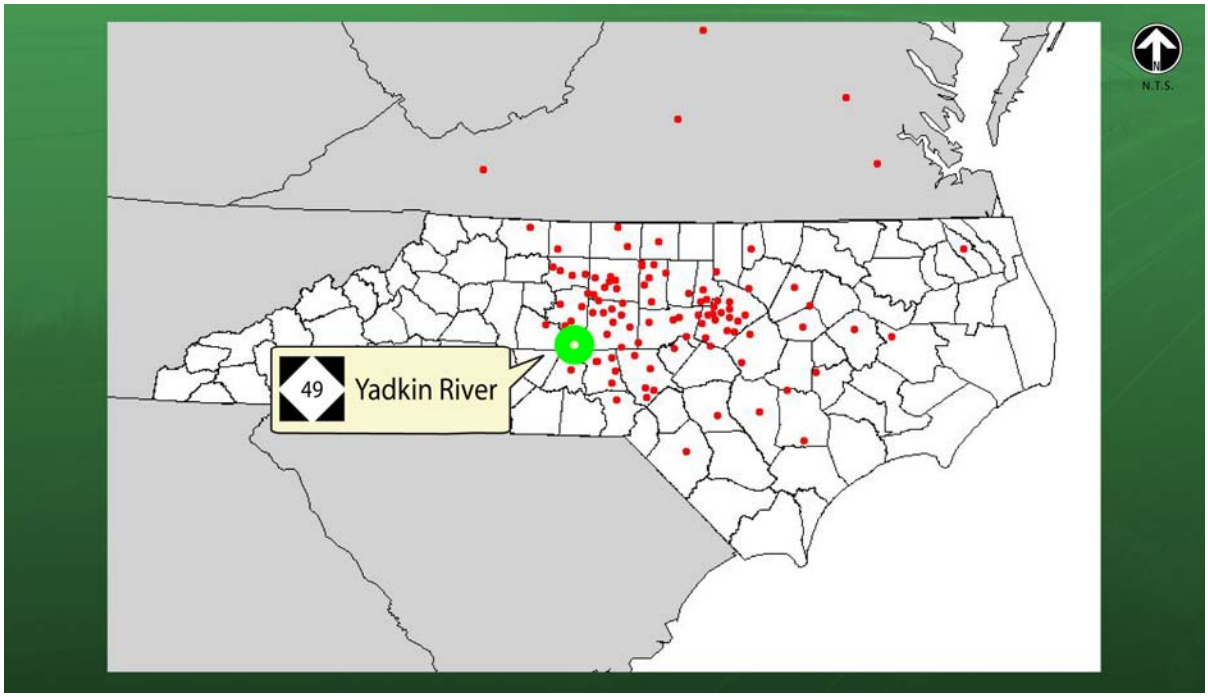
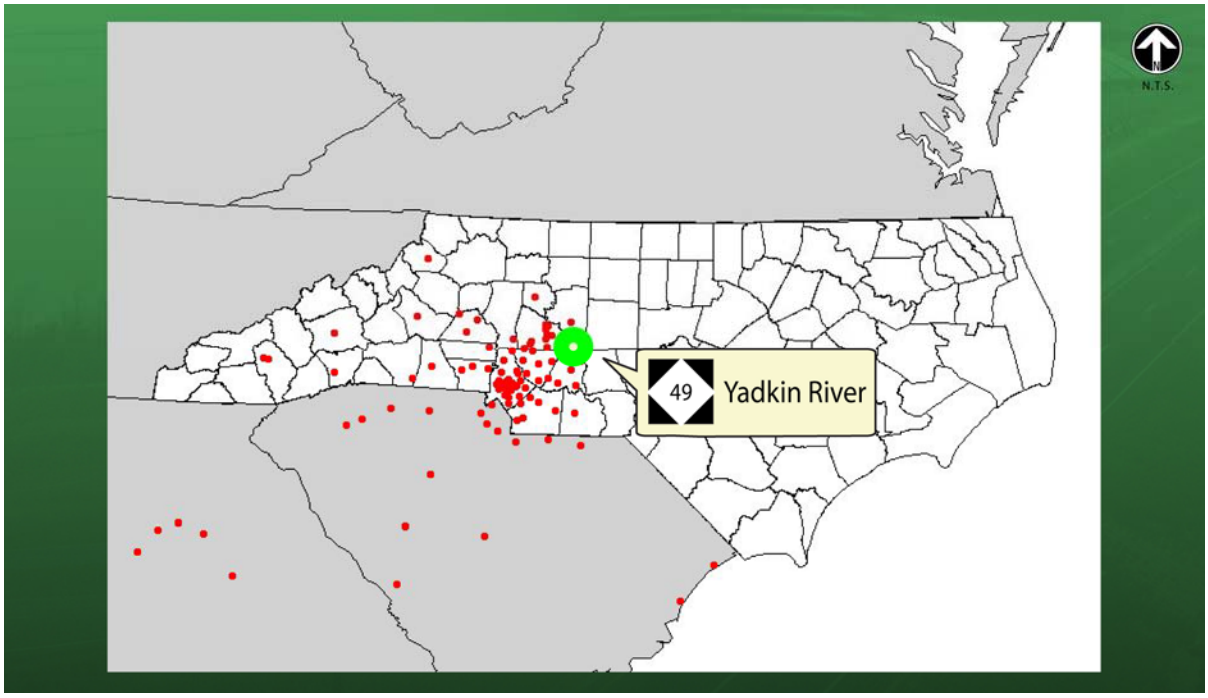


Figure 3.38: Destinations of Southbound Traffic Passing the NC 49 – Yadkin River Roadside Survey Station



As shown on **Figure 3.35**, the origins of the northbound NC 49 vehicles are concentrated in and around Mecklenburg County and the immediately adjacent counties to the east and west. A noticeable portion of the trips had their origins in either South Carolina along the I-77 corridor between Charlotte and Columbia, or along the I-85 corridor through South Carolina and into Georgia. Similarly, **Figure 3.36** illustrates that the destination of the northbound NC 49 vehicles, while generally concentrated in the Triad (Winston-Salem/Greensboro/High Point) and Triangle (Raleigh/Durham/Chapel Hill) areas, include locations throughout central and eastern North Carolina. Several of the northbound trips passing through this survey station reported destinations in central Virginia.

Figure 3.37 illustrates that the origins of the southbound NC 49 vehicles, while generally concentrated in the Triad and the Triangle urban areas, include locations throughout central and eastern North Carolina. Several of the southbound trips passing through this survey station reported their trip origins as being in central Virginia along the US 220 and I-85 corridors. As shown on **Figure 3.38**, the destinations of the southbound NC 49 vehicles are concentrated in and around Charlotte and the immediately adjacent counties to the east and west. Other concentrations of destinations were observed in the Lexington and Statesville areas. A noticeable number of the southbound trips reported their destinations in either South Carolina along the I-77 corridor between Charlotte and Columbia, or along the I-85 south corridor through South Carolina and into Georgia.

Figure 3.39 summarizes the northbound and southbound origin-destination travel data at the NC 49 roadside survey station to present a county-level aggregation of traffic flow patterns within the 19-county study area. As shown in this exhibit, a number of significant movements were identified. Not unexpectedly, the largest single movement was between Davidson and Stanly Counties. Other major movements included links between Stanly and Rowan Counties, Stanly and Randolph Counties, and Stanly and Cabarrus Counties. In addition to these shorter length county-to-county trips, the survey also identified a number of longer travel patterns. These included: Stanly to Forsyth, Stanly to Guilford, Mecklenburg to Randolph, and Mecklenburg to Wake.

US 64 – Siler City

Figures 3.40 and **3.41** present the origins and destinations of the eastbound US 64 vehicles passing through this survey station. Similarly, **Figures 3.42** and **3.43** present the origins and destinations of the westbound US 64 vehicles passing through this survey station.

As shown on **Figures 3.40**, the origins of the eastbound US 64 vehicles are concentrated in the following counties: Cabarrus, Davidson, Davie, Forsyth, Iredell, Mecklenburg, and Rowan. A noticeable portion of the trips had their origins along the I-85 corridor in South Carolina and Georgia, in the I-40 corridor through North Carolina, or to the northwest intoVirginia in locations served by the I-77 and US 220 corridors. **Figure 3.41** illustrates that the destination of the eastbound US 64 vehicles are highly concentrated in and around Wake County. Other destinations tend to follow either US 64 to the east of Raleigh or I-40 south of Raleigh to Wilmington.

Figure 3.39: County-to-County Travel Patterns of Vehicles Passing NC 49 – Yadkin River Roadside Survey Station

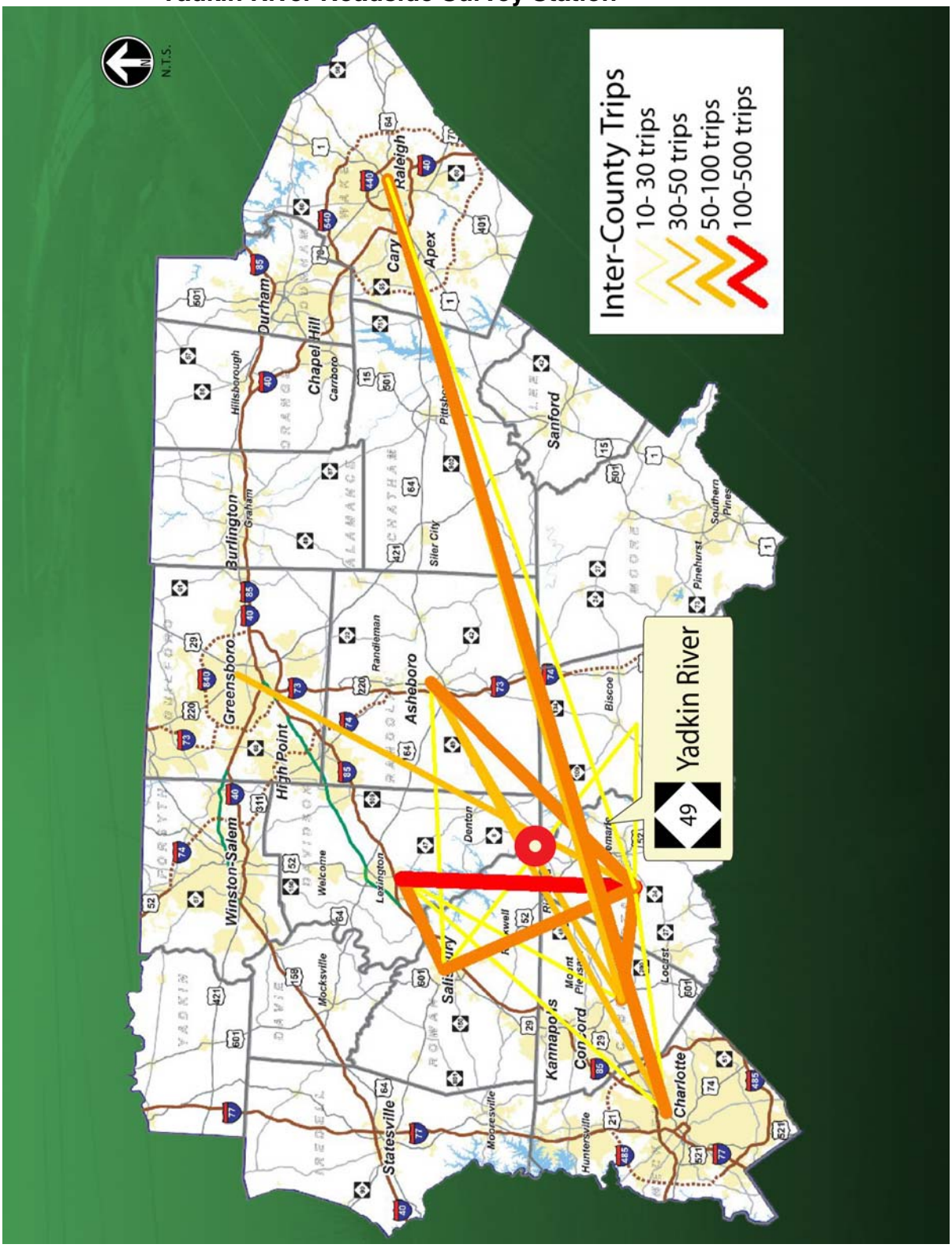


Figure 3.40: Origins of Eastbound Vehicles Passing US 64 - Siler City Roadside Survey Station

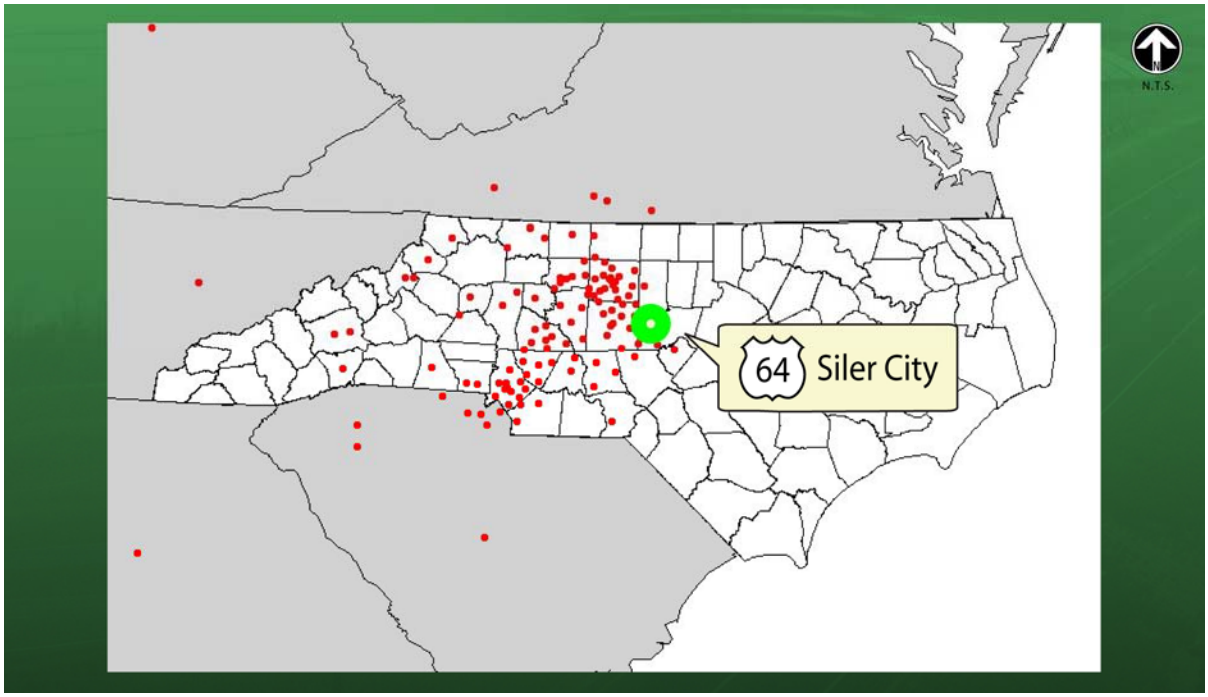


Figure 3.41: Destinations of Eastbound Vehicles Passing US 64 - Siler City Roadside Survey Station

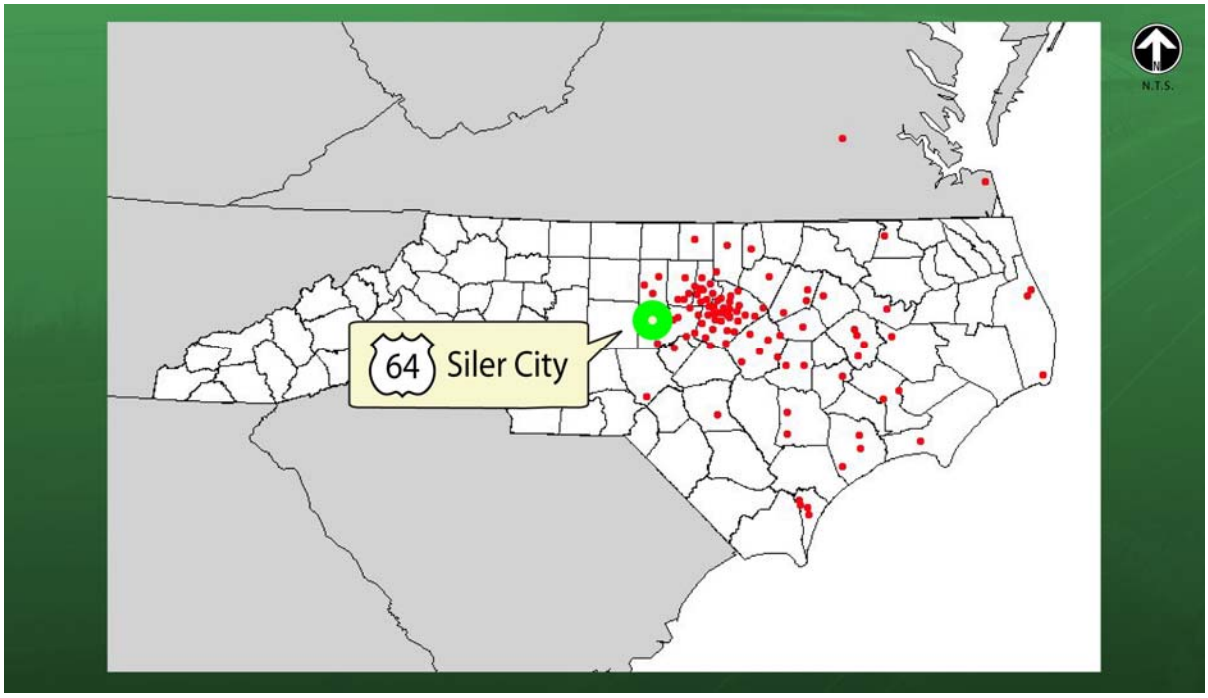


Figure 3.42: Origins of Westbound Vehicles Passing US 64 - Siler City Roadside Survey Station

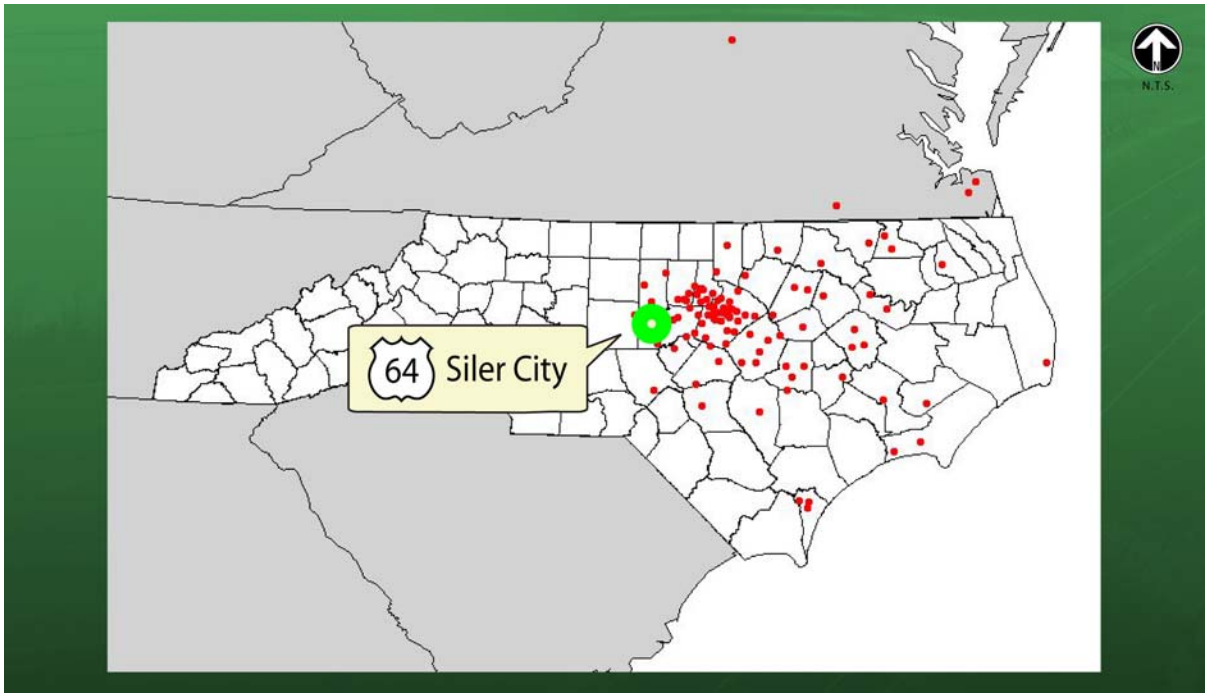


Figure 3.43: Destinations of Westbound Vehicles Passing US 64- Siler City Roadside Survey Station

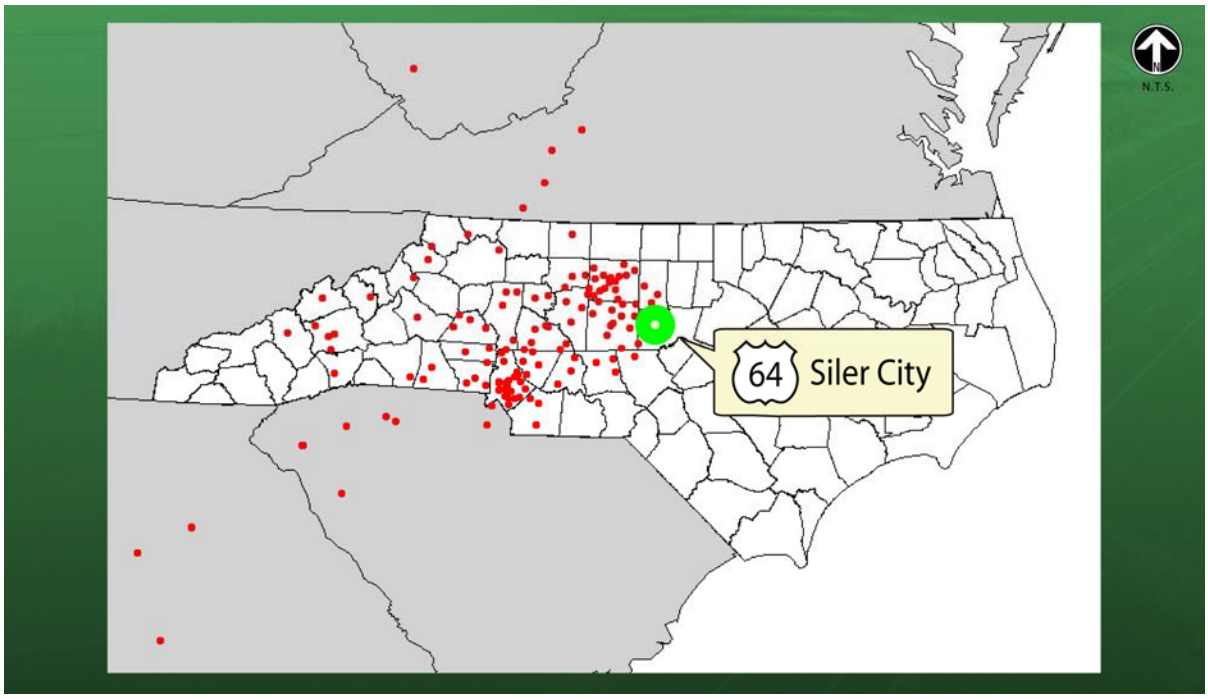


Figure 3.42 illustrates that the origins of the westbound US 64 vehicles passing through the US 64 - Siler City survey station. While heavily concentrated in Wake and Durham Counties, the trip origins include locations scattered throughout most of eastern North Carolina and generally follow the routings of US 64 and US 264 east of Raleigh. As shown on **Figure 3.43**, the destinations of the westbound US 64 vehicles traveling past this site are concentrated in the following counties: Cabarrus, Davidson, Davie, Forsyth, Iredell, Mecklenburg, and Rowan. Trip destinations also appear to follow the I-40 corridor through the western counties of North Carolina, and the I-85 corridor from Charlotte into South Carolina and Georgia. Other trips were scattered across southwest Virginia along the I-77 and I-81 corridors.

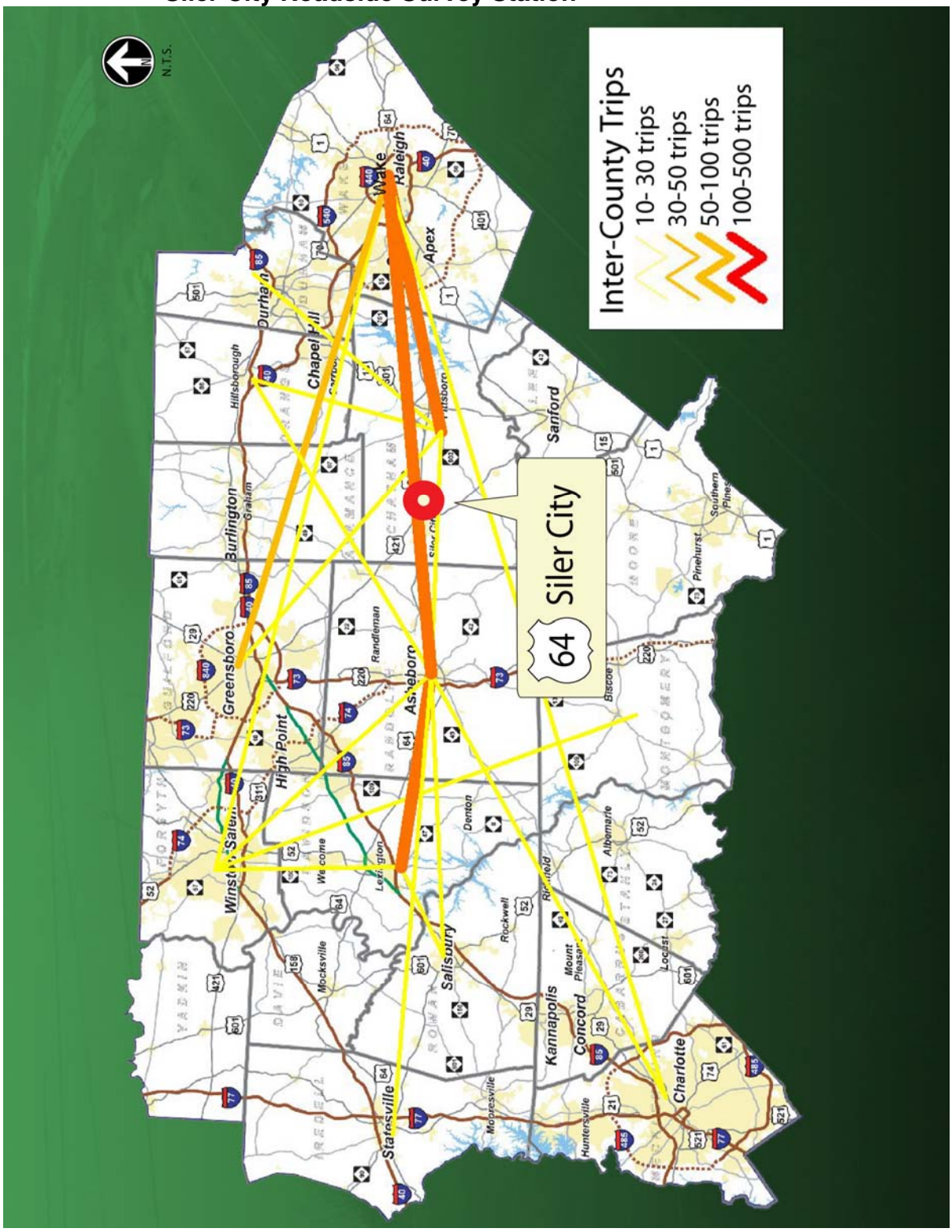
Figure 3.44 summarizes the eastbound and westbound origin-destination travel data at the Siler City roadside survey station along US 64 to present a county-level aggregation of traffic flow patterns within the 19-county study area. As shown in this exhibit, a number of significant movements were identified. Not unexpectedly, the largest movements were between Chatham County and Wake County, and between Randolph County and Wake County. A similar large scale county-to-county travel pattern was identified between Randolph County (Asheboro) and Davidson County (Lexington). Other major movements included links between Wake and Guilford Counties, and between Chatham County and its neighbors to the north (Durham, Orange, Alamance, and Guilford). In addition to these shorter length county-to-county trips, the survey also identified a number of longer travel patterns. Of particular interest here were connections between Orange County and Mecklenburg County, and between Mecklenburg County and Wake County.

3.6.3.5 Travel Time Survey

A series of travel time surveys were undertaken to record the average vehicle travel times and speeds for trips between Charlotte and Raleigh and Statesville and Charlotte utilizing I-40 and I-85, and US 64 and NC 49. The surveys were conducted over a period of six weekdays between November 19, 2003 and December 9, 2003. Multiple trips were taken in each direction along each route during both peak and off-peak periods. Details of these surveys are described in the *Travel Time Survey Technical Report, May 2004*.

As expected, the slowest sections of the Interstate were those located in the largest urban areas with the highest traffic volumes. Peak-period travel times along I-85 north of Charlotte, for example, were less than 30 mph until well into Cabarrus County. Once beyond the boundaries of the Charlotte urban area, travel speeds along I-85 north were almost always at or above the posted speed limit, with only minor slowdowns observed in the Salisbury area during peak periods.

Figure 3.44: County-to-County Travel Patterns of Vehicles Passing US 64 - Siler City Roadside Survey Station



One of the more consistently congested segments of the Interstate was the I-40/I-85 overlap section between Greensboro and Burlington. Throughout most of the survey period, speeds in this area were at or below 30 mph reflective of stop and go conditions. However, it should be noted that these travel time runs were conducted in late 2003 prior to the completion of Interstate improvements in the Greensboro area, and thus illustrate conditions that were significantly worse than what would be observed today if new data were collected.

Continuing east along the I-40 corridor beyond Burlington, travel times were consistently at or above the posted speed limit until entering the Raleigh/Durham/Chapel Hill urban area. From about the Orange County/Durham County line east to I-440, travel speeds along the I-40 corridor were less than 30 mph during peak periods.

Along US 64, traffic generally moved at the posted speed limits except for occasional small pockets of localized congestion and traffic signal delay. Between I-40 at Mocksville and I-85 at Lexington, travel speeds along US 64 were between 45 and 60 mph except when traversing the communities of Mocksville and Lexington, where average travel speeds were at times 15 mph. East of the I-85 interchange at Lexington, travel speeds along US 64 were at the posted speed limit to Asheboro.

From the US 64/NC 49 junction on the west side of Asheboro east along US 64 through Ramseur, traffic congestion was typically encountered. This resulted in fluctuations in the observed travel speed from less than 15 mph to more than 45 mph. These fluctuations are typical of conditions along multilane suburban arterial highways with substantial roadside commercial development characteristics, which define this portion of US 64.

East of Ramseur, travel speeds along US 64 were typically at the posted speed limit to the east side of Pittsboro in Chatham County. The exception to this was observed in the more commercialized area of Siler City, where speeds were in the 30 to 45 mph range. From the Chatham County/Wake County line east to the end of the defined study area at the I-40/I-440/US 1/US 64 interchange, moderate to heavy congestion and delay was typically observed during peak travel periods. Much of this was attributed to intersection delays, with resulting overall average travel speeds through the area being less than 30 mph.

Along NC 49 between Charlotte and Asheboro, a wide range of travel speeds was observed. The portions of NC 49 closer to Charlotte, generally from the Concord/Mount Pleasant area south into the city of Charlotte, experienced significant fluctuations in travel time, due primary to traffic signal delays. Peak-period speeds in this area were less than 30 mph. Once north of Mount Pleasant, travel speeds along NC 49 were at the posted speed limit to Asheboro. The only noted exceptions to this were observed at the intersection of NC 49 and US 52 in Richfield and at the NC 49/NC 109 interchange in Davidson County.

Based on the results of the travel time runs, a trip between Raleigh and Charlotte utilizing I-40 and I-85 would take approximately 2 hours and 30 minutes, covering a distance of approximately 155 miles at an average speed of 62 mph. Traveling between the identical

origin and destination points utilizing US 64 and NC 49 would also take approximately 2 hours and 30 minutes, covering a slightly shorter distance of approximately 140 miles at an average speed of 56 mph. From a total travel time perspective, these two routings are essentially identical. The travel distance on the Interstate is longer, but at a faster average speed. The same trip via US 64 and NC 49 is shorter in distance, but has a slower average travel speed.

A trip between Raleigh and Statesville along I-40 would take approximately 2 hours and 15 minutes, covering a distance of approximately 150 miles at an average speed of 67 mph. Traveling between the identical origin and destination points along US 64 would take approximately 2 hours and 30 minutes, covering a slightly shorter distance of approximately 130 miles at an average speed of 52 mph. From a total travel time perspective, the US 64 routing would take approximately 15 minutes more, or about an 11 percent increase over the Interstate travel time.

Given the relatively identical travel times between the same defined beginning and ending points along the corridor, regardless of whether the Interstate or state highway routings were used, it is reasonable that improvements to US 64 and NC 49 would allow these routings to offer lower travel times than those via the Interstate. This would create the opportunity to divert some appreciable percentage of Interstate traffic onto this defined Strategic Highway Corridor.

3.6.4 Safety

Crash data provided information on safety conditions in the study area. Traffic accident records were obtained for the most recent years available. Crash information was reviewed for I-85, I-40, US 64, and NC 49. General findings from the data review and analysis are summarized in this section.

The following sources were referenced:

- *Highway Safety Improvement Program (HSIP)(May 2003)*
- *Strip Analysis Data for US 64, NC 49, I-40, and I-85 (NCDOT, June 1, 2000 – May 31, 2003)*
- *North Carolina Moving Ahead (NCDOT Traffic Engineering and Safety Systems: 1999-2001 County Crash Data)*
- *Statewide Crash Rates (NCDOT Traffic Engineering and Safety Systems Branch: 2000-2002)*

3.6.4.1 Highway Safety Improvement Program

The *Highway Safety Improvement Program Report (May 2003)* provided information on the North Carolina's top potentially hazardous locations, including intersections, bridges,

roadway sections, and bicycle and pedestrian areas. The HSIP Report was downloaded from the following NCDOT website[5]:

The HSIP report provided a preliminary list of ranked locations that are considered potentially hazardous, meaning they are not necessarily dangerous; but simply a candidate for crash analysis and possible investigation. "Locations are weighted and prioritized using many factors. A location with a high rank in its category indicates, based upon the frequency, crash type, severity, and other miscellaneous factors, this is a priority candidate for analysis and investigation..." (HSIP Report, Page 1). The report notes that until a location is analyzed and investigated it is difficult to determine if the location is dangerous or not

"Crash data used to determine potential hazardous locations was based on crashes occurring between October 1, 1999 through September 30, 2002 (warrants based on three years of data) or based on crashes occurring between October 1, 1992 through September 30, 2002 (warrants based on ten years of data)" (HSIP Report, Page 2).

I-40 and I-85

Intersections. Three of the 400 potentially hazardous intersections statewide are located on I-40 and I-85 in the study area. Two of these are located in Wake County and two in Durham County as indicated below.

State Ranking	
	Durham County
#32	• I-85 at US 70
#48	• I-40 at SR 1973 (Page Road)
	Wake County
#190	• I-40 at SR 1497 (Cary Towne Boulevard)

Roadway Sections. Twenty-one of the 200 potentially hazardous sections of roadway statewide are located on or near I-40 and I-85 in the regional study area. One or more hazardous roadway sections are located in all counties that I-40 and I-85 pass through in the regional study area, except Cabarrus County, Mecklenburg County, and Wake County, which have none. Potentially hazardous sections of I-40 and I-85 are listed below by county.

State Ranking	
	Alamance County
#14	• I-40/I-85 near SR 1007 (Mebane Oaks Road)

[5] www.doh.dot.state.nc.us/preconstruct/traffic/ safety/ reports/ 2003_HSIP.pdf.

Davidson County

#24 • I-85 near NC 8
#26 • I-85 near SR 2085 (Baptist Children's Home Road)
#54 • I-85 near SR 1295 (I-85 Service Road)
#154 • I-85 near SR 1133 (Belmont Road)

Davie County

#24 • I-40 near SR 1410 (Farmington Road)
#19 • I-40 near US 64
#30 • I-40 near US 601
#152 • I-40 near SR 1436 (Pinebrook School Road)

Durham County

#148 • NC 147 near I-40
#177 • I-85 near SR 1675 (Glen School Road)

Forsyth County

#10 • I-40 near NC 66
#55 • I-40 near SR 1101 (Harper Road)

Guilford County

#15 • I-40/I-85 near SR 3056 (Rock Creek Dairy Road)
#191 • I-85 near I-85 Business

Iredell County

#4 • I-40 near SR 2158 (Old Mocksville Road)
#157 • I-40 near US 64
#167 • I-40 near SR 1005 (Old Mountain Road)

Orange County

#38 • I-40/I-85 near SR 1120 (Mt. Willing Road)

Rowan County

#96 • I-85 near SR 1505 (Mt. Hope Church Road)
#130 • I-85 near SR 1221 (Old Beatty Ford Road)

Bridges. Sixteen of the 113 potentially hazardous bridge locations statewide are located on or near I-40 and I-85 within the regional study area and are listed below by county.

State Ranking

Alamance County

#77 • Bridge #130 & #131 on I-40/I-85 near NC 49
#88 • Bridge #120 & #122 on I-40/I-85 near NC 49

	Durham County
#82	• Bridge #108 & #112 on I-85 near US 15
#83	• Bridges #229 & #230 on I-40 near I-540
#105	• Bridges # 17 & #21 on US 15 near I-40
#108	• Bridge #306 on SR 1118 (Fayetteville Street) near I-40
	Forsyth County
#90	• Bridge #125 on I-40 Business near I-40
	Guilford County
#26	• Bridge #325 on US 220 near I-85
#53	• Bridge #220 on SR 1541 (Wendover Avenue) near I-40
	Mecklenburg County
#43	• Bridge #294 on SR 2665 (Harris Boulevard) near I-85
#73	• Bridge #354 on NC 16 near I-85
#74	• Bridges #511 & #512 on SR 2665 (Harris Boulevard) near I-85
#95	• Bridges #187 & #188 on US 74 near I-485
#24	• Bridge #285 on SR 2480 (Cheshire Road) near I-85
	Orange County
#98	• Bridges #103, #106, #110, & #111 on I-85 near US 70
	Randolph County
#61	• Bridges #20 & #26 on I-85 near US 311

US 64 and NC 49

Intersections. Five of the 400 potentially hazardous intersections statewide are on or near NC 49 or US 64 in the study area and are listed below by county.

State Ranking	Cabarrus County
#51	• NC 49 at Old Charlotte Highway
#358	• US 601 at NC 49
	Randolph County
#126	• US 64 at SR 1335 (Rush Mountain Road)
#80	• NC 47 at NC 49
	Wake County
#336	• US 64 at SR 1163 (Kelly Road)

Roadway Sections. One of the 200 potentially hazardous sections of roadway statewide is located near US 64 in the study area and is listed below.

State Ranking	Chatham County
#42	• US 421 near US 64

Bridges. Two of the 113 potentially hazardous bridge locations statewide are located on or near US 64 or NC 49 in the study area and are listed below by county.

State Ranking	Randolph County
#51	• Bridge #191 on US 64 near NC 22
	Wake County
#3	• Bridge #167 on US 1 near its merge with US 64

Bicycle and Pedestrian areas. Three of the top 100 potentially hazardous bicycle and pedestrian sections statewide are located on US 64 or NC 49 in the study area and are listed below by county.

State Ranking	Mecklenburg County
#34	• NC 49 in rural Mecklenburg County
#79	• NC 49 in Charlotte
	Randolph County
#55	• US 64 in rural Randolph County

3.6.4.2 Strip Analysis Data

Accident data for I-40, I-85, US 64, and NC 49 for the period June 1, 2000 through May 31, 2003 were generated as Strip Analysis Reports by the Traffic Safety Systems Management Branch. The Strip Analysis Reports provided detailed information on accident occurrences and types along I-40, I-85, US 64, and NC 49. A summary table of the Strip Analysis Report Summary Statistics by roadway segment is included in **Appendix C.**

I-40 and I-85

Interstate crash data for 2000-2002 was reviewed to determine accident trends along I-40 and I-85 within the regional study area. The analysis also compared crash rates (crashes/100 million vehicle miles traveled (VMT)) to average crash rates for all Interstates in North Carolina.

The Interstate Strip Analysis revealed that I-40 in Wake County from the Durham County line to the I-440/US 1/US 64 interchange and I-85 in Mecklenburg County from the US 29/49

Connector to the Cabarrus County line had notably higher crash rates than the statewide average rates for Interstates.

The Strip Analysis Data also showed that most accidents on I-40 and I-85 occur during peak (morning and afternoon) periods and are rear-end collisions. This data suggests that most accidents along I-40 and I-85 are occurring during periods of congestion.

US 64 and NC 49

The analysis compared crash rates (crashes/100 million VMT) to statewide average crash rates for rural routes, primary rural routes, and rural US routes in North Carolina.

The accident rates suggest that the US 64–NC 49 Corridor is not particularly hazardous. Accident, injury, and fatality rates generally are below statewide averages in recent years. However, data for particular sections along the corridor reveal that NC 49 through Cabarrus County and US 64 through Randolph County had crash rates that were more than 20 percent higher than the statewide average crash rate.

3.6.4.3 North Carolina Moving Ahead

Another source used to assess safety conditions along US 64 and NC 49 is the NCDOT ***NC: Moving Ahead! Maps,*** which contain crash rate factors. These maps contain 1999-2001 crash data by county and were reviewed for all counties through which US 64 and NC 49 pass. A crash rate is given in units of crashes per vehicle miles traveled. A crash rate factor is derived by dividing the crash rate for that road segment by the county wide crash rate for that type of road. These maps can be viewed at the following NCDOT website[6]:

Data is defined with crash rate factors that range from 0-1, 1.01-2.00, 2.01-5.00, and 5.01-111. For the purpose of this analysis, sections with crash rate factors of 2.01-5.00 and 5.01-111 were noted as “high”.

The data suggests that US 64 in Randolph and Chatham Counties have a higher occurrence of crashes and highway safety “hot spots” compared to the rest of the NC 49 and US 64 corridors. With the exception of the high rates noted along the Pittsboro Bypass (full control of access), most of these occurrences are located on sections of US 64 that have no access control.

3.6.5 Programmed and Planned Roadway Improvements

With the planning horizon for this corridor study being the year 2030, it can be expected that a considerable amount of improvements will be made to the existing highway system in the

[6] www.ncdot.org/planning/tpb/gis/datadist/GISNCMovingAheadCenter.html.

19-county study area. These improvements will consist of a variety of small and large scale projects, from minor intersection improvements and bridge deck replacements to the widening and reconstruction of major rural and urban Interstate routes and the construction of new location highways. This portion of the report highlights those major projects that would result in the provision of increased capacity to some portion of the public highway system in the study area. For the purposes of this study, "increased capacity" is defined as the addition of through travel lanes. Minor geometric improvements such as the elimination of a low-speed curve or intersection channelization to provide additional dedicated turning lanes were not considered as resulting in capacity expansion for the purposes of this study.

The list of planned and programmed roadway improvements for the study area roadway system was prepared from a review of a variety of sources. These included:

- The current edition of NCDOT's Transportation Improvement Program for Fiscal Years 2004-2010.
- Fiscally constrained long-range transportation plans and associated short-range transportation improvement programs prepared by the various metropolitan planning organizations (MPOs) across the 19 counties.
- Project priority lists prepared by the Regional Planning Organizations (RPOs) in the study area.

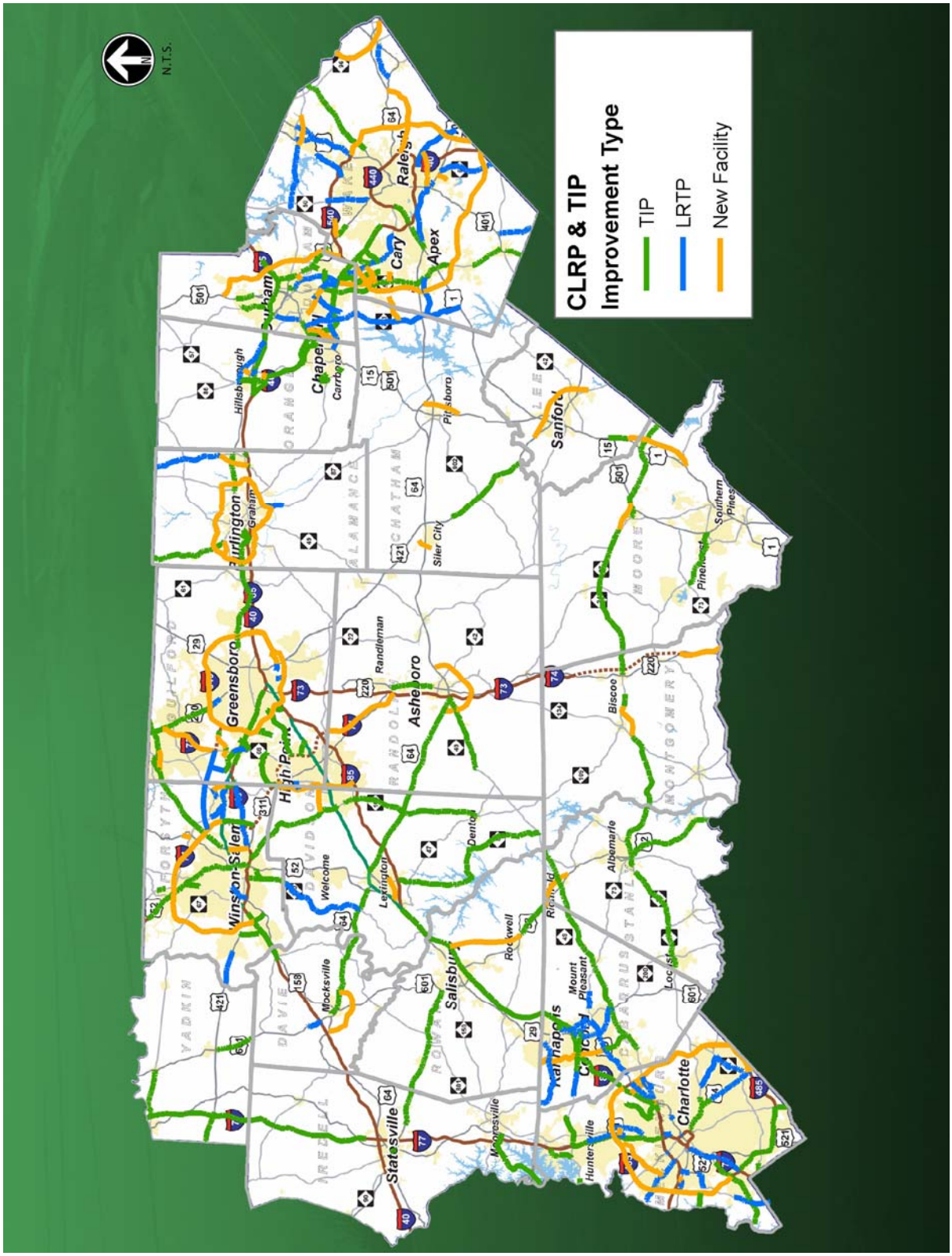
The compilation of these plans formed the basis for the definition of the "Existing plus Committed" (E+C) highway system network across the 19-county study area; that is, those highway improvement projects that can be reasonably expected to be completed and open to use by the planning horizon year of 2030. A list of those improvements included in the E+C highway system network is provided in **Appendix D**.

Figure 3.45 illustrates the major highway improvements that were assumed as part of the E+C highway system.

The majority of planned improvements to the study area highway system would be undertaken by NCDOT. NCDOT's Transportation Improvement Program (TIP) identifies those projects for which funding have been allocated for planning, design, right-of-way, and construction activities over the next seven years. Individual project listings also identify those phases of project development that are anticipated to take place beyond the seven-year TIP period. Such expenditures are identified as taking place in 'post years'. There are several improvements along the US 64–NC 49 Corridor and within the regional study area that are included in NCDOT's *2004-2010 Transportation Improvement Program*.

The following text summarizes TIP projects for US 64, NC 49, I-40, and I-85 within the study area, and addresses long-range projects of the MPOs and RPOs.

Figure 3.45: Existing Plus Committed Improvements within the Study Area



3.6.5.1 TIP Projects Along US 64 and NC 49

TIP Projects along US 64 are described below.

TIP Project R-3111

TIP Description:	US 64 east of Mocksville to US 601 west of Mocksville. Two-lane bypass of Mocksville on four-lane right-of-way, new location.
Length:	6.1 miles
Estimated Cost:	$29.6 million
Schedule:	This project is unfunded in the 2004-2010 TIP. Right-of-way and construction would occur post year.

TIP Project R-3602

TIP Description:	US 601 south of Mocksville to US 52 in Lexington. Widen US 64 to multi-lanes and upgrade interchange at US 52.
Length:	14 miles
Estimated Cost:	$95.2 million
Schedule:	This project is unfunded in the 2004-2010 TIP. Right-of-way and construction would occur post year.

TIP Project R-2220

TIP Description:	East of I-85 Business in Lexington to US 220 in Asheboro. Widen US 64 to four lanes.
Length:	28.5 miles
Estimated Cost:	$125.7 million
Schedule:	(Part complete: I-85 Bus. to I-85) Right-of-way and construction is anticipated to occur post year.

TIP Project R-2536

TIP Description:	Asheboro Southern Bypass. US 64 West to US 64 East. Four-lane freeway on new location with interchanges at US 220, NC 49, and zoo access at NC 159.
Length:	13.5 miles
Estimated Cost:	$163.1 million
Schedule:	Construction is scheduled to begin in FY 2009 and to be completed post year.

TIP Project U-3101

TIP Description:	US 1/US 64, US 64 to south of SR 1313 (Walnut Street). Rehabilitate pavement, additional travel lanes, and modify SR 1313 interchange.
Length:	2.6 miles
Estimated Cost:	$27.4 million
Schedule:	Construction to occur in the FY 2004-FY 2006 time period.

TIP Projects along NC 49 are described below.

TIP Project R-2533

TIP Description:	Harrisburg to Yadkin River. Widen NC 49 to multi-lanes.
Length:	29.3 miles
Estimated Cost:	$166.6 million
Schedule:	A portion of this project (from Harrisburg to Mount Pleasant) is currently under construction. Construction of the remaining sections (South of Mount Pleasant to the Yadkin River) is planned to begin in FY 2010 and continue post year.

TIP Project R-2535

TIP Description:	SR 1174 West of Farmer to proposed Asheboro Southern Bypass (R-2536) west of SR 1193. Widen NC 49 to a four-lane divided facility.
Length:	9.7 miles
Estimated Cost:	$31.6 million
Schedule:	Right-of-way acquisition is scheduled to occur in the FY 2004-FY 2010 time period. Construction is scheduled to occur post year.

3.6.5.2 TIP Projects Along I-40 and I-85

TIP Projects for mainline improvements I-40 from Statesville to Raleigh are described below.

TIP Project I-911

TIP Description:	West of NC 801 (Exit 180) to west of SR 1122. Pavement rehabilitation and construction fifth and sixth lanes.
Length:	7.1 miles
Estimated Cost:	$55.6 million
Schedule:	Part complete. Part unfunded.

TIP Project I-2201

TIP Description:	SR 1850 (Squire Davis Road) to west of SR 1398 (Freeman Mill Road) in Greensboro. Widen to six and eight lanes. Upgrade guardrail and lighting.
Length:	10.9 miles
Estimated Cost:	$199.1 million
Schedule:	Part complete. Part under construction.

TIP Project U-2524

TIP Description:	Greensboro Western Loop, North of I-85 to Lawndale Drive. Construct Freeway on New Location. (Part of Loop to be signed as I-40)
Length:	15.0 miles
Estimated Cost:	$569 million
Schedule:	Part complete. Part under construction.

TIP Project I-3306

TIP Description:	I-85 in Orange County to NC 147 (Buck Dean Freeway) in Durham County. Add additional lanes.
Length:	20.7 miles
Estimated Cost:	$88.9 million
Schedule:	Part under construction. Part unfunded.

TIP Project I-2204

TIP Description:	NC 147 (Exit 279) in Research Triangle Park to Bradshaw Freeway at Wade Avenue (Exit 289). Widen to eight lanes.
Length:	9.4 miles
Estimated Cost:	$27.5 million
Schedule:	Part complete. Part under construction.

TIP Projects for mainline improvements to I-85 from Charlotte to Greensboro are described below.

TIP Project I-3803

TIP Description:	US 29-NC 49 Connector in Mecklenburg County to NC 73 in Cabarrus County. Add additional lanes.
Length:	12.8 miles
Estimated Cost:	$174.9 million
Schedule:	Part under construction as design-build project. Part unfunded.

TIP Project I-2511

TIP Description:	US 29-601 Connector (Exit 68) to north of SR 2120 (Exit 81). Rehabilitate bridges and widen to eight lanes.
Length:	13.2 miles
Estimated Cost:	$236.8 million
Schedule:	Part complete. Part under construction.

TIP Project I-2304

TIP Description:	North of SR 2120 (Exit 81) in Rowan County to US 29-52-70/I-85 Business (Exit 87). Additional lanes and bridge reconstruction.
Length:	6.8 miles
Estimated Cost:	$147.8 million
Schedule:	Construction in 2006 (Design-build project)

3.6.5.3 State, Local, and Regional Highway Improvement Plans

Over and above the projects included in the current edition of the TIP, NCDOT, in association with the various metropolitan planning organizations (MPOs) and regional planning organizations (RPOs) in the study area have developed lists of longer range highway improvements. Such proposals would typically be included in the metropolitan area fiscally constrained long-range transportation plans (LRTPs), and generally have a planning horizon of 2020 to 2030. A number of these LRTPs are currently being updated by the MPOs. Because the RPO long-range transportation planning process is still evolving, NCDOT and local agency staff indicated that their current short-range TIPs were judged as identifying the majority of major project needs over the planning horizon of this corridor study.

All of the MPO and RPO identified projects were thus included in the E+C highway network for the study area that was used as the basis for the development and evaluation of alternative improvements in the US 64 and NC 49 corridors.

3.6.6 Existing Public Transit Services

Although the primary focus of this corridor study is on the regional highway system, it should be acknowledged that improvements to the highway system would be of benefit to local and intercity public transportation services. This section of the corridor study report summarizes the existing transit services in the study area.

In order to document these initiatives, information was obtained from the following agencies that coordinate and/or implement transit services throughout the region:

- North Carolina Department of Transportation, Public Transportation Division
- Charlotte Area Transit System (CATS)
- Piedmont Area Regional Transit (PART)
- Triangle Transit Authority (TTA)

Pursuant to information collected from the Public Transportation Division of NCDOT, all of the counties in the study area maintain some form of general use public transit or human service agency client transportation program. These programs provide access to

transportation through a variety of mechanisms, including fixed route, deviated fixed route, subscription, dial-a-ride, and non-emergency medical transportation.

Existing public transit services are summarized in **Table 3.11**. The following sections provide additional detail.

Table 3.11: Existing Fixed Route and Subscription Transportation Services Provided by Public Agencies in the Study Area

County	Transit Provider	Hours/Days of Operation	Services Offered
Alamance	Alamance County Transportation System, Inc. (ACTS)	6 a.m. – 6 p.m. Monday – Friday	Deviated fixed route, subscription, and dial-a-ride for residents of Alamance County.
Cabarrus	Cabarrus County Transportation System (CCTS)	6 a.m. – 6 p.m. Monday – Friday	Subscription and dial-a-ride for residents of Cabarrus County.
Cabarrus	Concord Kannapolis Area Transit (Rider)	5:30 a.m. – 9:30 p.m. Monday – Friday	Fixed route service
Chatham	Chatham Transit Network (CTN)	6 a.m. – 6 p.m. Monday – Friday	Daily subscription route non-emergency medical transportation to human service agencies. Transportation for Work First transitional/employment program participants and general public residents.
Chatham, Durham, and Wake	Triangle Transit Authority (TTA)	5 a.m. – 8 p.m. Monday – Friday	Operates fixed-route commuter bus service connecting Cary, Raleigh, Durham, and Chapel Hill with RTP, RDU and major universities.
Davidson	Davidson County Transportation System (DCTS)	6:30 a.m. – 5:30 p.m. Monday – Friday	Subscription and dial-a-ride services for residents of Davidson County.
Davie, Stokes, Surry, and Yadkin	Yadkin Valley Economic Development District, Inc. (YVEDDI)	7 a.m. – 5 p.m. Monday – Friday	Deviated fixed-route, subscription and dial-a-ride transportation services for county residents.
Durham	Durham Area Transit Authority (DATA)	5:30 a.m. – 11:30 a.m. Monday – Saturday	Fixed-route bus service and subscription and dial-a-ride transportation for residents of Durham County.
Durham	Durham County Access	6 a.m. – 6 p.m. Monday – Friday	Subscription and dial-a-ride transportation for residents of Durham County who reside outside the city of Durham.
Forsyth	Trans-AID	6 a.m. – 6 p.m. Monday – Friday	Subscription and dial-a-ride transportation for authorized residents of Forsyth County who reside outside the city of Winston-Salem.

Table 3.11: Existing Fixed Route and Subscription Transportation Services Provided by Public Agencies in the Study Area

County	Transit Provider	Hours/Days of Operation	Services Offered
Forsyth	Winston-Salem Transit Authority (WSTA)	6 a.m. – 12:00 a.m. Monday – Friday	Fixed-route buses within the city of Winston-Salem.
Forsyth and Guilford	Piedmont Area Regional Transit (PART)	6 a.m. – 7 p.m. Monday – Friday	Express bus service connecting the fixed-route systems of Greensboro, High Point, and Winston-Salem. Coordinates dial-a-ride paratransit service for cross county trips.
Guilford	Greensboro Transit Authority (GTA)	5:45 a.m. – 6:30 p.m. Monday – Friday 8:45 a.m. to 5:15 p.m. Saturday	Fixed-route buses within the city of Greensboro. Express bus service to PTIA.
Guilford	High Point Transit System (Hi Tran)	5:45 a.m. – 6:30 p.m. Monday – Friday 8:45 a.m. to 5:15 p.m. Saturday	Fixed-route buses within the city of High Point. Dial-a-ride paratransit service for city residents.
Guilford	Specialized Community Area Transportation	6 a.m. – 7 p.m. Monday – Friday	Subscription and dial-a-ride transportation for citizens of Guilford County who reside outside the cities of Greensboro and High Point.
Iredell	Iredell Transportation Authority (ITA)	6 a.m. – 6 p.m. Monday – Friday	Subscription and dial-a-ride transportation for residents of Iredell County.
Lee	County of Lee Transit System (COLTS)	7 a.m. – 5 p.m. Monday – Friday	Subscription and dial-a-ride transportation for residents of Lee County.
Mecklenburg	Charlotte Area Transit System (CATS)	5:30 a.m. – 1:30 a.m. Monday – Saturday 7 a.m. – 1:30 a.m. Sunday	Fixed-route bus service and paratransit services for the city of Charlotte and nearby suburbs. Local and express buses are available.
Mecklenburg	Mecklenburg Transportation System (MTS)	Varies	Deviated fixed route, subscription and dial-a-ride transportation for citizens of Mecklenburg County who reside outside the city of Charlotte.
Montgomery	Montgomery County Council on Aging	6 a.m. – 6 p.m. Monday – Friday	Dial-a-ride transportation for authorized residents of Montgomery County.
Moore	Moore County Transportation Services (MCTS)	7:30 a.m. – 5:30 p.m. Monday – Friday	Subscription and dial-a-ride transportation for residents of Moore County.
Orange	Chapel Hill Transit	6:15 a.m. – 12:45 a.m. Monday – Saturday	Fixed- route buses, shared-ride, and dial-a-ride paratransit services for the town of Chapel Hill, neighboring town of Carrboro, and the University of North Carolina at Chapel Hill.

Table 3.11: Existing Fixed Route and Subscription Transportation Services Provided by Public Agencies in the Study Area

County	Transit Provider	Hours/Days of Operation	Services Offered
Orange	Orange County Public Transportation (OPT)	6:30 a.m. – 6 p.m. Monday – Friday	Deviated fixed-route, subscription, and dial-a-ride transportation for citizens of Orange County who live outside of the town of Chapel Hill and the town of Carrboro.
Randolph	Randolph Coordinated Agency Transportation System	6 a.m. – 5 p.m. Monday – Friday	Subscription and dial-a-ride transportation for authorized residents of Randolph County.
Rowan	Rowan Area Transit System (RTS)	6 a.m. – 6 p.m. Monday – Friday	Subscription and dial-a-ride transportation for authorized rural residents of Rowan County
Rowan	Salisbury Transit System	6:15 a.m. to 6:45 p.m. Monday - Friday 8:45 a.m. to 4:15 p.m. Saturday	Fixed-route buses within the city of Salisbury. Dial-a-ride paratransit services for certain authorized residents of the city of Salisbury and nearby towns of Spencer and East Spencer.
Stanly	Stanly County Transportation (SCUSA)	6 a.m. – 6 p.m. Monday – Friday	Subscription and dial-a-ride transportation for residents of Stanly County.
Wake	Accessible Raleigh Transportation	6 a.m. – 10 p.m. Monday – Saturday	Dial-a-ride paratransit services within the city of Raleigh.
Wake	Capital Area Transit (CAT)	6 a.m. – 10 p.m. Monday – Saturday	Fixed-route buses within the city of Raleigh.
Wake	C-Tran	6 a.m. – 10 p.m. Monday – Saturday	Dial-a-ride paratransit services within the town of Cary
Wake	Wake Coordinated Transportation Services	6 a.m. – 6 p.m. Monday – Friday	Subscription and dial-a-ride transportation for citizens of Wake County who reside outside the cities of Raleigh or town of Cary

Source: North Carolina Department of Transportation, Public Transportation Division web site (http://www.ncdot.org/transit/transitnet/PublicInfo/Gazetter.html).

There are four primary agencies that offer ridesharing programs within the study area. Below is a brief description of each of these agencies and their services.

- **Ridesharing Services and Vanpooling of the Piedmont**, or RSVP, coordinates commuter transportation services for the Piedmont Triad region, including possible destinations in Guilford, Forsyth, Randolph, Davidson, and Alamance Counties.

- **Piedmont Authority for Regional Transit** also operates vanpools and bus pools in the Greensboro metropolitan region from connections in Guilford, Forsyth, Randolph, Davidson, and Alamance Counties.

- **Triangle Transit Authority** operates vanpools and bus pools in the Research Triangle metropolitan region to connect Raleigh, Durham, Cary, and Chapel Hill with Research Triangle Park, Raleigh-Durham International Airport and surrounding suburbs, including possible destinations in Chatham, Alamance, Orange, and Durham Counties. Park-and-ride facilities also are available.

- **Charlotte Area Transit System** provide commuter bus service and special-event transportation to Uptown Charlotte from surrounding suburbs, including Concord, Gastonia, Huntersville, Kannapolis, Monroe, and Rock Hill, South Carolina.

Several other smaller public and private transit providers also operate commuter buses and special-event transportation in the study area.

3.6.7 Future Transit Services

In order to accurately assess its overall mobility needs, significant initiatives for future transit improvements currently underway within the project study area must be taken into account. Major transit initiatives being undertaken within the study area include:

- 2025 Transit System Plan by the Charlotte Area Transit System
- Regional Rail by the Triangle Transit Authority
- Triad Major Investment Study by the Piedmont Authority for Regional Transit

As these initiatives are under development, alignments, technologies, and feeder bus networks associated with these initiatives are subject to change. Below are brief descriptions of these initiatives.

3.6.7.1 Charlotte Area Transit System – 2025 Transit System Plan

The Charlotte Area Transit System is in the early stages of building a state-of-the-art rapid transit system which will integrate bus, light rail, commuter rail and bus rapid transit into a comprehensive public transportation network for the 21st Century.

The Metropolitan Transit Commission (MTC) is taking the lead for planning and implementing various forms of bus and rail transit service in the city of Charlotte and the surrounding Mecklenburg County area. The 2025 Transit System Plan[7] consists of multiple rapid transit improvements in five corridors, a series of improvements in Center City Charlotte, and bus service and facility improvements throughout the rest of the region. Rapid transit guideway services will extend to I-485 in order to intercept trips coming in and out of Mecklenburg County and to improve regional connectivity.

[7] http://www.charmeck.org/Departments/CATS/Home.htm

Two corridors extend beyond Mecklenburg County to Iredell County in the North Corridor and to Cabarrus County in the Northeast Corridor. These recommendations are designed to leverage transportation investments already completed or underway in the corridors. Improvements in the West and Southeast Corridors are being planned so that future expansions into Gaston and Union Counties can be coordinated as well.

It is estimates that when completed the 2025 Transit System Plan will serve four times as many transit riders as the present system does today. There is expected to be 28 miles of bus rapid transit (BRT) guideways, 21 miles of light rail transit (LRT), 11 miles of streetcars, 30 miles of commuter rail, and an expanded network of buses and other transportation services throughout the entire region. The addition of park-and-ride lots, neighborhood transit centers, other transit facilities, and expansion of the bus fleet is projected to cost $952 million.

3.6.7.2 Triangle Transit Authority – Regional Rail

The Triangle Transit Authority is planning a 37-mile commuter rail system that stretches from north Raleigh to downtown, through Cary, Morrisville, and the Research Triangle Park and into Durham[8]. The North Carolina Board of Transportation approved an initial funding package for the project in December, 2003. TTA expects to begin operating this service in December 2008.

TTA has recently completed an Environmental Impact Study (EIS) for Phase I of the Regional Rail project. The proposed transit system is a two-track rail diesel multiple unit (DMU) system that will run from Duke Medical Center in Durham to Durant Road in Northeast Raleigh on an existing railroad alignment. The exception to this is the construction of a 1,600-foot section of track on new alignment to avoid construction disturbance and/or existing track relocation near downtown Raleigh.

The initial segment to be constructed for operation in 2008 will run from the Ninth Street Station in Durham to the Government Center in Raleigh. Construction is scheduled to begin in 2005. The entire Phase I Regional Rail project is scheduled for completion by 2015.

3.6.7.3 The Triad Major Investment Study

In November 2002, PART completed the Triad Major Investment Study (MIS)[9] to determine which corridors within the Triad region could support a fixed-guideway transit system. The MIS evaluated the feasibility of designing, building, operating and maintaining premium transit along the following four corridors that were deemed of the highest priority within the region:

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[8] http://www.ridetta.org

[9] http://www.partnc.org/triad_major_investment_study.htm

- Burlington to Clemmons
- High Point to Greensboro
- High Point to Piedmont Triad Airport
- High Point to Winston Salem

Two technologies, diesel multiple unit (DMU) and bus-rapid transit (BRT), were evaluated in this study for each of these alignments. The Triad MIS evaluated these alternatives for access, convenience, environmental consequences, and costs. The study did not recommend a preferred alternative, but provided a comparison of these alternatives to assist the community and PART in deciding which alternatives best meets the needs of the Triad. In May 2003, the PART Board of Trustees adopted the Burlington to Clemmons alignment as the preferred alignment for premium transit. The Federal Transit Administration has requested that PART reevaluate potential technologies for the corridor. This technology evaluation is expected to be complete by 2005.

3.6.7.4 Other Transit Improvements

Other than the improvements associated with the three major initiatives discussed in this section, there are no other planned transit improvements of regional significance within the US 64–NC 49 study area. Future transit improvements in the region will be in response to population growth, increased urban and suburban development (urbanization), and associated impacts to commuter patterns. Therefore, future transit improvements will likely be limited to the following elements:

- New, extended, or modified fixed-route and express service within urban areas.
- Expanded rural and urban paratransit services.
- Expanded vanpools and ridesharing services and initiatives.

3.6.8 Intercity Passenger Bus Service

Greyhound Lines (and its wholly owned subsidiary Carolina Trailways) provides service to 88 cities in North Carolina, with 60 locations receiving full service, and the remaining 28 locations receive limited service. **Table 3.12** lists the current full-service bus stations and limited service stops served by these carriers.

Full-service bus locations are manned stations that have available information on-line including operational and ticketing schedules and contact information such as mailing address, main phone number, and phone numbers for Greyhound package express and charter services.

Table 3.12: Current Full-Service and Limited-Service Intercity Bus Stops in North Carolina

Full-Service Bus Stations in North Carolina					
Ahoskie	Durham	Hickory	Morehead City	Rocky Mount	Tarboro
Asheville	Edenton	High Point	Morganton	Salisbury	Wadesboro
Boone	Elizabeth City	Jacksonville	Mt Airy	Sanford	Wallace
Burlington	Fayetteville	Kinston	New Bern	Scotland Neck	Washington
Camp Lejeune	Gastonia	Laurinburg	Raeford	Shallotte	Waynesville
Charlotte	Goldsboro	Lenoir	Raleigh	Shelby	Williamston
Cherry Point	Greensboro	Lexington	Red Springs	Smithfield	Wilmington
Clinton	Greenville	Lincolnton	Reidsville	Southern Pines	Wilson
Concord	Henderson	Lumberton	Roanoke Rapids	Spindale	Windsor
Dunn	Hendersonville	Monroe	Rockingham	Statesville	Winston-Salem
Limited-Service Bus Stops in North Carolina					
Chapel Hill	Halifax	Kittrell Job Corp	Mooresville	Rich Sq	Whitakers
Chocowinity	Hamlet	Lewiston	Newland	Richlands	Wilson Amtrak
Duke Vet Hosp	Hampstead	Marshville	Oak City	Rocky Mount Amtrak	Wingate
Enfield	Hertford Jct	Matthews	Pinetops	Roseboro	
Farmville	Holly Ridge	Maysville	Raleigh Durham Arpt Connector	Scotts Hill	

Greyhound and Carolina Trailways provide information on bus schedules and special services including package shipment and charter bus service through their web site[10]. Additionally, the web site has phone numbers and address information for each of the full-service bus stop locations.

Limited service bus stops provide scheduled service for a large number of locations which do not support a full-service terminal or agency. No Greyhound ticketing or baggage facilities are available at these locations. Service to these points may vary by schedule, day, week, carrier, or season, such as restricted service to colleges when school is not in session. Greyhound and their subsidiaries do not serve some areas of North Carolina. These areas mainly consist of smaller cities and towns in the northern and western reaches of the state. However, the central portion of the US 64–NC 49 Corridor is also lacking any existing intercity bus service. Some of the areas that are currently not served include the communities of Asheboro, Siler City, and Pittsboro.

[10] http://www.greyhound.com

3.6.9 Intercity Passenger Rail Service

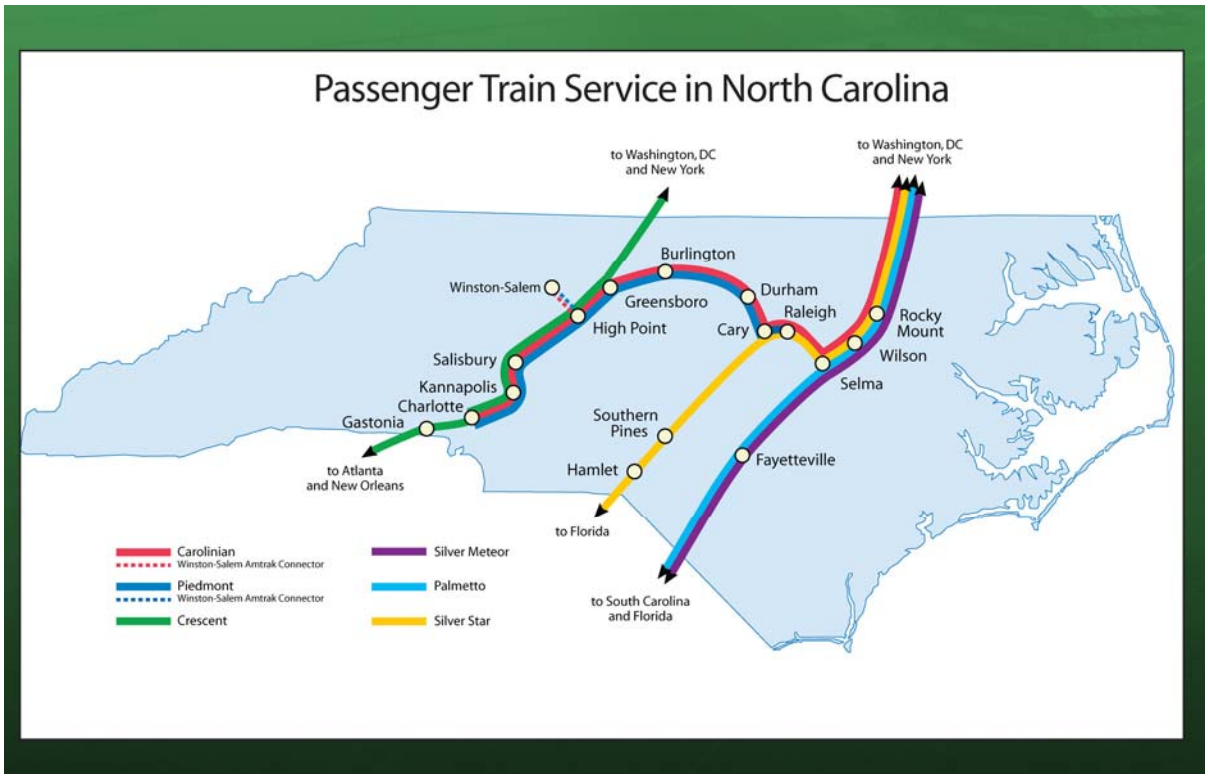
3.6.9.1 Existing Service

Amtrak is the sole intercity passenger rail carrier in North Carolina and operates three routes that travel through the study area: The Carolinian, The Piedmont, and The Crescent. These routes are shown in **Figure 3.46**. The state of North Carolina supports the operation of the Carolinian and the Piedmont through promotion and marketing and by reimbursing Amtrak for its in-state costs.

- The Carolinian - Provides roundtrip service between Charlotte and New York City. Within the study area, this route travels between Charlotte and Raleigh through Kannapolis, Salisbury, High Point, Greensboro, Burlington, Durham, and Cary. Total annual ridership for the entire route during 2004 was reported by Amtrak as 331,996.

- The Piedmont - Travels roundtrip between Charlotte and Raleigh through Kannapolis, Salisbury, High Point, Greensboro, Burlington, Durham, and Cary. This entire route is within the study area. Unlike other passenger rail services, the Piedmont is owned by the state of North Carolina and operated by Amtrak under contract. Total annual ridership for the entire route during 2004 was reported by Amtrak as 40,330.

Figure 3.46: Intercity Passenger Rail Routes



- The Crescent - Provides roundtrip service between New Orleans and New York City. Within the study area, this route travels between Charlotte and Greensboro through Salisbury, High Point, and Greensboro. Total annual ridership for the entire route during 2004 was reported by Amtrak as 254,152.

3.6.9.2 Recent Service Improvements

NCDOT is investing in rail infrastructure improvements such as rail cars, track structures, and stations. In many cases, the state is partnering with local governments and railroads in order to make the necessary improvements.

NCDOT built a maintenance facility in downtown Raleigh in 1995 to support the daily operations of the state-owned *Piedmont*. The facility is used daily to clean and perform routine maintenance on the passenger cars and locomotives used on the *Piedmont* route and the business cars on the *Carolinian*.

Working with the North Carolina Railroad (NCRR), Norfolk Southern Railway (NS), and CSX Transportation (CSX), NCDOT is upgrading the state's existing rail corridors to improve safety, efficiency, and capacity for freight and passenger train services. The first phase of improvements is scheduled along the North Carolina Railroad (NCRR). This 317-mile-long, state-owned corridor links Charlotte, Greensboro, and Raleigh and extends to the state-owned and -operated seaport at Morehead City. Norfolk Southern Railway operates freight trains along the entire corridor under a lease agreement with NCRR. CSX Transportation shares freight operations along a portion of the NCRR's corridor between Raleigh and Cary.

In 2004, NCDOT completed a first phase of work in track and signal improvements between Raleigh and Greensboro. These improvements have increased travel reliability and have reduced travel time between the two cities. The improvements included track siding extensions in Mebane, Funston, and McLeansville; improved track curvature between Cary and Charlotte to allow higher speed operations; signal improvements between Cary and Greensboro; and improved rail support facilities in Durham and Greensboro. To improve safety, rail crossings in Greensboro, Landis, Spencer, Thomasville, and China Grove were closed and rail/highway grade separations were initiated in Thomasville. In a second phase of work scheduled to commence in 2005, NCDOT will construct a second track in Durham, restore double-track operations between Greensboro and High Point, continue with the rail and signal upgrade program between Cary and Raleigh, and improve track curvature to permit higher speed operations between Cary and Raleigh.

A summary of recent rail station improvements is provided in **Table 3.13**.

Table 3.13: Recent Rail Station Improvements in North Carolina

Station Name	Improvement Projects
Burlington	North Carolina Railroad Company renovated the historic 1868 Engine House
Cary	NCDOT is planning to extend the current platform along the NCRR and construct a second platform along the CSX line. Design of the second platform was completed during 2003, with construction to be coordinated with the TTA regional rail project.
Charlotte	NCDOT is planning a new station three blocks from the city center that will incorporate conventional and high-speed intercity passenger rail, local and regional bus and rail services, intercity bus, rental cars, bicycles, and pedestrians. The project is expected to handle about 500,000 rail passengers annually by 2015. NCDOT has completed land acquisition for the new multimodal center and has initiated work on the track and platform design for the station. Development of the new Charlotte Multimodal Station and related track improvements is estimated to cost between $110 and $207 million.
Durham	A new $10 to $12 million multimodal center is planned for Durham. City of Durham voters approved $5 million in bond revenues to go toward the multimodal center; NCDOT and Federal funds will pay for the balance of the project.
Greensboro	Plans call for the former station to become a multimodal transportation center with provisions for Amtrak, intercity buses and city transit buses. Phase I construction, which included completion of the transit portion of the station complex, began in summer 2001 and was completed in summer 2003. Phase II construction began in fall 2003. Track work and will be completed by mid-2005, when passenger service is scheduled to resume.
Hamlet	A temporary modular station is now open for passengers, and it will remain in use until restoration of the historic station is complete. Building restoration began in July 2003 and is scheduled to be completed by the end of 2004 or early 2005.
High Point	The High Point station finished a $8.5 million dollar rehabilitation project in December 2003.
Kannapolis	A new $2.7 million station and transportation center, which serves as a transfer point for local transit service, was completed in late 2004.
Marion	Restoration work began in August 2003 and the station should be restored to its 1916 appearance in 2005.
Morganton	Restoration work began in August 2003 and the station should be restored to its 1916 appearance in 2005.
Old Fort	Restoration work began in August 2003 and the station should be restored to its 1916 appearance in 2005.
Raleigh	Conceptual planning for a multimodal ground transportation center has been completed. After the TTA track alignment and funding have been approved, detailed design work on the new facility will begin.
Rocky Mount	The Rocky Mount Station's $9 million dollar rehabilitation was completed in 2000.
Salisbury	Historic Salisbury Foundation, Inc. acquired the station, saving it from demolition. They raised more than $3 million in private donations and restored the main waiting room and other parts of the station.
Selma	The Selma station is on the National Register of Historic Buildings, and underwent a renovation from 2001 to 2002 that cost $3.4 million dollars.
Southern Pines	NCDOT intends to team with the City of Southern Pines to refurbish the structure to its early 1900s appearance and color scheme.
Wilson	The Wilson Station recently completed a $2.4 million renovation that restored the original architecture and added long-term parking facilities. Construction was completed in April 2003.

3.6.9.3 Planned Service Improvements

NCDOT has worked with Amtrak, the railroads, and local communities to investigate potential improvements to existing intercity rail passenger services in the state. The most significant planned passenger rail improvements include:

- Western North Carolina Passenger Rail Initiative[11]
- Southeastern North Carolina Passenger Rail Feasibility Study[12]
- Southeast High Speed Rail Corridor[13]

More specific route information is provided in the sections that follow. However, it should be noted that the service characteristics proposed within each of these initiatives is subject to change as each service is in the early stages of development.

Western North Carolina Passenger Rail Initiative

The North Carolina General Assembly in 2000 directed NCDOT to study the feasibility of providing passenger rail service to western North Carolina. The March 2001 Western North Carolina Passenger Rail Study, which updated a similar report from 1997, recommended a phased implementation for passenger service and outlined the costs associated with each phase, as well as criteria to measure service performance. During the course of the studies, the operation and number of freight trains in the corridor increased markedly as Norfolk Southern added and rerouted trains between Salisbury and Asheville.

In March 2001, NCDOT adopted a phased plan to extend passenger rail service to Asheville and western North Carolina via a routing linking Salisbury, Statesville, Morganton, and Hickory. The plan includes renovating or building train stations that would incorporate other uses. Current budgetary constraints have prompted NCDOT to delay the return of passenger rail service to the mountains.

In April 2002, the department submitted to the General Assembly a summary of costs to make necessary track and signal improvements to safely and efficiently accommodate the 37 existing freight trains and four proposed passenger trains. Based on the state's current financial status and cost of track improvements, NCDOT has recommended delaying the start of passenger train service to western North Carolina. The delay could likely push the start date for train service back to 2008.

In the interim, NCDOT has continued to work with communities in western North Carolina to renovate historic stations that will incorporate other community uses, as reported above. NCDOT has also continued partnering with communities along the route to develop a

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[11] http://www.bytrain.org/future/western.html

[12] http://www.bytrain.org/future/southeastern.html

[13] http://www.bytrain.org/highspeed/

program of safety improvements to prevent train-vehicle crashes at railroad crossings between Salisbury and Asheville.

Southeastern North Carolina Passenger Rail Feasibility Study

In May 2001 the final report was issued for the Southeastern North Carolina Passenger Rail Feasibility Study that evaluated three possible routes for the reinstitution of rail service to Wilmington and the southeastern part of the State. The study indicated strong interest in passenger train service along the Wilmington - Raleigh routes and recommended that the department conduct more detailed analysis to help determine the best possible route. The final report, which will identify the total estimated costs, as well as the best route for passenger service and the costs and benefits associated with enhanced freight services, was originally scheduled to be completed in early to mid-2004. As of the date of the US 64–NC 49 Corridor Study Report, the project website [14] indicates that the Southeastern North Carolina Passenger Rail Feasibility Study is still ongoing. The following two candidate passenger service routings are being evaluated:

- Raleigh – Selma – Goldsboro – Warsaw – Wilmington
- Raleigh – Selma – Fayetteville – Pembroke – Lumberton - Wilmington

Southeast High Speed Rail Corridor

In October 2002, the Federal Railroad Administration and Federal Highway Administration confirmed and approved the preferred Southeast High-Speed Rail Corridor. North Carolina and Virginia are now identifying the next steps necessary to develop high-speed rail in each segment of the corridor and soon will begin more detailed environmental and engineering studies to examine different track configurations. In 2004, the state legislatures in North Carolina and Virginia passed legislation to form a bi-state compact that will facilitate implementation of high-speed rail service in the corridor.

The North Carolina and Virginia Departments of Transportation also completed a Tier I Environmental Impact Statement (EIS) for the Washington, DC to Charlotte, NC portion of the corridor. A series of agency scoping meetings and public workshops were held in summer 2003 for the Petersburg to Raleigh segment. A Draft Tier II EIS is now being prepared, which outlines the potential impacts for detailed designs through this segment. Once completed, these documents can be used to acquire the permits needed for construction based on available funding.

The Tier II EIS studies will address specific impacts within the context identified in the Tier I Record of Decision. Once the corridor has been selected, the Department will work to acquire access to the Southeast High-Speed Rail Corridor and make any necessary improvements to the rail line to accommodate freight rail service and 110 mph passenger rail service by 2010.

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[14] http://www.bytrain.org/future/southeastern.html

3.6.10 Existing Freight Systems

3.6.10.1 Railroads

The extensive network of freight railroads serving the state are shown in **Figure 3.47**. As of 2002, the American Association of Railroads (AAR) reported that there was a total of 3,345 miles of track in North Carolina.[15] This is a reduction from the 3,379 miles of track that was being operated in 1999 as reported in the *North Carolina Rail Plan 2000*.[16] In 2000, a total of 25 freight railroads operated on this system, two Class I railroads – CSX Transportation (CSXT) and Norfolk Southern Railway (NS) – and 23 shortline railroads. By 2002, AAR reported that the number of shortline railroads had decreased from 25 to 23. According to AAR, CSXT and NS operated a total of 2,580 miles of track in 2002 (77 percent of the total), with the remaining 765 miles operated by the 21 shortline railroads.

In 2002, AAR reported a total of approximately 109 million tons of freight carried by all of the railroads in North Carolina. This represents a decrease of about 20 percent from the reported 136 million tons of freight that was shipped or received by North Carolina railroads in 1999. Of the estimated 13.4 million tons of railroad freight traffic originating in North Carolina in 2002, the major products transported were chemicals (24 percent), nonmetallic minerals (19 percent), and lumber and wood products (14 percent). Of the estimated 58.3 million tons of railroad freight traffic terminating in the State in 2002, the major products were coal (49 percent), farm products (13 percent), and chemicals (10 percent).

In the US 64–NC 49 study area, railroad lines tend to operate either along the I-40/I-85 corridor to the north of US 64 and NC 49 (Norfolk Southern) or along the NC 24/27 corridor to the south of US 64 and NC 49 (Aberdeen, Carolina and Western Railway Company – ACWR). Branch lines off of these two main routes connect Greensboro with Siler City, High Point with Asheboro, and Lexington and Salisbury with Albemarle. The main east-west Norfolk Southern (NS) line through the region operates over the state-owned North Carolina Railroad (NCRR). This 317-mile-long railroad connects Charlotte to Morehead City, and includes the most active rail corridor in the state between Raleigh and Charlotte.

3.6.10.2 Trucking and Courier Services

Within the study area there are nearly 1,400 firms specializing in trucking and courier services[17]. Collectively, these firms employ approximately 39,000 individual and have annual national sales of nearly $5.0 billion. The trucking firms located in the study area are

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15 Association of American Railroads, *Railroad Service in North Carolina – 2002*, Washington, D.C., January 2004.

16 North Carolina Department of Transportation, *North Carolina Rail Plan 2000*, Raleigh, North Carolina, January 2001, Page 8.

17 As derived from employment information obtained from InfoUSA.

estimated to generate nearly 30,000 daily truck trips.[18] Three large trucking firms have their headquarters within the study area, including:

- Old Dominion Freight Line, Inc., a national trucking company, is based in High Point and employs more than 6,400 individuals.
- Kenan Transport Company specializes in liquid and dry bulk hauling, is based in Chapel Hill, and has more than 1,700 employees.
- Central Transport, Inc, a hazardous materials and waste transporter, is based in High Point and employs 460 persons.

Of the nearly 1,400 trucking firms in the US 64–NC 49 study area, a majority (84 percent) are engaged in traditional motor carrier services. Another eight percent of the firms specialize in moving services and six percent are engaged in specialized hauling, such as heavy hauling of oversize and overweight shipments, including mobile homes. The remaining firms specialize in other hauling activities, such as hazardous materials and waste.

3.6.11 Existing Aviation System

There are three commercial service airports within the study area: Charlotte-Douglas International Airport in Mecklenburg County, Piedmont Triad International Airport in Guilford County, and Raleigh-Durham International Airport in Wake County. A brief description of each of these facilities is presented below.

3.6.11.1 Charlotte-Douglas International Airport

The Charlotte-Douglas International Airport (CLT) is located to the southeast of the interchange between I-77 and I-85. As reported by the Federal Aviation Administration (FAA), CLT accommodated a total of 11.7 million boarding passengers in 2002 and 11.5 million boarding passengers in 2003. This ranked CLT as the 19th busiest commercial service airport in the United States in 2002 and as the 18th busiest airport in 2003.

The airport is served by a number of mainline carriers, including Air Canada, AirTran Airways, American Airlines, ATA Airlines, Continental Airlines, Delta Air Lines, Independence Air, Lufthansa, Northwest Airlines, United Airlines, and US Airways. In 2004, CLT was US Airway's largest hub.

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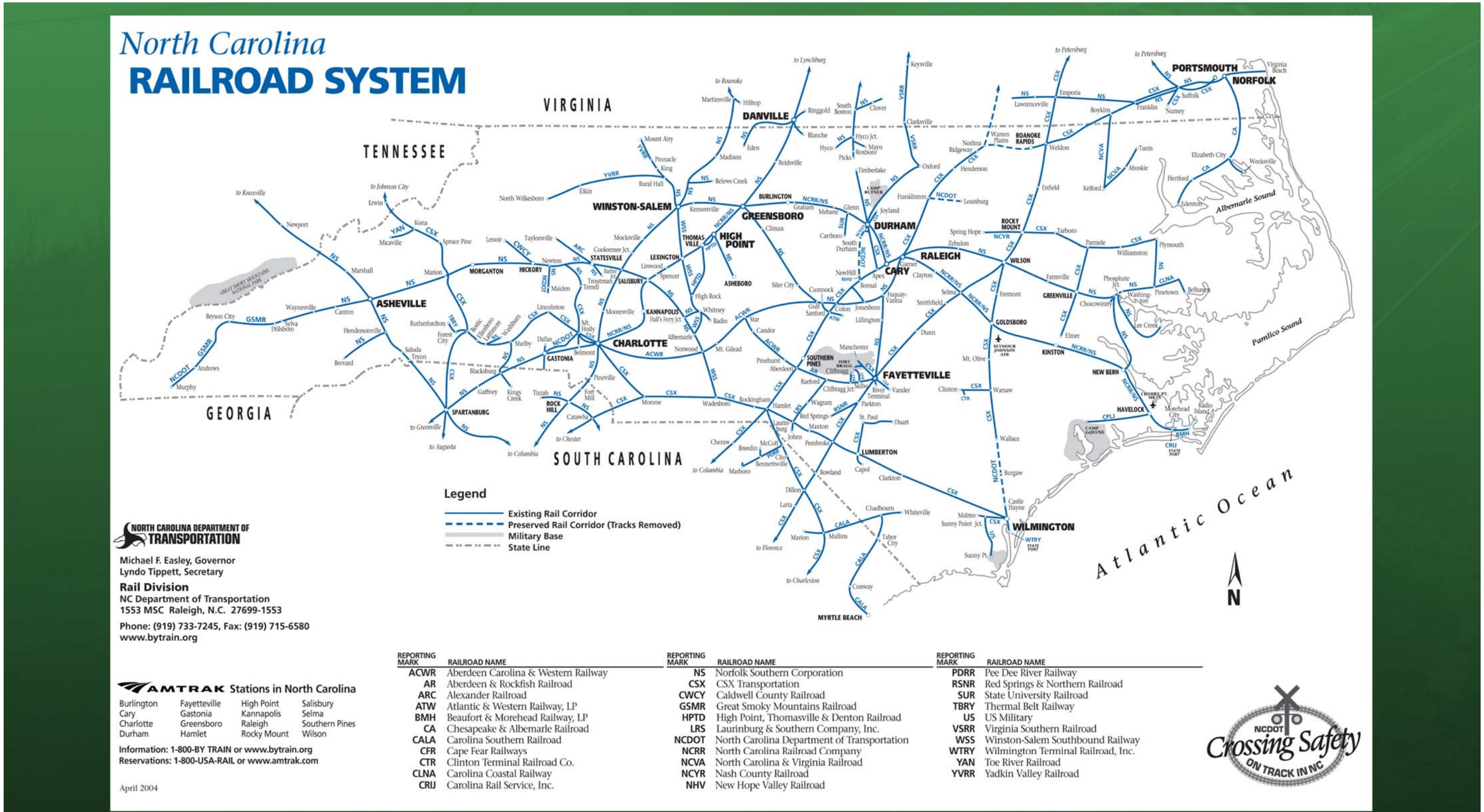
[18] Daily truck trip generation rate per employee for SIC 42 (Truck Transportation) based on average calculated from NCHRP 298, Transportation Research Board (2001).

Figure 3.47: Freight Rail



3.6.11.2 Piedmont Triad International Airport

Piedmont Triad International Airport (PTI) is located just northwest of Greensboro near the I-40 and NC 68 interchange. It is the primary airport for the cities of Greensboro, Winston-Salem, and High Point. During 2002, there were approximately 1.26 million passenger boardings at PTI. This ranked PTI as the 77th busiest commercial service airport in the United States during that year. FAA statistics for 2003 reported approximately 1.29 million passenger boardings, ranking PTI as the 78th busiest commercial airport in the country.

PTI is served by a number of mainline and commuter carriers, including: American Eagle, Continental Express, Delta Air Lines/Delta Connection, Independence Air, Northwest Airlines, United Airlines/United Express, and US Airways/US Airways Commuter,

3.6.11.3 Raleigh-Durham International Airport

Raleigh-Durham International Airport (RDU) is located 10 miles southeast of Durham and 10 miles northwest of Raleigh, just off I-40 near the Wake/Durham County line. RDU served 4.2 million passengers in 2002 and 3.9 million passengers in 2003. RDU ranked as the 42nd busiest commercial service airport in the United States in 2002, and the 44th busiest in 2003.

RDU is served by a number of mainline and commuter carriers, including: AirTran Airways, American Airlines/American Eagle, America West Airlines, Continental Airlines/Continental Express, Delta Air Lines/Delta Connection, Independence Air, Northwest Airlines, Southwest Airlines, United/United Express, US Airways/US Airways Commuter, and Air Canada.

Chapter 4 NEED FOR IMPROVEMENTS

As part of the US 64–NC 49 Corridor Study, the Study Team prepared what is referred to as a "problem statement" for the corridor. The problem statement describes how the US 64–NC 49 Corridor fits into the NCDOT Strategic Highway Corridors concept. It addresses transportation needs in the corridor on a broad scale, considering the corridor's existing and future role in meeting the state's regional transportation needs. The intent of the problem statement is to accomplish the following:

- Demonstrate how the corridor meets the criteria set forth in the NCDOT Strategic Highway Corridors concept.
- Describe the need for improvements to the US 64–NC 49 Corridor as they relate to the corridor's function as a Strategic Highway Corridor.
- Serve as a preface and supporting documentation for recommended future improvements that enter NCDOT's project development process and NCDOT's NEPA/404 Merger Process.
- Promote opportunity for early resource agency and stakeholder involvement and input on concerns regarding future improvements in the corridor.

The problem statement is distinct from project-level purpose and need statements that are prepared as part of project development activities conducted in compliance with the National Environmental Policy Act (NEPA) of 1969, as amended. It is part of a systems-level planning process and is not part of a NEPA document for a specific project. The problem statement helps establish a statewide and regional framework that can shape corridor-level recommendations for future projects and can influence individual projects' purpose and need statements and criteria for alternative evaluation. The information in the problem statement and the results of this corridor study can be incorporated into planning and environmental documents and purpose and need statements associated with future project-level improvements that may be proposed by NCDOT or other entities.

The factors and conditions that substantiate the need for an improvement vision for the US 64–NC 49 Corridor as developed for the problem statement are discussed on the following pages. The factors and conditions are organized based on the purposes of the Strategic Highway Corridors concept as well as the Strategic Highway Corridors selection criteria as developed by NCDOT and as adopted by the North Carolina State Board of Transportation.

4.1 Criterion – Mobility

Mobility is defined as the ability to move people and goods between two points. Improvements to mobility can result in faster travel, more reliable transportation, greater travel options, and reduced travel costs

Long-distance east-west mobility across the central portion of North Carolina is compromised at the present time by the limited number of available high-speed facilities. I-40 and I-85 are the only full control of access facilities traversing east-west across the central portion of the state, which is the most heavily populated and urbanized area of North Carolina. Between Greensboro and Burlington, I-40 and I-85 share a common roadway. These Interstates carry large numbers of commercial vehicles, short distance local travelers, and long-distance travelers. Extended periods of congestion are prevalent in the urbanized areas through which I-40 and I-85 pass.

The US 64–NC 49 Corridor is the most direct alternative corridor to I-40 and I-85. US 64 from Statesville to Raleigh is a part of the National Highway System. The segment of NC 49 from Charlotte to Asheboro is a designated National Scenic Byway. Both US 64 and NC 49 operate over a mix of different highway facility types within the study area including freeway; five-lane arterial; four-lane, divided highway; and two-lane, rural highways. The US 64–NC 49 Corridor serves local, regional, and long distance travel and is within a region that is heavily traveled by truckers and motorists, including commuters, business travelers, and, to a lesser extent, recreational visitors.

Origin and destination surveys conducted for this study show that truckers and travelers are making long-distance interstate and intercounty trips in and through the central portion of North Carolina, and some travelers appear to be consciously diverting to US 64 and NC 49 as an alternative to using I-40 and I-85. These current freight carriers and travelers could benefit from more efficient route options between Raleigh and Charlotte and Raleigh and Statesville.

4.2 Criterion - Connectivity

Existing major activity centers served either directly or indirectly (via US 421) by the US 64–NC 49 Corridor include Charlotte, Concord, Kannapolis, Greensboro, High Point, Winston-Salem, Burlington, Durham, Chapel Hill, Cary, and Raleigh. The Corridor also serves the major airports in Charlotte, the Triad, and the Triangle areas.

US 64 and NC 49 provide east-west connectivity between several north-south Interstate routes in the regional study area:

- US 64 between Statesville and Asheboro connects I-77, I-40, I-85, and I-73/I-74.
- NC 49 between Charlotte and Asheboro connects I-85, I-485, and I-73/I-74.
- US 64 between Asheboro and Raleigh connects I-73/I-74, the future I-540, I-440, and I-40.

Improvements to the US 64 and NC 49 would improve connectivity between the major activity centers along and in the vicinity of these routes and to the north-south oriented Interstate routes in the region.

4.3 Criterion – Interstate Reliever

Information obtained from the origin-destination travel surveys and stakeholder interviews indicate that US 64 and NC 49 are currently being used by travelers as viable alternatives to the parallel Interstate routes. This can be attributed to location and direct connection US 64 and NC 49 provide to Interstates connecting major activity centers within the region. As described above, the US 64–NC 49 Corridor provides connections to I-77, I-40, I-85, I-73/I-74, I-485, and I-440. These Interstates provide high-speed mobility, accessibility, and connections to North Carolina's major metropolitan areas, its capital city and emerging developments, as well as providing a linkage between the central portion of North Carolina and adjacent states.

Although I-40 and I-85 provide access to numerous cities and activity centers in the region, Interstate mobility from the Raleigh area west to Charlotte and Statesville is hindered by the congestion through the urban centers. Not unexpectedly, virtually all of the I-85 corridor in Mecklenburg County experiences heavy congestion throughout much of the day, with LOS E or F conditions observed during peak travel periods. Heavy congestion levels also were identified along the portion of I-40 between Winston-Salem and Greensboro and along the I-40/I-85 overlap section to the east. Similar high congestion levels are prevalent in the Raleigh/Durham area on I-40.

Travel time surveys were conducted to determine average travel times between Raleigh and Charlotte, and between Raleigh and Statesville using I-40 and I-85 compared to using US 64 and NC 49. The surveys showed essentially identical travel times between the same defined beginning and ending points along the corridor, regardless of whether the Interstate or state highway routings were used. Therefore, it appears intuitively obvious that any improvements to US 64 and NC 49 would allow these routings to offer competitive travel times to those achieved on the Interstate System. In turn, this would seem to have the potential to divert some appreciable percentage of Interstate traffic onto this defined Strategic Highway Corridor.

Travel demand forecasts prepared as part of this study for the year 2030 anticipate substantial increases in both locally generated and through travel demands on both the I-40/I-85 and US 64–NC 49 corridors. Given the location of the urbanized portions of I-40 and I-85 and the substantial amount of adjacent development that presently exists, it is unlikely that significant additional widenings beyond those identified in the current NCDOT TIP can be accomplished along these segments of I-40 and I-85. Thus, over the long term, improvements to alternative travel corridors such as US 64 and NC 49 will be needed to ensure the continuation of adequate regional and statewide mobility.

4.4 Purpose – Foster Economic Prosperity

Coordination with local stakeholders provided information on future conditions within their respective municipalities. Information obtained through these coordination efforts uncovered that many of the communities believe that transportation alternatives are vital to their prospective economic initiatives and development needs. US 64 over its entire length and the portion of NC 49 in the areas of Harrisburg and Mount Pleasant are both viewed as vital public infrastructure elements of future growth plans for the communities through which they pass. While many of the municipalities in the study area will continue to serve as "bedroom communities" for regional commuters, several stakeholders envision their county or municipality as becoming more self-supporting with a mixture of residential and commercial/service growth available to encourage a viable tax base.

The Yadkin-Pee Dee Lakes Project is a formal effort to develop the region as a major tourism/recreational and cultural/historic destination. The region already possesses many of these types of features (i.e. Badin Lake, Seagrove Pottery, Uwharrie National Forest, North Carolina Zoo, etc.), and there is a strong desire to promote the concept of the area as a distinct region in terms of its geographic and economic significance. The Yadkin-Pee Dee Lakes Project, also known as the "North Carolina Central Park Project," seeks to take advantage of the area spanning Charlotte to Raleigh/Durham. With this area lying at the junction of US 64 and NC 49, any improvements to these facilities would serve to further enhance and strengthen the development of the region.

4.5 Purpose – Protect the State's Transportation Investment

The currently adopted NCDOT TIP includes approximately 412 Interstate, rural, and urban roadway projects in the 19-county regional study area. In some instances, these are either multiple phases (planning, design, right-of-way acquisition, and construction) of a single major project or individual segments of a large corridor improvement. The total estimated cost of these projects in 2004 dollars is $18.4 billion.

Projects on I-40 and I-85 include enhancements to portions of I-85 between Charlotte and Greensboro and portions of I-40 between Winston-Salem and Raleigh. These range from major pavement rehabilitations and interchange modifications to the construction of additional through travel lanes.

There are several improvement projects along US 64 and NC 49 currently contained in the NCDOT TIP. These include the four-lane Asheboro Bypass (TIP Project R-2536), the two-lane Mocksville Bypass (TIP Project R-3111), the widening of US 64 from two to four-lanes between Mocksville and Lexington (TIP Project R-3602) and between Lexington and Asheboro (TIP Project R-2220), the widening of NC 49 from two to four-lanes between Harrisburg and the Yadkin River (TIP Project R-2533) and between the town of Farmer and

the Asheboro Bypass (TIP Project R-2535), and the six-lane widening of US 64/US 1 from the US 64/US 1 interchange to Walnut Street (TIP Project U-3101).

There are finite funds available for transportation system improvements throughout North Carolina. Prioritizing needs and having a clear vision of the ultimate function of the US 64–NC 49 Corridor will help direct funds for projects beyond the timeframe of the TIP more efficiently and could help preserve the functioning of the corridor as a major travel facility for a longer term.

4.6 Purpose – Promote Environmental Stewardship

The NCDOT Environmental Stewardship Policy (February 7, 2002) states NCDOT is "committed to planning, designing, constructing, maintaining and managing an interconnected transportation system while striving to preserve and enhance our natural and cultural resources." Environmental stewardship includes "safeguarding the public's health by conducting our business in an environmentally responsible manner, demonstrating our care for and commitment to the environment, and recognizing that our customers expect us to provide mobility and a quality of life that includes the protection of the natural resources and the cultural and social values of their community."

The US 64–NC 49 Corridor passes through or adjacent to numerous communities and several environmentally sensitive areas. The US 64–NC 49 Corridor provides a vital transportation link for the following major communities: Raleigh, Cary, Apex, Pittsboro, Ramseur, Siler City, Asheboro, Mocksville, Statesville, Richfield, Harrisburg, and Charlotte. In many of these communities, there are stretches of commercial or mixed development adjacent to US 64 or NC 49 that could be disrupted or relocated by improvements to the existing facilities.

Environmentally sensitive natural resources along the corridors include, but are not limited to, historic architectural sites, forested lands, Jordan Lake, the Haw River and its surrounding natural areas, Uwharrie National Forest, Badin Lake, and numerous streams with their associated floodplains and wetlands.

As individual transportation projects develop along US 64 and NC 49, early identification of these areas and resources as provided in this document will aid in future preparation of environmental documents required under the National Environmental Policy Act (NEPA), if federal funds are involved, or the NC State Environmental Policy Act (SEPA). NEPA and SEPA require detailed evaluation of environmental and social issues in the design and implementation of a transportation project.

Early planning and an overall vision for the entire corridor, along with the early involvement of local communities and state and federal resource agencies, can provide opportunities for long-term collaboration on preserving and enhancing natural resources in the corridor area

and for consideration of how the corridor's overall vision and the development of individual projects can help preserve the cultural and social values of communities along the corridor.

As local communities continue to grow, the information on environmental and social resources along the corridor that has been assembled as part of this corridor study can be used to aid their continuing street and infrastructure planning efforts.

Chapter 5 DEFINITION OF ALTERNATIVES

This chapter describes the conceptual improvement alternatives that were subjected to a formal evaluation as part of the corridor study. The alternatives are defined in terms of both physical and operational characteristics, which include typical roadway cross section, operating speed, right-of-way width, and access allowances. The definitions are broad in scope and are intended to represent varying degrees of financial investment.

5.1 No-build Alternative (Baseline)

The No-build Alternative serves as the baseline or benchmark against which the Build Alternatives are evaluated. Typically, a No-build Alternative is defined as an alternative that incorporates "planned" improvements that are included in the fiscally constrained long-range plan, and/or "committed" improvements such as those in the state DOT's transportation improvement program (TIP) or local agency's capital improvement program (CIP). However, the US 64–NC 49 Corridor Study is evaluating the compilation of all of the currently "planned" and "committed" improvements to US 64 and NC 49 as an investment alternative. Therefore, for the purposes of this study, the No-build Alternative is defined as only the "existing" facility for US 64 and NC 49, which consists of the present physical and operational condition of the facility, plus those improvements that were under construction at the time of the analysis. The remaining transportation network within the study area includes committed and planned improvements as defined previously.

Figure 5.1 shows the existing number of lanes on US 64 and NC 49. The two-lane and five-lane sections have no control of access. The four-lane highway sections have variable levels of access control, depending on location, but tend to a large degree to have no control of access. Freeway sections have full control of access. **Figures 5.2** through **5.5** present photographs that provide typical roadway characteristics that are representative of the corridor at large.

5.2 Build Alternatives

Four Build Alternatives were defined for this study. These alternatives address the project objectives and encompass a range of investment options. The definitions describe the primary physical and operational characteristics of each alternative and are consistent with the NCDOT facility type and control of access definitions provided in **Appendix E**. Descriptions of the Build Alternatives are provided in the following sections.

Figure 5.1: Existing Number of Lanes on US 64 and NC 49

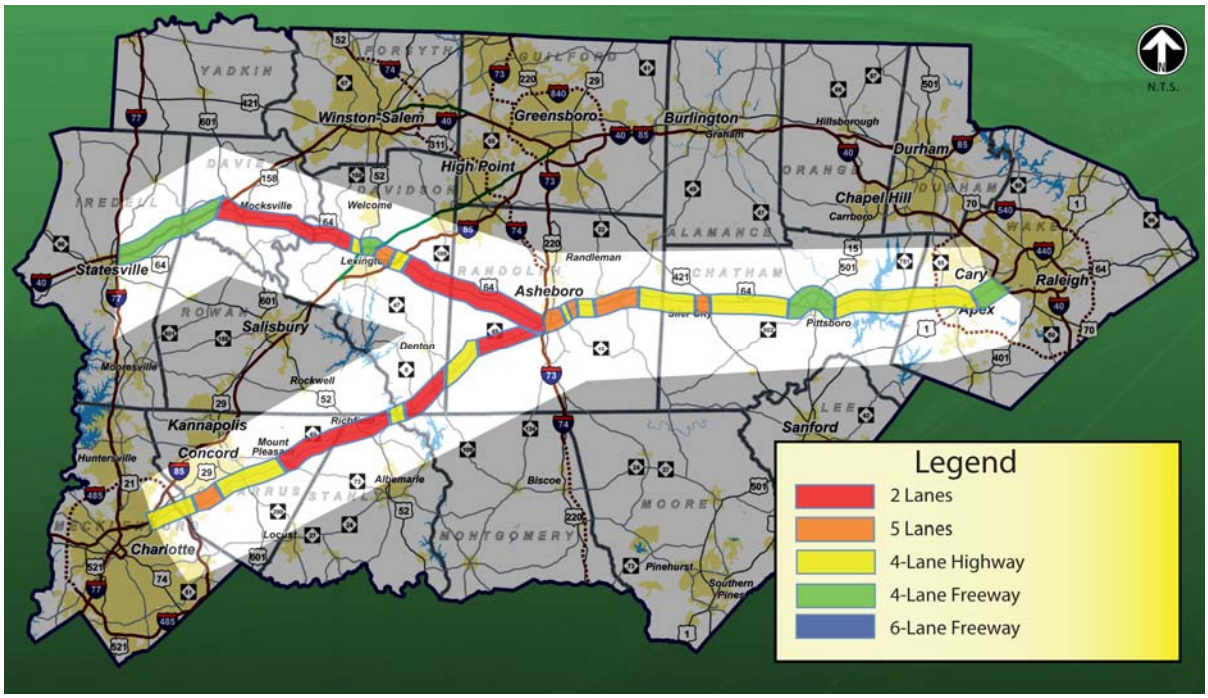


Figure 5.2: Typical Two-lane Roadway Section

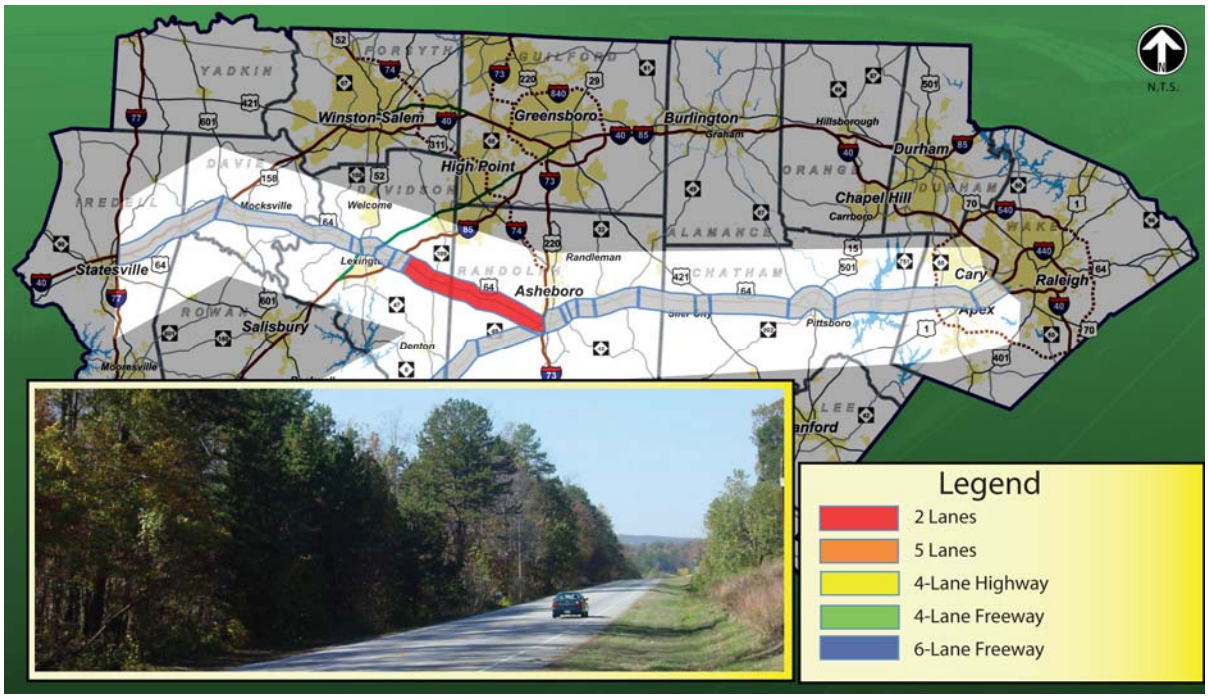


Figure 5.3: Typical Five-lane Roadway Section

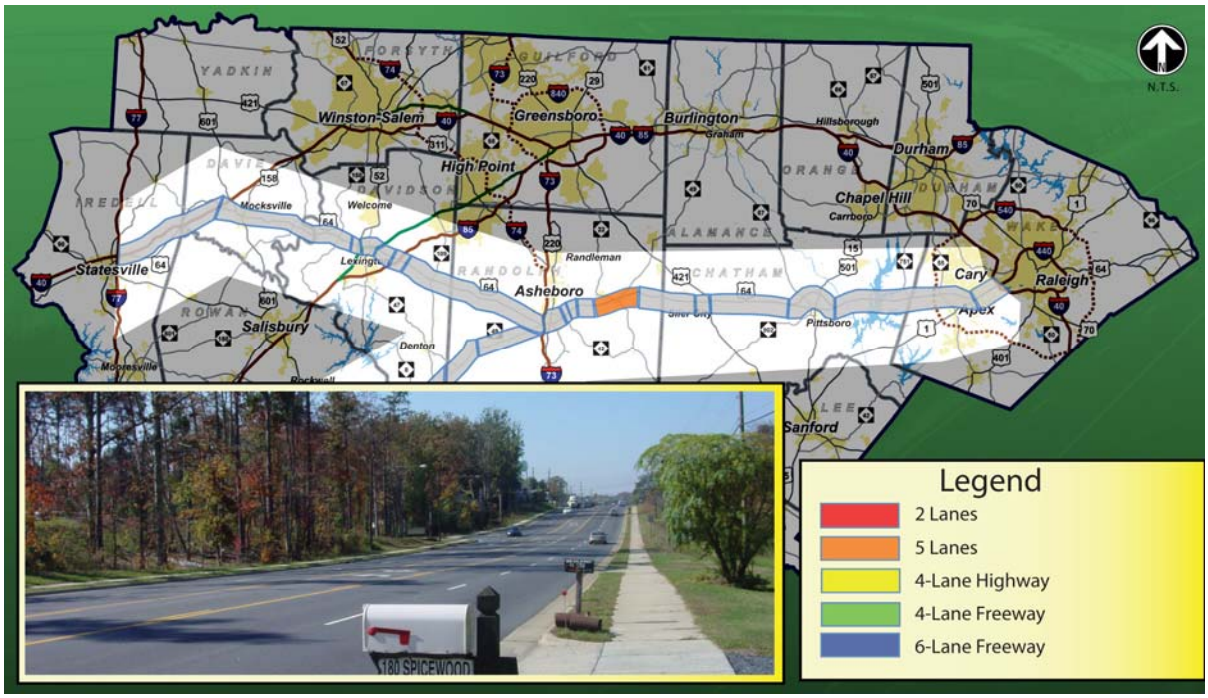


Figure 5.4: Typical Four-lane Highway Section

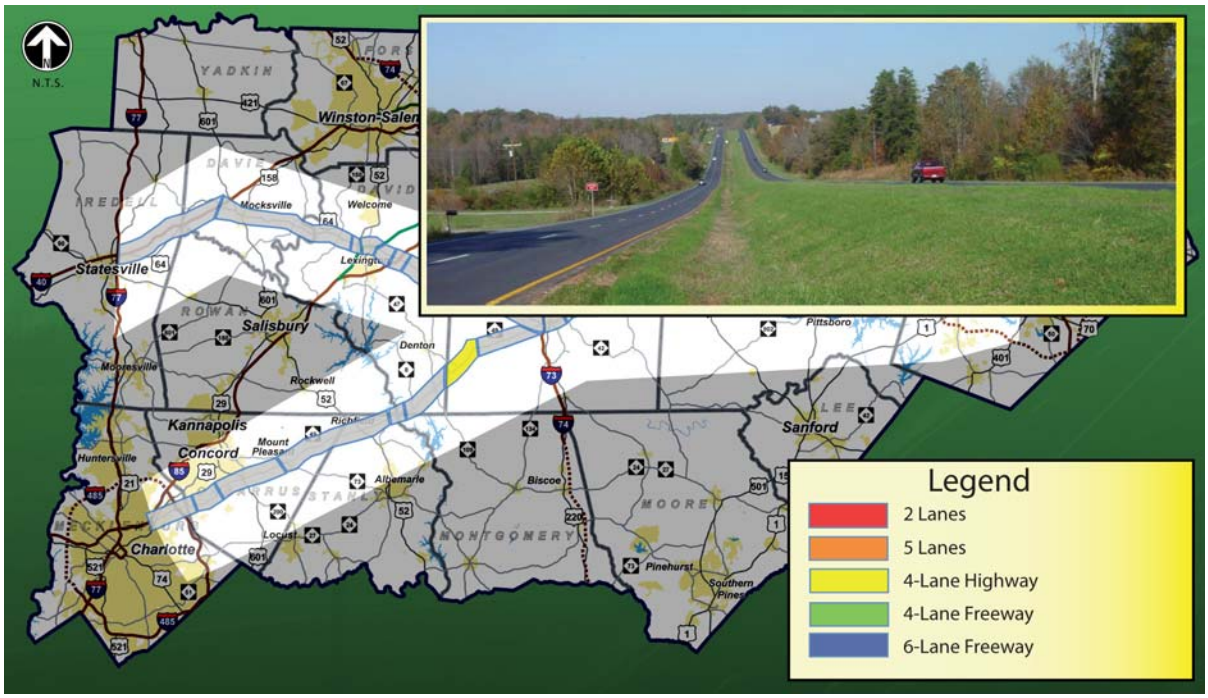
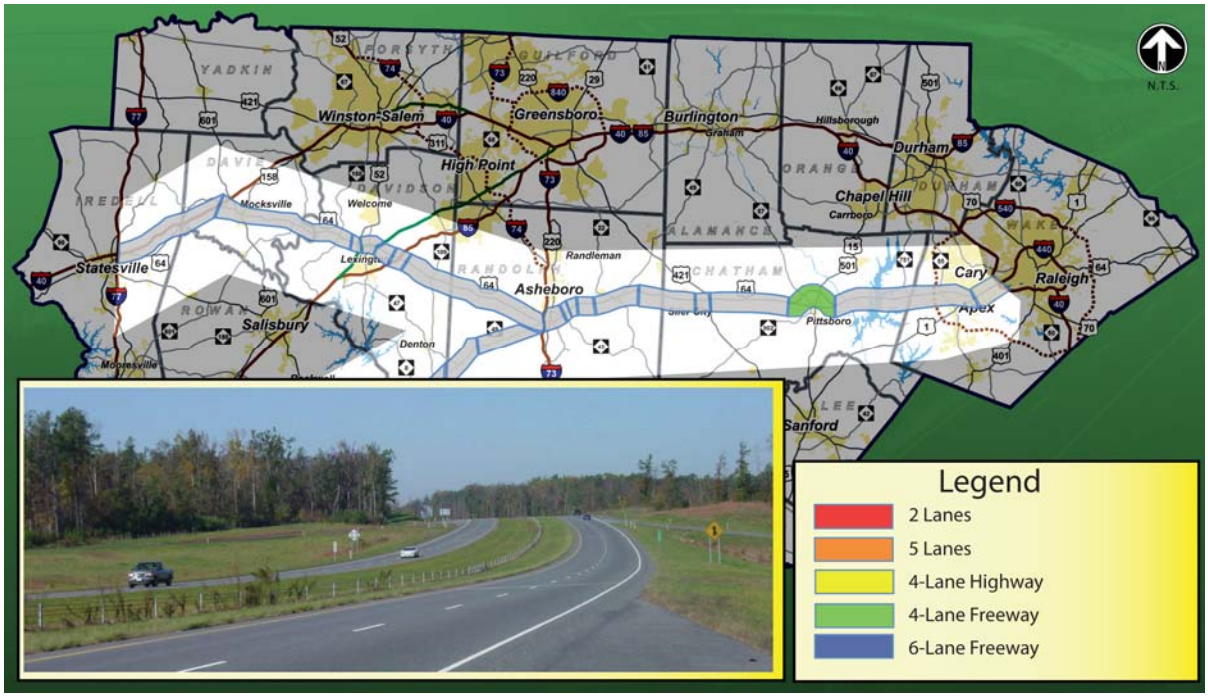


Figure 5.5: Typical Freeway Section



5.2.1 Existing plus Committed (E+C) Alternative

"Committed" for this alternative is defined as those improvements contained in the financially constrained long-range transportation plans (LRTPs), the NCDOT TIP, and local capital improvement programs. For the sections of US 64 and NC 49 proper through the study area, the only "committed" projects are those in the state's TIP for Fiscal Years (FY) 2004-2010. Descriptions of the TIP Projects are provided in **Table 5.1** (This information is identical to that in Section 3.6.5.1)

Table 5.1: US 64 and NC 49 NCDOT TIP (2004-2010) Projects

ROUTE	TIP #	LIMITS	LENGTH	IMPROVEMENT
NC 49	R-2533	Harrisburg to Yadkin River	29.3 mi.	Widen to multi-lanes.
NC 49	R-2535	SR 1174 West of Farmer to Asheboro Bypass (R-2536) West of SR 1193	9.7 mi.	Widen to four-lane, divided facility.
US 64	R-2220	East of I-85 Bus. in Lexington to US 220 in Asheboro	28.5 mi.	Widen to four-lanes

Table 5.1: US 64 and NC 49 NCDOT TIP (2004-2010) Projects

ROUTE	TIP #	LIMITS	LENGTH	IMPROVEMENT
US 64	R-3111	US 64 East of Mocksville to US 601 West of Mocksville.	6.1 mi.	Two-lane Bypass on four-lane R/W.
US 64	R-3602	US 601 South of Mocksville to US 52 in Lexington.	14.0 mi.	Widen to multi-lanes and upgrade interchange at US 52.
US 64	R-2536	US 64 West to US 64 East.	13.5 mi.	Four-lane freeway on new location with interchanges at US 220, NC 49, and zoo access at NC 159.
US 64/ US 1	U-3101	US 64 to South of SR 1313 (Walnut Street).	2.6 mi.	Rehabilitate pavement, additional travel lanes, and modify SR 1313 interchange.

Figure 5.6 shows the number of lanes and general facility types that would result across the study corridor following implementation of all defined elements of the E+C Alternative. Alternative characteristics are provided in **Table 5.2**.

Figure 5.6: E+C Alternative – Number of Lanes

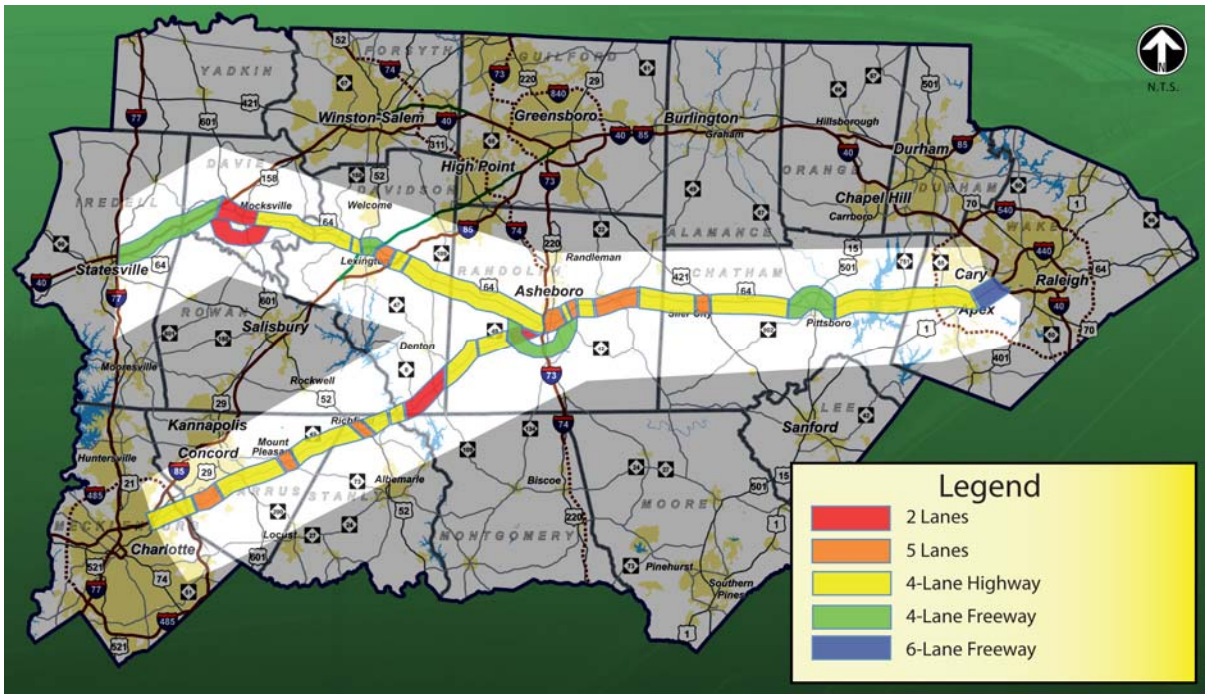


Table 5.2: E+C Alternative Characteristics

Operating Speed	Less than 55 mph
Right-of-way	Varies
Type of Access	• Interchanges. • Signalized intersections. • Unsignalized intersections. • Driveway access.

5.2.2 E+C Enhanced Alternative

An enhancement of the E+C Alternative would provide for a continuous four-lane, divided facility from Charlotte to Asheboro and from Statesville to Asheboro and on to Raleigh. Major improvement elements of the E+C Enhanced Alternative include the following:

- Implement all TIP projects.
- Upgrading all remaining two-lane segments to four-lane, divided roadways. (Mocksville Bypass (A)[1] and two-lane segment of NC 49 (B) in Davidson County)
- New location of four-lane, divided segments with full access control around urban areas now planned to have or presenting having five-lane sections. (Harrisburg (C), Mount Pleasant (D), Richfield (E), Ramseur (F), Siler City (G), and Lexington (H) between I-85 Business and I-85)
- Enhancement of the four-lane, divided section of US 64 through Lexington (I) to improve safety and operations.
- Freeway-to-freeway interchanges (free-flowing) at other freeways (J).
- Consolidation of driveways along all existing and committed four-lane, divided segments.
- Conversion of signalized intersections with major crossroads to grade-separated interchanges where appropriate along all existing and committed four-lane, divided segments.

Figure 5.7 identifies where the suggested improvements to the E+C Alternative would be made to create the E+C Enhanced Alternative. The general characteristics of the E+C Enhanced Alternative are described in **Table 5.3.** The E+C Enhanced Alternative improves the US 64–NC 49 corridor to a combination of a Freeway, Expressway Type-I and Expressway Type-II, as indicated in the NCDOT *Facility Type & Control of Access Definitions* in **Appendix E**.

[1] Project identifier as shown in Figure 5.7.

Figure 5.7: E+C Enhanced Alternative Improvement Locations

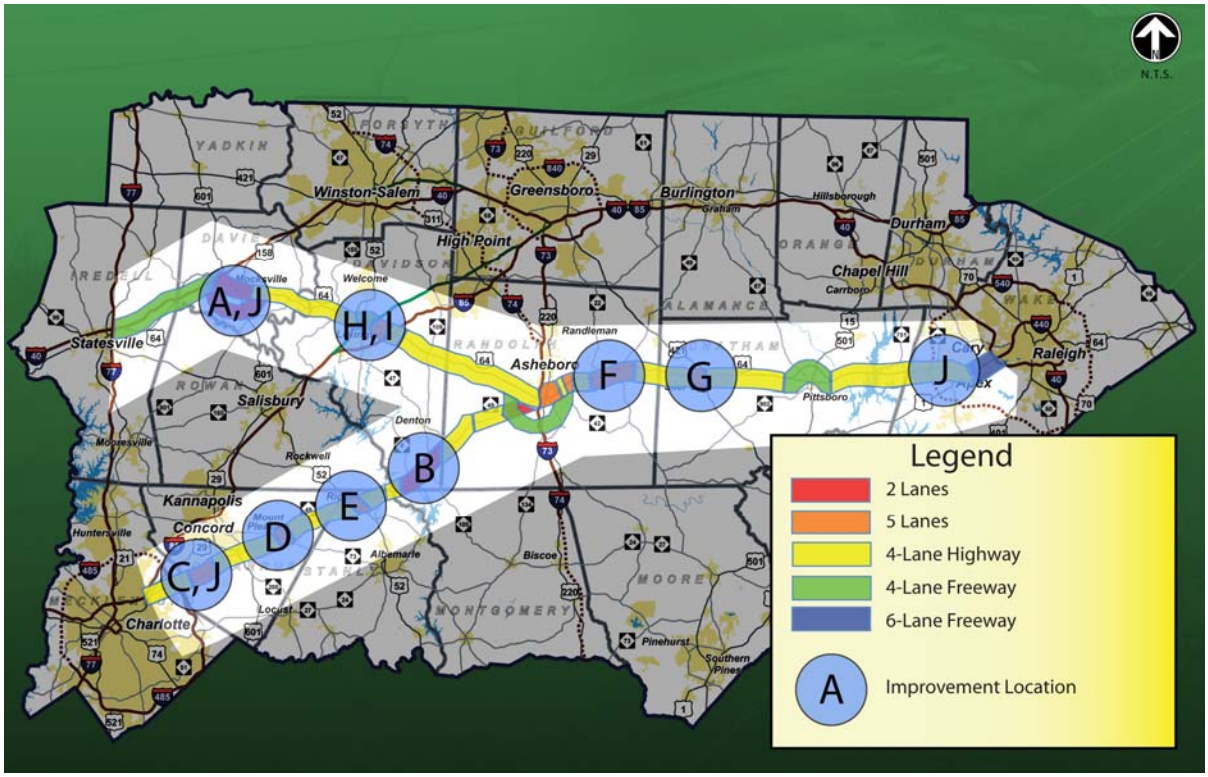


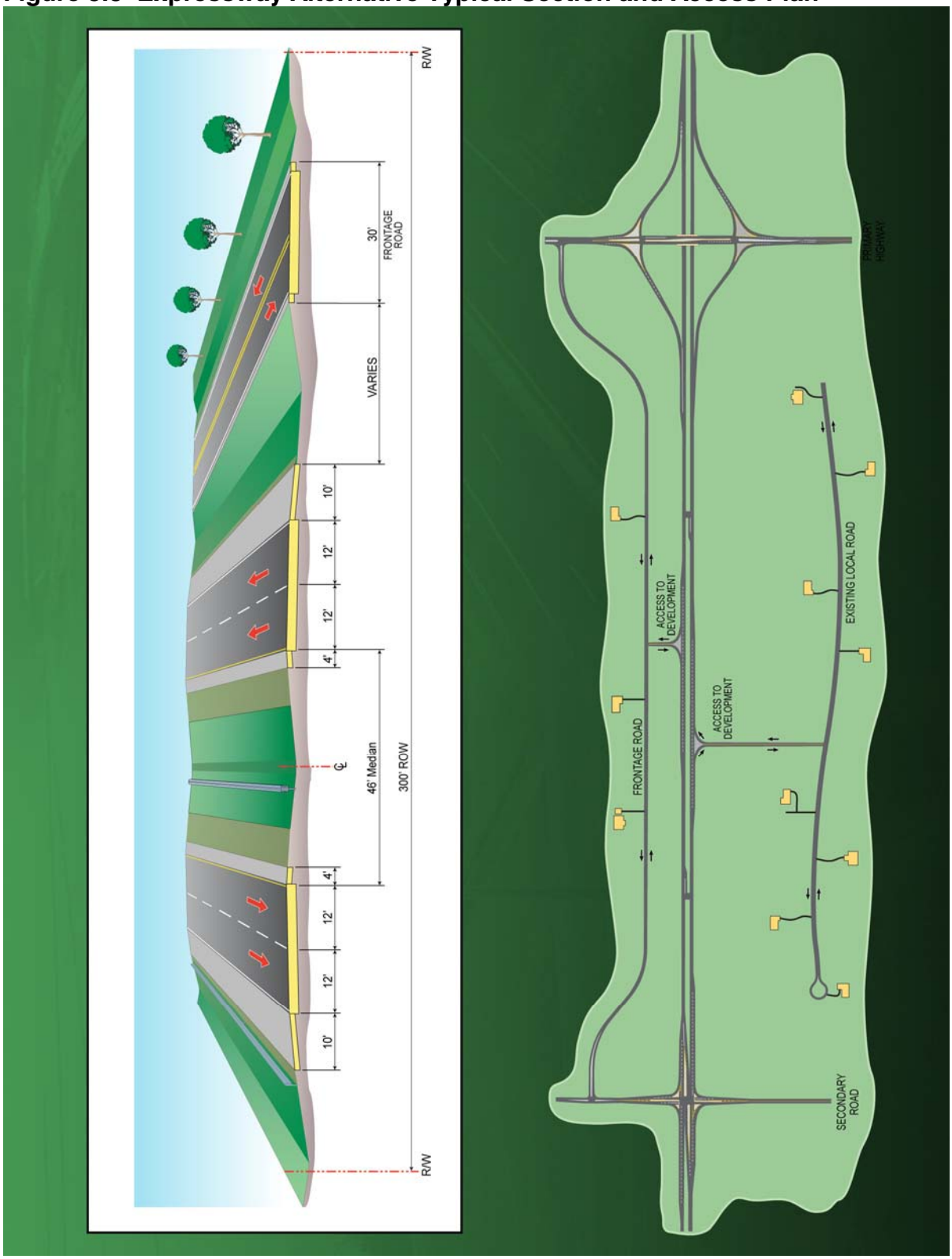
Table 5.3: E+C Enhanced Alternative Characteristics

Operating Speed	55 mph +
Right-of-way	250 feet +
Type of Access	• Interchanges. • No new signalized intersections with removal or bypassing of existing signalized intersections. • Consolidated driveway access.

5.2.3 Expressway Alternative

The Expressway Alternative is consistent with the NCDOT Expressway-Type I facility type definition. It provides high mobility with low to moderate direct access to adjacent land parcels. The general characteristics of this alternative are outlined in **Table 5.4**. The typical section is a four-lane, divided highway with a frontage or access road to one side. Access to the facility would be accomplished via interchanges, unsignalized intersections, and consolidated drives. A typical roadway cross section and access plan are shown in **Figure 5.8**. Major elements of the Expressway Alternative include the following.

Figure 5.8 Expressway Alternative Typical Section and Access Plan



- Four-lane, divided roadway with full control of access on new location around urban areas.
- Freeway-to-freeway interchanges (free-flowing) at other freeways.
- Utilization of existing two-lane segments as a frontage road where applicable.
- Utilization of existing four-lane segments in part or whole through access consolidation and implementation of frontage roads.
- Conversion of significant existing at-grade intersections to grade-separated interchanges.

Table 5.4 Expressway Alternative Characteristics

Operating Speed	55 mph +
Right-of-way	300 feet
Type of Access	• Interchanges. • Unsignalized intersections • Consolidated driveway access.

5.2.4 Freeway Alternative

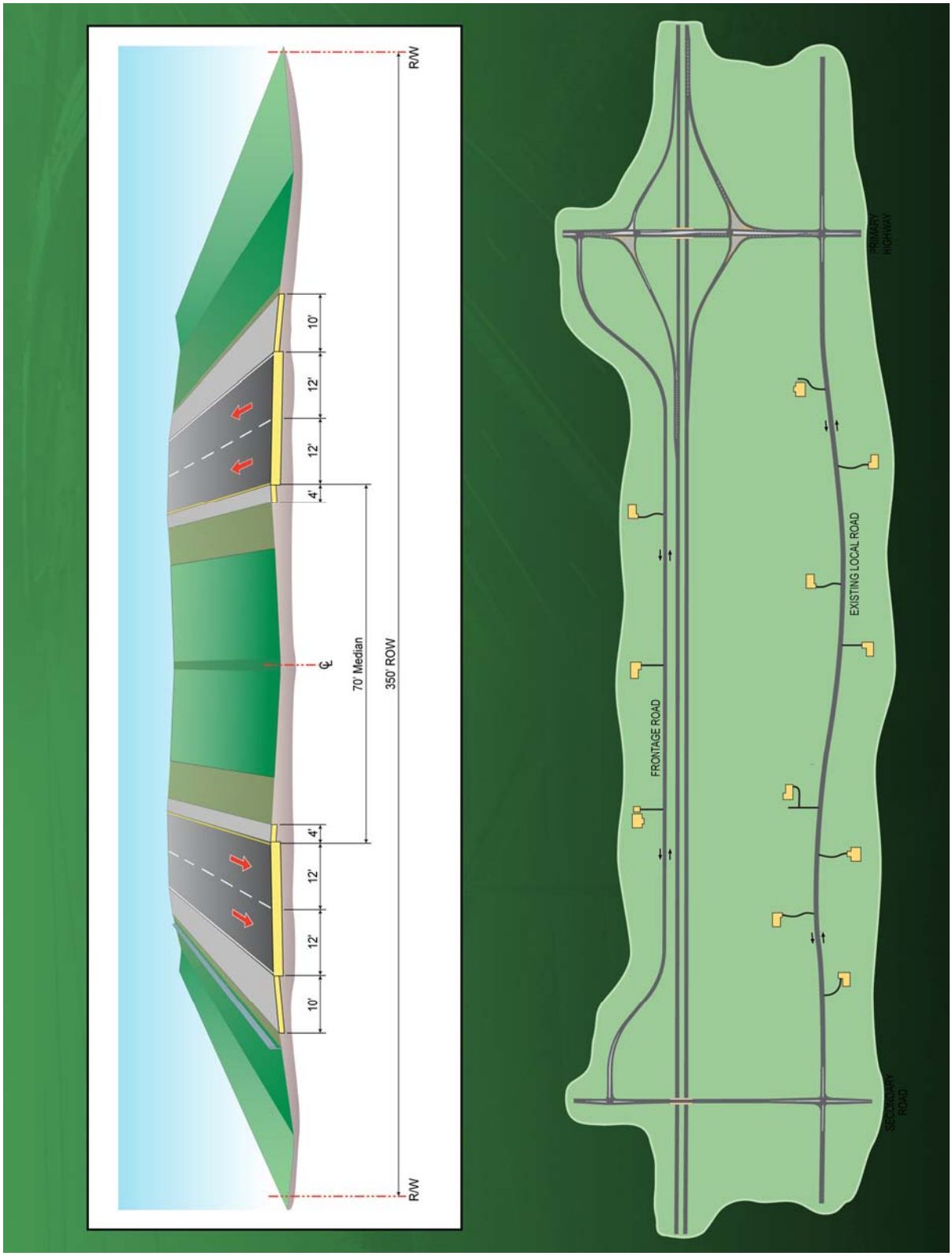
The Freeway Alternative provides high mobility and full control of access. The general facility characteristics for this alternative are outlined in **Table 5.5**. The typical roadway section is similar to the Expressway Alternative with the exception of a wider median as dictated by a higher design speed. The typical roadway cross section and access plan are shown in **Figure 5.9**. Major elements of the Freeway Alternative include the following:

- Four-lane, divided roadway with full control of access on new location around urban areas.
- Freeway-to-freeway interchanges (free-flowing) at other freeways.
- Utilization of existing two-lane segments as a frontage road where applicable.
- Utilization of existing four-lane segments in part or whole through upgrading mainline horizontal and vertical geometry, implementation of frontage roads, and access modifications.
- Interchanges with state highways and higher traffic volume county roads.

Table 5.5: Freeway Alternative Characteristics

Operating Speed	65 mph +
Right of Way	400 feet
Type of Access	Interchanges only

Figure 5.9: Freeway Alternative Typical Section and Access Plan



Chapter 6 TRAVEL DEMAND FORECASTING

Large and complex highway planning exercises often use travel demand forecasting models to help analyze the need for alternative highway investments. For Phase 1 of the US 64–NC 49 Corridor Study, the Study Team developed a transportation model as a forecasting tool that would be capable of producing reliable, order-of-magnitude estimates of both the potential increases in travel demand across the study area resulting from projected population and employment growth and the potential traffic diversion effects of providing additional highway capacity along the US 64–NC 49 Corridor. For these and other measures of effectiveness, the sketch-planning forecasting tool supplied information to confirm the need for congestion and mobility relief in the corridor and to judge the relative merits of the alternatives studied in addressing these needs.

6.1 Methodology

The US 64–NC 49 Corridor transportation model uses a conventional and sequential four-step process (trip generation, trip distribution, mode choice, and traffic assignment). The Study Team has implemented the travel demand forecasting model process in software using the TransCAD platform. TransCAD, NCDOT's primary modeling software, is one of several commercially available software packages designed for customized travel demand forecasting of the type produced for this study.

As a way of simplifying the very complex factors underlying the region's demand for travel, the model estimates the amount of all trip-making by trip purpose. Work and Non-Work travel with one end of the trip at home are considered separately, as are trips with neither end of a trip at home (Non-Home Based), long-distance travel (defined as travel greater than 100 miles), and travel starting and/or ending outside the state of North Carolina (defined as regional traffic). Truck travel is stratified by vehicle type: light, medium, and heavy trucks. While these categorizations are simplifications, they nonetheless allow for the development of a traffic forecasting model that is sensitive to the unique travel characteristics of the different travel markets that exist in the US 64–NC 49 regional study area.

The four-step process consists of the following basic elements.

- **Trip Generation:** Trip generation estimates the number of trips "produced" by households and "attracted" to shopping and job centers, without regard to the origin and destination of these trips. For non-truck travel, trip generation production rates are stratified by area type (Central Business District, urban and rural), auto ownership, and household size. Attraction rates are stratified by area type and seven employment types (retail, wholesale, service, construction, agriculture/forestry, transportation, and other). For truck travel, trip generation (attraction and production) rates are stratified by five categories of employment (agriculture/mining/construction, manufacturing/transportation/wholesale, retail, services, and other). The rates were derived from the National Cooperative Highway Research Program (NCHRP) 365 "Quick Response" manual.

- **Trip Distribution:** Trip distribution assigns a start and end point for each trip. The gravity model used in this study accounts for the distance between population and employment centers as well as the relative size of each location in developing production/attraction trip tables for each purpose. The gravity model used for trip distribution generates impedances using an exponential form, where the exponents have been derived (with slight modifications) from a statewide traffic forecasting model developed for the Missouri Department of Transportation (MODOT). The MODOT model includes trip table estimates based on information from a recently-completed statewide household interview survey for an area comparable to the model region for the US 64–NC 49 study. For this reason, the Study Team concluded the MODOT trip table estimates to be a reasonable proxy for the US 64–NC 49 model in the absence of statewide interview data for North Carolina. Trip tables are developed for all day travel, using appropriate production/attraction factors derived from NCHRP 365. The transportation model for this study was calibrated to average annual daily traffic conditions only.

- **Mode Split:** Traditionally, the mode split step assigns person trips to a mode of travel such as highway, bus, rail, high occupancy vehicle, etc, based on relative differences in travel time and cost for each mode. However, this model converts estimated person trips to highway vehicle trips only, through the application of trip-purpose specific vehicle occupancy factors derived from NCHRP 365.

- **Trip Assignment:** In trip assignment, vehicles choose their routes along the highway network based on their origin and destination, the travel time between origins and destinations via reasonable travel paths, and the level of congestion on the available roadways. Auto trips, light/medium truck trips, and heavy-duty truck trips are considered separately in this process.

6.2 Model Network

In its level of detail and sophistication, the transportation model was designed for consistency with the objectives of this phase of study. The model was constructed to capture changes in longer-distance (inter-urban) flows of autos and trucks that result from significant changes in highway capacity, household growth, and employment growth. In contrast, transportation models developed and used by Metropolitan Planning Organizations, such as those in Charlotte, the Triad, and the Triangle, are designed to capture traffic demand within a metropolitan region. They are designed to capture the impact of small scale changes in travel times and costs on travelers' mode of travel, their choice of routes, and their choice of destination.

The land use activities used in the trip generation step are represented as aggregated areas corresponding to 2000 US Census tract geography in a 24-county core model area (the previously defined 19-county primary corridor study area and the immediately adjacent counties that include major regional highway junctions/decision points) and as entire counties

in the rest of the state. In all, there are 904 traffic analysis zones, of which 740 lie within the core model area. The highway network in this expanded core area includes most roadway facilities up to and including the major collector functional classification. Outside of the 24-county area, the highway network includes only primary arterials such as the Interstate Highway System. These "non-core" areas are included in the US 64–NC 49 transportation model network in order to accurately capture the effects of through traffic volumes and other long-distance traffic flows. A number of external stations at key entry/exit points around the state are included as well.

6.3 Key Data Inputs

The TransCAD software and the four-step process provide a broad framework within which to construct the travel demand forecasting model for this study. The development process followed a series of stages that proceed in sequence. These stages are described below.

6.3.1 Data Collection

The two principal data requirements of the model are descriptions of land use and the regional highway network.

6.3.1.1 Land Use

The study required base (2002) and forecast (2030) year household and employment data. Base household data at the census tract level and county levels were derived from the 2000 US Census. Base year (2002) employment data were provided by InfoUSA, which provides marketing data on commercial establishments. The North Carolina Employment Security Commission assisted the Study Team in correcting various coding and processing errors in the employment data. For the travel demand forecasts, 2025 county-level employment forecasts by employment category and tract-level household forecasts were obtained from Global Insight, an economic forecasting firm. These forecasts were extrapolated to 2030 using trends developed by Global Insight.

6.3.1.2 Highway Network

The representation of the highway system in the transportation model requires that spatial coordinates be assigned to the start and end point of each roadway segment and that key attributes, such as functional classification, speed limit, capacity, and number of lanes, be assigned as well. These data were obtained from multiple sources, including the Federal Highway Administration's Freight Analysis Framework and NCDOT's asset management databases. NCDOT also supplied spatially referenced traffic counts, which the Study Team merged with the highway network file.

6.3.2 Build Highway Network

As noted above, the base year and forecast year highway networks used in the modeling exercise resulted from the merging of several databases, reports, plans, etc. Key data for the future highway network development came from NCDOT's Transportation Improvement Program along with the key elements of the Metropolitan Planning Organizations' and Rural Planning Organizations' long-range transportation plans and project priority lists, as described in Section 3.6.5. The Study Team and NCDOT collaborated closely to ensure that both the base year and forecast year highway networks accurately reflected the information obtained from all these sources. The highway networks must be sufficiently detailed to capture the diversion of traffic to alternative routes as congestion increases, ensure the roadway design speeds and capacities are accurate, and ensure there are no gaps or inconsistencies that skew the traffic forecasts. The Study Team conducted numerous tests and reviews of the initial traffic forecasts to ensure that the results obtained were valid and reliable. Tests conducted as part of the highway network building process include visual inspection of traffic volumes, a thorough review of individual trips between selected origins and destinations on the highway network, and a screening of travel times between all origins and destinations for unreasonable times.

6.3.3 Develop and Implement Model Process

The four-step model process described above was implanted as a single macro or "mini program" in the TransCAD software system. As a macro with a graphic user interface (GUI) the modeler can choose to execute one, several, or all steps in the model process and pair the highway network and land use data desired for an alternative test.

6.4 Model Calibration

The Study Team used the correspondence between year 2002 traffic counts obtained from NCDOT and year 2002 traffic simulation to assess the utility, reliability, and validity of the model as a forecasting tool. Numerous corrections and adjustments to the highway network's configuration were made as a result of these comparisons. Following these adjustments, the Study Team used a utility program in the TransCAD software package that adjusts the number of trips between origins and destinations so as to produce the best possible traffic assignment match to the traffic counts. More information on the model calibration process is available in the *US 64–NC 49 Corridor Study Model Calibration Technical Memorandum January 2005.*

Table 6.1 presents a comparison of the match between observed traffic counts and simulated traffic volumes in the core model area. The statistic used for this comparison, root mean square error (RMSE), measures the average error as a volume or as a percentage volume for each of nine daily volume ranges, from roadway segments with average daily volumes greater

than 100,000 vehicles per day (vpd) to roadway segments with average daily volumes under 2,500 vpd. **Table 6.1** shows that the percentage error generally increases as the volume range decreases, ranging from 2.6 percent for the highest range to 31.3 percent for the lowest.

Table 6.1: Model Calibration Results

Volume Range	Final Results		
	Number Counts	RMSE	% RMSE
Over 100,000	32	3,136	2.6
75,000-99,999	51	3,604	4.2
50,000-74,999	60	2,120	3.5
40,000-49,999	42	3,191	7.2
30,000-39,999	36	1,196	3.5
20,000-29,999	51	883	3.8
10,000-19,999	88	1,503	10.2
5,000-9,999	75	5,077	68.7
2,500-4,999	42	530	14.8
Under 2,500	28	413	31.3

6.5 Model Output

Following the model calibration, a series of 2030 travel demand forecasts were developed by matching the single projected set of household and employment forecasts with the regional highway system alternatives previously described in Chapter 5. All of the highway system alternatives described in Chapter 5 differed in the configurations of US 64 and NC 49 in the study corridor. The forecast households and jobs and all other components of the highway network remained constant for all the alternatives tested. All Build Alternatives were evaluated against a No-build or Baseline Alternative, for which no highway improvements were assumed on US 64 and NC 49. In order to assess the results of the travel demand forecasts according to the screening criteria developed for the study, model outputs were summarized in several ways. Some of the most important model outputs are described below.

6.5.1 Level of Service Comparison

For each alternative, color-coded volume bandwidth maps were developed directly from the travel demand modeling results for the forecast year 2030. The link color corresponds to the average daily highway level of service (LOS) and the width of the line on the map corresponds to the volume range. LOS is a measure of congestion which is usually measured

as a letter grade from A to F, with an "F" denoting significant levels of delay and congestion and an "A" denoting free-flow conditions. Maps for each of the alternative definitions evaluated for this study are provided in **Figures 6.1** through **6.5**. These maps allowed the Study Team to assess the relative congestion levels and traffic flows for each of the alternatives. In general, higher levels of investment produced higher volumes on US 64 and NC 49 and improved levels of service on I-40 and I-85.

6.5.2 Vehicle Hours of Travel at Level-of-Service F

Table 6.2 shows for each facility type in the transportation network, the percentage of total vehicle hours of travel (VHT) that is projected to operate at congested conditions (LOS F) in the year 2030. Systemwide, 37 percent of all VHT is forecast to operate in congested conditions by the year 2030, up from 14 percent in the base year (2002).

Table 6.2: Percent of VHT at LOS F (Baseline Alternative)

Facility Type	2002	2030
RURAL		
Interstate	10%	27%
Other Principal Arterials	2%	22%
Minor Arterials	7%	24%
All Others	18%	45%
URBAN		
Interstate	31%	54%
Other Freeways/Expressways	12%	34%
Other Principal Arterials	15%	45%
Minor Arterials	14%	23%
All Others	34%	75%
Network Total	**14%**	**37%**

Different highway functional classifications are projected to experience differing levels of congestion in the horizon year of 2030 as compared to the 2002 base year. For example, 27 percent of the VHT on "Rural Interstate" routes for the Baseline Alternative is projected to experience LOS F conditions in the year 2030, as compared to only 10 percent of VHT on these facilities in the base year of 2002 operating at this congestion level. Similarly, the percent of VHT operating at LOS F on "Other Principal Arterials" is projected to increase from two percent in 2002 to 22 percent in the year 2030

Figure 6.1: Level of Service and Volume Range Map for Baseline Alternative (Year 2030)

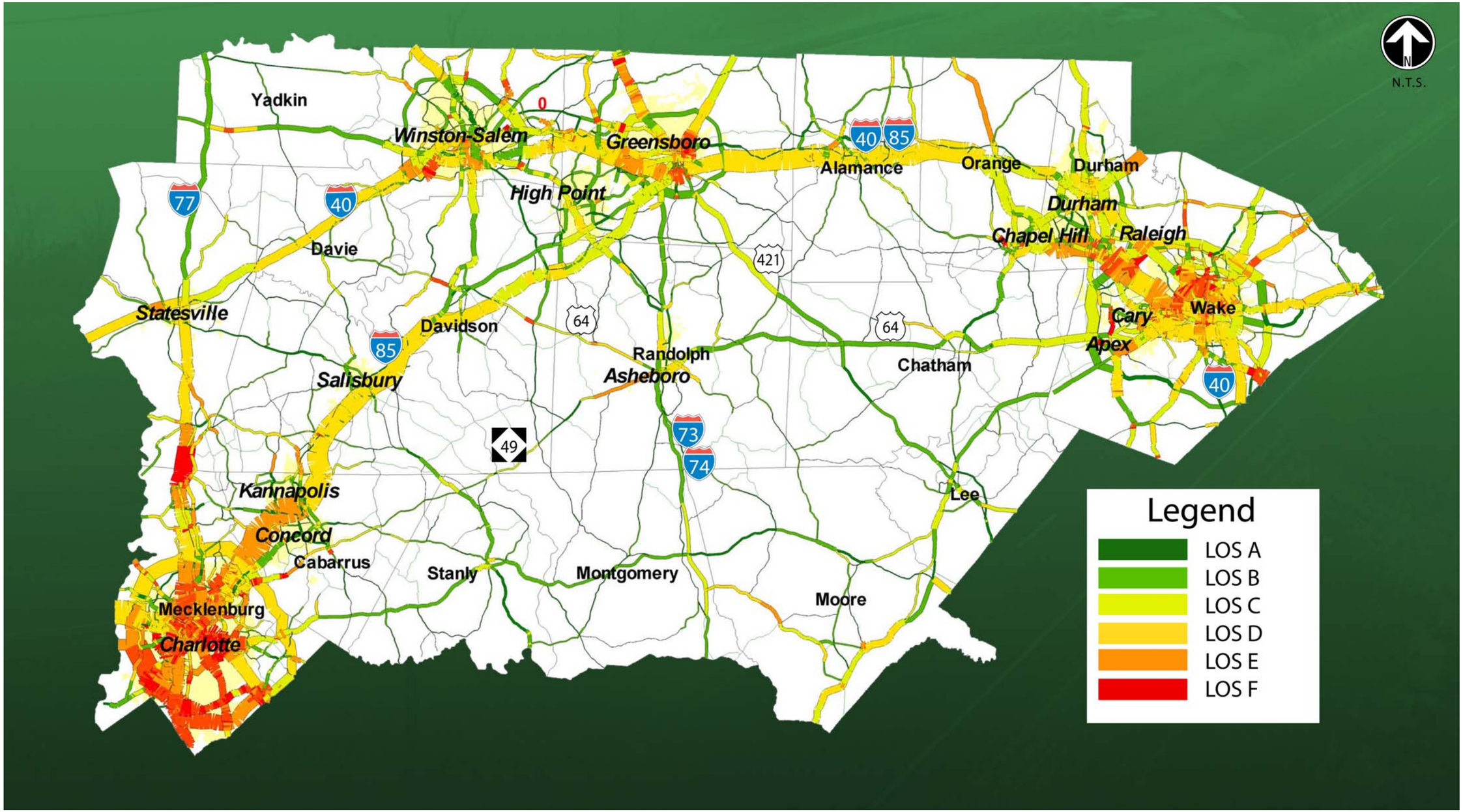


Figure 6.2: Level of Service and Volume Range Map for E+C Alternative (Year 2030)

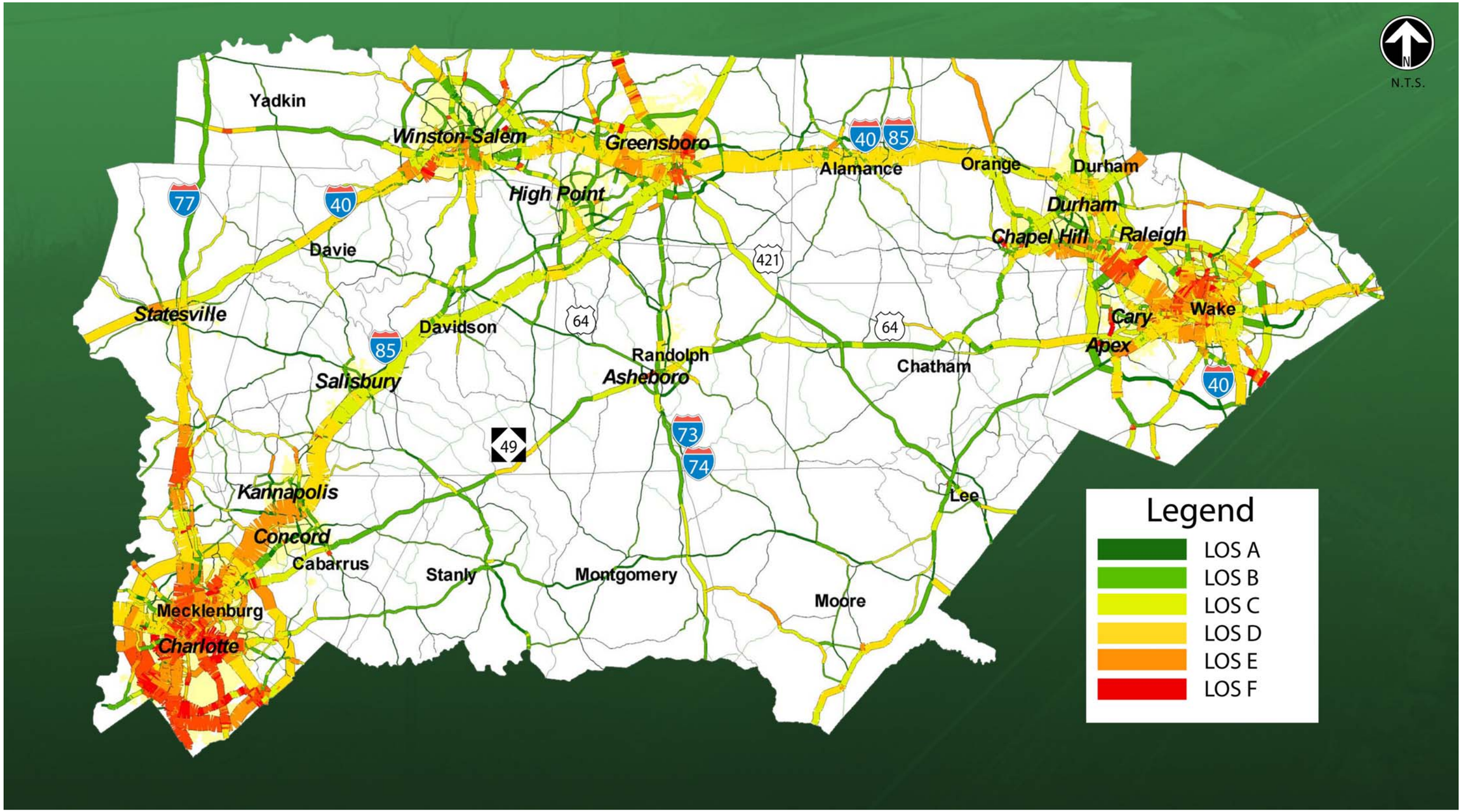


Figure 6.3: Level of Service Map and Volume Range for E+C Enhanced Alternative (Year 2030)

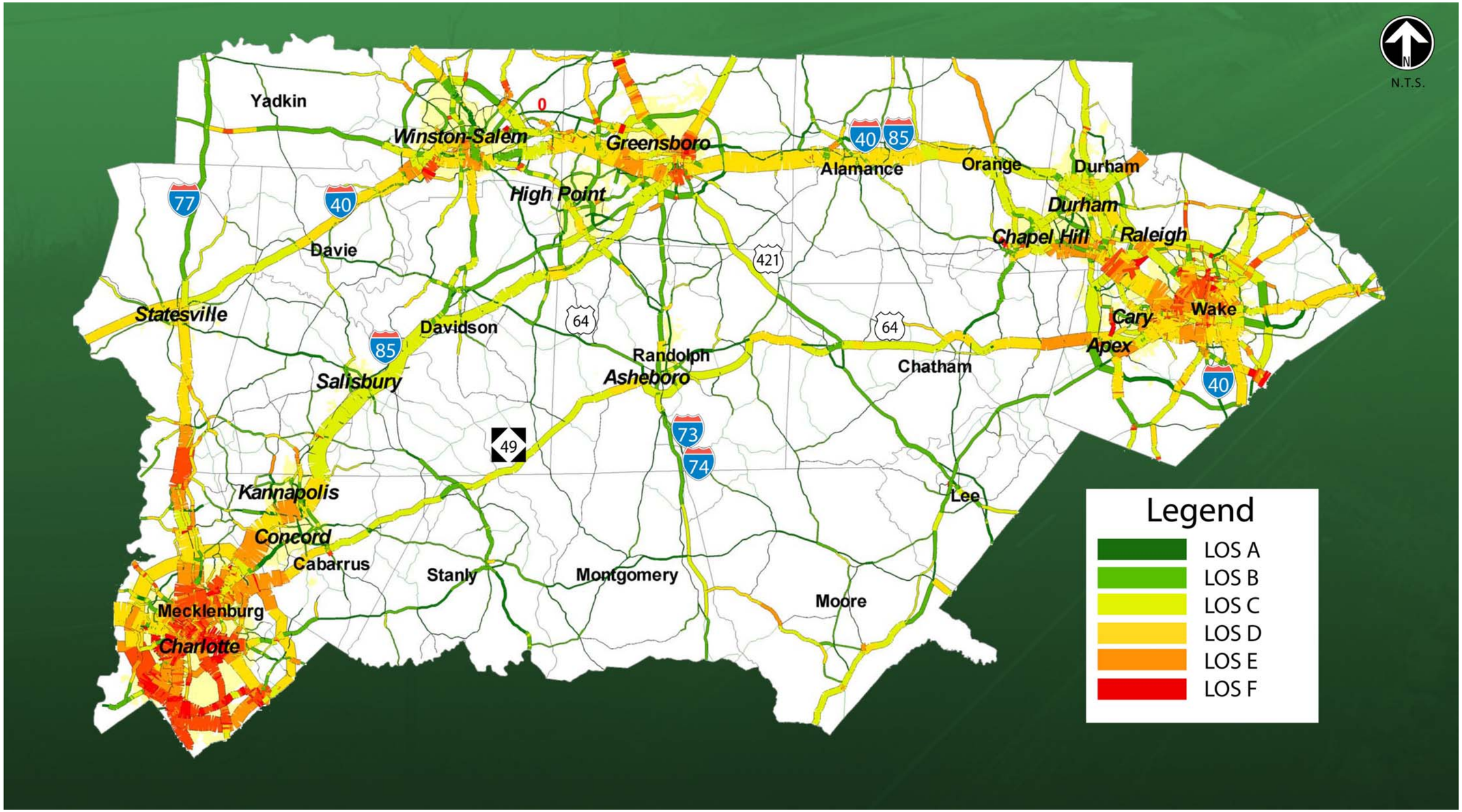


Figure 6.4: Level of Service and Volume Range Map for Expressway Alternative (Year 2030)

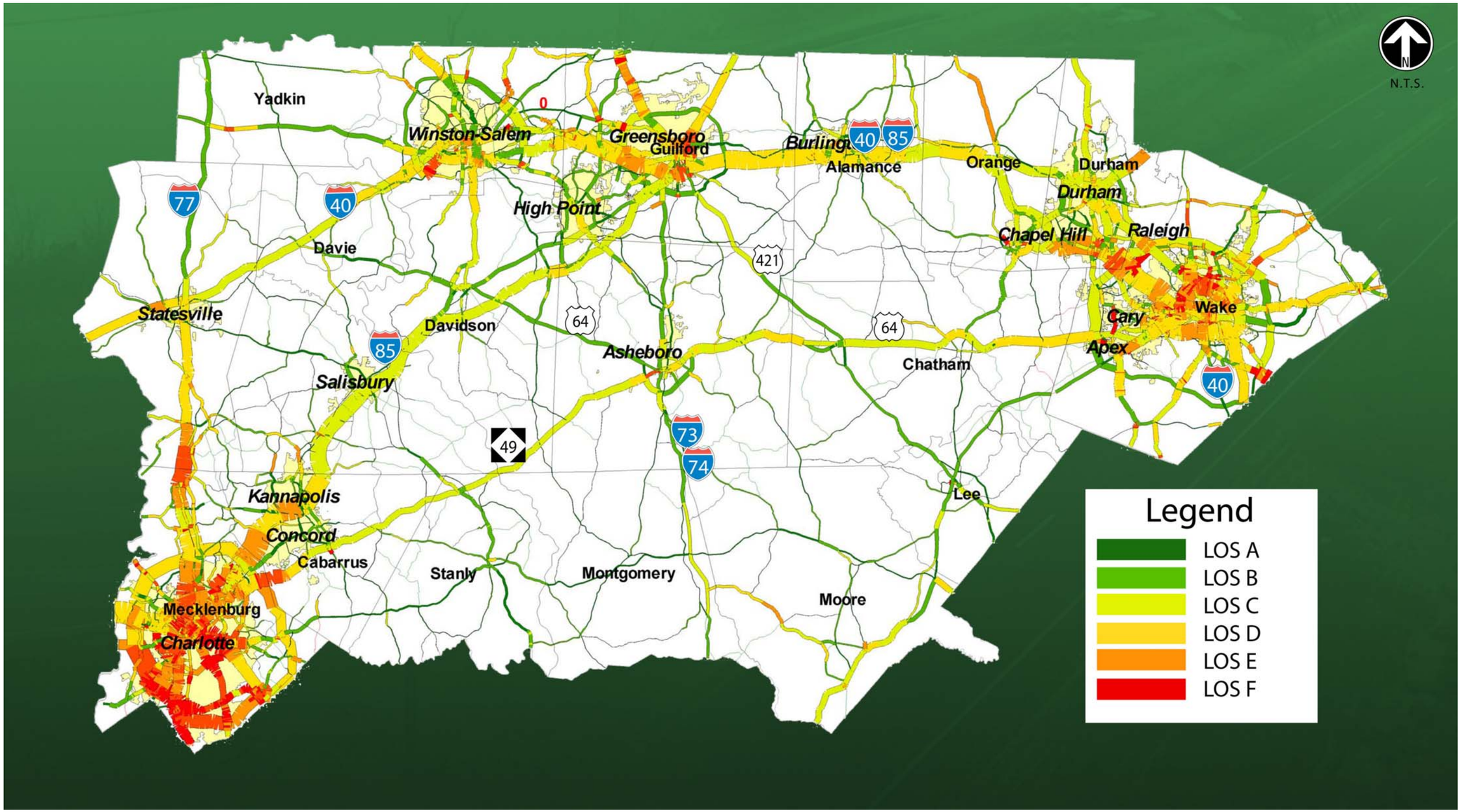
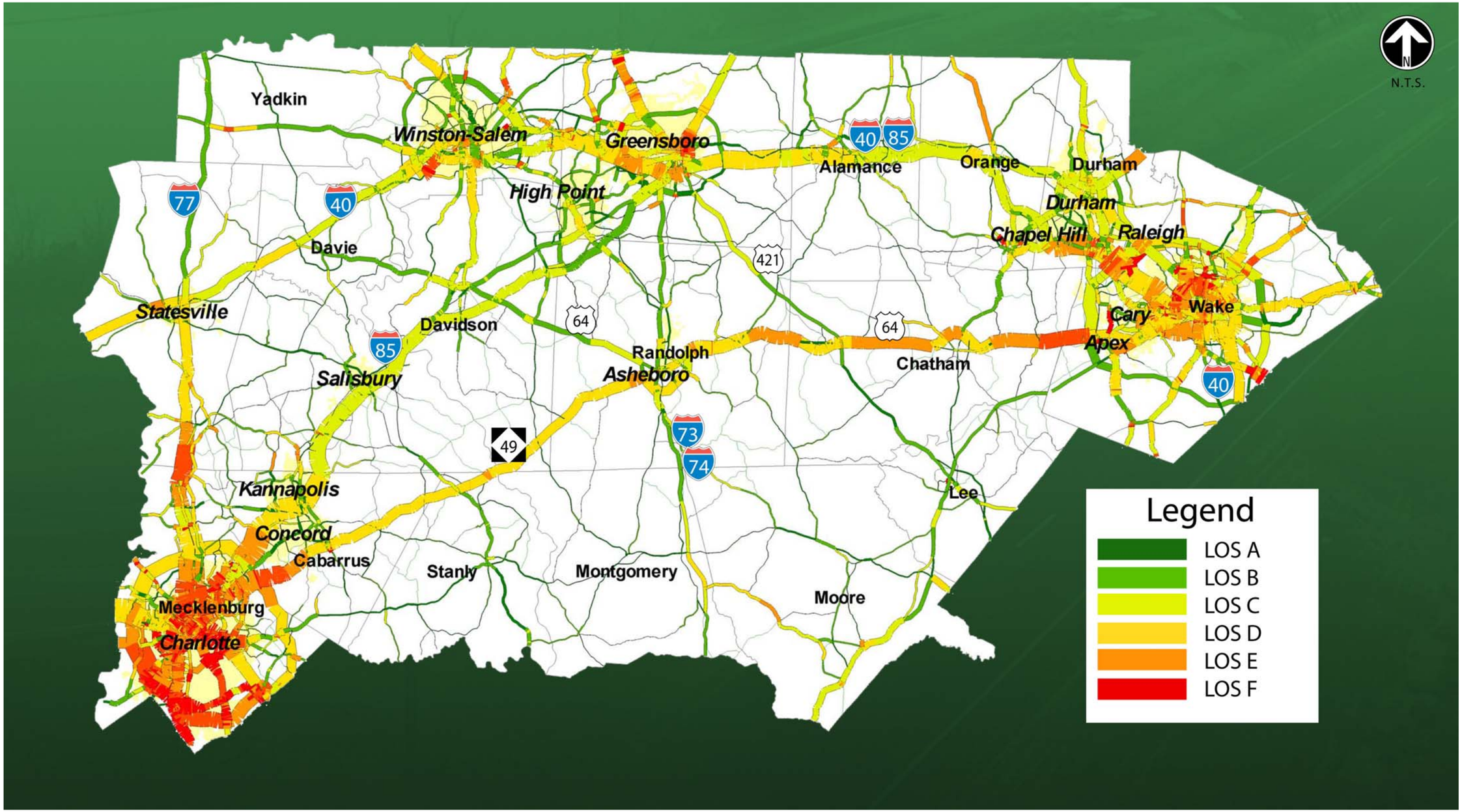


Figure 6.5: Level of Service and Volume Range Map for Freeway Alternative (Year 2030)



6.5.3 Screenline Analysis

Screenlines are imaginary lines, which cut across the principal arterial highways of interest to this study and which capture travel movement patterns between and among major activity centers in the core area. For this study, six north-south screenlines capturing east-west travel across the study area were developed. These screenlines are shown in **Figure 6.6**.

Figure 6.6: Study Area Screenlines

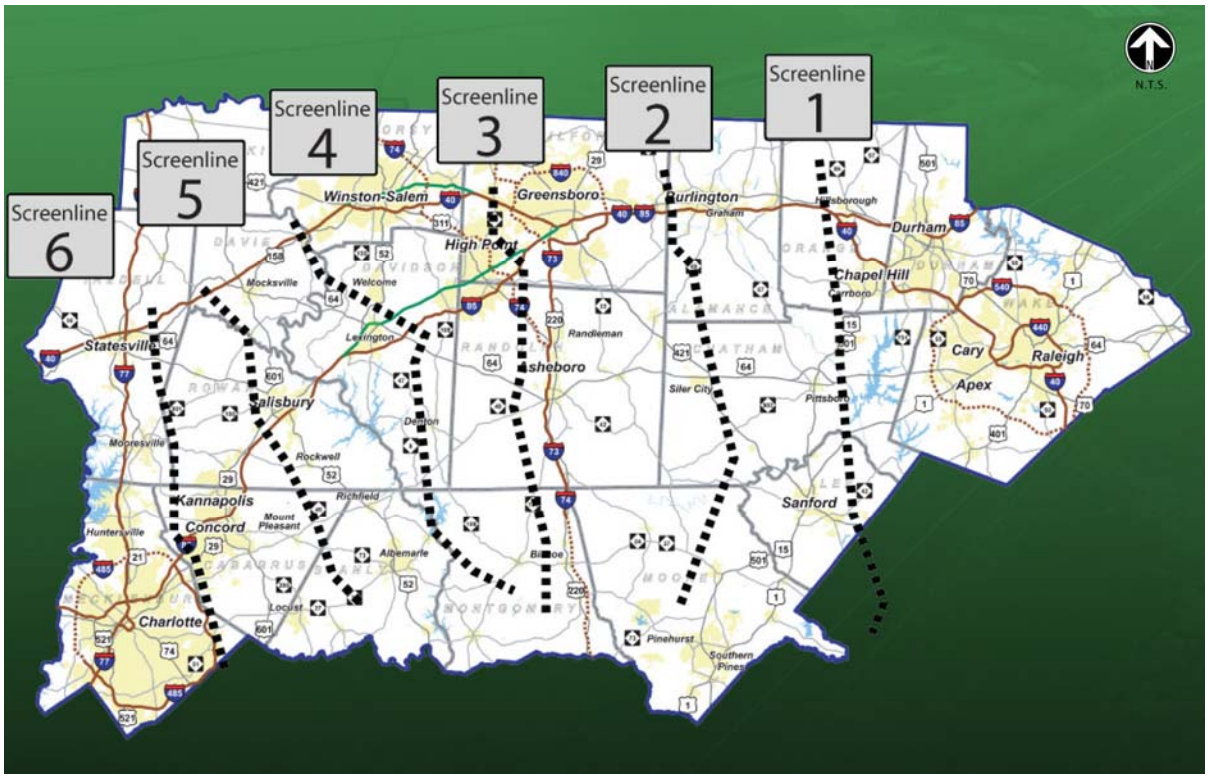


Table 6.3 presents forecast (year 2030) traffic volumes for a sampling of roads cut by the screenlines (including US 64 and NC 49) for each alternative. As shown in **Table 6.3**, the greater the speed and capacity of the US 64–NC 49 improvement alternative, the greater the volume of traffic that is projected to use the improved facility.

Table 6.3: Year 2030 Screenline Volumes by Alternative

Facility	No-Build (Baseline)	E + C	E+C Enhanced	Expressway	Freeway
Screenline 1 (Pittsboro-Raleigh)					
I-40/I-85	134,700	132,200	123,900	122,100	112,000
US-64	44,400	47,400	66,200	64,300	87,500
US-421	25,200	25,500	22,600	23,500	21,800
Screenline 2 (East of Ramseur)					
US-64	35,200	38,600	55,100	56,400	81,200
US-421	18,400	19,200	20,100	18,000	16,700
I-40/I-85	130,900	128,000	120,500	118,800	113,000
Screenline 3 (Between Winston-Salem and Greensboro)					
I-85	68,500	65,900	59,100	58,500	52,200
I-40	145,100	143,400	141,600	136,300	130,000
NC 49	33,900	44,800	62,200	60,100	82,500
US 64	10,900	15,900	17,300	29,600	42,200
Screenline 4 (West of Winston-Salem)					
I-40	94,600	94,000	92,200	85,900	79,300
I-85	84,200	80,900	73,100	73,200	65,900
NC 49	22,200	28,700	45,200	43,600	66,500
US 52	42,000	44,900	45,200	46,500	48,200
US 64	7,600	10,900	12,000	23,400	34,500
I-85 Bus.	26,900	27,000	27,000	28,800	31,100
Screenline 5 (South of Mocksville)					
I-40	57,700	57,400	55,800	58,400	59,600
I-85	118,900	115,000	107,900	107,400	100,300
NC 49	20,100	26,600	41,200	43,500	67,200
Screenline 6 (East of Charlotte)					
I-40	56,500	56,200	54,600	57,100	58,300
I-85	157,800	154,200	146,600	144,800	138,400
US 64	3,300	3,300	3,300	3,300	3,300
NC 49	42,500	52,700	80,700	81,300	98,600

6.5.4 Traffic Diversion

One of the primary evaluation criteria for this analysis is the potential for traffic diversion from I-40 and I-85 to the US 64–NC 49 Corridor. **Table 6.4** summarizes the screenline results and shows the magnitude of this diversion by alternative. All of the investment alternatives show the greatest potential for diversion around the Piedmont Triad, where clusters of development are closely spaced (Screenlines 3-4) and the least (percentage-wise) between Charlotte and Mocksville (Screenline 6). The E+C Enhanced Alternative and the Expressway Alternative show very similar results across all screenline locations.

Table 6.4: Traffic Diversion from I-40/I-85 to US 64–NC 49 by Alternative Relative to the Baseline Alternative

		E+C		E+C Enhanced		Expressway		Freeway	
Screeenline #		vpd	%	vpd	%	vpd	%	vpd	%
1	I-40/I-85 (Pittsboro-Raleigh)	2,500	2%	10,800	8%	12,600	9%	22,700	17%
2	I-40/I-85 (East of Ramseur)	2,900	2%	10,400	8%	12,100	9%	17,900	14%
3	I-85 (Between Winston-Salem and Greensboro)	2,600	4%	9,400	14%	10,000	15%	16,300	24%
3	I-40 (Between Winston-Salem and Greensboro)	1,700	1%	3,500	2%	8,800	6%	15,100	10%
4	I-85 (West of Winston-Salem)	600	1%	2,400	3%	8,700	9%	15,300	16%
4	I-40 (West of Winston-Salem)	3,300	4%	11,100	13%	11,000	13%	18,300	22%
5	I-85 (South of Mocksville)	300	1%	1,900	3%	(700)	-1%	(1,900)	-3%
5	I-40 (South of Mocksville)	3,900	3%	11,000	9%	11,500	10%	18,600	16%
6	I-40 (East of Charlotte)	300	1%	1,900	3%	(600)	-1%	(1,800)	-3%
6	I-85 (East of Charlotte)	3,600	2%	11,200	7%	13,000	8%	19,400	12%
Overall		**21,700**	**2%**	**73,600**	**8%**	**86,400**	**9%**	**139,900**	**15%**

Overall, the E+C Alternative would only divert about two percent of projected year 2030 average daily traffic volumes from the I-40/I-85 Corridor to the US 64–NC 49 Corridor. Conversely, the higher investment levels associated with the E+C Enhanced, Expressway, and Freeway alternatives would divert, respectively, eight percent, nine percent, and 15 percent of the total daily traffic demand from the I-40/I-85 Corridor to the US 64–NC 49 Corridor.

6.5.5 User Benefits

User benefits estimate total costs to users of the transportation system, in term of travel time, accident, out-of-pocket, and operating costs. Travel time and VMT data were output from the traffic forecasting model for this analysis. Discussion of user benefits by alternative is provided in Chapter 7.

Chapter 7 EVALUATION OF ALTERNATIVES

As noted in Chapter 1 of this report, Phase 1 of the US 64–NC 49 Corridor Study is the initial step in a successively more refined alternatives evaluation process that will ultimately result in definition of a master plan of physical and operational improvements as well as associated state and local government policy actions for the corridor. Phase 1 addresses the transportation needs of the region through an evaluation of broad roadway investment strategies against a set of project objectives stemming from the purposes of the Strategic Highway Corridors concept and criteria for Strategic Highway Corridors selection.

7.1 Evaluation Criteria and Measures of Effectiveness

The degree to which alternatives achieve project objectives is determined through the application of evaluation criteria that reflect the project objectives. The project objectives for the US 64–NC 49 Corridor Study can be summarized into the following categories:

- Mobility Benefits
- Growth Management Benefits
- Economic Development Benefits
- Environmental Issues
- Cost Effectiveness Benefits

Evaluation criteria developed in coordination with the Corridor Development Team are presented in **Figure 7.1**. The criteria were limited to those that would demonstrate an appreciable difference among the alternatives. The evaluation criteria are defined by measures of effectiveness (MOE). MOEs are the actual data against which the relative performance of each alternative is evaluated.

7.2 Rating Scale

As shown in **Figure 7.2**, the performance of each of the alternatives was rated as “Good”, “Better”, or “Best” with regard to its degree of satisfaction of each evaluation criteria. The Build alternatives were compared against the No-build (or Baseline) condition.

Figure 7.1: Evaluation Criteria

TIER 1 ALTERNATIVES EVALUATION MATRIX

Study Objective Category Evaluation Criteria	Measure of Effectiveness
MOBILITY BENEFITS	
Travel Time	Percent reduction in travel time from Charlotte to Raleigh vs. baseline condition.
Travel Diversion I-85 and I-40	Percent Interstate traffic reduction from baseline condition.
Safety	Reduction in accidents using National (and/or Statewide) average accident rates by facility type vs. baseline condition.
Accommodation of Transit Plans	Alternative's potential to facilitate implementation of transit initiatives.
GROWTH MANAGEMENT BENEFITS	
Development Pattern Impacts	Potential to direct growth consistent with locally desired development patterns and policies.
ECONOMIC BENEFITS	
Accessibility	Percent change in number of jobs or households within specified travel times to specific destinations vs. baseline condition.
Development Opportunity	Potential for improved access to future development that includes major employers.
ENVIRONMENTAL ISSUES	
Sensitivity to environmental factors	Potential for adverse impact based on facility footprint and location.
Sensitivity to social factors	Potential for adverse impact based on facility footprint and location.
COST EFFECTIVENESS BENEFITS	
Transportation User Benefits	Travel time, operating, and safety cost savings relative to the baseline condition.
Capital Cost	Estimate of probable cost.
User Benefits / Capital Costs	Calculated ratio.

Figure 7.2: Alternatives' Rating Scale

●	◓	○
Best	Better	Good

7.3 Evaluation Results

The following sections present the MOE results associated with each of the alternatives that were examined relative to each of the evaluation criteria. It should be noted that these results describe the performance of each alternative for each evaluation factor relative to the performance of the Baseline condition. As described previously, the Baseline assumed the implementation of all of the identified Existing plus Committed (E+C) projects throughout the study area **except** those projects associated with the US 64 and NC 49 mainlines.

7.3.1 Travel Time Savings

Figure 7.3 presents the MOE and alternatives' rating for the *Travel Time Savings* evaluation criteria.

Figure 7.3: Travel Time Savings MOE and Alternatives' Rating

Evaluation Criteria	Measure of Effectiveness	E+C	E+C Enh.	Expwy	Frwy
Travel Time	Percent reduction in travel time from Charlotte to Raleigh vs. baseline condition.	○	◓	◓	●

●	◓	○
High reduction in travel time	Moderate reduction in travel time	Minimal reduction in travel time

The MOE results for each alternative are provided below:

- E+C Alternative reduces average travel time by approximately three percent (five minutes) on I-40/I-85 and seven percent (ten minutes) on US 64/NC 49.
- E+C Enhanced Alternative reduces average travel times by approximately 12 percent (20 minutes) on I-40/I-85 and 14 percent (21 minutes) on US 64/NC 49.
- Expressway Alternative reduces average travel times by approximately 10 percent (17 minutes) on I-40/I-85 and 17 percent (25 minutes) on US 64/NC 49.
- Freeway Alternative reduces average travel times by approximately 17 percent (29 minutes) on I-40/I-85 and 24 percent (36 minutes) on US 64/NC 49.

The travel time savings were calculated by comparing the difference in point-to-point travel times between each of the alternatives along identical origin-destination paths between the Charlotte and Raleigh areas. For the US 64–NC 49 Corridor, as an example, the path began in Charlotte at the I-85/NC 49 connector and continued along NC 49 to its junction with US 64 in Asheboro. The path then continued east along US 64 to the interchange of US 64 and I-40 in Raleigh. The path along I-40 and I-85 used the same origin and destination points as the path along the US 64–NC 49 Corridor. The travel times along these paths, as determined by the regional travel demand forecasting model for each alternative examined, were then compared against the year 2030 travel times along these same paths associated with the No-Build (Baseline) condition. Travel times between Charlotte and Raleigh are shown in **Table 7.1**. The travel time savings associated with each alternative in comparison to the Baseline were calculated and expressed in terms of a percentage difference.

Table 7.1: Model Travel Times Between Charlotte and Raleigh (2030)

Route	Travel Time by Alternative (Minutes)				
	Baseline	E+C	E+C Enh.	Expwy	Frwy
I-40/I-85	168	163	148	151	139
US 64–NC 49	149	139	128	124	113

7.3.2 Travel Diversion from I-40/I-85

Figure 7.4 presents the MOE and alternatives' rating for the *Travel Diversion from I-40/I-85* evaluation criteria.

Figure 7.4: Travel Diversion MOE and Alternatives' Rating

Evaluation Criteria	Measure of Effectiveness	E+C	E+C Enh.	Expwy	Frwy
Travel Diversion From I-85/I-40	Percent Interstate traffic reduction from baseline condition.	○	◒	◒	●

●	◒	○
High reduction	Moderate reduction	Minimal reduction

The MOE results for each alternative are provided below:

- E+C Alternative results in a 2,500 vehicle per day (vpd) diversion (two percent) from I-40/I-85.
- E+C Enhanced Alternative results in a 10,800 vpd diversion (eight percent) from I-40/I-85.
- Expressway Alternative results in a 12,600 vpd (nine percent) diversion of traffic from I-40/I-85.
- Freeway Alternative results in a 23,000 vpd (17 percent) diversion of traffic from I-40/I-85.

The diversion of projected year 2030 average daily traffic from the I-40 and I-85 corridor to the parallel US 64–NC 49 Corridor was calculated along Screenline #1 located just west of the junction between I-40 and I-85 in Orange County near Hillsborough (see **Figure 6.6**). The selection of screenline #1 for this analysis was at random. As described in Chapter 6 of the report, 2030 average daily traffic volumes forecasts were generated for all of the regional alternatives that were considered. The resulting traffic volume forecasts at the same locations were then compared to one another with the amount of anticipated diversion (expressed in terms of both vehicles per day and percentage) then being calculated relative to the projected volume at the defined location for the Baseline.

7.3.3 Safety Improvement

Research conducted by NCDOT and the University of North Carolina at Chapel Hill's (UNC) Highway Safety Research Center for NCDOT substantiates the assumption that drivers on divided highways are likely to experience lower crash rates than drivers on undivided roadways. In 2003, NCDOT compared the accident histories of two four-lane divided highways (US 29 in Concord and US 74 in Shelby) with that of a five-lane section of US 64

in Asheboro. This study found that the total crash rate on the five-lane section of US 64 in Asheboro (with a two-way, left-turn lane) was significantly higher than those of the other two locations. The rates for the four-lane, divided roadway sections (US 29 and US 74, respectively) were 130 and 206 crashes per 100 million vehicle miles traveled (100 MVMT), while the rate for the US 64 section was 503 crashes/100 MVMT. A similar analysis, which compared accident rates between a five-lane section of US 17 in Wilmington with that of nearby four-lane, divided sections on US 421 and NC 132 with similar daily traffic volumes, revealed similar results.

The UNC study examined factors that contribute to high accident rates on North Carolina roads, using the Highway Safety Information System (HSIS). This analysis revealed that, of all road types, drivers on rural two-lane highways experienced the highest crash rates in North Carolina (2.09 crashes per million vehicles miles traveled), compared to the crash rates experienced on either rural multilane divided, non-Interstate type highways (1.55 crashes per MVMT) or rural freeways (0.61 crashes per MVMT).

In addition to the above information, the Study Team relied on the general understanding that (1) accidents are more prevalent on roads with higher degree of access including at-grade intersections and driveways and (2) accidents are more prevalent on roads designed using older design standards.

Figure 7.5 presents the MOE and alternatives' rating for the *Safety Improvements* evaluation criteria.

Figure 7.5: Safety Improvement MOE and Alternatives' Rating

Evaluation Criteria	Measure of Effectiveness	E+C	E+C Enh.	Expwy	Frwy
Safety Improvement	Reduction in accidents using National (and/or Statewide) average accident rates by facility type vs. baseline.	○	◒	◒	●

●	◒	○
High reduction	Moderate reduction	Minimal reduction

The MOE results for each alternative are provided below:

- E+C Alternative replaces most, but not all two-lane sections of US 64 and NC 49 with a four-lane, divided or five-lane facility. Generally, there is no control of access or consolidation of driveways. Signalized intersections remain prevalent. There is limited improvement to existing horizontal and vertical alignment. Relative to the

other alternatives, the E+C Alternative would have a minimal reduction in accident rates.

- E+C Enhanced Alternative provides a continuous, four-lane divided facility with consolidation of existing driveways, conversion of major signalized intersections to grade-separated interchanges, and no addition of new signalized intersections. There is limited improvement to existing horizontal and vertical alignment. The E+C Enhanced Alternative would have a moderate reduction in accident rates.
- Expressway Alternative would provide a continuous, four-lane divided facility with limited access control, consolidation of driveways, removal or bypassing of all signalized intersections, and improved horizontal and vertical alignment throughout the corridor. The Expressway Alternative would have a moderate reduction in accident rates.
- Freeway Alternative would provide a continuous, four-lane facility with full control of access, grade-separated interchanges only, and improved horizontal and vertical alignment throughout the corridor. Relative to the other alternatives, the Freeway Alternative would have the highest reduction in accident rates.

7.3.4 Accommodation of Transit Plans

Figure 7.6 presents the MOE and alternatives' rating for the *Accommodation of Transit Plans* evaluation criteria.

Figure 7.6: Accommodation of Transit Plans MOE and Alternatives' Rating

Evaluation Criteria	Measure of Effectiveness	E+C	E+C Enh.	Expwy	Frwy
Accommodation of Transit Plans	Alternative's potential to facilitate implementation of transit initiatives.	○	○	○	○

●	◒	○
Greatest support of transit initiatives	Moderate support of transit initiatives	Minimal support of transit initiatives

As noted in Section 3.6.6, major transit initiatives within the regional study area are limited to the large metropolitan areas. There are no planned transit improvements in the US 64–NC 49 Corridor other than minor rural transit service upgrades. As such, the alternative definitions do not preclude transit accommodation, but do not directly address it either. All the alternatives were rated as providing minimal support of transit initiatives, since there is no discernable difference between them. For each alternative, urban transit services are not

impacted. In addition, rural public transit and ridesharing services can be expected to benefit from reduced travel time to urban areas for healthcare and job access.

7.3.5 Development Pattern Impacts

Figure 7.7 presents the MOE and alternatives' rating for the *Development Pattern Impacts* evaluation criteria.

Figure 7.7: Development Pattern Impacts MOE and Alternatives' Rating

Evaluation Criteria	Measure of Effectiveness	E+C	E+C Enh.	Expwy	Frwy
Development Pattern Impacts	Potential to direct growth consistent with locally desired development patterns and policies	●	◓	◓	○

●	◓	○
Consistent with local land use and development goals	Somewhat consistent with local land use and development goals	Not consistent with local land use and development goals

The E+C Alternative is presently what is recognized in the local land use plans and therefore is the "most consistent" with local development patterns and polices. There are some future land use plans that envision US 64–NC 49 as a "major" roadway with access consistent with the Expressway Alternative definition. The Expressway Alternative was therefore rated as "somewhat consistent" with local development patterns and policies. There are no future land use plans within the US 64–NC 49 Corridor that view a Freeway Alternative definition as an essential part of desired development patterns and polices, with the result being that this alternative was rated as "not consistent" with local land use and development goals . The E+C Enhanced Alternative by definition will function as an expressway with respect to land use, and it is therefore rated as "somewhat consistent."

7.3.6 Accessibility

Figure 7.8 presents the MOE and alternatives' rating for the *Accessibility* evaluation criteria.

Figure 7.8: Accessibility MOE and Alternatives' Rating

Evaluation Criteria	Measure of Effectiveness	E+C	E+C Enh.	Expwy	Frwy
Accessibility	Percent change in the number of jobs or households within specified travel times to specific destinations vs. baseline.	○	○	○	○

●	◒	○
Greatest percent change	Moderate percent change	Minimal percent change

The measure of effectiveness for *Accessibility* was calculated through a comparison of the total number of jobs within a 60-minute travel time of all residences in the 19-county regional study area for each of the alternatives considered. Initially, the total number of jobs within a 60-minute travel time of all residences for the Baseline condition was calculated. The same calculation was then made for all four of the other regional alternatives examined to determine what impact, if any, the changes in travel time associated with the various levels of highway improvement would have on the accessibility measure. The relative differences in the number of jobs within a 60-minute travel time between the Baseline and each of the alternatives was then expressed in terms of a percent difference.
The MOE results for each alternative are provided below:

- E+C Alternative results in a change of + 0.62 percent.
- E+C Enhanced Alternative results in a change of + 0.62 percent.
- Expressway Alternative results in a change of + 0.62 percent.
- Freeway Alternative results in a change of + 0.67 percent.

Thus, for all practical purposes, the four investment alternatives have an identical performance in comparison to the projected Baseline condition with regard to this particular MOE.

7.3.7 Development Opportunity

Figure 7.9 presents the MOE and alternatives' rating for the *Development Opportunity* evaluation criteria.

Figure 7.9: Development Opportunity MOE and Alternatives' Rating

Evaluation Criteria	Measure of Effectiveness	E+C	E+C Enh.	Expwy	Frwy
Development Opportunity	Potential for improved access to future development that includes major employers.	○	●	●	◒

●	◒	○
Greatest potential	Moderate potential	Minimal potential

The potential for development opportunities increases with improved access. Major employers are generally most attracted to sites located adjacent to or near high speed facilities (average travel speed greater than 45 mph), particularly when such facilities provide access to "Greenfield" sites, or near highways where there are or will be relatively high volumes of traffic traveling steadily in an uncongested condition. The Freeway and Expressway alternatives by definition would provide the greatest regional draw or reach, but would be the most restrictive in terms of allowing direct access to adjacent land parcels. The Expressway Alternative while still providing mobility to the region would also have greater access to adjacent areas via at-grade intersections between grade-separated interchanges that would be the case with the Freeway Alternative. For that reason, the Expressway Alternative was rated as having the "greatest" potential for development opportunity while the Freeway Alternative was rated as providing only a "moderate" development potential. The E+C Alternative provides "minimal" travel time improvements to the corridor beyond additional roadway capacity. Since the other three alternatives include locating the facility in part on new alignment thereby opening an undeveloped area (Greenfield) for future development, the E+C Alternative offers comparatively less access to undeveloped land. Therefore, the E+C Alternative was rated as providing only minimal development opportunity. The E+C Enhanced Alternative by definition more closely represents the Expressway Alternative and was rated as also having the "greatest" development potential.

7.3.8 Sensitivity to Environmental Factors

Figure 7.10 presents the MOE and alternatives' rating for the *Sensitivity to Environmental Factors* evaluation criteria.

Figure 7.10: Sensitivity to Environmental Factors MOE and Alternatives' Rating

Evaluation Criteria	Measure of Effectiveness	E+C	E+C Enh.	Expwy	Frwy
Sensitivity to Environmental Factors	Potential for adverse impact based on facility footprint and location.	●	◒	○	○

●	◒	○
Minimal potential for adverse impact	Moderate potential for adverse impact	Greatest potential for adverse impact

In general, the construction of a roadway on new location creates greater impacts to natural resources than improving an existing road. In addition, the larger the construction footprint required for the roadway, the greater the potential for impacts to natural resources. Both the Freeway and Expressway alternatives would require a significant amount of new location roadway for full implementation and would thus have the largest footprints resulting in the greatest potential impact on natural resources. The E+C Alternative would have minimum new location needs and the smallest footprint, and consequently the least potential impact. The E+C Enhanced Alternative falls between the Expressway Alternative and E+C Alternative with regard to the need for new location alignment and construction footprint size and was thus rated as having a moderate potential impact on natural resources.

7.3.9 Sensitivity to Social Factors

Figure 7.11 presents the MOE and alternatives' rating for the *Sensitivity to Social Factors* evaluation criteria.

Figure 7.11: Sensitivity to Social Factors MOE and Alternatives' Rating

Evaluation Criteria	Measure of Effectiveness	E+C	E+C Enh.	Expwy	Frwy
Sensitivity to Social Factors	Potential for adverse impact based on facility footprint and location.	●	◒	○	○

●	◒	○
Minimal potential for adverse impact	Moderate potential for adverse impact	Greatest potential for adverse impact

In general, location and construction footprint size dictate a roadway improvements potential for impact to social factors. As noted in Section 7.3.8, the Freeway and Expressway alternatives have the largest construction footprints and greatest amount of new location need. For these reasons, the Expressway and Freeway alternatives were rated as having the greatest potential for adverse impact to social factors. The E+C Alternative has the smallest construction footprint and least amount of new location. The E+C Alternative, therefore, was rated as having the least potential for adverse impact. The E+C Enhanced Alternative falls between the Expressway Alternative and E+C Alternative with regard to the need for new location alignment and construction footprint size and was rated as having a moderate potential for adverse impact.

7.3.10 Transportation User Benefits

Figure 7.12 presents the MOE and alternatives' rating for the *Transportation User Benefits* evaluation criteria.

Figure 7.12: Transportation User Benefits MOE and Alternatives' Rating

Evaluation Criteria	Measure of Effectiveness	E+C	E+C Enh.	Expwy	Frwy
Transportation User Benefits	Travel time, operating, and safety cost savings relative to the baseline condition.	○	◒	◒	⊙

⊙	◒	○
Greatest cost savings	Moderate cost savings	Minimal cost savings

For the purposes of this corridor study, "user benefits" were defined as the value of travel time, vehicle operating, out-of-pocket, and internal accident cost savings experienced by the users of the regional highway network over the course of a year. First, for each pair of origins and destinations in the model, the travel time of all users of the system in the year 2030 under the Baseline condition was calculated. This value used the regional travel demand model estimates of average daily travel time across the system (expressed in terms of daily vehicle hours of travel) and converted this to an annual value by application of the factor of 365 days per year. Total vehicle miles of travel on an average daily and an annual basis were calculated as well. Next, the total cumulative travel time and vehicle miles of travel experienced by all users of the system in the year 2030 associated with each of the four alternatives considered was calculated in a similar manner. The relative differences (savings) in annual travel times and vehicle miles of travel between the 2030 Baseline and each of the

four build alternatives and unit values for each cost component (e.g., the value of one hour of time [$8.90], which is the current value used by the Surface Transportation Efficiency Analysis Model [STEAM], an FHWA user-benefit analysis tool) are used to generate total user cost estimates.

The MOE results for each alternative are provided below:

- E+C Alternative achieves user benefits of approximately $11 million per year.
- E+C Enhanced Alternative achieves user benefits of approximately $22 million per year.
- Expressway Alternative achieves user benefits of approximately $23 million per year.
- Freeway Alternative achieves user benefits of approximately $35 million per year.

In comparison to the Baseline condition, the E+C Alternative has minimal cost savings, the E+C Enhanced and Expressway alternatives have moderate cost savings, and the Freeway alternative has the greatest cost savings.

7.3.11 Capital Cost

Figure 7.13 presents the MOE and alternatives' rating for the *Capital Cost* evaluation criteria.

Figure 7.13: Capital Cost MOE and Alternatives' Rating

Evaluation Criteria	Measure of Effectiveness	E+C	E+C Enh.	Expwy	Frwy
Capital Cost	Estimate of probable cost.	●	◒	○	○

●	◒	○
Low cost	Moderate cost	High cost

Planning-level capital cost estimates were prepared by NCDOT using sketch plans of an example implementation scenario for each alternative as well as individual TIP project costs documented in NCDOT's 2004 – 2010 TIP. Costs were based on NCDOT historical estimates of major construction items and activities. The capital cost includes construction and right of way expressed in terms of year 2004 dollars.

The MOE results for each alternative are provided below:

- E+C - $550,000,000
- E+C Enhanced - $1,750,000,000 (includes total cost of E+C projects)
- Expressway - $2,340,000,000 (includes $210 million of E+C projects)
- Freeway - $2,560,000,000 (includes $210 million of E+C projects)

In comparison to the Baseline condition, the E+C Alternative has the lowest cost, the E+C Enhanced Alternative has a moderate cost, and the Expressway and Freeway alternatives have high costs.

7.3.12 User Benefits/Cost

Figure 7.14 presents the MOE and alternatives' rating for the *User Benefits/Cost* evaluation criteria.

Figure 7.14: User Benefits/Cost MOE and Alternatives' Rating

Evaluation Criteria	Measure of Effectiveness	E+C	E+C Enh.	Expwy	Frwy
User Benefits / Cost	Calculated ratio	●	◒	○	◒

●	◒	○
Largest Ratio	Moderate Ratio	Smallest Ratio

The User Benefits/Cost ratio is a result of the comparison of the *Transportation User Benefits* MOE (Section 7.3.10) to the total estimated *Capital Cost* MOE (Section 7.3.11). User benefits and capital costs are spread across a 20-analysis period (2010 to 2030) in recognition of the time required to construct any of the regional alternatives, and in acknowledgement of the fact that the amount of user benefits experienced by travelers in the study corridor would vary from year to year during the period of construction. The resulting value of total cumulative user benefits was then divided by the total estimated capital cost associated with each alternative to generate the value of the *User Benefits/Cost* MOE.

The MOE results for each alternative are provided below:

- E+C Alternative achieves a user benefits to cost ratio of 0.30.
- E+C Enhanced Alternative achieves a user benefits to cost ratio of 0.19.
- Expressway Alternative achieves a user benefits to cost ratio of 0.15.
- Freeway Alternative achieves a user benefits to cost ratio of 0.21.

The E+C Alternative has the largest user benefits to cost ratio, while the E+C Enhanced and Freeway alternatives have a moderate ratio. The Expressway Alternative has the smallest ratio.

It should be noted that the US 64–NC 49 study used a "standard" benefit/cost analysis as a comparative measure to evaluate the alternatives tested. This approach is widely used for early planning projects, but it is limited in its ability to measure the full impacts of a significant corridor improvement. Thus, B/C ratios tend to be lower than what actually may be achieved, yet are still acceptable for alternative comparision purposes. Only "user benefits" were estimated (see Section 7.3.10) on the benefits side. These account for changes in the value of travel time, vehicle operating, out-of-pocket, and internal accident cost savings experienced by system users. In a more detailed benefit/cost analysis, potential economic and societal benefits are taken into consideration to more fully quantify the magnitude of the expected "benefits" of any major transportation system investment. Large-scale transportation investments in corridors with development potential can spur significant business attraction and business expansion, which increases regional business sales, income, and employment. These additional economic benefits are typically estimated in relation to the positive or negative effects on travel time and accessibility associated with various investment alternatives.. The application of a more detailed economic impact analysis to the US 64 – NC 49 corridor would most likely result in greater higher B/C ratios than those determined through the standard analysis conducted for this study.

7.4 Evaluation of Alternatives Conclusions

The purpose of this section is to present alternative evaluation conclusions in the context of the five study objective categories (outlined in Section 7.1). Whereas the previous section presented performance results for each of the individual evaluation criteria, this section presents broader conclusions through a review of all evaluation criteria under each specific objective category. **Figure 7.15** provides the Alternatives' Evaluation Matrix. The conclusions presented here are utilized in framing the recommended corridor vision that is described in Chapter 8.

Figure 7.15: Alternatives' Evaluation Matrix

ALTERNATIVES EVALUATION MATRIX

Study Objective Category / Evaluation Criteria	Measure of Effectiveness	Alternative			
		E+C	E+C Enhanced	Expressway	Freeway
MOBILITY BENEFITS					
Travel Time	Percent reduction in travel time from Charlotte to Raleigh vs. baseline condition.	○	◒	◒	●
Travel Diversion I-85 and I-40	Percent Interstate traffic reduction from baseline condition.	○	◒	◒	●
Safety	Reduction in accidents using National (and/or Statewide) average accident rates by facility type vs. baseline condition.	○	◒	◒	●
Accommodation of Transit Plans	Alternative's potential to facilitate implementation of transit initiatives.	○	○	○	○
GROWTH MANAGEMENT BENEFITS					
Development Pattern Impacts	Potential to direct growth consistent with locally desired development patterns and policies.	●	◒	◒	○
ECONOMIC BENEFITS					
Accessibility	Percent change in number of jobs or households within specified travel times to specific destinations vs. baseline condition.	○	○	○	○
Development Opportunity	Potential for improved access to future development that includes major employers.	○	●	●	◒
ENVIRONMENTAL ISSUES					
Sensitivity to environmental factors	Potential for adverse impact based on facility footprint and location.	●	◒	○	○
Sensitivity to social factors	Potential for adverse impact based on facility footprint and location.	●	◒	○	○
COST EFFECTIVENESS BENEFITS					
Transportation User Benefits	Travel time, operating, and safety cost savings relative to the baseline condition.	○	◒	◒	●
Capital Cost	Estimate of probable cost.	●	◒	○	○
User Benefits / Capital Costs	Calculated ratio.	●	◒	○	◒

7.4.1 Mobility Benefits

"Mobility" in its most basic definition is simply the characteristic of being "mobile." With respect to transportation, mobility incorporates several qualitative elements including riding comfort, ease in changing lanes, absence of speed changes, and acceptable and reliable travel time. Typically the primary measure of mobility is travel time (or average operating speed). Mobility is provided at varying levels of service and is inversely proportional to the degree of land access provided.

In the context of the criteria used to define Strategic Highway Corridors, mobility for this study is addressed from a regional perspective with the more favorable alternatives being those that reduce long distance travel times between defined activity centers, improve safety for all system users, and promote better distribution of auto travel through relief of other major roadways. It is somewhat intuitive then to expect high-level facilities (i.e. freeways) to better satisfy these criteria. A review of the alternatives evaluation summary shows this to be the case.

The Freeway Alternative as a fully-controlled access facility performs the best in reducing travel times and encouraging use of the US 64–NC 49 Corridor as an alternative to I-40 and I-85. In addition, full control of access facilities in the broad definition have the lowest accident rates based on national and North Carolina crash data. The Expressway and E+C Enhanced Alternatives trade travel time for a higher degree of access through a greater number of access points. The resulting decrease in travel time savings relative to those achieved for the Freeway Alternative translates into lower traffic diversion from I-40 and I-85. However, the performance of the Expressway and E+C Enhanced alternatives is still quite good when compared to the Baseline condition. The E+C Alternative, while adding additional roadway capacity via upgrades of existing two-lane roadway sections to multi-lanes, does little to reduce land access and therefore has the least travel time saving, lowest interstate diversion potential, and the highest accident rate probability. For accommodation of transit plans, there is no discernable difference between the four alternatives.

Cross referencing mobility with capital cost shows that better performance comes with a price (higher-level facilities require a greater investment). Affordability is a function of need and time. Selection of an appropriate alternative must be balanced between achieving the desired degree of mobility with a reasonable expectation of available funding.

The Study Team concludes that mobility benefits should be considered in the selection of a long-term corridor vision.

7.4.2 Growth Management Benefits

For this study, growth management is measured by one evaluation criteria, *Development Pattern Impacts*, as described in Section 7.3.5. Because the measure of effectiveness is development growth potential consistent with desired local development patterns and policies, the evaluation results favor an alternative definition that is presently represented in the local land use plans. It is therefore important to keep in mind that this local land use plan definition of US 64 and NC 49 is influenced heavily by the present facility's physical and operational characteristics and programmed improvements, which generally maintain the facility status quo. Alternative definitions that redefine the US 64 and NC 49 facility type, such as the Freeway Alternative, are rated less favorable simply from the standpoint that they do not match the present land use plan definition. Obviously, the definition of US 64 and NC 49 in the local land use plans can be changed should the long-term vision of the corridor change.

The Study Team concludes that differences in growth management benefits are not significant in the selection of a long-term corridor vision.

7.4.3 Economic Benefits

Economic benefit was measured through increased job accessibility, which is a function of regional travel time improvements and development opportunity for major employers (not including small business/commercial strip development). Due to broad regional congestion, there is no discernable difference in regional travel time savings from households to jobs. With regard to development opportunity for major employers, such employers tend to favor locations near or around high-level roadway facilities such as freeways and expressways. The Expressway and E+C Enhanced alternatives were rated better than the Freeway Alternative from the standpoint of being able to provide relatively high mobility, but with slightly greater access opportunity. However, with an assumed application of frontage roads for the Freeway Alternative, the difference in rating between the E+C Enhanced, Expressway, and Freeway is not discernable.

The Study Team concludes that economic benefits should be considered in the selection of a long-term corridor vision.

7.4.4 Environmental Issues

In evaluating major investment strategies at this level of planning, environmental issues are broadly assessed using a typical construction footprint and need for new location alignment as noted in Sections 7.3.8 and 7.3.9. During Phase 1 of this study, no specific alignments have been established for the alternatives. Therefore, the potential for environmental impacts

can only be assessed at a qualitative level and thus primarily reflect intuitive expectations – the larger the construction footprint and greater amount of new location, the greater the potential for environmental impacts. Certainly the alternative ratings reflect this. What is not reflected is the potential for positive environmental impacts such as reduced auto emissions through higher operating speed and less stops, opportunities to improve stormwater runoff, and mitigation opportunities for noise, streams, and wetlands. Because of this, the potential environmental impact difference between the E+C, E+C Enhanced, Expressway, and Freeway alternatives is not discernable at the broad regional scale of this study.

The Study Team has concluded that the differences in environmental impacts are not significant in the selection of a long-term corridor vision.

7.4.5 Cost Effectiveness

Cost effectiveness is the relationship of transportation user benefits to the cost of making improvements. For this study, user benefits were developed in terms of travel time, operating and maintenance, and safety cost savings. Capital cost consists of probable construction and right-of-way costs. As would be expected, the higher facility type definitions provide the greatest user benefits. In turn, higher facility types cost more. The evaluation of the cost effectiveness objective category should be accomplished in concert with mobility benefits.

The Study Team concludes that cost effectiveness should be considered in the selection of a long-term corridor vision.

Chapter 8 CORRIDOR VISION

The establishment of a consensus-based vision for the US 64–NC 49 Corridor is an important planning step in that it provides a long-term, directional goal for all roadway improvements to US 64 and NC 49 within the defined study area. The vision defines the major characteristics of a substantial financial investment and provides the means to build stakeholder buy-in and commitment to major facility modifications and enhancements. The vision also provides an implementation strategy through the identification of a logical sequence of facility improvements, outlining the "evolution" of the corridor from a condition of current physical and operational characteristics to the ultimate facility type. The vision is not defined by a year of achievement, but serves as the beacon on the horizon to guide and direct US 64 and NC 49 roadway improvements with regard to desired physical and operational characteristics.

Based on the results of the alternatives' evaluation, the Study Team has drawn the following conclusions:

- The E+C Alternative provides sufficient user benefits compared to the investment level and effectively serves a short-term need for safety improvement and capacity enhancement.
- The E+C Enhanced Alternative provides user benefits similar to the Expressway Alternative, but at a substantially reduced cost.
- The Expressway Alternative substantially improves corridor mobility and diverts a good percentage of traffic from the I-40/I-85 Corridor; however, the capital cost is nearly as much as the Freeway Alternative with less overall user benefit.
- The Freeway Alternative provides the greatest mobility improvement and traffic diversion from the I-40/I-85 Corridor, but at the highest capital cost.

It is clear from the alternatives' evaluation that the Freeway Alternative best satisfies the purposes and criteria of a Strategic Highway Corridor. However, it is also clear that immediate implementation of the Freeway Alternative is not financially feasible. Therefore, it is the Study Team's and the Corridor Development Team's recommendation that the Freeway Alternative serve as the "Corridor Vision" with achievement of the vision occurring through a program of the staged implementation of necessary improvements. There is no set time table for achieving the vision. The vision serves solely to provide improvement direction with full achievement of the vision ultimately being a function of operations and safety needs.

While it is not within the scope of this study to develop specific design guidelines, it is the recommendation of the Study Team that the roadway improvements encompassing the vision be developed in context with the surroundings to take advantage of the corridor's contours and natural beauty. Design elements such as a wide vegetated median, decorative retaining walls and structures, and attractive signing can all be used effectively to blend the facility into its surroundings. Examples of such design elements from the Baltimore-Washington Parkway are shown in **Figure 8.1**.

Figure 8.1: Baltimore-Washington Parkway

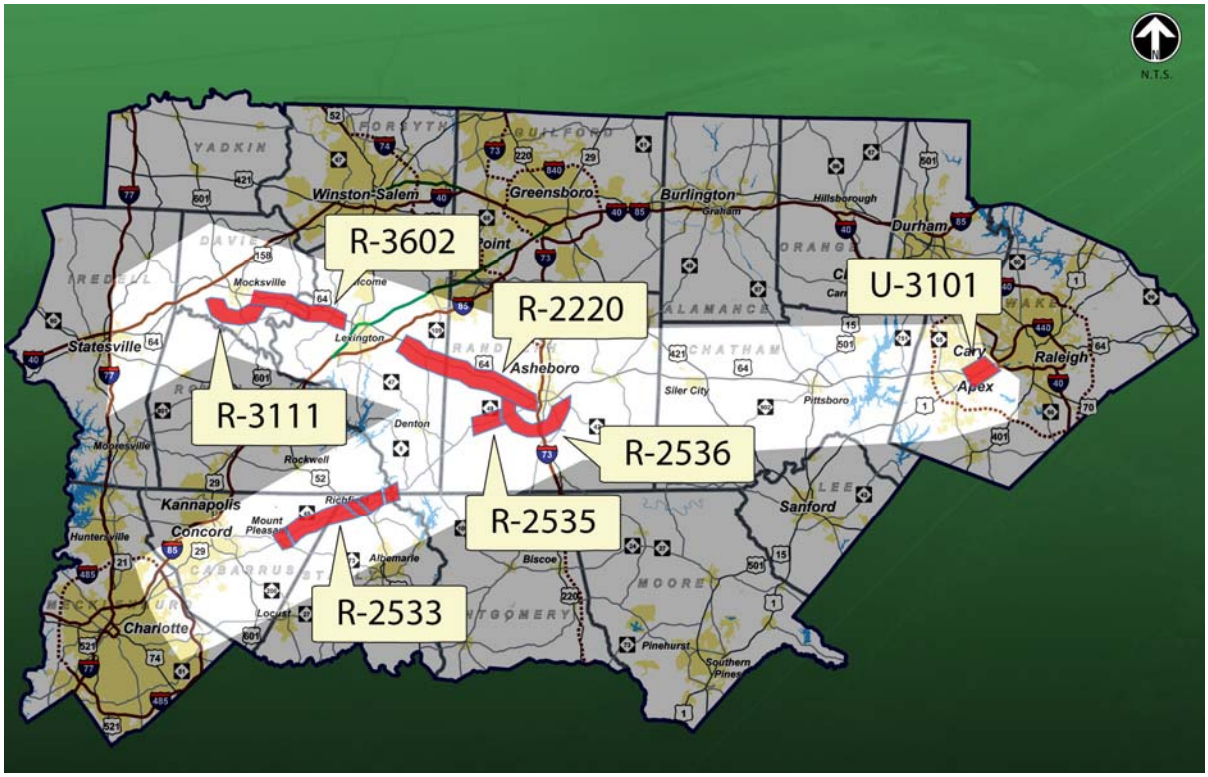
Implementation steps to achieve the vision are described in the following sections.

8.1 Step 1

The first step toward the vision is to implement improvements that are presently in NCDOT's TIP (2004 – 2010). These projects are highlighted in **Figure 8.2.** They are important from the standpoint that they address the short-term need for improved safety and additional roadway capacity. While projects R-2536 (Asheboro Southern Bypass) and R-3101 (US 1/US 64 improvements through Cary) are consistent with the Freeway Alternative definition in that they are high-speed facilities with access allowed only via interchanges, the remaining projects with the exception of R-3111 (Mocksville Bypass) are multi-lane (five-lane and /or four-lane, divided) improvements with no control of access. R-3111 is presently described as a two-lane road on an ultimate four-lane right-of-way with access via signalized intersections.

The TIP projects are in various stages of project development. These projects should be reviewed for opportunities to provide consolidated driveways and allow for the conversion of signalized intersections to interchanges without disruption to established project delivery dates. Such project enhancements will improve safety and traffic operations, while advancing the facility closer to the vision of a freeway.

Figure 8.2: NCDOT 2004 – 2010 TIP Projects on US 64 and NC 49



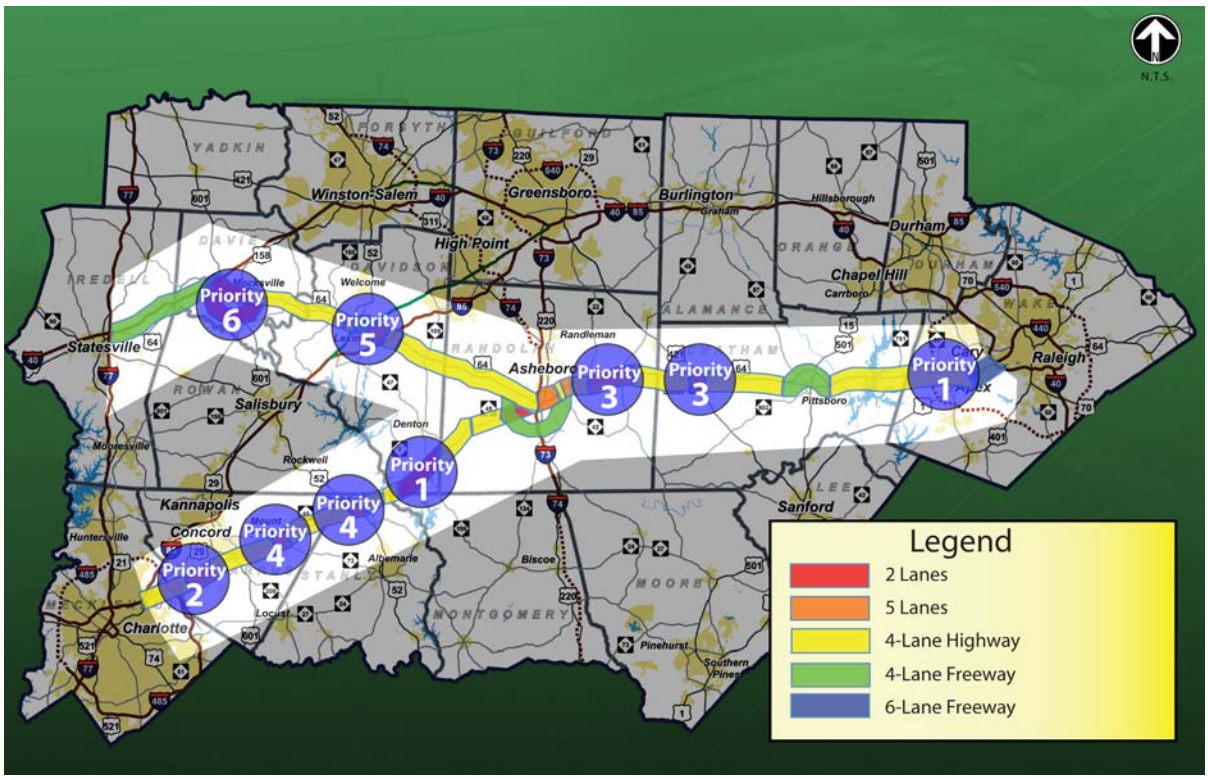
In addition to proceeding with current NCDOT TIP projects, an access management plan should be developed and implemented to protect the existing four-lane sections of US 64 and NC 49 between the urban areas from the creation of new driveways and signalized intersections. Where possible, the number of existing driveways should be consolidated into a reduced number of better designed access points.

8.2 Step 2

The second step in achieving the corridor vision implements those improvements identified for the E+C Enhanced Alternative (see Section 5.2.2). **Figure 8.3** shows these improvement projects along with a suggested implementation priority ranking. All of these projects would be consistent with the Freeway Alternative definition. The greatest travel demand is between

Charlotte and Raleigh. As such, priority projects 1 and 2 should be implemented as soon as possible as they are the most critical in making the US 64–NC 49 route between Charlotte and Raleigh an attractive alternative to I-40 and I-85. Priority projects 3 and 4 further enhance the attractiveness of the corridor by bypassing emerging urban areas. Priority projects 5 and 6 round out the list by improving travel through Mocksville and Lexington. Implementation of these projects would improve the corridor to a combination of a Freeway, Expressway-Type I, and Expressway-Type II. Through careful monitoring of traffic volume, traffic operations, and accidents, the sequence of the remaining projects, 3 through 6, may be adjusted as appropriate.

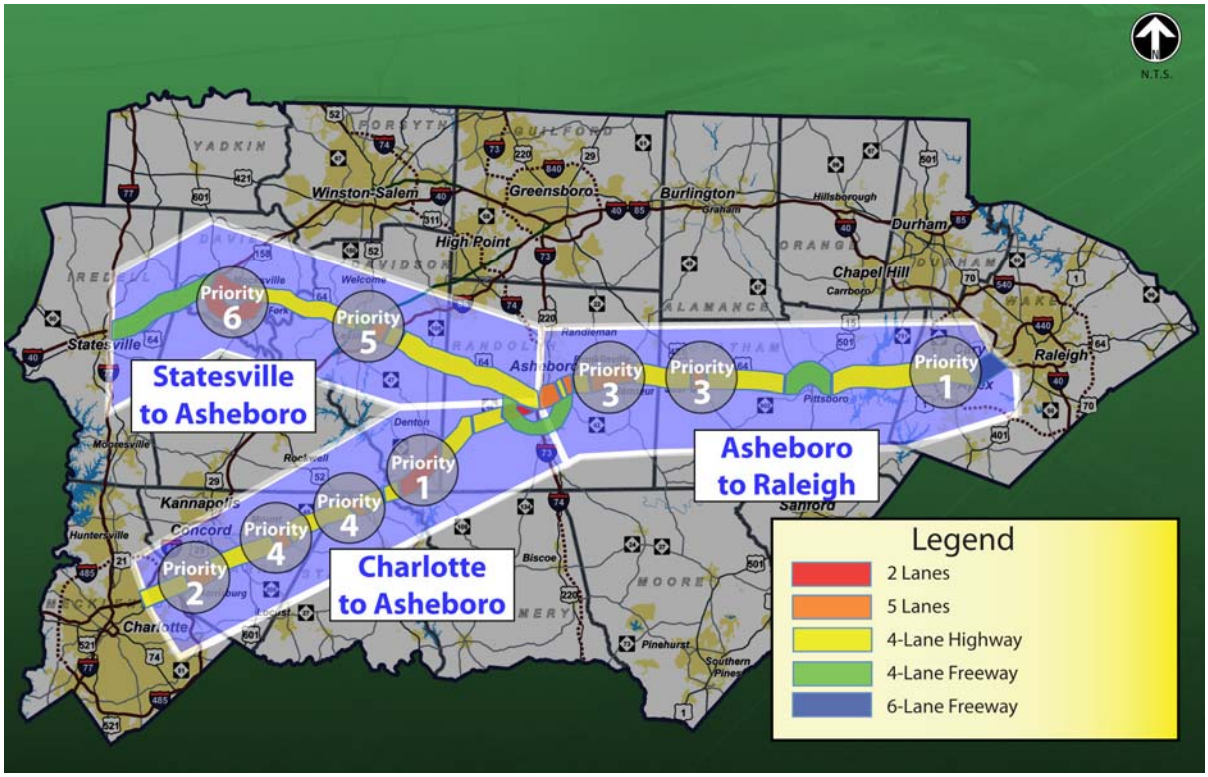
Figure 8.3: E+C Enhanced Improvements with Priority Ranking



8.3 Step 3

The final step in achieving the vision entails connecting all the "freeway" portions of the corridor. Such improvements may consist of an upgrade of the facility on existing alignment, or may require new location. As defined by the Study Team, there are three major segments of the study corridor. These segments are identifies in **Figure 8.4**.

Figure 8.4: Corridor Segments



Given what is known today with regard to safety, traffic volume, traffic operations, and land development, the Study Team envisions segment priority as follows:

- Asheboro to Raleigh
- Charlotte to Asheboro
- Statesville to Asheboro

However, given the long-range nature of these projects, segment priority designations will need to be continuously adjusted through careful monitoring of traffic volume, traffic operations, accidents and land development.

Defining the ideal relationship between land use and transportation has long been a conundrum for those involved in the planning of either. A number of studies have focused on the impacts of new roads on land use as improvements to the transportation network increases access to land parcels, which often brings more opportunities for development and growth. Several such studies have concluded that, while new roads have little to do with the rate of growth in a region, they do shape our cities and towns by attracting new development and redevelopment[1]. However, few studies have addressed the impacts of land use on new roads. Controlling land use impacts will require land use policies that guide development in a way that distributes local traffic more evenly throughout the local road network, maintains the long-term mobility of our highways, and maximizes mobility for through traffic.

Though striking a balance between competing land use and transportation objectives has multiple benefits, reducing congestion is the primary goal of those wrestling with this issue. Congestion on our roadways is one of the first signs that urban growth and development have outpaced the rate of improvements to the transportation network. While economists will point out that some amount of congestion is good for business, planners know—and economists agree—that too much congestion will have negative impacts that will outweigh the good. Thus, finding and maintaining that balance between development levels and traffic flow is important, especially in rapidly growing areas.

Controlling development, which involves adopting and implementing land use policies, is largely the responsibility of local government. With states investing millions of dollars in major transportation improvements every year, it is not surprising that each state has an interest in protecting its investments through land use policy, as well. However, the specific activities that can be undertaken at the state level to ensure such protection are few. The purpose of this chapter is to summarize a broad range of land use policies that can inform the decisions of those who can make a difference in protecting the mobility of a new roadway, particularly a freeway or expressway [hereafter referred to as "the highway"], and identify the ways in which those policies can be translated into action at all levels of government.

9.1 The Land Use/Mobility Issue

Before land use policies can be evaluated, consideration must be given to the primary issue that the policies must address: the loss of mobility on major roadways.

Freeways and expressways are high-speed roadways designed to carry through traffic (inter- and intra-state traffic as well as some regional traffic). Such roadways are constructed when existing roads that once served this purpose become too congested to function in that way.

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[1] *Salila V., Handy, S., & Kockelman, K.M. (2003, April 18). State-Local Coordination in Managing Land Use and Transportation Along State Highways. Available: http://www.ce.utexas.edu/prof/kockelman/public_html/JUPD,InteragencyCoop.pdf*

They are constructed with the capacity needed to accommodate existing and future through traffic.

Whether the highway is constructed as an upgraded roadway on an existing alignment, or as a new roadway on a new alignment, the result is the same. Development near the intersections and interchanges intensifies. First, highway-dependent uses will locate along the new roadway, followed by uses that benefit from proximity to the highway-dependent uses. This combination and pattern of land uses boosts the number of local trips between them, placing a new burden on the local street network and often putting so many local trips onto the freeway or expressway that it acts as a part of that network. Over time, mobility is lost when such roads are utilized for local trips. Building our way out of congestion is a logical response, but the results are temporary. Typically, this congestion requires an increase in roadway capacity in the form of a new road or widening of an existing road. Once the improvement is made and congestion decreases, access is again perceived as good and development continues in that area until the additional traffic generated by new development results once more in an undesirable level of congestion. Again, one of two choices must be made to alleviate the congestion: build a new road or widen an existing one, creating a continuing cycle of increased development and increased congestion.

There are a limited number of solutions to this cyclical problem. One of those solutions is the adoption of effective land use policies that are aimed at protecting the mobility of new roads. Assessing the potential effects of land use on transportation facilities requires determining what kind of development will occur, where it will occur, and what form it will take. These determinations (and the land use policies that arise from them) are associated with two activities: growth management (where and when development occurs) and land use planning (what type of development occurs). Growth management techniques control the direction, pace, and timing of development, while land use plans describe the nature of development—its density/intensity, mixture of uses, site layout, building orientation, street patterns, and access/connectivity. The level to which both types of techniques are employed, which depends on adopted land use policies, affects the way a highway functions in the long term. Both growth management techniques and land use regulations, which should be based on adopted policies, need to work in conjunction to achieve the desired balance between transportation improvements and future land use.

No particular land use can be described as suitable or unsuitable for areas adjacent to highways. Instead, it is the mixture of uses, the relationship between them, and the way each use is accessed that determines whether development will have a positive or negative impact on the highway. Definitions of “Land Use” need to be expanded to help communities guide growth and land use decisions. This definition includes design of development, which includes density/intensity, mixture of uses, site layout, building orientation, street patterns, and access/connectivity.

9.2 Existing Development Patterns and Related Issues

The US 64–NC 49 Corridor is characterized by various development patterns. The changing development patterns throughout corridor reflect the history of development in the corridor, which spans several decades. These patterns range from undeveloped areas to completely developed urban conditions.

All these different conditions affect the way the corridor functions. Undeveloped parts of the corridor provide better mobility; the more developed areas, while having access to goods and services, have experienced a decrease in mobility along the corridor.

Between the developed portions of the corridors lies land that to date has remained relatively undeveloped for a variety of reasons. These undeveloped areas include the following:

- Scenic/Protected – A segment of NC 49 is a designated NC Scenic Byway, and another segment passes through the Jordan Lake Recreation Area. Flanked by tree-covered areas, lakes and other natural features, these sections of the corridor are two of a few through which the roadways pass that stand the best chance of maintaining their natural, rural character. Some of these segments are protected in their undeveloped state, while others are not.

Scenic/Protected
US 64 – West of Lexington

- Rural: Vacant or Agricultural – Clusters of large tracts of land that have never been developed or have been farmed (and continue to be farmed) can be found in multiple locations throughout the corridor.

Rural: Vacant or Agricultural
US 64 – East of Pittsboro

The patterns that should be examined include both those that exist in the corridor today and those that are emerging throughout the corridor.

- Rural: Low-density Residential – Over time, single family homes have been constructed on large tracts of land. Many of these structures are not visible from the highway, but the private driveways that provide access to them give an indication of the number that exist within areas that otherwise appear vacant.

Rural: Low-Density Residential

US 64 – East of Asheboro

US 64 - Ramseur

- Conventional, Single-use Subdivisions – The subdivision of large tracts of land has occurred in multiple locations along the corridor. Some have been developed for single family homes on lots of one acre or less, while others have been developed as business parks for business and/or industrial uses. Common to both are the single (or few) points of access that, in this corridor, direct all related traffic to either US 64 or NC 49. Also, these subdivisions rarely have direct, physical connections to adjacent development. These subdivisions are more common near the endpoints of the corridor, in places such as Western Wake County and Concord.

Conventional, Single-Use Subdivision
US 64 - Cary

- Commercial Strip – Taking advantage of the access from the highway, commercial development comprised mainly of large- and small-scale retail, restaurants, gas stations, and other commercial development lines both sides of several sections of US 64 and NC 49. Each commercial establishment is oriented toward the highway, and gains its access to the highway through at least one private driveway serving only that parcel. Such commercial development is typically continuous, stretching one parcel deep on each side of the highway for at least one-half mile where it occurs. Siler City, Ramseur and Asheboro are three of several communities within the corridor that have these commercial strips.

Commercial Strip
US 64 – Siler City

- Highway-oriented Business – An emerging development pattern is the highway-oriented business development, which is often comprised primarily of regional-scale retail, typically found at freeway interchanges. As improvements to US 64 and NC 49 have

been made, interchanges have been constructed that encourage a concentration of businesses that depend on the patronage of passing traffic. Such interchanges, like those found along the bypass around Pittsboro, in Apex, and near Lexington are attracting large-scale retail and restaurant chains as well as gas stations, which are all being incorporated into conventional "power centers" (regional shopping centers of 300,000 or more square feet). While these businesses are typically not accessed by individual driveways, the centers in which they locate typically have a single point of entry near the interchange.

Highway-Oriented Business
Hwy 64 – US 1

- Downtown – The alignments of US 64 and NC 49 pass through or near the original centers of the towns and cities (Mocksville and Lexington) within the corridor. In these locations, the development patterns still reflect forms of the traditional town center, such as narrow streets and small blocks edged by two- and three-story buildings containing a mixture of uses.

Downtown Mocksville

Development, where it has occurred, has had an impact on mobility in the US 64–NC 49 Corridor. Unless the issues presented by current and emerging development patterns are addressed, mobility will continue to be compromised even with improvements made to the roadways. The Future Land Use Map (see **Figure 3.10**) depicts the land use vision of different communities. To understand the overall emerging patterns, the detailed future land use categories were simplified into Conservation, Rural, Suburban, and Urban in **Figure 9.1**. What is reflected in **Figure 9.1** is the continuation of the development patterns discussed above but depicted in a simpler form to show the linear urbanization of the corridor. The specific, related issues are as follows:

- Separation of uses – When uses are isolated, or when located near each other, but not well-connected, travel to and from them becomes more difficult, which encourages vehicular travel and makes bike and pedestrian travel less convenient or feasible. When these isolated or separated uses are located on or near US 64 or NC 49, the local vehicular trips to or between the developments are often made via the highways, compromising mobility on them.

- Multiple access points (driveways) along the highway – Having multiple driveways on US 64 or NC 49 results in multiple turning movements, which slows traffic and contributes to congestion on the highway.

- Single points of ingress and egress serving large developments – When most or all of the traffic generated by one development is directed to a single entrance, the traffic entering and exiting the development utilizes only one road instead of being evenly distributed throughout the street network. If the ingress/egress point is located on US 64 or NC 49, the development compromises mobility on the highway.

- Lack of connectivity between adjacent developments – Without connections between developments, traffic traveling from one to another is unnecessarily forced out onto adjoining roads, increasing traffic on those roads.

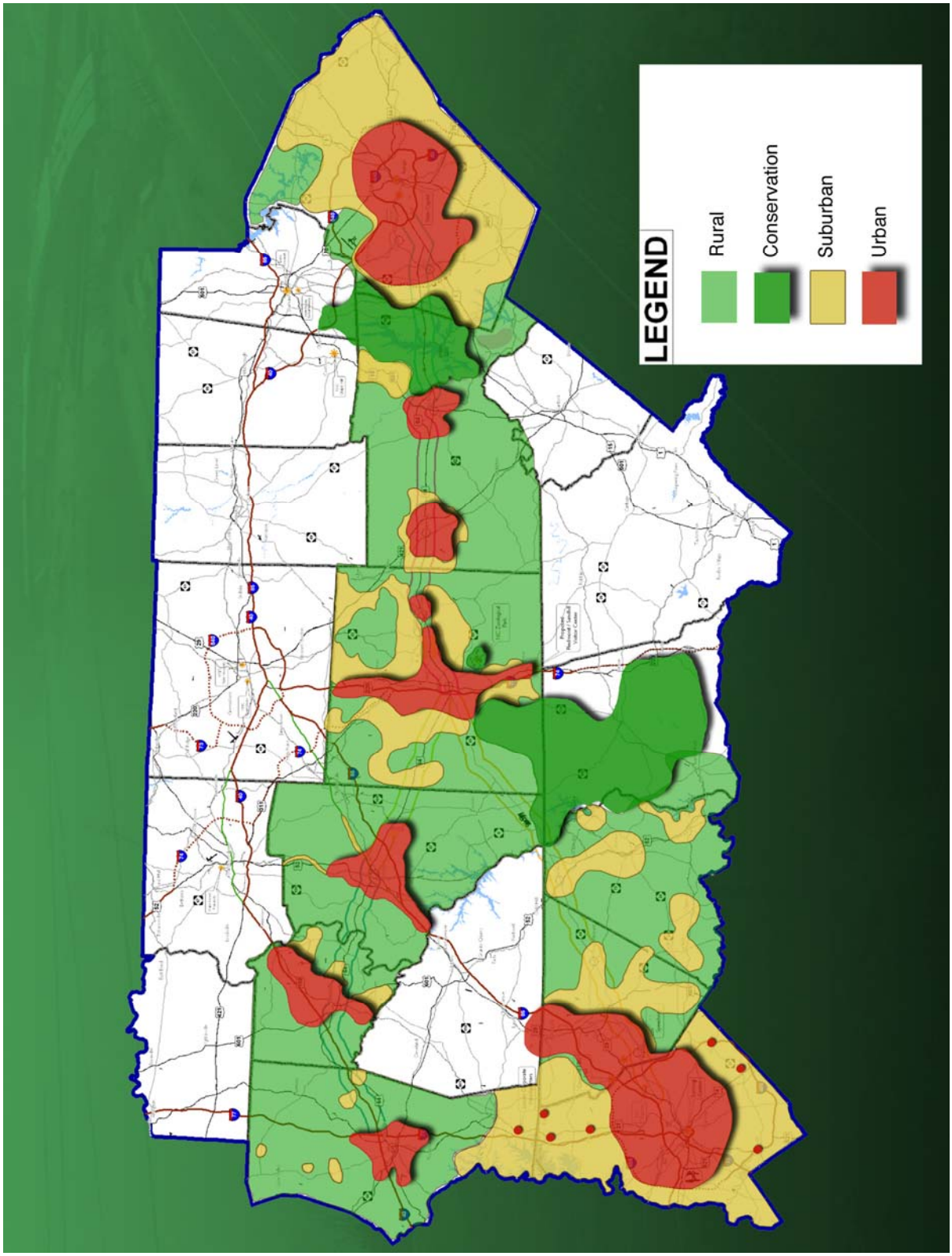
- Lack of attention to parallel roads – Parallel roads are not constructed or improved to be attractive local routes when the new facility (Strategic Highway Corridor) is constructed. Providing alternative east-west connections is critical for the corridor to maintain mobility. Unless local, parallel streets are created—or re-created—in a manner that attracts private investment and encourages orientation of development and access toward the local street, the highway will be perceived as the "front door" and the more appealing route for local trips, thus impacting mobility on the highway.

- Greenfield development – Development will follow the construction of infrastructure. When infrastructure is improved further and further from an urban core, development is attracted to these previously undeveloped "greenfield" locations. This phenomenon often contributes to the problem of suburban, low-density sprawl, which attracts local trips on the highway as people travel longer distances to and from the development. Highway-oriented developments, especially around interchanges, possess additional problems since they attract a lot of local trips, often on the highway.

- Lack of strategic growth management – Unless growth is managed in a manner that directs it to key locations in an urbanizing area, development will continue to "strip out" highway corridors. This uncontrolled development pattern increases the occurrence of a number of the issues mentioned above, especially multiple access points, greenfield development, and interchange growth.

In combination, many of the issues listed above contribute to the larger issue of local trips shifting to the highway that is intended to move regional traffic. This increase in local trips impedes mobility.

Figure 9.1: Future Development Pattern Based on Current Land Use Plans



9.3 Precedents

The best policies are those based on lessons learned. Where an issue has been successfully addressed in a similar situation, pinpointing the specific features of that successful solution and learning from them—learning why they contributed to success—will increase the likelihood of developing effective policies.

Based on the key issues associated with existing and emerging development patterns described in the previous section, several development alternatives, or precedents, were examined. Precedents are actual places that exhibit the characteristics that are believed to help achieve a desired condition. In this case, the precedents examined have qualities that help maintain the mobility of highways. Those that possess such characteristics that address such issues are presented below.

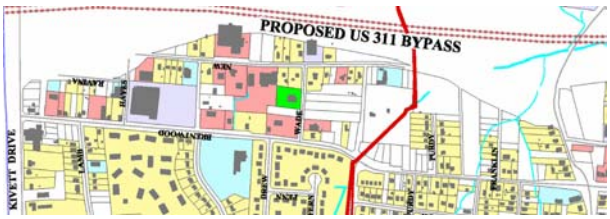
Precedent: Protected corridor with limited development
Lexington-Paris Pike
Lexington, KY
The corridor passes through a historic bluegrass landscape of rolling hills, passing large historic mansions and horse farms featuring plank and rock fencing. The corridor has remained virtually unchanged since the 1830s, flanked by agricultural uses for most of its length.

Source: www.asla.org/lamag/lam03/may/feature3.html

Notable features:

- Twelve miles of the corridor have remained undeveloped, as land has been protected by adherence to and regulations based on small area plans (recognized by all of the affected jurisdictions that call for preserving and protecting the character of the corridor.)

Precedent: Corridor redevelopment
US 311 Bypass
High Point, NC
When the US 311 Bypass alignment was placed parallel to Brentwood Drive, enough distance was left for development to occur and thrive between the two roads.



Existing

Notable features:

- Orientation of development is toward local street, not the US 311 Bypass.
- Depth of parcels between two roads suitable for viable development.
- Planned streetscape improvements are intended to create a safer, more comfortable pedestrian environment.

Proposed

Precedent: Corridor development
Whitehall
Charlotte, NC
Whitehall is a major employment center in the southern part of Charlotte located along I-485.

Notable features:

- Roadways parallel to the highway was designed to allow traffic to access the development without using the highway.
- Interchanges provide access to the local street network that includes these 2 parallel roadways, thereby keeping Whitehall traffic off of the highway.
- Internal circulation is designed to minimize traffic on these local roads, which minimizes congestion interchange areas.

Precedent: New interchange development
Ballantyne
Charlotte, NC
Ballantyne is a 2,000+ acre mixed-use development that offers a wide variety of employment, residential, and shopping uses all taking advantage of proximity to an interchange and major highway.

Notable features:

- An interconnected street system within the development allows users to access various areas without returning to the main roadway.
- Only one point of access (an interchange) to the highway (I-485) was created, with limited access to the perpendicular, intersecting road.
- Access through the local road network is encouraged.

Precedents: Greenfield, mixed-use development

Greenfield sites will always experience development pressure when infrastructure is extended to them. The next four precedents show how a mix of uses developed at different scales could achieve desired balance between land use and transportation.

Abingdon
Charlotte, NC

Notable features:

- Mix of uses within Abingdon combined with a highly connected system of streets and pedestrian and bicycle paths means that visitors, residents, and employees rarely have to use the highway or the major arterial roads that adjoin the site for local trips.

Birkdale Village
Huntersville, NC

An integrated mixed-use development combines street-level retail and office with apartments above for an exciting, truly walkable environment.

Notable features:

- A walkable, connected system of vehicular and pedestrian routes combined with a mix of residential, retail, and office space reduces the need for local trips on the highway.
- Connection points are provided allowing access to future development, and facilitating a highly connected local street system through developments lessoning the pressure on the highway.

Harrisburg Town Center
Harrisburg, NC

A new town center was created around institutional use using the Town Hall as the focal point. Different residential types are mixed with retail to create a more walkable community.

Notable features:

- Compact mixed-use community next to NC 49.
- Interconnected local street network, providing alternative ways of getting in and out.

Baxter
Fort Mill, SC

A 1,000-acre mixed-use community with a blend of residential projects laid out in tight-knit, walkable neighborhoods. Civic uses including a library, elementary school, parks and greenways are an integral part of the plan. The Town Center includes businesses, employment, civic and open spaces, and a variety of residential units in a pedestrian-oriented setting.

Notable features:

- The mix of residential, retail, office, and open space combines with institutional uses such as a library and school to further reduce the need for local trips outside of the development.
- A development like this almost functions as a small town in its own right, which reduces residents' needs to use the highway to reach their everyday destinations.

Precedent: Developed area, mixed-use development
US 311 Bypass
High Point, NC
A US 311 Bypass interchange connects to Lexington Avenue, which is already a congested roadway lined with a wide variety of commercial uses having access to Lexington Avenue.

Notable features:
- Redevelopment of the commercial strip along Lexington Avenue will allow for better integration of commercial uses in a residential area.
- Redevelopment will also reduce congestion on the highway by creating a better, more connected local street system and managing access along Lexington Avenue.

Precedent: Multi-modal design
Transit-oriented development (TOD)
Cornelius, NC
TOD possesses the characteristics of a good, walkable community. Where walking and biking is convenient, the environment is also conducive to transit. In many ways, it recreates the 'streetcar suburbs' of the late 1800s and early 1900s, before automobile use became a predominant transportation option.

Notable features:
- Compact development with compatible mix of uses.

Precedent: Infill development

Southend, including Camden Village and Atherton Mill

Charlotte, NC

Charlotte's Southend has been redeveloped from a declining district of warehouses and mill facilities to a vital and attractive area popular with visitors, residents, and employers.

Notable features:

- Brownfield redevelopment, with the use of grants, in this area has offered a feasible alternative to greenfield development on the outskirts of city for retailers and offices.
- Infill development creates an urban environment that is compact.
- Existing infrastructure is better utilized.

Beneficial Characteristics of the Precedents
Though the specific features of the precedents presented above have been executed with varying degrees of success, these precedents have one or more of the following characteristics that, in combination, aid in protecting the mobility of highway corridors.

- Compatible uses are mixed in a compact environment where the proximity of uses makes alternative modes of travel as convenient as or more convenient than vehicular travel.

- Few access points (driveways) along the highway. Parcel access is internal to development, minimizing the number of—and need for—driveways along the highway and other major roads adjoining development.

- Multiple points of ingress and egress serving large developments provide access to more than one local road off site, allowing traffic entering and exiting the development to be more evenly distributed throughout the local street network.

- Connectivity between adjacent developments providing routes for all types of traffic to travel between destinations without having to use the highway or other major roads.

- Parallel roads serve as the preferred routes to development. In addition, such streets are designed and constructed to attract private investment and encourage orientation of development toward the local street. This forces development to treat local roads as the "front door" and encourages primary access from it instead of the highway or other major roads.

- Preservation of greenfields by taking advantage of existing—and sometimes under utilized—infrastructure, thereby avoiding (or at least reducing) development outside from the urban core. This is incentivized in many communities through a number of mechanisms including brownfield redevelopment grants.

- Strategic growth management has been undertaken in the community in a manner that directs development to key locations, which helps to prevent the "stripping out" of highway corridors. Instead, a nodal pattern of development emerges, which limits access to the highway to a few key places along it.

9.4 Policy Guidelines

In order to address the issues outlined in Section 9.2 and begin achieving the characteristics identified as beneficial in Section 9.3, appropriate land use policies should be adopted throughout the corridor. The following land use policy guidelines address conditions associated with the many facets of the land use/mobility issue described in Section 9.1. Each policy statement is followed by a series of recommended actions for putting it into practice,

which target various audiences from local planning staffs to the state's Department of Transportation. Some of these recommendations are followed by associated sub-recommendations or specific tools that may be used to carry them out. *These policies are not intended to be assigned to specific communities. Each is appropriate for application in every segment of the US 64–NC 49 Corridor, although the prioritization of the policies and their application may vary depending on the particular challenges in each community.*

The policies and accompanying recommendations on the following pages outline ways to achieve a balance between land use and transportation along the highway and at interchanges.

Policy #1: Promote adherence to land development principles that minimize the need for local trips on the highway.

As stated previously, no particular land use can be described as suitable or unsuitable for areas adjacent to highways. Instead, it is the mixture of uses, the relationship between them, and the way each use is accessed that determines whether development will have a positive or negative impact on the highway. Thus, development should follow design principles that reduce numbers and lengths of local trips and provide alternatives to the new highway for those trips. Efficient travel behavior is positively associated with such land-use characteristics as density of development and a mix of complementary land uses within walkable distances. These land-use characteristics are in turn associated with transportation infrastructure and facilities that support efficient travel behavior, such as frequent transit service and complete sidewalk and bike lane networks. Development design must incorporate these elements effectively.

Recommended actions for putting this policy into practice:

- Encourage the concentration of a mixture of uses to minimize the number and length of local trips.
    - Locate auto-oriented businesses in a manner that does not conflict with the compact form of mixed-use development and can be accessed via the local street network.
    - Allow vertical mixing of uses (such as residential above commercial/retail) by right in zoning. Cities such as Seattle, Orlando, and Washington, DC, use density bonuses to encourage mixed uses.
    - Vary the intensity of development along a highway corridor by encouraging commercial/mixed-use activity centers near intersections of through streets that are well linked to the surrounding area.

- Establish site design standards to promote development patterns that make feasible a variety of transportation options for pedestrians, bicyclists, transit users, and automobile drivers. Not accommodating this variety of transportation choices encourages vehicular travel, thereby increasing local trips on a nearby highway.

- Support human-scaled design and streetscape features that help enclose and define a more pedestrian-friendly environment by orienting buildings to the street and requiring building entrances to be placed close to the street. Also promote the incorporation of ground-floor windows, articulated facades, appropriately scaled signs and lighting, awnings and other weather protection, and landscaping, including buffering where appropriate.

North Street Revitalization Project

In Burlington, NC, the Community and Economic Development Office is working on a North Street Revitalization Project to create a thriving, pedestrian-friendly area to encourage economic development along the mixed-use street. Transportation improvements are aimed at pedestrian safety, street aesthetics, and traffic reduction. Traffic-calming measures include narrowing the street and using pedestal-mounted signals and bump-outs at intersections and crosswalks. Bicycle use will be encouraged with additional signs and education. Lighting reconfiguration will improve lighting levels on the street and sidewalks, address issues of safety, glare, and discoloration, and decrease light pollution.

- Locate parking and vehicle drives away from building entrances and not between building entrances and streets with pedestrian activity. Orient surface parking behind or to the side of buildings.
- Provide access from shared driveways or alleys to minimize the number of driveways pedestrians must cross. Driveways separate buildings; minimizing them tends to shorten the walk between uses.
- Provide pedestrian walkways through sites, connecting building entrances and the public sidewalk with safe crossings of streets, drives, and parking lots.
- One way to do this is to create an overlay zoning district that applies design principles across multiple zoning districts without rewriting entire zoning categories. Parcels affected by an overlay zone are subject to the standards of the underlying zone in addition to the standards of the overlay zone.

Traditional Neighborhood Development Ordinance

Belmont, NC, was the first community in the country to adopt a municipal traditional neighborhood development (TND) zoning ordinance. Belmont's TND ordinance allows for the development of fully integrated, mixed-use, pedestrian-oriented neighborhoods. The intent of the ordinance is to minimize traffic congestion, suburban sprawl, infrastructure costs, and environmental degradation.

- Manage parking design, location, supply, and demand to help create more balanced auto and pedestrian environments. Surface lots should be small, on-street parking should be offered, and structured parking should be incorporated in order to avoid substantially separating uses and impeding pedestrian movement. Oversupply of parking should be avoided since it not only induces auto travel (including travel on the highway), but can discourage travel by foot or bicycle.

- Reduce or waive minimum off-street parking standards.
- Establish a maximum parking ratio based on land use.
- Provide shared parking requirements in areas of mixed retail and commercial uses.
- Allow "in-lieu" parking fees to be paid by a developer to forego providing on-site parking. These funds would combine in a fund for constructing off-site municipal parking facilities.

Policy #2: Support efforts to increase connectivity within and between developments.

Travel patterns within a road network are dynamic; they shift with each network improvement as motorists search for and find the optimal route: one that is the shortest in terms of travel time and distance between destinations. Many local roads are created through the subdivision of private property, but as developers strive to minimize costs, money spent on infrastructure is kept to a minimum. As a result, few streets, particularly through streets that could contribute to the local road network, are built; developers build only what is necessary to provide access *within* each development, leading to deficiencies in the transportation network. When the local street network is not sufficient, a highway or expressway can become the quickest route, reducing mobility for through traffic. Connectivity between and within developments not only encourages drivers to use the local street network for local trips without traveling on the highway, but also provides options for people to walk or bike to their local destinations instead of driving, further reducing the number of local trips made by vehicle.

Recommended actions for putting this policy into practice:

- Foster the creation of a dense and highly connected street system.
    - Require a continuous network of streets at the local level. While local transportation plans recommend critical connections, implementation occurs primarily through the development process.
    - Designate future street extensions to plan for connectivity. Stub-out connections to neighboring parcels may be constructed if cross-access is not feasible at time of permit approval.
    - Require the formation of blocks with a minimum street spacing standard. Local governments can plan ahead by stipulating maximum block lengths and perimeters in their zoning codes.
    - Limit closed street systems and cul-de-sac designs to situations where topography, environmental impacts, or existing development patterns prevent full street connections.

- Encourage connectivity for pedestrian and bicycle travel by requiring a continuous network of pedestrian and bicycle pathways that link to roadways and adjacent developments. These pathways need not coincide with street and driveway locations,

making their creation more feasible and, often, their use more convenient than taking a vehicular route.

- Require multiple points of ingress and egress for new developments, locating them on secondary roads in addition to or instead of the highway when possible. Encourage, require, or provide a density bonus for providing access points along more than one roadway, where appropriate, to distribute the trips to and from the development and reduce the burden on the main roadway.

Policy #3: Promote development design that adequately manages access and reduces congestion levels on roads.

Achieving transportation efficiency requires addressing potential conflicts between mobility on the highway and accessibility to the highway. As access to a highway is increased, mobility may be reduced. For example, when a highway has an excessive number of curb cuts, access is increased allowing multiple turning movements which slow traffic. Also, easy access facilitated by the many curb cuts encourages local trips on the highway. Access management is key to maintaining the mobility of the highway.

Recommended actions for putting this policy into practice:

The following access management recommendations should be applied to the highway, but may also be considered for intersecting roadways when access management could help reduce congestion on those roads. They may be applied by incorporating the techniques into the zoning code, creating an access management ordinance, or requiring the techniques' application during the subdivision and site plan review process.

- Minimize the number of driveways/curb cuts on the highway. Fewer driveways, appropriate driveway location, and design standards will allow for vehicular movement that will help minimize congestion.
    - Adopt minimum spacing requirements and maximum driveways per development.
    - Encourage shared driveway access through regulations and incentives.
    - Encourage cross-access agreements that allow one or more parcels to gain secondary access across the property of another, reducing the reliance on driveways onto the highway.
    - Because the width of lot frontage affects the spacing between driveways, set minimum lot frontage requirements high enough to prevent land along thoroughfares from being subdivided into small lot frontages. On strategic highway corridors, minimum lot frontage requirements could be tied to minimum driveway spacing standards. Where there are alternatives to direct

Alternate Access
DelDOT works with Delaware property owners to find access points to their property other than those linking directly onto the corridor. They also try to achieve a site design that conforms to the corridor capacity preservation program.

access onto the highway (such as access to a cross street or shared driveway), smaller lot frontages could be permitted[2].

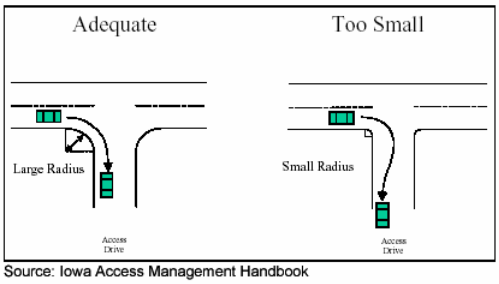
- At the intersection of arterial and local roads, require corner lot access from local roads in order to minimize access points on the highway.

Landscaped Driveway

Source: Iowa Access Management Handbook

- Encourage smooth traffic flow on the highway by regulating the nature of driveways and other access points.
  - Encourage driveway turn-around areas to improve the safety of vehicles that would otherwise be backing out on the highway.
  - Implement adequate sight distance policies based on posted speed limits to allow traffic to enter the highway safely and efficiently and to improve visibility of driveways.
  - Establish guidelines for a minimum turn radius, minimum driveway width, and maximum driveway slope are important because they help slower, turning traffic move off the arterial more quickly, and help the traffic leaving a driveway turn and enter the stream of traffic more efficiently[3].

Adequate Turn Radius



Source: Iowa Access Management Handbook

  - Require new developments to conduct traffic impact analyses to determine the need for turn lanes to allow entering and exiting traffic to move smoothly.
  - Require bus pullout bays along transit routes.
  - Establish a minimum offset between a local road intersection and the highway in order to give enough stacking distance for traffic to exit the highway and turn onto the local road without causing congestion on the highway.

- When access must be provided to small lot frontages, build a back road that can be integrated into the local street system more easily than a frontage road. To do this, the department of transportation may consider building the back road.

- Encourage or require a traffic impact study for all projects that would generate traffic above a certain level in order to lay the groundwork for effective access management.

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[2] *Williams, K. & Marshall, M. (1996). Managing Corridor Development: A Municipal Handbook. Tampa: Center for Urban Transportation Research.*

[3] *Access Management Handbook (2000). Ames: Center for Transportation Research and Education, Iowa State University Research Park.*

Statewide Programs

In August 2000, the North Carolina Department of Transportation (NCDOT) made it easier for local governments to implement traditional neighborhood street networks in new developments. NCDOT approved street design guidelines to support community interest in streets that slow and disperse vehicular traffic and provide a pedestrian-friendly environment. The guidelines specify widths, street geometry, utility placement, and provision of bicycle and pedestrian facilities that promote walkable, human-scaled communities.

New Jersey and Delaware have created similar statewide programs that combine access management approaches to road and street design with context-sensitive design principles. These programs seek to provide alternatives to street widening in order to preserve the character of small historic or suburban towns while improving conditions for traffic through the towns (Ewing, R. 2001. Flexible Street Design of New Jersey's Main Streets. New Brunswick: Voorhees Transportation Policy Institute, Rutgers University.).

Policy #4: Maintain the viability of existing development when new highways are constructed.

When a new highway is built parallel to an existing roadway, whether immediately adjacent or as a bypass around a town or city, the danger exists that the development along the original roadway can migrate toward the highway, drawing local trips onto the highway and leaving the original roadway to lose vitality and users. This can have a negative impact on the existing land uses, provided these uses remain. Fully utilizing an existing roadway as a parallel connection after the new highway is built advances connectivity goals and helps reduce congestion on the highway. A main factor in ensuring that the existing development thrives is a roadway that continues to be used for local trips. The treatment of the existing roadway (i.e. investment that enhances the appearance and function of the roadway as a local street and front door to the existing uses) and the distance between it and the highway are critical.

Recommended actions for putting this policy into practice:

- Provide adequate space between the existing road and the new parallel highway for development to occur on both sides of the original roadway. The appropriate distance will vary depending on the municipality's size, type, and development pattern.

- Invest in streetscape and pedestrian amenities along the existing roadway to attract private investment and help convert it into a vibrant street with the look, feel, and function of a local street instead of a highway or commercial corridor.

- Encourage continuous local streets as development and redevelopment occurs, particularly those that may provide an alternative, east-west route paralleling the new highway.

Orphan Highways

The "Orphan Highways" program in Portland, Oregon, promotes the conversion old highways running parallel to freeway to more pedestrian-friendly, dense, mixed-use corridors. Congressman Blumenauer recently introduced "H.R. 2927, the Orphan Highway Restoration Act," which would authorize funding for repair and rehabilitation of the nation's "orphan highways," many of which function as Main Streets in communities throughout the nation. Orphan highways are federal routes that served as major thoroughfares before the advent of the Interstate Highway System, but now suffer from neglect and maintenance needs. Investing in orphan highways creates a major opportunity for economic redevelopment, safety improvements, and enhancing community livability. With targeted funding and greater decision-making directed to urban areas where the impacts are most directly felt, we can have a positive impact on efforts to reinvigorate tired old highways and restore the Main Streets so important to our nation's communities. In the Portland region, Sandy Boulevard, Martin Luther King, Jr. Boulevard, Grand Avenue, and SW Pacific Highway are all examples of orphan highways. For more information visit http://blumenauer.house.gov/Issues/Issue.aspx?IssueID= 15.

Policy #5: Encourage redevelopment in the urban core to reduce pressure for greenfield development, which is likely to occur along the highway and attract local trips to it.

Development is often attracted to areas where construction is easiest and access is most convenient, such as greenfield sites along new and existing highways. However, development of these greenfield sites often has negative effects on the highway, attracting local trips and resulting congestion. If new development can be concentrated in areas that have already been developed, especially areas within the inner city and urban core of a municipality, there will be less pressure for the growth to occur in greenfield locations, and the increased number of local trips on the highway can be avoided.

Recommended actions for putting this policy into practice:

- Use brownfield redevelopment incentives as a catalyst to promote growth in inner city and urban areas. Give tax incentives to municipalities (ultimately passed on to the developer) for site assessment, clean-up, and redevelopment. In order to encourage reuse of brownfield sites, Department of Environment and Natural Resources (DENR) enters a "brownfields agreement" with a prospective developer that defines the clean-up and land management actions that are necessary for a particular brownfield site. With this agreement in place, the developer receives liability protection that opens the door to obtaining loans that would previously not have been offered for the project.

Policy #6: Manage development around highways, particularly the interchanges that pass through relatively undeveloped areas (greenfields) in order to minimize negative effects of highway-oriented development on mobility.

Introducing unfavorable development patterns around highways and highway interchanges often attracts development patterns that are highway-oriented. Such patterns are not desirable from a transportation standpoint. For example, interchanges can attract the development of large land parcels that are typically commercial or industrial, are destinations for local trips, and are typically not connected in any way to neighboring parcels, which are often vacant.

Because of its isolation, this type of development encourages local vehicular trips, as travelers must drive between the parcel and almost any other destination. In addition, the nature and the isolation of these developments often combine to create a lack of both pedestrian connections to neighboring parcels and transit links to more distant destinations, further promoting the number of local trips made by automobile. Thus, managing development in these high-impact areas is key to controlling the effects of land use on a new highway or expressway. The following recommendations show how this development may be managed.

Recommended actions for putting this policy into practice:

- Prepare small area plans at the local level prior to new highway construction. Interchange and other capacity expansions along the corridor should not take place until adequate land use preservation and facility access restrictions are put in place.

- Establish an additional layer of regulation for corridors and interchange areas to control the nature of this development.
    - Implement Interchange Zoning districts.
    - Implement Corridor Overlay Districts.
    - Establish conditional uses.
    - Require Planned Unit Developments (PUDs).

- Purchase land within a specified distance of such access points to prevent development in those locations.

- Provide incentives to stimulate development in target areas and to achieve desired design, intensity, and other characteristics.
    - Allow the transfer of development rights, when permitted in North Carolina.
    - Provide density bonuses.

Interchange Zoning Technique

Jurisdictions in several states have created specific interchange zoning categories that set forth the uses, standards, and restrictions for land within that zoning category. Lakeland, Florida, has an interchange activity center zoning category as one of the categories in local ordinances that are implemented at the regional level along key corridors. Use of this zoning category has encouraged compact development at interchanges along important corridors. (Salila V., Handy, S., & Kockelman, K. M. 2003, April 18. State-Local Coordination in Managing Land Use and Transportation Along State Highways. http://www.ce.utexas.edu/prof/kockelman/public_html/JUPD,InteragencyCoop.pdf

Executive Order for Conservation

Vermont's Executive Order No. 19-3 (No. 07-01) addresses conservation of land in and around interstate interchanges. It encourages state agencies and departments to conserve land in these areas and ensure that any development that does occur meets the state's goals for new development, including compact development patterns and preservation of scenic, agricultural, natural, and historic assets.

- Establish easements (e.g. scenic easements) or employ other preservation tools that can be put in place around interchanges.

- Create multi-governmental interchange access agreements (see **Appendix F** for examples of multi-governmental agreement to better integrate land use with transportation), which could ensure that development around interchanges is managed to meet the criteria agreed upon by the interested municipalities, counties, and state department of transportation. This type of agreement is allowed under North Carolina law section 160A-461 – Inter-local cooperation authorized.

- Utilize new technology to predict and understand the impact of different land use policies on growth around interchanges. The Interchange Development Model (IDM) is a computerized, multivariate regression model that helps in identifying the overall impact of current development and how an interchange may help or fall below development expectations. It also helps determine steps that can be taken to enhance or limit development and provide future alternative scenarios.

Policy #7: Encourage growth management initiatives that would manage the rate and direction of growth community-wide.

The pace and direction of growth directly affects road mobility and therefore congestion. If the rate of growth in a region outstrips the road mobility serving and connecting it, then any new improvements, including the new or improved highway, will immediately feel negative impacts such as congestion. One way to handle this problem is by assessing existing and future transportation improvements in light of the rate of growth. If it is determined that the transportation infrastructure planned, especially the highway, is not compatible with the growth rate, growth management efforts will be even more vital to protecting the mobility of the highway.

Recommended actions for putting this policy into practice:

- Restrict extension of services in areas where development should be limited.

- Conduct planning studies such as small area plans to guide development in areas in which growth should be directed.

- Adopt adequate public facility ordinances to make the connection between road mobility and the rate of growth.

Jobs-Housing Balance Grants

California offers "Jobs-Housing Balance Grants" to communities that have the greatest increase in the number of housing units permitted in comparison to a previous three-year average. The program goal is to encourage new housing construction, primarily in high job-growth areas where housing has not kept pace with job growth. There are two components to the award: production, which rewards increases in housing supply relative to county-level employment demand and the jobs-housing relationship; and planning incentive, which rewards production of types of housing that advance livable-community objectives. The competitive grant program also offers bonus points for infill and affordable housing projects. The communities can use the grants for a wide variety of community projects (Environmental Protection Agency Smart Growth Initiative. September 2004. http://cfpub.epa.gov/sgpdb/sgdb.cfm).

- Create a program for protecting corridor mobility, incorporating an educational component that addresses land use policies.

- To reduce the number of workers driving on the highway to commute long distances to employment, reward communities that create a balance between jobs and housing. The state may do this by offering grants, tax incentives, or other advantages to communities that meet certain criteria.

9.5 Conclusions

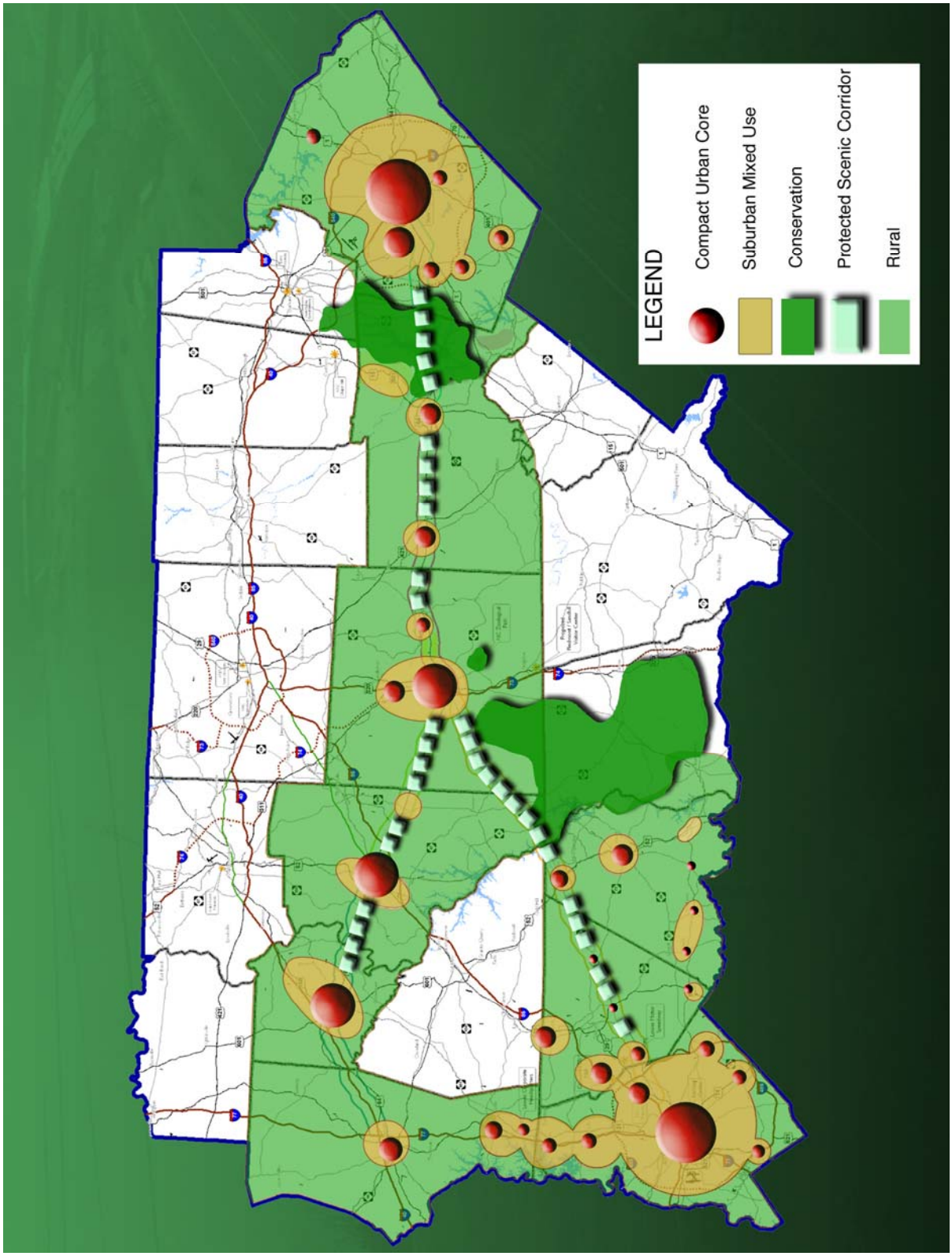
Land uses along the US 64–NC 49 Corridor range from agricultural in the rural areas to commercial and industrial in the relatively dense suburban and urban environments. Many of these uses depend on access to US 64 and NC 49 to be successful. However, the specific conditions surrounding development in the corridor are also varied, so the impact of land use on existing and future roadway mobility differs from one area to the next. Thus, the number and types of land use policies that should be applied vary throughout the length of the corridor.

One of the key issues in addressing the need for balance between land use and transportation priorities is how various authorities work at different levels. Most highway transportation improvements fall under the state's jurisdiction, while land use planning is a heavily guarded power of local jurisdictions. Thus, the power to directly control two closely connected issues is dealt with at two very different levels by two very different organizations. Both state and local jurisdictions will play important roles in preserving highway mobility, and all of these entities working together to achieve this goal will be as important as any efforts they make individually.

In conjunction with other planning and zoning activities, adoption of the policies discussed above at the local level may result in land use patterns that satisfy the needs of both the communities through which the roads pass and the agencies responsible for maintaining mobility for through traffic in a given area. Each jurisdiction may choose to adopt a subset of the policies described in this report, depending on the needs in the area and the input of citizens who are affected by the policies. While embracing these policies is an important first step in implementation, the true benefits will be realized when such policies are reflected in the regulatory frameworks of each municipality and county, ideally in a consistent manner.

If policies are applied appropriately throughout the corridor, the future development pattern that ultimately emerges may resemble that which is illustrated in **Figure 9.2**. The alternative future land use development pattern suggests compact urban cores surrounded by lower density suburban mixed-use development. It also depicts future scenic corridors protected at local level from intense development, mainly between major urban areas. It discourages

Figure 9.2: Alternative Future Development Pattern



stripping of the corridor for high intensity uses between Asheboro and Ramseur by encouraging more compact development.

Since land use is controlled at the local level, the state's ability to influence land use decisions is limited to communication and coordination with the units of local government. As a resource, the state can fill an educational role, giving the affected jurisdictions equal access to useful policy information, including helping to train local officials about land use and its impact on transportation. Providing consistent information opens the door for regional coordination, as neighboring jurisdictions consider the adoption of common policies. State government can also provide a policy framework to encourage changes in land use and transportation patterns in response to population growth. The state might also consider the practices of other states, such as New Jersey, of providing funding and incentives. For instance, NCDOT might direct state and federal transportation funding to cities and regions that preserve land around key interchanges, facilitate the development of land use plans that foster long-term mobility, or demonstrate improvements in vehicle miles traveled per capita.

While efforts at the local level and the state level can be very effective, the best solution lies in bringing the two levels of government together and adopting an incentive-based approach in which road mobility and level of service (issues critical to NCDOT) are balanced with the intensity and nature of development (issues important to local jurisdictions). Balancing the needs and priorities of the two types of organization is part of the larger quest to balance land use and transportation needs and design principles. Successful land use/transportation programs are accomplished in states where inter-governmental cooperation thrives, such as California, Maryland, New Jersey, and Oregon. Such efforts, though difficult and complex undertakings, will provide the most effective solution, allowing both statewide and local needs to be met as goals for the relationship between transportation facilities and land use patterns are realized.

10.1 Why Preserve Corridors?

When a federally-funded new or expanded roadway is planned, an approval process conducted according to the National Environmental Policy Act of 1969 (NEPA) determines whether the transportation corridor is acceptable, given its environmental impacts. This process aims to minimize negative impacts on the environment made by the final alignment of a corridor. Under the current system, acquisition of the land needed for the right-of-way of the transportation facility is intended to begin once the alignment is approved according to NEPA. In fact, the Federal Highway Administration restricts right-of-way acquisitions before the NEPA process is completed, with the intent of avoiding prejudicing the environmental approval process. However, NEPA approval of a corridor can take up to five years; if land within the planned right-of-way is not set aside during this time period, the corridor may be developed, which may require a new location to be found for the corridor and could direct the corridor into environmentally sensitive areas, or areas in or near neighborhoods that will be negatively affected by the roadway. Relocation also requires that plans be redrawn and project development be postponed, increasing the cost of the project. Alternatively, if the corridor is not relocated, development that occurs within it will require transportation agencies to pay much higher prices for land that has been improved while the NEPA process has been underway. Thus, the very process that is meant to ensure that corridor alignments are appropriate may allow private development to occur within the preferred alignment, directing transportation improvements onto sensitive sites or costing transportation agencies far more than is necessary.

In order to avoid development of properties within planned rights-of-way, local, regional, and state planning entities must find ways to protect key sections of planned corridors until construction is set to begin, without contravening the requirements of either NEPA or the FHWA. This can include finding ways to preserve the corridor without acquiring the properties, such as exercising police power, acquiring interests less than fee simple in the properties, or reaching agreements with property owners. Alternatively, the planning entities can find ways to acquire key properties within the parameters of NEPA.

Whether corridor preservation occurs through acquisition in accordance with NEPA requirements, or through methods that are not restricted by NEPA, it is key to avoiding the environmental and capital costs of delaying any control over the planned corridor until NEPA approvals are completed. While corridor preservation is not appropriate or necessary in all cases, it is crucial along corridors that are likely to experience significant development pressure in the near future. However, there may be instances in which a high level of controversy over a proposed improvement makes preservation efforts too contentious to be undertaken.

10.2 When Should Preservation Efforts Begin?

Corridor preservation should begin during the planning and project development process. Once the needed improvements to a roadway and its general corridor have been identified, the improvements should be prioritized. Next, state, regional, and local agencies should collaborate to determine whether the corridor will require protection. If protection will be needed, the planning agencies should determine a more precise location for the corridor, the nature of the threats to the corridor, what preservation actions may be appropriate, how necessary funding may be obtained, and when the actions should be initiated. At this time, they may also consider preserving land to be used for environmental mitigation. For instance, if a right-of-way acquisition will occur in a wetland area, additional land may need to be preserved to act as replacement wetlands after construction begins. These steps should be taken early, so that the necessary actions can be included in the Transportation Improvements Program and coordinated with state, regional, and local transportation entities.

10.3 Communication, Coordination, and Cooperation

Preservation of the land needed for transportation improvements can only be achieved if local, regional, and state planning agencies work very closely together to identify threats to planned rights-of-way and find solutions to them. In reviewing each of the preservation techniques in this report, agencies should aggressively pursue communication, coordination, and cooperation within each agency, among the agencies, and with property owners.

This need for coordination can be formally promoted at the state level. For instance, local jurisdictions can be required or encouraged to notify the state transportation agency before approving any rezoning, building permit, subdivision change, or other permitting activity within a planned corridor. The state can then respond within a set time frame by purchasing the property in question, beginning negotiations with the owner for exercising other preservation techniques, or initiating eminent domain proceedings. State, regional, and local entities may also foster coordination by incorporating tools such as memoranda of understanding into their planning processes, ensuring that all parties with interest in a corridor are united in their efforts to preserve it. For instance, a memorandum of understanding may be issued by a state agency to a regional planning body to communicate full intention to develop a corridor if the regional body preserves land along it.

Even if no formal programs or tools to advance coordination are used, such collaboration should be considered absolutely vital to preservation efforts. This cooperation should help align the goals of planning bodies, as well as bring property owners into close communication with them, so that creative solutions are found, costs are minimized, and lawsuits are avoided.

10.4 Methods for Corridor Right-of-way Protection

10.4.1 State Corridor Management Program

State-level programs can make corridor preservation a priority by establishing a system for identifying and protecting important corridors, including methods for ensuring coordination between jurisdictions involved, and measures for obtaining funding. This type of program can be formal and included in state law, or may be informal. Alternatively, the state may establish a corridor preservation team to address such issues at the state level, or may set up a procedure in which the state formally ensures regional or local entities that if they preserve certain corridors, the state fully intends to develop them. These state programs support corridor management by providing established avenues for uniformly carrying out corridor preservation efforts across the state. North Carolina does not have such a system, but three examples of such state-level corridor preservation programs are described below.

California statutes allow the CalTrans, the state's transportation authority, to pursue corridor preservation, but the identification of corridors to be preserved is undertaken by regional transportation agencies and local municipalities. These regional and local entities must take several required steps in designating corridors for preservation, including establishing geographic boundaries for the corridor; completing a survey of traffic and air quality impacts of the corridor; and considering the widest possible range of transportation facilities that could be located in the corridor and the environmental impacts they may cause. The state department of transportation then pursues preservation through donations, dedications, transportation impact mitigations, advance right-of-way purchase, and other means. Each land acquisition proposal must be submitted to the regional transportation planning agency for review before it can be carried out.

In Kansas, a policy within the Department of Transportation allows for the following:

- A corridor management committee to coordinate corridor management issues.
- District plans that are collaboratively created to identify corridors that will require careful management.
- Special requirements for commercial and industrial access, including design review for extensive development, traffic impact studies, and drainage reports.
- Methods for corridor preservation, and processes for carrying out corridor preservation.

It also places heavy emphasis on coordination among the DOT, MPOs, local municipalities, public utility companies, and other groups in pursuing corridor preservation. The corridor preservation program based on this policy is allowed by state legislation, and funded by the state. It encourages memoranda of understanding between cities, counties, and KDOT for pursuing corridor preservation, but does not have mechanisms to enforce the policies it supports. Corridor identification is sometimes developer-driven, but the program also works

with municipalities to identify corridors. The program does have the authority to pursue corridor preservation, including property acquisition, but the design process must be underway, with right-of-way limits established.

In 1988, Florida legislation authorized FDOT and local governments to designate transportation corridors for protection on an official map, based on which local governments were required to withhold development permits in mapped corridors for five years. This five-year period could be extended an additional five years with no commitment by the State to purchase the property in question. The statute's stated purpose was to freeze land values in anticipation of condemnation, and prevent the increased costs of land acquisition that would occur if development permits were granted. In 1990, the Florida Supreme Court ruled that these provisions were unconstitutional and a violation of due process. Since then, corridor preservation policy in Florida has changed focus, taking place mainly at the local level now. In 1995, new legislation encouraged close coordination between FDOT and local governments on corridor preservation, emphasizing local comprehensive and thoroughfare plans as the proper place for designation of corridors for preservation. This legislation authorized local governments to adopt transportation corridor management ordinances, as discussed in Section 10.4.3.1. Local governments are directed to notify FDOT before approving any rezoning, building permit, subdivision change, or other permitting activity that would negatively impact the future viability of the corridor for transportation purposes. This allows FDOT to identify problems and negotiate alternatives while implementing corridor preservation at the local level.

While these programs make significant progress toward making corridor preservation a priority, none of them represents the perfect statewide program. For instance, the California program puts the task of identifying corridors for preservation with the regional and local entities, while the task of preservation remains with the state. This can reduce the likelihood that corridors preserved are significant and consistent on a broader level, and could lead to problems with the NEPA process if the state funds acquisition that contravenes NEPA rules. The Kansas program's use of a committee to promote corridor preservation throughout the state is not as strong as it could be, lacking the ability to enforce their recommendations. In a program like this, it should also be ensured that the committee has access to the staffing, information, and funding resources it needs to fulfill its duties. The Florida program, while innovative in offering a model ordinance for local adoption, lacks state-level coordination to ensure that local governments are aware of the ordinance's availability and purpose. It could also benefit greatly from state-level efforts to encourage communication among neighboring jurisdictions regarding corridor preservation. If the establishment of a state-level corridor management program is considered, the needs and opportunities specific to the state in question should be appraised in combination with successful aspects of existing programs in order to determine the best structure for the new system.

10.4.2 Mapping

Local governments can put transportation improvements and rights-of-way in master plans and comprehensive plans at varying levels of specificity, showing centerline alignments and rights-of-way required. The validity of later corridor preservation actions, if challenged, may depend on the inclusion of the project in a comprehensive, thoroughfare, or other plan, making these plans an important step in corridor preservation. In North Carolina, thoroughfare plans produced and adopted by MPOs are the most typical of these plans. Including corridors in these types of plans makes their preservation much more likely to succeed, as it forms a basis for corridor preservation efforts following plan adoption, especially those at the local level. This type of planning also allows land uses adjacent to the facility to be adjusted accordingly in order to reduce conflicts between the right-of-way needed and the development occurring within and near it. The planning process also helps establish buy-in and lays the groundwork for cooperation with property owners in the future. This planning step is effective for both expanding existing facilities and establishing new ones.

When incorporating future transportation corridors into local plans, municipalities and regional planning entities should coordinate closely with state agencies. Local efforts at corridor preservation may be strongly challenged if they do not have clear support from the state department of transportation.

10.4.3 Police Power Regulation

Local governments can regulate development on private property by exercising police power in a variety of ways, as described in this section. These types of controls are best used for corridor preservation if they are considered early in the planning process, and are advantageous because they usually incur no capital costs. However, jurisdictions exercising police power must be very careful not to over-regulate, which can lead to liability under inverse condemnation, and may be challenged in court as a 'taking' requiring compensation.

10.4.3.1 Corridor Management/Preservation Ordinance

If state statutes allow it, as they do in Florida but do not in North Carolina, municipalities may adopt ordinances that establish procedures for preserving or acquiring needed right-of-way to protect transportation corridors for future improvement. A corridor preservation ordinance would generally address some or all of the following:

- Criteria to manage land uses within or adjacent to the corridor.
- Restrictions on construction within the corridor.
- Uses permitted in the corridor.
- A public notification process.

- A variance and appeal process.
- A process for intergovernmental coordination.

As with other exercises of police power, corridor preservation ordinances may be challenged in court as takings. In Florida, several counties and local municipalities have adopted such ordinances. A model ordinance for protecting corridors and rights-of-way developed by the State of Florida can be found in **Appendix G**.

10.4.3.2 Zoning and Subdivision Regulations

Corridor preservation objectives should be considered in the formulation of local zoning and subdivision regulations. Existing zoning should be tested in combination with planned transportation facilities, with attention to the transportation impacts and the advantages of various land use options. Overlay district zoning may be applied along corridors to be preserved. These districts may include provisions that address right-of-way reservation or dedication, allowances for interim uses, setbacks on the corridor in question, cluster zoning, transferable development rights, specifications for joint and cross access, driveway limitations, and driveway spacing.

Setbacks required in the zoning code may also contribute to corridor preservation. A setback is an area within a certain distance from a curb, property line, or building line within which construction is prohibited; this area may provide space for a future right-of-way to supplement and widen an existing right-of-way. Local governments may also require setbacks to be measured from the future right-of-way line. A required setback must be related to the preservation and promotion of public health, safety, and welfare, and may not be arbitrarily or capriciously applied. If a setback is used to reserve future rights-of-way and does not serve other, valid purposes for setbacks[24], courts may find the setback unconstitutional, viewing it as merely a way to avoid compensating the property owner. A setback may preserve land for the right-of-way, but that must be a secondary result of the setback, and compensation must be made to the property owner when the right-of-way is acquired.

Lot dimensions can also be coordinated with corridor management objectives. Deeper, wider lots along important corridors can allow space for an expanded right-of-way in the future. High minimum lot frontage requirements can help manage driveway spacing when lots access the corridor in question. Smaller frontages may be allowed when lots have alternative access options and do not require driveway cuts on the main highway.

To provide these alternative access options, joint or cross access can be encouraged, and may be required when a property later redevelops or expands. When using these access

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[24] Valid purposes for setbacks include separation from noise of the street, promotion of safety for pedestrians, drivers, and occupants of structures along the street, improving the attractiveness of residential environments, and securing availability of light and air.

techniques, flexibility should be exercised as properties are addressed individually. Density bonuses, variances, or other benefits may be offered for properties that create joint and cross access.

During the development review process, local jurisdictions can make sure that their procedures further corridor preservation goals. The government and the developer may collaborate to find ways to avoid encroachment on planned corridors, such as making the planned right-of-way a single lot, which is left undeveloped until it is purchased prior to the roadway's construction. Traffic impact analyses may be required according to regulations established by the municipality. The process can also assess access features affecting corridors planned for improvement.

10.4.3.3 Official Maps

North Carolina's Transportation Corridor Official Map Act allows official maps to place temporary restrictions on private property rights by prohibiting the issuance of a building permit or the approval of a subdivision within the adopted alignment of future corridors. However, an application for a building permit or for subdivision plat approval may not be delayed more than three years from the date the application is submitted. This tool is available to local jurisdictions or to the state transportation agency. It may be used only for major controlled access facilities that are included in the TIP, and only once an EIS has been drafted and construction is imminent. In addition, an official map may only be adopted where pressure from development is existing or anticipated, where inaction could lead to excessive costs for future right-of-way acquisition or to the elimination of highway alternatives, and where less restrictive measures would be ineffective or inappropriate. The Zoning Board of Adjustment in the local jurisdiction may grant special variances for corridor properties if:

- The owner cannot earn a reasonable return on the land, even with the tax benefits.
- The limitations on development create practical difficulties or unnecessary hardships.

Within one year of the establishment of the official map, work must be begun on an environmental impact statement or preliminary engineering. Any undeveloped or unsubdivided land within an official map roadway corridor is taxed at 20% of the general tax rate levied on real property.

According to the North Carolina General State Statutes, the regional transportation authority or city that initiated the official map may make advance acquisition of parcels when the acquisition is determined to be in the best public interest to protect the transportation corridor, or when the official map places undue hardship on the affected property owner. The entity acquiring the property must obtain concurrence from the department of transportation, and the advance acquisition must subsequently be reimbursed by the DOT.

Like many other police power techniques, official maps may be challenged in court to determine whether the limits on development are a legitimate exercise of police power or qualify as takings. This was the case in Florida, where an aggressive official mapping program was declared unconstitutional. Under Florida's program, FDOT and local governments could file official maps designating transportation corridors for preservation, and local governments were required to withhold development permits for properties within each corridor for five years through a setback requirement. This five-year period could then be extended by another five years even without a commitment from the State to purchase the property. In the 1990 case *Joint Ventures v. Florida Department of Transportation*, reasons cited for the program's unconstitutionality included the lengthy time period of the moratorium on development, and the clear goal of suppressing land values for the purpose of reducing purchase prices several years in the future. The lack of flexibility for mitigating hardships to property owners was also noted as a problem. Several years later, Florida courts upheld Palm Beach County's right to pursue corridor management through their thoroughfare plan, which had its basis in the state-mandated comprehensive plan, met statutory objectives of planning for future growth, and provided for mitigation of hardships to property owners.

10.4.3.4 Exactions

An exaction is a contribution by a developer to the government in return for subdivision approval, a special or conditional use permit, an amendment to the zoning map, or another land use approval or permit that is necessary to the developer. Contributions that act as property exactions can be:

- In-kind contributions within the project, usually including dedication of land for streets, schools, parks, sewer lines, or fire facilities, and sometimes including construction of such facilities.
- In-kind contributions near the project, such as the construction or rehabilitation of streets that bound, cross, or pass near the site and will be strained by traffic generated by the development.
- Payment in lieu of in-kind contributions.
- Impact fees.

Special assessments are often part of exactions, and are used to pay for improvements necessary to meet existing deficiencies on the site (not those generated by the development). The funds generated by special assessments are used for sewers, transportation facilities, and other infrastructure that benefits the property owner.

For corridor preservation, exactions may be used to obtain land within the planned right-of-way or to reach an agreement in which the developer constructs some part of the planned facility on or near the property. Exactions may also be used to obtain funds that may be used for corridor preservation, but care should be taken to ensure that the use of such funds, typically collected as impact fees, is legitimate and lawful. These fees may be used for transportation improvements that not only serve an immediate transportation need but also

promote corridor preservation. However, such fees are likely to be more effective if collected in a larger fund that is dedicated to improving the roadway network community-wide, including corridor preservation. If this approach is taken, the unit of local government must make sure that the fund can be defended as mitigating the impacts created by those who contribute fees. Criteria must also be developed to determine who is required to contribute to this fund. For example, fees might be required of owners of all developments over a certain size (if the fund to be used throughout the jurisdiction), developers of properties over a certain size along a particular corridor (if the fund is to be used in that corridor), or owners of properties that generate a certain amount of traffic.

Property exactions should be used only when there is a clear and direct connection between the exaction and a substantial advancement of a legitimate government interest. Governments should be careful to ensure that the developer receives benefits equal to the value of the exaction, and that exactions do not constitute a regulatory taking of an easement.

10.4.3.5 Development Moratoria

Established through a local law or ordinance, a development moratorium suspends property owners' rights to obtain development approvals, including subdivision approvals, building permits, site plan approvals, or wetland permits. A moratorium is meant to allow a municipality time to address a pressing problem, develop and adopt a plan, or create new rules for the area in question. A moratorium may be applied to a specific geographic area, such as a planned transportation corridor, or a specific type of permit or approval. It may also allow exemptions under certain circumstances, such as hardship. Development moratoria should be considered very carefully before being used as a corridor preservation technique, and should be used only when absolutely necessary. The basis for the moratorium should be specific and legitimate, the timetable should be reasonable, and a solution to the problem and conclusion of the moratorium should be within reach. If the moratorium is challenged in court, it may be voided, and damages may even be awarded to the property owner.

10.4.4 Early Property Acquisition

The most commonly used method of preserving corridors is simply to acquire key parcels along the corridor. However, care must be taken when using early acquisition as a method for preserving rights-of-way, because NEPA requirements generally disallow state acquisition before the approval process is completed. There are some ways for states to acquire key properties within the parameters of NEPA:

- Obtaining a categorical exclusion for right-of-way activities.
- Using information developed during the planning process to demonstrate NEPA compliance for right-of-way authorizations and possibly even construction authorizations.

- Initiating full NEPA environmental document preparation during the planning process.
- Using a tiered environmental document approach.

Alternatively, local jurisdictions can acquire key properties in the right-of-way of the planned transportation improvement, which is not prohibited by NEPA rules.

Early acquisition of key parcels along the corridor usually takes place through fee simple acquisition, often by the exercise of eminent domain. After acquiring the parcels, a government banks them until construction begins. Property may be acquired for use in the actual corridor, to control the land use of property near the corridor, or for environmental mitigation, such as creating replacement wetlands. The purpose of the acquisition may determine the methods available for acquiring it; for instance, condemnation will likely require a strong justification on the grounds of safety or other legitimate goal.

Early acquisition has both strong advantages and great disadvantages. Acquisition avoids the need for government regulation of the property, fully compensates the property owner, allows for banking of land, and may allow for income on the property prior to construction, recapturing the acquisition costs.

However, acquiring property in advance requires substantial funding long before construction is to begin, and the property is eliminated from the local tax based. In addition, the liabilities associated with managing the property fall upon the transportation agency, which is responsible for maintaining the aesthetic and safety conditions of the property until construction begins. To decide whether acquisition is an appropriate choice for corridor preservation, the transportation agency must weigh these advantages and disadvantages to determine whether the savings achieved through early purchase are great enough to offset the liabilities of maintaining the property.

Several other challenges may be faced when early acquisition is attempted. When a transportation agency endeavors to acquire part of a larger property, the property owner may be hesitant to agree to early acquisition if their questions about basic project design and engineering cannot be answered. Constitutional or statutory problems may also arise during early acquisition. Some courts are hesitant to allow acquisition for public purpose or necessity unless a relatively short-term construction need is demonstrated. This attitude overlooks the important public purpose of avoiding the high cost of securing rights-of-way after land development or intensification of uses has occurred on the property in question.

The most often used approach to acquiring rights-of-way is taking advantage of federal regulations that allow federal aid or state funds to be used for protective and hardship acquisitions before the corridor's location is approved. Hardship and protective buying are usually parcel-by-parcel, and intended to be used only in extraordinary circumstances or emergency situations. The state must also have documentation that the hardship or protective buying acquisition is in the public interest. State dollars can be used for either method, but if

federal dollars are used, a public hearing must be held and a Categorical Exclusion document may be required. In the hardship or protective buying process, the state highway department may ask approval from the Federal Highway Administration to acquire a limited number of particular parcels in the proposed corridor before the environmental impact statement is processed or denied. In protective buying, land is acquired because the owner has impending plans to develop it in such a way that would preclude the future transportation use. Protective buying with state or federal funds can occur at any time during the NEPA process. However, protecting a corridor or certain parcels from being developed should not be used to influence the selection of the preferred alignment. Hardship acquisition is initiated by the property owner because of particular financial or health-related hardship, such as when a transportation project renders the particular property unsaleable, placing a hardship on the owner. Hardship acquisition must not occur until after a least environmentally damaging practicable alternative (LEDPA) has been selected as part of the NEPA process, but it can occur before the record of decision.

10.4.5 Acquisition of Lesser Interest than Fee Simple

To avoid many of the disadvantages of acquisition, such as the significant costs and the need for maintenance of the property until construction begins, a government can acquire some interest in the property that is less than fee simple interest in order to preserve the land as is. This may be accomplished through development easements or options to purchase.

10.4.5.1 Development Easements

Through a development easement, a government acquires the right to use land owned by someone else for a special purpose. An easement[25] can be affirmative, allowing something to happen to the land (such as allowing wires to pass over it, or water to be discharged onto it), or negative, disallowing the owner from doing something to the land that he would otherwise be allowed to do. For corridor preservation, development easements often involve the purchase of development rights to offset the restricted use of the land. In this case, a government purchases the right to further develop a property, so that the property and its management remain the responsibility of the private owner, but the current condition of the property is preserved. If the owner sells the land, the purchaser is bound to the terms and conditions of the easement.

Unlike the case with fee simple acquisition, the property owner retains most rights to the property, including maintaining the current use of the property, as long as it is not further developed. In addition, the property remains on the local tax rolls.

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[25] Common examples include conservation easements (to conserve environmental amenities), preservation easements (to protect a historic area from disruption by development), or scenic easements (to protect the aesthetic nature of open space).

A development easement can be permanent or temporary, and the price of the easement depends on its tenure. The valuation of an easement can cause litigation, and should be carefully negotiated. Other challenges may be faced as well. If there is development pressure, development easement may cost nearly as much as the fee simple title. However, because the value of the easement is based on potential uses, not actual uses, the appraisal of the easement can be difficult and debatable. In addition, if the easement is acquired by condemnation, there may be litigation over the value of the lost development rights.

10.4.5.2 Options to Purchase

An option to purchase is a conditional contract in which a party purchases the sole right to buy a property under specified conditions within a certain time period. An option to purchase is sometimes called a right of first refusal, but the two are actually distinct concepts; an option to purchase is more useful to the government, as it establishes the terms of the purchase in advance.

To use an option to purchase in the context of corridor preservation, a government agency, upon identifying a needed property whose value is likely to increase due to development pressure, determines the property's value and enters an option to purchase contract with the property owner, giving the government the right to purchase the property at the agreed-upon price within a specified time frame. As an incentive for the property owner to agree to such a contract, the government pays the owner a consideration. The cost of the option is often a percentage of the purchase price, negotiated between the agency and the seller. The option to purchase contract must specify the essential details of the sale if the option is used. Alternatively, a proposed contract of sale may be attached to the option so that the details of the potential sale are clear. The option should include a provision precluding the owner from substantially changing the condition of the property during the term of the option.

An option to purchase avoids many of the problems of fee simple acquisition, since the property owner still owns, uses, and is liable for the property. An option can allow the government to secure an advantageous price for a property in a rising market. It also avoids any increase in value that may accompany the development and announcement of the transportation project. On the other hand, if the sale is never completed, the agency has lost the consideration it paid for the option. In a seller's market or rapidly developing area (where it is most important to preserve rights-of-way ahead of time), it can be difficult to negotiate an option to purchase with a longer time frame. Also for this reason, the cost of the option can be prohibitive.

10.4.6 Inducements for Property Owner

In some cases, the government may be able to offer or arrange inducements for a property owner to preserve a site in its current state. These agreements do not remove the value of any rights from the property owner, but also help achieve the corridor preservation goals of the

state. These inducements may include transferable development rights or public/private partnerships that encourage the property owner to preserve future rights-of-way. Like acquisition of less than fee simple interest in a property, these inducements achieve corridor preservation while avoiding many of the problems of property acquisition: they do not generate high capital costs, and they allow the property owner to continue owning, using, and maintaining the property.

10.4.6.1 Transferable Development Rights

In a transfer of development rights (sometimes called density transfer), the right to develop a property is transferred to another appropriate property. Thus, the sending property—the property whose development right has been transferred—cannot be developed, while the receiving property—the property to which the development right has been transferred—can develop at a higher density than previously allowed. This can be used to remove development rights from a site to be preserved for a future right-of-way, either because the owner is allowed to transfer the rights to another of his own properties, or because he is encouraged to sell the rights to another property owner. Thus, the property owner is compensated in a monetary or non-monetary way without capital costs to the transportation agency. This approach could also be used if the property owner donated the right-of-way, if property dedication is exacted, or if the owner agrees to maintain the property as-is, in which case the owner would be compensated for the value of the development rights.

This technique can reduce the objections to police power regulation, since the property owner receives some benefits from transferring his development rights. It can also achieve a situation in which the land is preserved as open space, the owner is compensated, and the government incurs no capital costs. However, transfer of development rights can only be used when the ordinance allows transferable development rights in the area in question, either on the basis of floor area ratio, or units per acre. The ordinance should also establish a system for setting up recipient properties for transferable development rights. In North Carolina, transferable development rights are not allowed by the general statutes.

10.4.6.2 Public/Private Partnerships

Under a public facilities ordinance or a similar system, such as a proffer system, sufficient roadway capacity to handle the traffic generated by a development must be provided before development approvals can be granted. This type of system may encourage developers to set aside the right-of-way and build the planned facility or contribute significantly to its construction. Even when this type of system is not in effect, communicating and cooperating with the property owner may be the best way to achieve corridor preservation. Some developers may be persuaded to set aside right-of-way or even build a part of the planned transportation improvement because it is in their best interest. For instance, the improvement may enhance access to the site. Accomplishing this level of cooperation requires that the property owner receives some benefit, such as the government allowing the location of the right-of-way to shift on the property to suit the developer's needs, or advancing the

construction date of the improvement. However, many developers are willing to reach agreements in these situations in order to build a good relationship with the local planning bodies.

When using these techniques, agreements with developers must be carefully written so that decisions made during the NEPA process can be accommodated as they arise.

Another technique for using public/private cooperation to achieve corridor preservation is for the government to exchange excess government land for the desired property, when such property is available and the owner of the site in the planned corridor is amenable to such an arrangement.

Public/private partnerships can also be used to regain the cost of early fee simple acquisition. In this case, the government can purchase the property and then 1) exchange the 'air rights' above the ground level for other property needed, or 2) lease back the air rights. In this process, the government would need to identify excess land for joint development, and to enter into sale or leaseback arrangements with the developer. The government agency may also need to transfer development rights, fast track permitting, or issue tax exempt financing, revenue bonds, tax increment bonds, or mortgage backed bonds.

In all of these potential agreements with property owners, government agencies should take care to deal fairly with property owners or litigation could ensue.

10.4.7 Access Management Techniques

Some of the techniques used in access management (see Chapter 9) may also be applied effectively to achieve corridor preservation along existing facilities where expansion is planned. Chief among the access management practices that may also support corridor preservation are increasing the minimum spacing between driveways, decreasing the number of driveways on a corridor, and using frontage and service roads. These practices not only contribute to the safety, capacity, and appearance of a corridor, but also help discourage development in and near the planned right-of-way. These techniques will be most effective for corridor preservation when used in combination with other access management techniques such as setbacks, joint and cross access, and lot dimensions, which are discussed in the Zoning and Subdivision Regulations section.

10.5 Funding Options

The biggest obstacle to corridor preservation is often a lack of funding at the state or local level. To avoid the significant costs of acquisition, governments may use some of the other techniques discussed in this report to reduce or eliminate capital costs of preservation. When

the most appropriate technique does require funding, there are several approaches that may be taken to obtain it.

10.5.1 Federal-aid Reimbursement

States can, under federal regulations, acquire a right-of-way with their own funds and still be eligible for future Federal-aid reimbursement under limited circumstances. To take advantage of these reimbursements, acquisitions must be performed in accordance with civil rights provisions of Title VI and provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

Some local land use planning ordinances may encourage donations of rights-of-way for future transportation facilities. Under the Surface Transportation and Uniform Relocation Assistance Act of 1987, the market value may be used by state transportation agencies toward local matching share on Federal-aid projects.

When property is acquired from a local jurisdiction for corridor preservation, the cost of replacing any facilities on the acquired property may be recovered in Federal-aid funds: the Federal Highway Administration Functional Replacement Program allows Federal aid funding of the actual replacement cost (not the fair market value) of publicly-owned and -occupied facilities. This program can relieve the local jurisdiction from financial responsibilities for replacement costs of displaced public facilities, which benefits both the local government and the taxpayers.

10.5.2 State Trust Funds

Some states have transportation trust funds that collect revenues from fuel taxes, rental car surcharges, vehicle registration, and other sources, sometimes including bonds, to fund a variety of transportation endeavors. North Carolina has such a fund, the Highway Trust Fund, but corridor preservation is not an allowable use for it. Some efforts are being made to bring about changes that would make the fund more flexible or eliminate it altogether. Such funds in other states may be used for corridor preservation efforts if certain requirements are met, such as inclusion of the project in a work program within a specified timeframe.

10.5.3 State Infrastructure Banks

The ISTEA identified state infrastructure banks as a method for meeting transportation financing challenges, and selected ten states, including North Carolina, to participate in a pilot infrastructure bank program. These banks are investment funds that offer loans and other types of financial assistance to transportation projects that will meet State goals. States

with an infrastructure bank are allowed to fund them with up to 10% of their federal gas tax funds annually. The funds are bolstered as the loans are repaid with interest, so that the fund acts as a revolving fund for a variety of transportation projects. The North Carolina State Infrastructure Bank is a flexible funding tool that can be applied in different ways to a variety of project types.

10.5.4 Income from DOT-owned Land

California has used income from the rental, lease, or sale of land owned by the state Department of Transportation to fund corridor reservation efforts. As mentioned in the Value Recapture section, this method can be applied to land acquired as part of corridor preservation efforts as a way to recapture funds spent on preservation. However, it may also be extended to apply to other properties owned by the state transportation agency as a way to generate funds for future corridor preservation efforts.

10.5.5 Value Recapture

Once funding has been obtained, the government may be able to recapture the value of an acquisition through effective management in the interim. For example, excess land beyond the planned right-of-way that will be needed during construction may be acquired and leased back to the seller until the land is needed or remarketed. In this situation, the government can lease the seller 'air rights' above ground level, which can provide the government with revenue or non-monetary returns such as parking or office space in joint use facilities. However, state statutes may limit leases of government-owned properties to short timeframes, which can make this arrangement less attractive to the private sector. The availability of long-term leases on these properties is important for the joint public/private use of excess property.

10.5.6 Local Option Sales and Use Taxes

Each municipality must petition the state legislature for the right to impose local taxes on gas, rental cars, or other relevant items. The revenues from the taxes are dedicated to a particular funding need, but the need can be defined broadly. Such a tax could be proposed to address long-term transportation needs such as corridor preservation.

10.5.7 State-shared Revenue Sources

Municipalities can use state-shared revenue sources to fund corridor preservation efforts, if there are enough available. Further study is needed to determine whether the use of state-shared revenue can be considered in violation of NEPA requirements.

10.5.8 Impact Fees

Impact fees, as discussed in the Property Exactions section, are payments made by a developer to a government to recover the costs of infrastructure improvements needed to support a development. Generally, impact fees must not generate more funds than are required to construct the necessary public facility, and must be directly related to a legitimate government purpose or to the cost necessitated by the development. As part of corridor preservation, these funds can be used to purchase additional rights-of-way that are necessitated by the development, but are not located in areas controlled by the developer and therefore cannot be secured by direct property exaction. However, a more powerful way to use these fees may be to combine them in a fund for improvement of the overall road network, so that corridor preservation may be pursued as one part of ensuring an efficient roadway network. This approach should be carefully structured, though. The long-term benefits an effective roadway network has for property owners should be equal to the impact fees exacted, and criteria for determining who pays such fees should be clear-cut and valid.

Using impact fees for transportation improvements can be difficult, because it is sometimes challenging to measure the use of transportation facilities as a result of the development, and because much of the need for highways is generated beyond the boundaries of the jurisdiction that is setting the fees.

10.5.9 Public/Private Partnerships

Partnerships between the transportation agency and the private sector may help reach corridor preservation goals by reducing the government's capital or time investment in the project, while also benefiting the private sector participant. In some cases, a private sector entity may fund a facility and operate it for a period of time to recapture costs before transferring ownership to the state for long-term maintenance and operation. Some states, such as Florida, allow the formation of transportation corporations. These corporations may work with landowners, local and state governmental agencies, and elected officials to promote and develop transportation projects, including corridor preservation efforts. Their efforts may include acquiring, holding, investing, and administering property and transferring the title of the property to the department of transportation for development of projects. The corporations can also receive land and cash contributions for right-of-way protection.

10.5.10 Special Assessment Districts

Special assessment districts are areas in which a tax is levied on property owners who will benefit from specific improvements, which are then funded by the tax revenues. Property owners may not pay more than they will receive in special benefits. The taxation can be consistent across the district or vary based on the benefit received from the improvement. The tax might also vary based on property owners' activities, such as dedicating rights-of-way. If using special assessment district taxing, governments must be careful not to make zoning changes that would reduce the benefit to property owners from the improvement.

10.5.11 Conventional Financing

In the future, federal legislation could allow a state department of transportation to acquire property using any conventional financing vehicle in common use in the real estate industry. This would allow the state to negotiate the terms of the purchase and enter into a contract with the seller, then later, when the project is funded for construction, pay the private lender in full.

10.6 Conclusions

Corridor preservation is crucial to ensuring that important roadway projects are able to follow the preferred alignment with minimum capital, environmental, and social costs. Preservation will not be necessary or appropriate for every section of a corridor, and should be applied judiciously and creatively to achieve right-of-way protection goals in a strategic way. In order to work toward corridor preservation in North Carolina, it is recommended that the North Carolina Department of Transportation consider the following steps.

- Develop and distribute a model corridor preservation ordinance for adoption by municipalities and counties. The model ordinance provided to local governments in Florida may be used as a starting point, with elements removed or added to create a document that is appropriate for use in North Carolina.
- Assemble a detailed inventory of corridor preservation activities in North Carolina. Note which tools are in use, where they are in use, which entities are involved, and what level of success is being reached.
- Identify North Carolina state agencies, organizations, and departments that can play a role in successful corridor preservation. Study other states' agencies, organizations, and departments that are focused on land use issues in order to determine whether corridor preservation in North Carolina could benefit from the establishment of similar entities or the expansion of the duties of agencies and organizations already present in North Carolina to include corridor preservation activities.

- Coordinate with units of local government to promote corridor preservation.
  - Implement an educational program to inform municipalities and counties of the importance of corridor preservation, encourage them to pursue it, and identify the tools they can begin using right away to protect important corridors.
  - Identify NCDOT as a resource for corridor preservation information and materials such as the model corridor preservation ordinance.
  - Facilitate coordination of corridor preservation efforts between units of local government that neighbor one another or lie along the same corridor.
- Undertake advocacy of corridor preservation and the tools necessary to carry it out, including lobbying for legislation to allow corridor protection tools that are deemed necessary but are not currently allowed in North Carolina.
- Study the state-level corridor preservation programs of other states at greater depth and compare them to the needs, issues, and priorities present in North Carolina. Based on this research, develop a program to pursue corridor preservation statewide, either by expanding the Strategic Highway Corridors program or establishing a new system. This state-level program should act proactively and have the resources, staffing, and authority necessary to be effective. Upon creation, the program should assume responsibility for the activities outlined in the previous recommendations as well as pursue those corridor preservation efforts that can be made at the state level.

10.7 Sources

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Chapter 11 CONCLUSION

The US 64-NC 49 Corridor from Charlotte to Raleigh (NC 49/US 64) and Statesville to Raleigh (US 64) is today a patch work of roadway facility types ranging from a full control of access freeway to a two-lane, rural highway and everything in between. The corridor has evolved from a primarily rural, farm-to-market route to one that serves a variety of trip purposes; including long distance travelers, freight movement, commuters, and short-distance local trips. While congestion today primarily is isolated to the major urban areas along the corridor, continued development along and within the US 64-NC 49 Corridor, coupled with a constrained regional roadway network that offers few alternative routes, provides the ingredients for continued deterioration of travel conditions.

The North Carolina Department of Transportation (NCDOT) has recognized the limitations of continuing to widen the Interstates and constructing new roads to facilitate regional mobility and freight carrying capacity that often result in a great expense to the environment and urban structure. With the update to the state's Long-Range Statewide Multimodal Transportation Plan, NCDOT has a new emphasis on targeted mobility improvements. This policy, termed the Strategic Highways Corridor concept, was adopted by the North Carolina Board of Transportation (BOT) in September 2004. The policy promotes the need to improve, protect, and maximize the capacity of existing highways deemed critical to statewide mobility and regional connectivity. The Strategic Highway Corridor concept represents an opportunity for the NCDOT and stakeholders to consider long-term visions, decision-making consistency, land use partnerships, and overarching design/operational changes. The US 64-NC 49 Corridor is recognized by the NCDOT as a Strategic Highway Corridor with the potential to carry a significant volume of traffic (including truck traffic), to connect major activity centers, to connect existing and planned Interstate facilities, and to serve as an Interstate reliever.

Within this context, the NCDOT initiated a corridor study of the US 64-NC 49 Corridor in September 2003. The focus of the study, termed a Phase 1 Corridor Study, was on conducting a regional assessment of transportation needs and evaluating broad alternative roadway investment strategies to meet those needs. The principal products of the Phase 1 Study consist of:

- A Problem Statement. This document describes the need for improvements to the US 64–NC 49 Corridor, as they relate to the corridor's function as a Strategic Highway Corridor, and promotes the opportunity for early resource agency and stakeholder involvement on concerns regarding future improvements in the corridor. (Chapter 4)
- A Consensus-Based Vision. A vision for the US 64-NC 49 Corridor that will provide a long-term, directional goal, defining the major characteristics of a substantial financial investment and providing the means to build stakeholder support and commitment. (Chapter 8)
- A List of Land Use Policy Guidelines. These guidelines address land use/mobility issues and can be used to achieve a balance of land use and transportation in support of the corridor vision. (Chapter 9).

- Potential Corridor Preservation Methods. A description of probable corridor preservation methods that may be used to help control increasing project costs. (Chapter 10)

These four products, developed through a comprehensive assessment of the entire 200-mile corridor in a collaborative effort with corridor stakeholders, provide the foundation upon which future project development phases can build. Continuing beyond the Phase I Corridor Study, NCDOT will use these products to:

- Support the need for improvements to US 64 and NC 49 as they relate to the corridor's function as a Strategic Highway Corridor.
- Promote continued stakeholder involvement.
- Ensure that improvements are consistent with the overarching corridor vision in terms of design characteristics, operations, and esthetics.
- Work with local agencies to develop land use plans that are consistent with and support the corridor vision.
- Develop a corridor preservation plan specific to US 64 and NC 49.
- Serve as a preface and supporting documentation for improvement projects that enter the environmental document phase.

STRATEGIC HIGHWAY CORRIDORS
GLOSSARY OF TERMS

April 22, 2005

401 Permit: Part of the Clean Water Act this permitting process is a certification of the water quality standards of the state. It can be applied to wetlands protection.

404 Permit: Part of the Clean Water Act, it allows states to designate specific areas as a disposal site for dredged or fill material.

Access Management Plan: A plan showing the location, and in some cases the design, of access for every parcel on a major roadway segment or within an interchange area, which is often jointly developed and adopted by state agencies and local jurisdictions that have control over land development in the affected area.

Access Management: The planning, design, and implementation of land use and transportation strategies that maintain a safe flow of traffic while accommodating the access needs of adjacent development. The goal of Access Management is to balance the need to provide efficient, safe, and timely travel with the desired ability to allow access to the individual destination.

Access: The ability to reach or connect to a transportation facility (e.g. from an individual property or another mode).

Activity Centers: Destinations that encompass statewide, regional, and places outside of North Carolina's borders that serve the state's citizens.

Affected Environment: The physical features, land, area, or areas to be influenced, or impacted, by an alternative alignment under consideration. This term also includes various social and environmental factors and conditions pertinent to an area.

Agency Coordination: A general term referring to the process whereby government agencies are afforded an opportunity to review and comment upon transportation proposals.

Air Pollutants: Substances in air that could, at high enough concentrations, harm human beings, animals, vegetation or material. Air pollutants may include forms of matter of almost any natural or artificial composition capable of being airborne. They may consist of solid particles, liquid droplets or gases, or combinations of these forms.

Air Quality Standards: Levels of air pollutants prescribed by regulations that may not be exceeded during a specified time in a defined area.

Alternative Access The ability of any vehicle to enter a roadway indirectly through a roadway of lower classification.

Alternative: One of a number of specific transportation improvement proposals, alignments, options, design choices, etc., in a defined study area. For a transportation project, alternatives to be studied normally include the no-action alternative, an upgrading of the existing roadway alternative, new transportation routes and locations, transportation systems management strategies, multi-modal alternatives, if warranted, and any combinations of the above.

Alternatives Analysis: Comparative analysis of the social, economic and environmental impacts and benefits for alternatives on a proposed action.

Annual Average Daily Traffic (AADT): The total volume of traffic on a highway segment for one year, divided by the number of days in the year.

Appalachian Development Highway System (ADHS): A system of highways in Appalachia (200,000-square-mile region that follows the spine of the Appalachian Mountains from southern New York to northern Mississippi) designed to generate economic development in previously isolated areas, supplement the interstate system, connect to the interstate system, and provide access to areas within the Region as well as to markets in the rest of the nation.

Aquifer: Underground geologic formation, or group of formations, containing groundwater that can supply wells and springs. See also groundwater reservoir.

Area Source: Source of non-natural air pollution released over a relatively small area that cannot be classified as a point source. Such sources may include vehicles and other small fuel combustion engines.

Arterial: A class of roads serving major traffic movements (high-speed, high volume) for travel between major points.

Average Daily Traffic (ADT): Total volume during a given time period (in whole days), greater than one day and less than one year, divided by the number of days in that time period.

Avoidance Alternative: general term used to refer to any alignment proposal which has been either developed, modified, shifted, or downsized to specifically avoid impacting one or more resources.

Backage Road: A local street or road running parallel to an arterial for service to abutting properties and for controlling access to the arterial which provides land access to the rear lot line for the property. Arterial frontage becomes the rear lot and the buildings front the backage road.

Boulevard: A facility with a functional purpose of moderate mobility and low to moderate access. The facility has limited (Type I) or partial control of access (Type II), traffic signals, and a minimum of 2 travel lanes with a median. Connections are provided primarily at at-grade intersections for major and minor cross streets. Type I facilities do not have driveways, while driveways are allowed on Type II facilities.

Brownfield: Abandoned, idled, or under used industrial or commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination.

Capacity: A transportation facility's ability to accommodate a moving stream of people or vehicles in a given time period.

Categorical Exclusion: A classification given to federal aid projects or actions, which do not individually or cumulatively have a significant impact on the environment. Categorical Exclusions do not require extensive levels of environmental documentation.

Clean Air Act (CAA): Purpose is to "protect and enhance the quality of the Nation's air resources." Its primary programs regulate the release of contaminants to air from new and existing polluting facilities.

Clean Air Act Amendments of 1990 (CAAA): Federal legislation passed in 1990 that amended the Clean Air Act. It strengthened ability of EPA to set and enforce pollution control programs aimed at protecting human health and the environment; included provisions for acid rain program.

Clean Water Act (CWA): Objective is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." One of the act's major enforcement tools is the National Pollutant Discharge Elimination System permit.

Coastal Zone: lands and waters adjacent to the coast that exert an influence on the uses of the sea and its ecology or, inversely, whose uses and ecology are affected by the sea.

Collector: In rural areas, routes that serve intracounty rather than statewide travel. In urban areas, streets that provide direct access to neighborhoods and arterials.

Command-and-Control Policy: Environmental policy that relies on regulation (permission, prohibition, standard setting and enforcement) as opposed to financial incentives, that is, economic instruments of cost internalization.

Comment Period: Duration of time during which written comments or responses may be submitted to an agency that has distributed a document for review and comment. It can be applicable to all types of documents that are circulated, as well as to formal presentations such as those, which may be given by transportation department officials at a public hearing.

Commercial Service Airport: Public airport that annually enplanes 2,500 or more passengers and receives schedule airline passenger service.

Common Property Resources: Eenvironmental natural resources owned and managed collectively by a community or society rather than by individuals.

Comprehensive Transportation Plan (CTP): A mutually adopted, multi-modal transportation planning set of vision maps (highway, public transportation & rail, bicycle, and pedestrian) that serves present and anticipated travel demand in a safe and effective manner.

Conformity: Process to assess the compliance of any transportation plan, program, or project with air quality implementation plans. The conformity process is defined by the Clean Air Act.

Congestion Mitigation & Air Quality Improvement Program (CMAQ): A categorical Federal-aid funding program created to fund projects that contribute to meeting national air quality standards. CMAQ funds generally may not be used for projects that result in the construction of new capacity available to single-occupant vehicles.

Connectivity: The ability to travel to desired destinations.

Conservation: Management of human use of organisms or ecosystems to ensure that such use is sustainable.

Control of Access: The regulation of public access rights to and from properties abutting and public streets crossing highway facilities. Also See Full Control of Access, Limited Control of Access, Partial Control of Access, and No Control of Access.

Corridor Preservation: The coordinated application of various measures to obtain control of or protect the right-fo-way for a planned transportation facility and to preserve the capacity of existing roadways through access management.

Corridor Study: A study that examines and addresses issues of strategic importance to the long-term functioning and character of a transportation corridor; typically includes elements such as visioning, corridor analysis, alternatives development and selection, implementation plan, and partnering agreements.

Corridor: A broad geographical land area that is linear, connects major sources of trips, and may contain a number of streets, highways, transit lines, and routes; generally follows an interstate, greenway, or major roadway.

Cross-section: A basic description of type of roadway. Includes at a minimum the number of lanes and whether the roadway has a median or two way left turn lane.

Cumulative Impacts: The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Design Speed: A selected speed used to determine the various geometric design features of the roadway. The assumed design speed should be a logical one with respect to topography, the adjacent lane use, the classification of the highway, and the anticipated operated speed (usually 5 mph less than design speed).

Direct Effects: Effects caused by a given action and occurring at the same time and place. Changes in noise levels, fill discharges in wetlands, and changes in visual conditions are some examples of direct effects.

Directional Median Opening: An opening in a restrictive median that provides for specific movements and physically restricts other movements.

Driveway Permit: A permit required for all street and driveway connections to the State Highway System. Approved by NCDOT, sometimes with additional approval by the local government.

Economic Prosperity: The ability to move people and goods efficiently making for a more competitive business climate, while providing a good quality of life for those employed.

Ecosystem Enhancement Program: The North Carolina Department of Transportation (NCDOT) and the Department of Environment and Natural Resources (DENR) partnered to create the Ecosystem Enhancement Program, in order to deal with a rapidly expanding transportation program that would impact acres of wetlands and streams. The Ecosystem Enhancement Program protects the state's natural resources through the assessment, restoration, enhancement, and preservation of ecosystem functions, and through identifying and implementing compensatory mitigation programmatically, at the watershed level.

Efficient Transportation Decision-Making (ETDM): Process developed by the State of Florida, is used to accomplish transportation planning and project development within its current statutes and regulations. The ETDM Process creates linkages between land use, transportation and environmental resource planning initiatives through early, interactive agency involvement which is expected to improve decisions and greatly reduce the time, effort and cost.

Enplanement: An aviation industry term that refers to a person getting on or off a plane at a gate within a designated airport.

Environmental Assessment: Analytical process that systematically examines the possible environmental consequences of the implementation of projects, programs, and policies.

Environmental Degradation: Deterioration in environmental quality from ambient concentrations of pollutants and other activities and processes such as improper land use and natural disasters.

Environmental Health Indicators: Indicators that describe the link between environment and health by measuring the health effect due to exposure to one or several environmental hazards.

Environmental Impact Assessment (EIA): Analytical process that systematically examines the possible environmental consequences of the implementation of projects, programs, and policies.

Environmental Impact Statement (EIS): Report developed as part of the National Environmental Policy Act requirements, which details any adverse economic, social, and environmental effects of a proposed transportation project for which Federal funding is being sought. Adverse effects could include air, water, or noise pollution; destruction or disruption of natural resources; adverse employment effects; injurious displacement of people or businesses; or disruption of desirable community or regional growth. A Draft (DEIS) and Final (FEIS) document are prepared. The FEIS must address comments received on the DEIS, making any appropriate revisions or decisions and, identify (if not identified in the DEIS) and describe the preferred alternative and the basis for the decision.

Environmental Impacts: Direct effect of socio-economic activities and natural events on the components of the environment.

Environmental Justice Populations: Historically ethnic and low-income groups who do not typically participate in the planning process and have been under-represented and/or underserved by the transportation system.

Environmental Monitoring: The continuous or periodic assessment of the actual and potential impact of any activity on the environment.

Environmental Protection: Any activity to maintain or restore the quality of environmental media through preventing the emission of pollutants or reducing the presence of polluting substances in environmental media.

Environmental Restoration: Reactive environmental protection. It includes (a) reduction or neutralization of residuals, (b) changes in the spatial distribution of residuals, (c) support of environmental assimilation and (d) restoration of ecosystems, landscape and so forth.

Environmental Stewardship: Striving to preserve and enhance our natural and cultural resources by maximizing the use of the existing transportation infrastructure with the support of compatible land uses (NCDOT Environmental Stewardship Policy context).

Environmental Streamlining: An initiative aimed at identifying ways that transportation and environmental agency representatives can more effectively work together in a collaborative and cooperative manner to avoid unnecessary delays in processing environmental documents, approvals and permits. The environmental streamlining provision is contained in the Federal transportation law passed in 1998, the Transportation Equity Act for the 21st Century (TEA-21). This provision calls on Federal agencies to jointly develop a coordinated environmental review process for transportation projects. Because major transportation projects are affected by dozens of Federal, State, and local requirements administered by a multitude of agencies, improved interagency cooperation is critical to the success of environmental streamlining. By Streamlining, NCDOT and partnering agencies can improve the efficiency of the project development and delivery process, as well as increase the predictability of the project schedule and cost, without compromising the quality of the environment.

Environmentally Sensitive Areas: An area of environmental importance having natural resources which if degraded may lead to significant adverse, social, economic or ecological consequences. These could be areas in or adjacent to aquatic ecosystems, drinking water sources, unique or declining species habitat, and other similar sites.

Erosion: Wearing away of the land by running water, rainfall, wind, ice or other geological agents, including such processes as detachment, entrainment, suspension, transportation and mass movement. Geologically, erosion is defined as the process that slowly shapes hillsides, allowing the formation of soil cover from the weathering of rocks and from alluvial and colluvial deposits. Erosion is often intensified by land-clearing human activities related to farming, resident and industrial development and it has as effect increasing run-offs, decline of arable layers, siltation in lakes, lagoons and oceans.

Expansion: Activities focused on adding capacity of new facilities/services.

Expressway: A facility with a functional purpose of high mobility and low to moderate access. The facility has limited (Type I) or partial control of access (Type II), no traffic signals, and a minimum of 4 travel lanes with a median. Connections are provided only at interchanges for major cross streets and at-grade intersections for minor cross streets. Type I facilities do not have driveways, while driveways are allowed on Type II facilities.

Facility Type: A classification for highways in terms of the character of service that individual facilities are providing or are intended to provide, including the level of access, ranging from travel mobility to land access. Facility Types include Freeways, Expressways, Boulevards, and Thoroughfares.

Final Environmental Impact Study (FEIS): The Environmental Impact Statement is a full disclosure document that provides a full description of the proposed project, the existing environment, and analysis of the anticipated beneficial and adverse environmental and social effects of reasonable alternatives. A Draft (DEIS) and Final (FEIS) document are prepared. The FEIS must address comments received on the DEIS, making any appropriate revisions or decisions and, identify (if not identified in the DEIS) and describe the preferred alternative and the basis for the decision.

Finding Of No Significant Impact (FONSI): Environmental document for proposed projects where it has been determined through the circulation of an Environmental Assessment that a project will not have a significant impact on the environment.

Freeway: A facility with a functional purpose of high mobility and low access. The facility has full control of access, no traffic signals, no driveways, and a minimum of 4 travel lanes with a median. Connections are provided only at interchanges for major cross streets. All cross street are grade-separated.

Frontage Road: A public or private drive that generally parallels a public roadway between the right-of-way and the front building setback line. The frontage road provides access to private properties while separating them from the arterial roadway. Also see Service Road.

Full Control of Access: Connections to a facility provided only via ramps at interchanges. All cross-streets are grade-separated. No private driveway connections allowed. A control of access fence is placed along the entire length of the facility and at a minimum of 1000 feet beyond the ramp intersections on the Y lines (minor facility) at interchanges (if possible).

Grade-Separation: the use of a bridge structure and its approaches to confine portions of traffic to different elevations, thus dividing or separating the crossing movement.

Greenfield: Property in both rural and urban areas that has not been previously developed. It also includes forestry and agricultural land and buildings, as well as previously developed sites, which have now blended into the natural landscape over time.

Groundwater: Freshwater beneath the earth's surface (usually in aquifers) supplying wells and springs. Because groundwater is a major source of drinking water, there is a growing concern over leaching of agricultural and industrial pollutants or substances from underground storage tanks.

Hurricane Evacuation Route: Major facilities that shall be used to evacuate people from coastal areas in the event of a hurricane; developed by the North Carolina Division of Emergency Management.

Idle Land: Land that was cultivated but is now in a state of disuse; abandoned land; fallow land.

Indirect and Cumulative Impacts: An analysis, by project alternative, of a) effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (secondary effects) and b) impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency.

Indirect Effects: Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Infill Development: Development that takes place on vacant or under utilized parcels within an area that is already characterized by urban development and has access to urban services.

Intelligent Transportation Systems (ITS): Advanced traffic operations and communications technologies that increase traffic flow on existing facilities, improve safety, and provide better and more accurate traveler information.

Interagency Leadership Team (ILT): Their purpose is to address Goal #1 of the FHWA/NCDOT Joint Work Plan for Timely Program Delivery with Environmental Excellence. The Goal is: "develop and implement an action plan that demonstrates NCDOT, FHWA and resource agency commitment to deliver NC's transportation program in a timely manner with environmental excellence." The mission of the ILT is "to develop an interagency plan for North Carolina to balance successfully mobility, natural and cultural resource protection, community values, and economic vitality at the confluence of our missions". Partners include: NCDOT, FHWA, US Army Corps of Engineers, US Fish and Wildlife Service, NOAA-National Marine Fisheries Service, Environmental Protection Agency, DENR, NC Department of Cultural Resources, NC Wildlife Resources Commission and the NC Department of Commerce.

Interchange: A system of interconnecting roadways in conjunction with one or more grade separations that provides for the movement of traffic between two or more roadways or highways on different levels (with ramps).

Intermodal Surface Transportation Efficiency Act (ISTEA): Landmark federal legislation signed into law in 1991. It made broad changes in the way transportation decisions are made by emphasizing diversity and balance of modes as well as the preservation of existing systems and construction of new facilities. The law expired in 1997, but much of the program were carried forward by TEA-21.

Intermodal Terminals: Location where people or goods transfer from one mode to another.

Intermodal: Interconnectivity between various types (modes) of transportation.

Interparcel Circulation: The ability of vehicular traffic to circulate between adjacent parcels without reentering a public roadway.

Intersection: The general area where two of more highways join or cross, including the roadway and roadside facilities for traffic movements within the area. The three general types of highway crossings are at-grade intersections, grade separations without ramps, and interchanges.

Interstate Highway System (IHS): The system of highways that connects the principal metropolitan areas, cities, and industrial centers of the United States. Also connects the US to internationally significant routes in Canada and Mexico.

Interstate Loops and Spurs: Interstate Highways connectors or full or partial circumferential beltways around an urban area. These highway carry a three digit number.

Interstate: Full control of access freeway of at least four lanes designated by the Federal Highway Administration as part of the Interstate System. Interstates are the highest form of freeways and have uniform geometric and construction standards, which include a minimum of four 12-foot wide travel lanes, a minimum shoulder width of 10 feet, full control of access, and design speeds of 50 to 70 miles per hour.

Investing Support for Resource Agencies: The North Carolina Department of Transportation (NCDOT) funds 21 positions with state and Federal resource agencies for staff dedicated to review of environmental projects. The funded positions include the following: 22 positions at the North Carolina Department of Environment and Natural Resources; 3 at the North Carolina Wildlife Resource Commission; 3 at the North Carolina Department of Cultural Resources; 3 at the US Fish & Wildlife Service; and 2 at the US Environmental Protection Agency.

Land Use Plan: A plan which establishes strategies for the use of land to meet identified community needs.

Land Use: Refers to the manner in which portions of land or the structures on them are used, i.e. commercial, residential, retail, industrial, etc.

Land-use Classification: Classification providing information on land cover, and the types of human activity involved in land use. It may also facilitate the assessment of environmental impacts on, and potential or alternative uses of, land.

Level of Service (LOS): 1) A qualitative assessment of a road's operating conditions. For local government comprehensive planning purposes, level of service means an indicator of the extent or degree of service provided by, or proposed to be provided by, a facility based on and related to the operational characteristics of the facility. Level of service indicates the capacity per unit of demand for each public facility. 2) This term refers to a standard measurement used by transportation officials which reflects the relative ease of traffic flow on a scale of A to F, with free-flow being rated LOS-A and congested conditions rated as LOS-F.

Limited Control of Access: Connections to a facility provided only via ramps at interchanges (major crossings) and at-grade intersections (minor crossings and service roads). No private driveway connections allowed. A control of access fence is placed along the entire length of the facility, except at intersections, and at a minimum of 1000 feet beyond the ramp intersections on the Y lines (minor facility) at interchanges (if possible).

Long Range Transportation Plan (LRTP): A document resulting from regional or statewide collaboration and consensus on a region or state's transportation system, and serving as the defining vision for the region's or state's transportation systems and services. In metropolitan areas, the plan indicates all of the transportation improvements scheduled for funding over the next 20 years.

Maintenance: Regular, routine roadway and bridge treatments that sustain highway conditions.

Master Plan: Contains all recommended operational, design, access, and land use improvements that support a corridor vision.

Median: The portion of a highway separating opposing directions of travel, not including two-way left-turn lanes; can be nontraversable (a physical barrier, such as a concrete barrier of landscaped island) or traversable (does not physically discourage or prevent vehicles from crossing it, such as a painted median).

Merger 01: The melding together of 404 regulations and NEPA for current projects. One of the goals of the Merger 01 process is to incorporate regulatory requirements into the NEPA decision-making process. The Merger 01 process is also designed to improve interagency coordination and it is an effort to streamline the project development and permitting processes.

Metropolitan Planning Organization (MPO): A federally mandated transportation policy-making entity made up of representatives from local government and transportation authorities for urban areas with populations greater than 50,000. MPOs are responsible for developing long-range transportation plans and Transportation Improvement Plans (TIP) for their respective regions, while ensuring transportation projects and programs are based on a comprehensive, cooperative, and continuing (3-C) planning process.

Mitigation: The process of moderating the impact(s) a project has on the environment.

Mobility: The ability to move unimpeded, safely, and efficiently using a reliable transportation system.

Modernization: Improvements related to upgrading system safety, functionality, and overall operational efficiency, without adding major physical capacity.

Multi-modal: The availability of multiple transportation options, especially within a system or corridor.

Multiple Land Use: Use of land for more than one purpose, for example, grazing of livestock, recreation and timber production. The term may also apply to the use of associated bodies of water for recreational purposes, fishing and water supply.

National Ambient Air Quality Standards (NAAQS): Federal standards that set allowable concentrations and exposure limits for various pollutants. The EPA developed the standards in response to a requirement of the CAA. Air quality standards have been established for the following six criteria pollutants: ozone (or smog), carbon monoxide, particulate matter, nitrogen dioxide, lead, and sulfur dioxide.

National Environmental Policy Act of 1969 (NEPA): NEPA: an act to establish a national policy for the environment, to provide for the establishment of a Council on Environmental Quality (CEQ) to administer NEPA, and to provide for other purposes. The National Environmental Policy Act requires that any project using federal funding or requiring federal approval, including transportation projects, examine the effects of proposed and alternative choices on the environment before a federal decision is made. The NEPA process consists of a set of fundamental objectives that include interagency coordination and cooperation, and public participation in planning and project development decision-making. Environmental reviews involve an interdisciplinary and interagency process. This coordinated review process includes input from the public, as well as from other agencies, to guarantee that all environmental protections, as well as other issues are addressed.

National Highway System (NHS): The Interstate Highway System as well as other roads important to the nation's economy, defense, and mobility; developed by the US Department of Transportation in cooperation with the states, local officials, and metropolitan planning organizations.

Natural Resources: Natural assets (raw materials) occurring in nature that can be used for economic production or consumption. See also renewable natural resources and non-renewable natural resources.

No Control of Access: Connections to a facility provided via ramps at interchanges, at-grade intersections, and private driveways. No physical restrictions, i.e., a control of access fence, exist. Normally, private driveway connections are defined as one connection per parcel. Additional connections may be considered if they are justified and if such connections do not negatively impact traffic operations and public safety.

Non-Attainment: Any geographic area that has not met the requirements for clean air as set out by EPA/federal legislation in the Clean Air Act of 1990 (that is their air quality is poor). This triggers a requirement of actions by the MPO or State that an analysis be performed on long range plans and the TIP to show that these programs will improve their air quality. After being designated as "non-attainment" and improving their air quality to the required standards, the area becomes "maintenance" – it does not reverse to "attainment".

Non-Point Source of Pollution: Pollution sources that are diffused and without a single point of origin or not introduced into a receiving stream from a specific outlet. The pollutants are generally carried off the land by storm-water run-off. The commonly used categories for non-point sources are agriculture, forestry, urban areas, mining, construction, dams and channels, land disposal and saltwater intrusion.

Non-Renewable Natural Resources: Exhaustible natural resources such as mineral resources that cannot be regenerated after exploitation.

North Carolina Certified Sites: North Carolina Department of Commerce Certified Sites program showcases premium property sites that have been pre-qualified by undergoing a stringent site package preparation process to ensure property is ready for development. Sites are approved by the North Carolina Certified Sites Steering Committee.

North Carolina Intrastate Highway System: A 3,600 mile system of highways designated by the General Assembly in 1989 to be multi-lanes to help encourage economic development and growth and to connect the population areas to outlying areas of the state.

North Carolina Regional Economic Partnerships: Counties of North Carolina are organized into seven regional partnerships for economic development. These regional partnerships enable regions to compete effectively for new investment and to devise effective economic development strategies based on regional opportunities and advantages.

Notice of Intent: The Notice of Intent (NOI) is an announcement to the public and to interested agencies that a project is being developed and that an EIS will be prepared. It briefly describes the Study Area, the proposed action, its proposed purpose and need, the agency's proposed public scoping process, and identifies the agency contact person (name and address).

Operations: The day to day tasks associated with maintaining and constructing highways. Includes evaluating driveway permits, traffic signal installations, overseeing constructing projects, and patching potholes. The 14 NCDOT Division Offices are the primary groups responsible for handling the daily operations.

Partial Control of Access: Connections to a facility provided via ramps at interchanges, at-grade intersections, and private driveways. Private driveway connections are normally defined as a maximum of one connection per parcel. One connection is defined as one ingress and one egress point. The use of shared or consolidated connections is highly encouraged. Connections may be restricted or prohibited if alternate access is available through other adjacent public facilities. A control of access fence is placed along the entire length of the facility, except at intersections and driveways, and at a minimum of 1000 feet beyond the ramps terminals on the minor facility at interchanges (if possible).

Permit: Written permission given by a governmental agency with "permitting" authority to take certain action during specific steps of a project development process. Example: permits may include permission for any construction, excavation, depositing of material, or other work in navigable waters (Corps of Engineers), permission required for the discharge of dredged or fill material into waters of the United States (Corps of Engineers). A permit may also refer certain other clearances or certifications such as a clearance from the Federal Aviation Administration for proposed highway construction in the vicinity of public use and military airports, and water quality certifications for the licensing of an action that would result in a discharge into regulated waters. These approvals, plus certain others relating to solid waste management, underground storage tanks, coastal zone areas, etc., involve approvals and documentation commonly referred to as permits.

Point Source of Pollution: Anthropogenic source of emissions that is located at an identifiable point in space. The term covers stationary sources such as sewage treatment plants, power plants, other industrial establishments, and similar buildings and premises of small spatial extension.

Preferred Alternative: The recommended alternative put forth no later than the FEIS. A recommended Preferred Alternative can be identified in the DEIS.

Preservation: Activities that protect natural resources (natural resource context).

Preservation: Activities that protect the infrastructure and extend facility service life (Statewide Transportation Plan context).

Public Hearing: A meeting designed to afford the public the fullest opportunity to express opinions on a transportation project. A verbatim record (transcript) of the proceedings is made part of the project record.

Public Involvement: The process through which government communicates with its stakeholders using a series of products, tools, documents and outreach opportunities.

Public Meeting: An announced meeting conducted by the convening agency designed to facilitate participation in the decision-making process and to assist the public in gaining an informed view of a proposed project at any level. Can be referred to as a public information meeting.

Purpose and Need Statement: Establishes why the project is proposed and is the foundation to determine if alternatives meet the needs in the area. The Purpose and Need Statement is developed in consultation with local, state and federal agencies as well as the public. The Study Team will solicit comments from the public on the Purpose and Need until the completion of the Draft Environmental Impact Statement. It is the first concurrence point of the 404/Merger process.

Right of Way: The land (usually a strip) acquired for or devoted to highway transportation purposes.

Rural Planning Organization (RPO): Planning entities for rural (non-MPO) areas of three to 15 counties (establishment is voluntary). Core roles include: 1) development and prioritization of transportation projects for input into the Statewide Transportation Improvement Program (STIP); (2) coordination of local and regional multi-modal transportation plans; (3) providing an information clearinghouse (information resource center); and, (4) providing a mechanism for meaningful public participation.

Scoping: The process of establishing the principal issues to be addressed in an environmental impact assessment.

Secondary and Cumulative Effects Analysis: See Indirect and Cumulative Impacts.

Service Road: A public or private road, auxiliary to and normally located parallel to a controlled access facility or arterial that maintains local road continuity and provides access to parcels adjacent to the controlled access facility or arterial.

Shared Access: A single access connection serving two or more adjoining lots or parcels.

Shoulder: The portion of the roadway contiguous to the traveled way for accommodation of stopped vehicles, for emergency use, and for lateral support of the roadway.

Significant Impacts: Any number of social, environmental, or economic effects or influences which may be brought about as a result of the implementation of a transportation improvement. "Significant impacts" may include effects, which are direct, secondary, or cumulative. The term "significant" is used and interpreted to determine which type of NEPA document is appropriate. Categorical exclusions are those actions which do not involve sign ificant effects. Environmental Impact Statement projects in most cases can and do involve significant impacts.

Stakeholder: Individuals, communities, government agencies, private organizations, non-governmental organizations or others having a legitimate interest or "stake" in both the process and outcomes of a project.

Statewide Transportation Plan: State's transportation system consists of all transportation modes and the facilities that link them together. A "multimodal" statewide transportation plan identifies and evaluates a full spectrum of future transportation needs and potential solutions by mode and by function. The overriding purpose of this Statewide Transportation Plan is to establish a long-range blueprint for transportation investment in North Carolina. The Statewide Transportation Plan also provides a balanced picture of the State's transportation challenges and opportunities based on anticipated resources, projected passenger and freight movement needs, and estimated improvement costs. The end result is a preferred North Carolina transportation investment strategy for the next 25 years.

Stormwater Management (SWM): Physical design features such as ponds or drainage swales which are incorporated into a highway project as measures to retain or direct stormwater run-off in a manner that controls discharge volumes and/or water quality, replicating the pre-construction drainage conditions.

STRAHNET: The Department of Defense’s Strategic Highway Network for moving military personnel and equipment.

Strategic Highway Corridors: A set of primarily existing highway corridors that exemplify the long-term potential to serve passenger and freight movement in a high-speed manner. These facilities upon, some level of improvement, will substantially increase the mobility and connectivity of travel to destinations within and just outside North Carolina, while helping foster economic prosperity and promoting environmental stewardship. The SHC concept was adopted by the Board of Transportation as a part of the Statewide Transportation Plan in September 2004.

Superfund: The common name used for the trust fund or process established under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) to clean up hazardous waste sites across the country. Also used to in the context of a cleanup site that has been place on the National Priorities List (e.g. a Superfund site).

Systems Planning Studies: Studies that examine existing conditions and future deficiencies, leading to the creation of a transportation vision for an area typically 25-30 years in the future.

Thoroughfare: A facility with a functional purpose of moderate to low mobility and high access. The facility has no control of access, traffic signals, driveways with full movements, and a minimum of 2 travel lanes without a median. Connections are provided primarily at at-grade intersections.

Traditional Neighborhood Development (TND): A compact, mixed-use neighborhood where residential, commercial, and civic buildings are within close proximity to each other. It is a planning concept that is based on traditional small town and city neighborhood development principles.

Transportation Equity Act for the 21st Century (TEA-21): Congressional act authorizing Federal surface transportation programs for highways, highway safety, and transit for the six-year period from 1998-2003.

Transportation Improvement Program (TIP): Federally-mandated, fiscally constrained schedule that prioritizes transportation projects and studies of regional or statewide significance that covers a minimum period of three years. (7 years in North Carolina.) A short-term, fiscally constrained program of multi-modal transportation projects for a metropolitan areas. It documents the anticipated timing, cost, and rationale for transportation improvements to be made in the region. It translates recommendations from the long-range transportation plan into a short-term program of improvements. The MPO generally prepares and updates the TIP every year (but is only required to do so every 2 years) in cooperation with the state transportation and public transit operators. The metropolitan planning organization, Governor, and federal transportation agencies must approve the program.

Trauma Center: A specialized hospital facility distinguished by the immediate availability of specialized surgeons, physician specialists, anesthesiologists, nurses, and resuscitation and life support equipment on a 24 hour basis to care for severely injured patients or those at risk for severe injury.

Travel Demand Management (TDM): A system of actions whose purpose is to alleviate traffic problems through improved management of vehicle trip demand. These actions, which are primarily directed at commuter travel, are structured to either reduce the dependence on and use of single-occupant vehicles, or to alter the timing of travel to other, less congested time periods. Simply stated, the purpose of travel demand management is to maximize the movement of "people," not vehicles, within the transportation system.

Truck Traffic Percentages: The percentage of trucks of the total number vehicles using a highway.

Urban Run-off: Storm water from city streets and adjacent domestic or commercial properties that contains litter, and organic and bacterial wastes.

Urban Sprawl: Expansion of an urban area to accommodate its growing population.

Vehicle Miles Traveled: A measure of highway use; measures the total miles traveled by all vehicles in the area for a specified time period (one vehicle traveling one mile is one vehicle-mile).

Wetlands: Areas that inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Zoning: Process in physical planning, or the results thereof, in which specific functions or uses are assigned to certain areas (for example, industrial zones, residential areas).

REFERENCES

1. American Association of State Highway and Transportation Officials (AASHTO), *A Policy on Geometric Design of Highways and Streets*, 4th Edition, 2001

2. Interagency Leadership Team (ILT), *Interagency Leadership Plan Glossary*, 2005

3. North Carolina Department of Transportation (NCDOT), *Policy on Street and Driveway Access to North Carolina Highways*, 2003

4. North Carolina Department of Transportation (NCDOT), *Charting a New Direction for NCDOT: North Carolina's Long-Range Statewide Multimodal Transportation Plan*, 2004

5. North Carolina Department of Transportation (NCDOT), *US 64-NC 49 Corridor Study: Land Use Policy Guidelines for Mobility Protection*, 2005

6. Transportation Research Board (TRB), *Access Management Manual*, 2003

APPENDIX A

Corridor Development Team Meeting Summaries

US 64 - NC 49 CORRIDOR STUDY
CORRIDOR DEVELOPMENT TEAM (CDT) MEETING #1 SUMMARY

November 12, 2003
10:00 a.m. to 1:00 p.m.
Randolph County Office Building
725 McDowell Road, Asheboro, NC

Prepared by: PBS&J

Organizations were represented by the following meeting attendees:

US 64 – NC 49 Project Team

Jamal Alavi	NCDOT - SWP
David Wasserman	NCDOT - SWP
John Adams	PBS&J
Joel Leisch	PBS&J
Jill Gurak	PBS&J
Lauren Wolfe	PBS&J
Heidi Stamm	HS Public Affairs
Meg Connolly	Land Design
Lewis Grimm	Cambridge Systematics
Don Vary	Cambridge Systematics

Corridor Development Team (CDT) Members

Marcus Wilner	FHWA
Brenda Moore	NCDOT – Roadway Design
Derrick Lewis	NCDOT – Feasibility Studies
Mike Reese	NCDOT – Traffic Engineering Congestion Management
Rebecca Harper	Iredell County
Juliet Andes	Town of Cary
Jim Parajon	Town of Cary
Rodger Lentz	Cabarrus County
Terry Bralley	Davie County
Jack Meadows	Siler City
Hal Johnson	Randolph County
Tim Mangum	Randolph County
Jay Dale	Randolph County
Keith Megginson	Chatham County
Pat Strong	Triangle J COG/Triangle RPO
David Rowland	Town of Apex
Tim Clark	Wake County

Project Team introductions were given by David Wasserman. John Adams followed with having the CDT Meeting attendees introduce themselves. The meeting agenda is attached for reference.

The Project Team presentation was given and covered the following items:

- Outline of the presentation itself (Adams)
- Strategic Corridors Concept (Wasserman)
- US 64/NC 49 Corridor Study Overview (Adams)
- Corridor Development Team (Adams/Wasserman)
- Tier I Analysis (Grimm/Leisch)
- Public Involvement (Stamm)

Following the presentation was a general question and answer session with the CDT members.

Q. Will corridor protection measures be taken?
A. Corridor protection measures will be analyzed during Tier II

Q. Will the various jurisdictions within the corridor be asked how they plan to deal with development?
A. Land use guidelines that may be used by the State and local governments in their efforts to implement a corridor land use plan will be developed in Tier II of the study.

Q. When will outreach presentations occur?
A. Over the next several months (primarily in December and January). The outreach presentations will be a spin-off of this presentation. The Project Team would like input from the CDT members on who and where these outreach presentations should be given.

Q. Will there be any access management team building?
A. No, it is not part of the Tier I or Tier II processes that we are currently scoped for. However, a mutual agreement between the jurisdictions on access management should be addressed immediately following the Tier II process.

Q. Where will funding come from? What is the timeline for this study?
A. Funding may come from any number of sources, depending upon the type of improvement done to the corridor. Some improvements may be funded by the Transportation Improvement Program (TIP). The horizon year for the study is 2030.

Q. What is currently on the TIP for US 64/NC 49?
A. Widening of NC 49 to four lanes basically from Asheboro to Concord, the Asheboro Bypass, and widening of US 64 to four lanes from Asheboro to Lexington.

Q. Will the requirement and/or deficiencies of the major intersecting routes by analyzed by the end of Tier II?
A. Yes, within the US 64/NC 49 corridor area of influence.

Q. Will detailed costs be prepared for the different alternatives?
A. No. A cost range will be determined for each alternative.

Q. How were the Public Involvement cells determined?
A. The public involvement cells are based on common needs and desires for the roadway (local use, commuter use, etc.) and geography.

The meeting attendees took a quick break and returned to discuss specific CDT discussion topics including: Project Goal and Objectives, Evaluation Criteria, Stakeholder Interviews, Outreach Presentations, and the location of the next CDT Meeting. Questions and comments from the discussion are provided below.

Project Goal

Q. Should "safety" be added to the goal?
A. Safety is included as a project objective.

Q. Having a hard time with "economic development concerns." Perhaps "economic development opportunities" would work better.
A. The Project Team will consider making that change.

Q. Should "accessibility" be added to the project goal to balance "mobility"?
A. The Project Team will consider making that change.

Project Objectives

Q. Should consideration be given to addressing transit demand as an objective? Are there plans to generate demand forecasts?
A. The purpose of the study is not to develop a transit plan for the corridor. However, roadway improvements to US 64 – NC 49 should be supportive of local and regional transit plans. A travel model for 2030 will be developed and transit demand will be discussed qualitatively through that model.

Q. What about supporting local land use plans as part of the Project Objectives?
A. The Project Team will consider changing the Project Objectives to support local land use plans.

Q. Do not like the term "liveable community"
A. It is intended to refer to diverting through traffic in communities and making it safer for pedestrians, thereby, making the community more "liveable."

Q. Concerned about the optimizing costs and benefits objective (objective #7). Does it address funding feasibility?
A. Yes, funding sources will be identified but a quantitative cash flow financial analysis will not be conducted as part of this study.

Q. Will the Tier I and/or Tier II process evaluate a cost comparison of improving the US 64/NC 49 corridor vs. improving I-40/I-85?
A. It will not be part of this study to make recommendations for improvements to interstate facilities. However, diversion of traffic from I-40/I-85 to the various US 64/NC 49 corridor alternatives will be evaluated.

Q. There is a need to take a look at I-40/I-85 as part of this study. Freight will be an issue and may need a broader spectrum of study.
A. As the study develops, the Project Team address this. However, it will be an investment decision by the NCDOT/FHWA. As the travel model is developed, these issues (freight, cost, traffic diversion)

will be considered as TIP and/or Long Range Transportation Plan (LRTP) projects are included in the model and their effects are evaluated.

Evaluation Criteria

Q. Consideration of land use/liveability is missing from the Evaluation Criteria.
A. Tier I is very broad and will not be analyzing the corridor at that level of detail. Tier II will look at the corridor in more detail and will consider effects on land use and liveability. Land use and liveability are included indirectly in Criterion #8 (Be sensitive to environmental and *social* factors).

Q. Some of the evaluation criteria may be in direct conflict with communities' land use goals/plans (Example: Increased travel speed may conflict with other needs.)
A. Not all criteria would apply to all portions of the corridor. Later in the process, the land use plans of individual communities will be taken into account.

Q. Perhaps using terms like "balance" rather than "increase" may be more palatable to certain communities.
A. The Project Team will consider making that change.

Q. Regional and local perspectives may be in conflict with one another. An example of this is the high speed rail corridor in Cabarrus County. Regionally it was good, but locally it was not well received since crossings were being closed.

Q. The CDT can provide good advice and insight related to local community "hot buttons."
A. Yes, the CDT can function as a sort of "early warning system" to let the Project Team know of any issues that certain communities may have with this study.

Q. May want to consider developing some guiding principles for communities in order to help move the project forward and avoid conflict.
A. Yes, that is the purpose of the stakeholder interviews.

Stakeholder Interviews

Heidi Stamm asked for individuals present from each cell to give specific names of people that they thought should be included in the Stakeholder Interviews. Four people from each cell will be asked to participate in a Stakeholder Interview. The following people were recommended by the CDT.

Cell #1: US 64 – Cary to Pittsboro

- Tommy Emerson, Chatham County Board of Commissioners, Chair
- Elaine Chiosso, Haw River Assembly
- Keith Weatherly, Mayor of Apex
- Cary Auto Park - Keith Elkes (Leith Management) & Mike Desmond (Hendrick Automotive)

Cell #2: US 64 – Pittsboro to Asheboro

- Charles Turner, Siler City Mayor
- Robert Porter, Sierra Club on North Carolina (Orange/Chatham Counties Group)
- Tony Tucker, Economic Development Commission, Chair
- Father Daniel Quakenbush, St. Julia Catholic Church, Siler City

Cell #3: US 64 – Asheboro to Lexington

- Talmadge Baker, Asheboro City Council member, Piedmont Triad RPO Chairman
- Mary Joan Pugh, NC Zoo, Piedmont Land Conservancy
- George Gusler, Asheboro/Randolph Chamber of Commerce, Executive Vice President
- Hans Klaussner, Klaussner Furniture, owner

Cell #4: US 64 – Lexington to Statesville

- Ken White, Northwest Piedmont RPO Co-Chair, Davie County Commissioner
- Ann Liebenstein, Yadkin Pee Dee Lakes Project
- Billy Jo Kepley, Davidson County Commissioner
- Danny Hearn, President of Statesville Chamber of Commerce

Cell #5: NC 49 – Asheboro to Charlotte

- Troy Barnhardt, Mt. Pleasant Mayor, TAC member
- Tyrel Moore, Harrisburg Planning Board Chair, Planning professor at UNC-Charlotte
- Michael Sandy, Stanly County Planning Director
- Thomas Horner, Uwharrie National Forest District Ranger

Outreach Presentations

The CDT members were asked for possible forums and/or locations for the Outreach Presentations to take place. The following were recommended by the CDT:

- Davie County Planning Board Meeting
- The TAC's of all the RPO/MPOs (9 groups)
- Siler City Commissioners Meeting
- Apex Town Council Meeting
- Cary Town Council Meeting

Next CDT Meeting

The group agreed that Asheboro was the best place to hold future CDT meetings.

Other Discussion

Pat Strong indicated that he would like 100 study brochures as soon as possible for distribution at a Triangle Area RPO meeting to take place in early December. He plans to distribute them to all meeting participants. Brochures will be given to all CDT members for distribution throughout the project study area.

The meeting was adjourned at 1:00 pm.

US 64 – NC 49 Corridor Study
Corridor Development Team (CDT) Meeting #1

Randolph County Office Building
725 McDowell Road, Asheboro, NC

November 12, 2003, 10 am to 1pm

AGENDA

Agenda Item	Presenter	Time
Welcome & Introductions	David Wasserman	10:00-10:05
Presentation Overview	John Adams	10:05-10:10
Presentation	Team	10:10-11:15
Break		11:15-11:25
Project Goals & Objectives	John Adams	11:25-11:50
-Discussion		
Evaluation Criteria	Joel Leisch	11:50-12:10
-Comments & Suggestions		
Stakeholder Interviews	Heidi Stamm	12:10-12:30
-Participant review & additions		
Outreach Presentation Forums/Locations	David Wasserman	12:30-12:45
Next CDT Meeting	David Wasserman	12:45-12:50
Closing & Action Items	David Wasserman	12:50-1:00

US 64 - NC 49 CORRIDOR STUDY
CORRIDOR DEVELOPMENT TEAM (CDT) MEETING #2 SUMMARY

August 23, 2004
10:30 a.m. to 2:00 p.m.
Harrisburg Town Hall

Prepared by: PBS&J

The following attended the meeting:

US 64 – NC 49 Study Team

Jamal Alavi	NCDOT – Transportation Planning
David Wasserman	NCDOT – Transportation Planning
John Adams	PBS&J
Kim Bereis	PBS&J
Jill Gurak	PBS&J
Joel Leisch	PBS&J
Heidi Stamm	HS Public Affairs
Meg Connolly	Land Design
Padam Singh	Land Design
Lewis Grimm	Cambridge Systematics
Don Vary	Cambridge Systematics

Corridor Development Team (CDT) Members

Brenda Moore	NCDOT – Roadway Design
Thad Duncan	NCDOT – Roadway Design
Derrick Lewis	NCDOT – Feasibility Studies
James Dunlop	NCDOT – Traffic Engineering
Laura Cummings	MUMPO
Rebecca Harper	Iredell County (Lake Norman RPO)
Juliet Andes	Town of Cary
Rodger Lentz	Cabarrus County
Terry Bralley	Davie County
Jack Meadows	Siler City
Mayor Calvin Gaddy	Rocky River RPO (New London)
Hal Johnson	Piedmont Triad RPO
Keith Megginson	Chatham County
Pat Strong	Triangle J COG/Triangle RPO
Diane Khin	Town of Apex
Tim Clark	Wake County
Ed Johnson	CAMPO

David Wasserman began the meeting at approximately 10:30 a.m. and asked attendees to introduce themselves. The meeting agenda is attached for reference.

The Study Team covered the following topics in a formal presentation:

- CDT Meeting #1 Recap (Adams)
- Alternatives Evaluation (Adams)
- Definition of Need (Bereis/Connolly/Gurak/Grimm)
- Definition of Alternatives (Adams)
- Travel Demand Model (Vary)
- Evaluation Criteria and Evaluation of Alternatives (Leisch)
- Evaluation Discussion (All)
- Next Steps (Adams)

Heidi Stamm facilitated an open question and answer dialogue between the CDT members and the Study Team. Questions/comments from this discussion are provided below.

Q. When did the traffic surveys (covered in the presentation) take place?
A. The roadside origin-destination (O-D) and video license plate surveys took place in October of 2003. The postcard survey of vehicles passing video survey site #2 took place in October 2003. The travel time surveys between Charlotte and Raleigh and between Statesville and Raleigh took place in November 2003 and February 2004.

Q. How much longer will we continue 5-lane configurations?
A. Five-lane roadway cross-sections are most appropriate when there is a substantial amount of existing or planned commercial development along both sides of a highway. These conditions are generally found in urban and suburban areas. When a major widening of an existing road is being considered, for example from a two-lane to a multi-lane cross section, the provision of a raised median is the generally preferred design option. Any new location, multi-lane facilities should be, by definition, constructed as median divided roadways. In the final analysis, the specific features of any specific highway in the state of North Carolina are defined through a collaborative design process involving NCDOT and the effected local communities.

Q. At what point in the process will we know when to set aside right-of-way? (Concern that the opportunity to preserve this corridor will pass by because of corridor development pressures in some areas).
A. State and local governments corridor protection measures/land use guidelines for consideration will be presented at the next meeting. This information outlines what can be done in this regard under current state law. It is anticipated that this preservation will occur much further on in the project development process. Specifically, more detailed route location, preliminary engineering, and environmental studies would need to be completed before potential right-of-way requirements can be identified.

Q. On the model output slide, why is the LOS in the Apex area "more orange than red"?
A. The land use assumptions used in the model are a critical input to the daily volume forecasts. For this study, Global Insight (GI), an economic forecasting firm, developed year 2025 employment and household forecasts. Cambridge Systematics extrapolated the GI forecasts to 2030. While the process for developing these forecasts is consistent throughout the study area, some area forecasts may be higher or lower than forecasts generated by local jurisdictions. However, the land use forecasts we are using are consistent with the purpose and intent of the study, which is to understand the relative benefits of and need for various roadway investments in the US 64 – NC 49 corridor.

In addition, the travel demand forecasting model used for the analysis was regional in nature, and was developed primarily to estimate intercity and county-to-county travel patterns. The model encompassed virtually the entire state of North Carolina, with each of the 19 counties in our primary study area being represented by a relatively small number of traffic analysis zones, generally 30-40 zones for each county. By contrast, the regional travel demand model used in the Raleigh/Wake County area has something on the order of 300-400 or more traffic analysis zones in each county. Thus, the level of detail between the two models is not directly comparable. With regard to the Apex area and elsewhere in the Raleigh, Charlotte, and Triad regions, it would be expected that the more detailed MPO regional traffic forecasting models would show higher traffic volumes and thus higher levels of congestion, than would the essentially statewide model used on this study.

Q. On the model output slide (with rural and urban facility types and network percentages), why is the percentage higher for VHT operating at LOS F worse for urban area roads?

A. As is typical of most urban areas, traffic tends to find alternative routes to avoid congestion. This shows that the capacity of existing and proposed future facilities is falling behind, per se, in its ability to accommodate the significant increases in travel demand that are projected to occur between today and the year 2030. Basically, traffic congestion in the future will be worse than that observed today, even if all of the E+C projects are completed and open to traffic.

Q. Was an O/D survey conducted for diverted traffic?

A. No, a "select link analysis" was not conducted as part of this scope.

Q. Why do the screenlines for I-85 and NC 49 suggest that so much traffic will be diverted to NC 49 with a Freeway alternative?

A. As noted in the travel time surveys, the current travel times between Charlotte and Raleigh via the NC 49 - US 64 corridor are essentially the same as the travel time between these two areas via the I-85/I-40 corridor. The Freeway alternative assumed improvements to the NC 49 and US 64 corridors that would allow operating speeds of 65 mph over the entire length of the corridor, versus the average operating speed of 50-55 mph that is observed today. With traffic volumes and congestion projected to increase dramatically along the I-85 and I-40 corridors, the travel times along these routes would become longer while those along NC 49 and US 64 would remain the same or decrease from those observed today, thus making the improved NC 49 - US 64 corridor a much more attractive diversion route.

Q. Was there any attempt to correlate the evaluation criteria for "safety" to facility type? Also, did the analysis include accident reductions in the I-85/I-40 corridor as a result of diversion to US 64?

A. Yes, this was considered because 2-lane rural facilities tend to have higher accident rates than do multi-lane highways or freeways, and because congestion, such as that found on existing sections of the Interstate, is often associated with high accident rates. Additionally, the improved horizontal and vertical design standards associated with the Freeway and Expressway alternatives would contribute to safer traffic operations along the corridor. The analysis did not explicitly consider changes in accident rates in the Interstate corridor as a result of traffic diversion to the NC 49 - US 64 corridor.

Q. Why in the evaluation was the E+C scored "better" than a limited access facility and freeway facility in the "Sensitivity to Social Factors"? (Despite the "footprint" associated with the high-speed alternatives, a CDT member felt that a 5-lane section in his respective area creates a "barrier" and that the other alternatives would improve social benefits by shifting conflicting traffic on another facility).

A. Although this may be the case in some areas (i.e. urban areas), the evaluation considered mostly the types of social impacts associated with the right-of-way footprint over the entire length of the

corridor. Thus, any new location facility was assumed to have the potential to be more disruptive to communities along the corridor than the widening and reconstruction of an existing highway.

Q. Functionally, how would access at specific locations be handled if the Expressway Alternative were implemented, especially when there is not a lot of "will" by local governments to limit driveway access? (There was overall concern from several CDT members that not enough can be done to limit driveway access by local municipalities along the entire corridor, resulting in "hot spots").

A. Consolidation and/or maintaining access at specific locations would need to be agreed upon for the Expressway Alternative. This type of detail for the overall corridor(s) has not been conceptualized at this time. Also, how to phase implementation and identifying priority "hot spots" have not been assessed at this time.

This issue is part of why the Strategic Highway Corridor concept was put in place. The idea is that increased mobility will be reached by taking various steps and that there is the potential for a process prototype in the future. The steps will include some means of access management and corridor right-of-way advancement, but will require buy-in and agreement from multiple jurisdictions/agencies. The Department is looking at other states for ideas and how some of their methods could apply and be legislated in North Carolina.

Q. What is the "year horizon" for right-of-way preservation?

A. That has not been determined at this time.

Q. How do we avoid the problem of having to build a "bypass" around a "bypass" because of the amount of time it takes to get these projects realized? Perhaps the vision should go to 2050?

A. The Department could consider an Enhanced E+C Alternative by 2030 with reserved right-of-way for a freeway by 2050. This could include developing an access management strategy with "teeth" for the TIP projects and for the Enhanced projects that are not bypasses. If the 2050 plan is for a Freeway, there will be full control of access. Consequently, if the access is not managed for part or all of the 4-lane sections in the Enhanced E+C, the 2050 plan would resolve the issue.

The need clearly exists for the city, town, and county governments to work closely with NCDOT with respect to right-of-way preservation and improved access management.

Q. How can this work…Isn't this a recipe for disaster? (A concern from a CDT member that "politics will rein".)

A. This is the prototype effort by NCDOT to study a strategic highway corridor in detail. The formal adoption by the NC Board of Transportation of the strategic highway corridors concept and the associated highway facility type definitions will provide a strong basis for allowing these plans to be successfully implemented. It will be important for town, city, and county governments to work closely with NCDOT to ensure that the desired outcomes are achieved.

The next CDT meeting is tentatively scheduled for early November. David Wasserman will follow up with the CDT members to determine an exact date, time and location.

The meeting was adjourned at 2:00 pm.

US 64 – NC 49 Corridor Study
Corridor Development Team (CDT) Meeting #2

Harrisburg Town Hall

August 23, 2004
10:30 a.m. to 2 p.m.

AGENDA

Agenda Topic	Duration
Welcome & Introductions	
CDT Meeting #1 Recap	10 min.
Presentation	
Alternatives Evaluation Process	5 min.
Definition of Need	60 min.
Definition of Alternatives	15 min.
****Lunch****	30 min.
Travel Demand Model	20 min.
Evaluation Criteria	10 min.
Evaluation of Alternatives	30 min.
Evaluation Discussions	25 min.
Next Steps	5 min.

US 64 - NC 49 CORRIDOR STUDY
CORRIDOR DEVELOPMENT TEAM (CDT) MEETING #3 SUMMARY

November 10, 2004
10:30 a.m. to 2:00 p.m.
Davie County Public Library

Prepared by: PBS&J

The following attended the meeting:

US 64 – NC 49 Study Team

David Wasserman	NCDOT – Transportation Planning
John Adams	PBS&J
Kim Bereis	PBS&J
Jill Gurak	PBS&J
Joel Leisch	PBS&J
Heidi Stamm	HS Public Affairs
Meg Connolly	Land Design
Padam Singh	Land Design
Lewis Grimm	Cambridge Systematics
Don Vary	Cambridge Systematics

Corridor Development Team (CDT) Members

Brenda Moore	NCDOT – Roadway Design
Thad Duncan	NCDOT – Roadway Design
Lynnise Hawes	NCDOT – Roadway Design
Derrick Lewis	NCDOT – Feasibility Studies
Terry Bralley	Davie County
Jack Meadows	Siler City
Mayor Calvin Gaddy	Rocky River RPO (New London)
David Monroe	Town of Pittsboro
Pat Strong	Triangle COG/Triangle RPO
Diane Khin	Town of Apex
Tim Clark	Wake County
Ed Johnson	Capital Area MPO

David Wasserman began the meeting at approximately 10:30 a.m. and asked attendees to introduce themselves. The meeting agenda is attached for reference.

The Study Team covered the following topics in a formal presentation:

- Problem Statement (Gurak)
- Definition of Alternatives (Leisch)
- Evaluation of Alternatives (Leisch)
- Corridor Vision (Leisch)
- Land Use Development Patterns/Models and Precedents (Connolly and Singh)
- Closing Comments (Wasserman)

CDT members offered comments and/or asked questions following each topic listed above. CDT questions and comments are provided below.

Problem Statement

No questions/comments.

Definition and Evaluation of Alternatives

Q. Would the E+C Enhanced Alternative incorporate signals and median openings? Do you have an idea of how many signals there would be with the E+C Enhanced system versus Expressway Alternative?

A. Ideally, the E+C Enhanced would eliminate all signals and eliminate the placement of new signalized intersections. Existing signalized intersections would be looked at (i.e. with respect to accidents, etc.). However, the E+C Enhanced would include bypasses around the existing signalized urban areas. Potential median openings would be evaluated at specific areas through a collaborative process involving the NCDOT and effected local communities.

Q. Did you account for intersections delays in the traffic modeling?
A. The modeling was not at that level of detail for such a geographically large corridor study area (over 200-mile corridor). It was assumed that realistically a few signals would not affect mobility.

Q. Will the evaluation become more geographically specific?
A. That level of detail for the overall corridor(s) has not been conceptualized at this time, nor has how to phase implement the improvements and identify priority areas.

Q. For your costs criterion, what is included in those figures?
A. These figures include cost of construction and right-of-way in 2004 $.

Corridor Vision

Q. Does the vision in which we are trying to reach consensus on include a freeway by 2040? Has that changed?
A. What is presented is to establish the Freeway alternative as a long-range vision with no specified completion year (recognizing funding priorities) and to step-by-step address remaining segments that are not freeway. It is possible that the long-range freeway vision may not be realized. One of the goals is to reach consensus on the overall "type" and look of the corridor (specific picture examples were provided in the "Corridor Vision" portion of the presentation) with the understanding that coordination and the course of local decisions are necessary in reaching the desired outcome.

Q. Something separate from this vision still needs to be done for the section between I-540 and US-1 and perhaps should be discussed with the resource agencies before entering the formal NEPA Merger 01 Process.
A. Reconfiguring the US 64/US 1 interchange to utilize 540 would solve the traffic problem. The footprint (clover leaf) is sufficient to develop a range of alternatives where a US 64 to I-540 movement can be facilitated.

Q. In the long-term, could US 64 be routed along I-540 to the south of Raleigh?
A. That is a possibility.

Q. Please explain what would happen to existing 5-lane sections with the E+C Enhanced Alternative.
A. The existing 5-lane urban sections would remain and be bypassed with a new alignment.

Q. Where would the Asheboro Bypass project connect on the east side? Wasn't there discussion at some point about a continuous bypass around Ramseur and Siler City? What's the status of the Asheboro Bypass project?
A. The bypass would miss the large shopping center on the east end. Evaluating an extension of the bypass around Ramseur and Siler City is a possibility, but the implications of this are not covered in this study. (There was a discussion about the status of the Asheboro Bypass project, TIP R-2536. It was noted that the segment from US 64 to NC 49 is scheduled last.)

Q. The median opening spacing of no less than 2,000 feet for non-freeway highway facilities with posted speeds greater than 45 mph would be a beneficial feature to include with your recommended Expressway and E+C Enhanced classifications. For the E+C Enhanced classification, the provision of signalized directional crossovers in urban fringe areas in accordance with this spacing distance would also preserve a high degree of functionality.
A. With regard to the median opening spacing, this is included in the NCDOT Facility Types Definitions, which was provided to the CDT at the last meeting. The E+C Enhanced concept is essentially a combination of a Type I and Type II Expressway. Therefore, the median opening spacing guidelines would be incorporated into the E+C Enhanced concept, which is also signal free.

Heidi Stamm facilitated an open dialogue between the CDT members and the Study Team. Specifically, CDT members were asked to share their views on the recommendation for the Freeway Alternative as the long-term vision with the E+C Enhanced as a staged improvement. The following summarizes specific suggestions and/or comments from CDT members who attended the meeting:

- *Have a hard time with the vision in that there will be a disruption to urban areas and rural areas that wish to stay that way.*
- *Like the vision because it provides a means to get goods between counties, and this will benefit the Charlotte and Raleigh areas, which are growing. People will continue to move outside of the urban areas and this vision is needed for this growth.*
- *It's a good vision, but the DOT needs to be cautious about setting this vision so far out that it is not reachable. The E+C Enhanced is reachable and good for connectivity.*
- *Like the Freeway for long-term and the E+C Enhanced is a good compromise for something less than a straight freeway.*
- *Like the E+C Enhanced concept because it discourages through-traffic from using 5-lane sections, but need guidance/worried about potential development around specific interchanges, such as problems that are arising around the Pittsboro Bypass interchanges.* **(Mayor Calvin Gaddy)**
- *Realize it's difficult to articulate the long-term vision, but as a long-term solution, the vision set forth makes sense. However, getting down to segment by segment will be helpful to tie things together for decision-making and for putting mechanisms in place at the local level.* ***(Jack Meadows)***
- *Appears that the Enhanced E+C will meet the need best as can possibly can, and it's a good direction for starting to plan for long-term needs.*
- *Need to ultimately reach for the freeway solution, but E+C Enhanced projects should be in place.*
- *It's okay to look at the freeway as a long-term vision, but probably not realistic. Rather a combination of the Expressway and Freeway alternatives to address mobility. Has concern for heavily traveled and 2-lane sections.*
- *Freeway as ultimate solution is good.* **(Lynnise Hawes)**

- *Freeway is a good goal to shoot for, but hard pressed to get even the Enhanced E+C on the books.* **(Brenda Moore)**
- *Have a hard time buying in to the vision because it's not illustrated, but like the picture examples (i.e. the intent/effort to keep the corridor scenic). This means that coordination needs to begin with resources agencies now because of competing interests that emerge during the NEPA process. Education and coordination should begin now.* **(Ed Johnson)**
- *Likes the freeway concept as long-term. The I-540 and 64 interchange has little development, but inevitable pressures mean that now is the time to plan for that area. Also concerned with the I-540 to US 1 segment as a "superstreet". Agrees the E+C Enhanced is a good stepping stone, but not going to a freeway the "right way" is of a concern. It would be a mistake not to maintain the rural nature of the corridor with the long-term freeway alternative.* **(Diane Khin)**

Land Use (Development Patterns/Models and Precedents)

Q. Aren't these really local issues?

A. Yes. All of the examples provided would be local issues. In some cases, this may involve more than one community working together. There would be a partnership between the multiple jurisdictions and the NCDOT. Potential policies and/or guidelines will be presented at the next meeting.

Closing Comments

The next CDT meeting is tentatively scheduled for **Friday, January 14, 2005**, with the location to be determined (mostly likely in the Apex/Cary area). David Wasserman will follow up with the CDT members to determine an exact date, time and location.

The meeting was adjourned at 1:30 pm.

US 64 – NC 49 Corridor Study
Corridor Development Team (CDT) Meeting #3

Davie County Public Library

November 10, 2004
10:30 a.m. to 2 p.m.

AGENDA

Agenda Topic	Duration
Welcome & Introductions	5 min.
Presentation	
Problem Statement	25 min.
Definition of Alternatives	10 min.
Evaluation of Alternatives	20 min.
****Lunch****	30 min.
Land Use	60 min.
Development Patterns	
Models and Precedents	
Closing Comments	30 min.

US 64-NC 49 CORRIDOR STUDY
CORRIDOR DEVELOPMENT TEAM (CDT) MEETING #4 SUMMARY

January 14, 2005
10:30 a.m. to 2:00 p.m.
Page Walker Arts and History Center
Town of Cary

Prepared by: PBS&J

The following attended the meeting:

US 64 – NC 49 Study Team

David Wasserman	NCDOT – Transportation Planning
Jamal Alavi	NCDOT – Transportation Planning
John Adams	PBS&J
Kim Bereis	PBS&J
Jill Gurak	PBS&J
Joel Leisch	PBS&J
Heidi Stamm	HS Public Affairs
Meg Connolly	Land Design
Padam Singh	Land Design
Lewis Grimm	Cambridge Systematics
Don Vary	Cambridge Systematics

Corridor Development Team (CDT) Members

Brenda Moore	NCDOT – Roadway Design
Thad Duncan	NCDOT – Roadway Design
Derrick Lewis	NCDOT – Feasibility Studies
Jack Meadows	Siler City
Mayor Calvin Gaddy	Rocky River RPO (New London)
David Monroe	Town of Pittsboro
June Cowles	Town of Apex (sitting in for Dianne Khin)
Tim Clark	Wake County
Ed Johnson	Capital Area MPO
Rodger Lentz	Cabarrus-Rowan MPO
Jason Sullivan	Chatham County
Keith Megginson	Chatham County
Rebecca Harper	Iredell County
Joe Stevens	FHWA (sitting in for Marcus Wilner)
Juliet Andes	Town of Cary

Heidi Stamm began the meeting at approximately 10:30 a.m. and asked attendees to introduce themselves. The meeting agenda is attached for reference.

The Study Team covered the following topics in a formal presentation:

- Review of CDT Meeting #3 (Stamm)
- Implementing the Corridor Vision (Leisch)
- Land Use Policies (Connolly)
- Land Use Alternatives (Singh)
- Corridor Preservation Strategies (Connolly)
- Next Steps/Beyond Phase I and Closing Comments (Adams and Wasserman)

CDT members offered comments and/or asked questions following each topic listed above. CDT comments/questions are provided below.

Review of CDT Meeting #3

a. Problem Statement – The following comments were noted:

Comment: There appears to be a contradiction in the discussion of population growth in Stanly County. On p. 48 (under Section 4.7.2. Forecasted Population Conditions Year 2030) it states that "virtually no population increases are anticipated in Stanly and Davidson Counties, and the northern portion of Iredell County." On p. 51 (under Section 8.7.3. Existing Land Use and Local Land Use/Transportation Plans), it states that, "Stanly County is anticipating a solid growth rate of 11 percent for each decade until 2030.

Response: Text will be amended in the Problem Statement to clarify the disparity between the two data sources (Global Insight and the Stanly County Land Use Plan). According to Global Insight, a relatively low population increase is anticipated for Stanly County (only 6.8% over a 30-year period). The projected lack of overall population growth is due in part to the decline in manufacturing jobs, once the County's economic base. The Stanly County Land Use Plan (2002) anticipates a population growth rate of around 10% for each decade until 2020.

Comment: Left out discussion of the "Rider" transit system, which serves the Concord and Kannapolis areas.

Response: The Concord/Kannapolis Area Transit (Rider) will be acknowledged in the final version of the Problem Statement.

Comment: Left out discussion of the C-Tran system, which serves Cary.

Response: The Problem Statement includes only discussions of fixed route transit services. C-Tran offers dial-a-ride (reservation only) transportation services.

b. Corridor Vision – There were no comments on this topic.

c. Land Use Elements (Existing Development Patterns and Models and Precedents) – There were no comments on these topics.

Implementing the Vision

Mr. Leisch discussed the process for realizing the long-term vision for a Freeway type facility over the entire length of the study corridor. This involves accomplishing committed TIP projects (including "revisiting" them and "revising" them, as necessary, to provide roadway facilities more closely associated with the ultimate vision), then moving to the implementation of enhanced projects such as addressing the replacement of existing five-lane sections with median divided, controlled access facilities. Mr. Leisch discussed priorities, which may be adjusted in the future based on traffic growth, traffic operations and safety, and land development. Mr. Leisch then discussed segment priorities for the ultimate corridor Freeway vision. First segment priority is Asheboro to Raleigh, then Charlotte to Asheboro, then Statesville to Asheboro. Again, this order could be adjusted based changes in the above mentioned factors. Mr. Wasserman reiterated that the initial step is to get the corridor to an Expressway, while keeping in mind the long-term Freeway vision.

Comment: Mr. Lentz (Cabarrus-Rowan MPO) expressed support for the vision and steps to realize that vision, but suggested that location decisions and corridor preservation be completed sooner rather than later so as to avoid having to "build a bypass around a bypass". He is particularly concerned about corridor preservation for the recommended bypass in the Harrisburg area because of the currently observed rate of growth and development there. Mr. Lentz also questioned how some of these enhanced projects would be funded. His concern is that the current NCDOT equity funding allocation formula includes interstate projects (i.e. I-85) and therefore limits how much money is available for local projects.

Response: Mr. Wasserman noted that the General Assembly is looking at the Highway Trust Fund, but is not sure if changes to funding methods will result from this review.

The Land Use/Transportation Connection, Land Use Alternatives, and Corridor Preservation Strategies

Ms. Connolly discussed potential policies based on precedents that were presented at CDT Meeting #3. Rather than focus on the impact of transportation decisions on land use (as is usually the case in planning research/studies), Ms. Connolly discussed how land use locations and decisions can actually "shape" and affect transportation decisions. She presented potential policies that can be applied to the corridor(s) at the local level.

Mr. Singh then discussed potential future land use "issues" along the corridor, particularly how these patterns can compete with implementing the vision for the corridor. Mr. Singh also presented an example "alternative" future land use pattern for the corridor that would be in harmony with the corridor vision.

Finally, Ms. Connolly discussed potential methods for corridor preservation, including local tools used in other states.

Question: Ms. Cowles (Apex) asked what happens when a local government wants to include a certain design feature such as a raised median as an alternative to a NCDOT recommended concept.

Response: Mr. Wasserman noted that there are numerous examples where partnerships are being formed at the project level. There are several examples of this in the project development phases. For example, the NCDOT has applied Context Sensitive Solutions (CSS), in some projects. CSS is an interdisciplinary approach in which the DOT works with regulatory agencies, local governments, citizens and other stakeholders as part of a solutions team. CSS uses a collaborative process to develop transportation solutions that are sensitive to and integrate the natural environment and communities they serve.

Comment: There was a discussion about outreach and coordination between the NCDOT and affected municipalities. To ensure participation, the NCDOT should make personal contact with the leadership of those small towns along the corridor (i.e. Mt. Pleasant) that do not have full-time directorial/planning staff. At the same time, it is the responsibility of all affected municipalities to inform the NCDOT of their needs and desires.

Response: Mr. Grimm provided examples in which other states (Maryland and New Jersey) are changing their philosophies with respect to working together on developing and implementing transportation solutions for state highway improvements in such smaller communities.

Ms. Moore noted that "standards" have changed over time, and that affected local governments are becoming more involved in the planning process through public meetings, workshops, and hearings. Ms. Moore sees partnerships and/or a more collaborative process as a philosophy in the best interest of both the NCDOT and local governments.

(Note: Although not represented on the CDT, a stakeholder interview was conducted with Mayor Troy Barnhardt, Town of Mt. Pleasant, in January 2004)

Comment: Mr. Johnson (Capital Area MPO) suggested that the NCDOT does not utilize the states MPOs and RPOs to identify and communicate important issues, etc. in a timely fashion.

Response: Mr. Wasserman, and others, noted that the US 64–NC 49 corridor study has served to illustrate how such a collaborative process can be used on a large-scale project. A similar philosophy will likely be employed on all future strategic corridor studies undertaken in the state.

Comment: Mr. Singh provided an example of the NC 73 Corridor Transportation/Land Use Plan where there was an MOU between multiple jurisdictions and agencies regarding the implementation of the plan especially as it relates to the land use along the corridor.

Response: Mr. Singh mentioned that a copy of actual MOU for the above mentioned project is part of the Land Use Policy Guidelines paper.

<u>Comment</u>: Mr. Monroe (Town of Pittsboro) likes the idea behind the reward policy (Policy 5.0 – Redevelopment - Reward communities that balance jobs and housing, which reduces the number of workers commuting long distances on highways), but cautions that there are other dynamics (i.e. income levels) that influence commuting/long distance travel.

<u>Response</u>: No response needed.

<u>Comment</u>: Mr. Monroe (Town of Pittsboro) supports some of the corridor preservation methods presented, but is concerned that if a municipality adopts a "policy" that "prematurely" protects a corridor, it could put people in a bad situation with respect to future potential use for that land. As other CDT members have mentioned in previous meetings, timing is everything.

<u>Response</u>: Mr. Alavi noted that often times the overall "system level" corridor is closest to the actual "selected corridor." At the same time, it was noted that the NEPA process requires the examination of a wide range of "reasonable" alternatives, and that all parties to the process need to understand the need for flexibility.

Next Steps and Beyond Phase I

Mr. Adams noted that completion of the following activities will round out Phase I:

- Finalize the Problem Statement
- Complete the Corridor Study Report
- Update the project website
- Conduct outreach presentations

Mr. Adams further noted that Phase I of the study just "scratches the surface" and is just the beginning of the multi-year effort required for implementing the vision for this strategic corridor. It is crucial that coordination and collaboration among the NCDOT and affected municipalities go beyond Phase I be continued and expanded.

Mr. Wasserman reviewed the steps for implementing the vision, including evaluating/revising current TIP projects to fit within the vision. The NCDOT will evaluate products/information obtained from this study, and will then determine what exactly the next step should be, including ways to protect the corridor by applying some of the policies/tools presented today. The NCDOT is looking at other states' access management policies as a potential template for NC jurisdictions to consider, and will share this information with CDT members. In Phase II, it is possible that the NCDOT will look at working with local jurisdictions to preserve particular areas along the corridor.

Mr. Wasserman will coordinate with CDT members about upcoming outreach presentations.

The meeting was adjourned at 1:30 pm.

US 64 – NC 49 Corridor Study
Corridor Development Team (CDT) Meeting #4

Page Walker Arts and History Center - Town of Cary

January 14, 2005
10:30 a.m. to 2:00 p.m.

AGENDA

Agenda Topic	Duration
Welcome & Introductions	5 min.
Presentation	
Review of CDT Meeting #3	10 min.
Implementing the Vision	30 min.
Land Use Policies	45 min.
Land Use Alternatives	15 min.
****Lunch****	45 min.
Corridor Preservation	30 min.
Next Steps	15 min.
Closing Comments	15 min.

APPENDIX B

Land Use Category Definitions, Land Use Conversion Table, and Zoning Conversion Table

Definition of Future Land Use Categories

- **Conservation**
- **Rural / Agricultural**
- **Suburban Residential (Low-Density)**
- **Suburban Residential (Medium to High-Density)**
- **Commercial**
- **Office and Institutional**
- **Industrial**
- **Suburban Mixed Use**
- **Urban Mixed Use**

- **Conservation**
  This category includes areas that are permanently protected at various levels – Federal, state, Regional or local.

- **Rural / Agricultural**
  This category includes areas where agriculture is the prime use of the land. Naturally pristine areas that are not currently used as agricultural land but are not protected by any regulations, laws, or agencies also fall under this category. Large lot residential (estate) is also grouped in this category.

- **Suburban Residential (Low Density)**
  This category includes areas with low-density single family residential (1 du/ac and lower). The character of these areas will be suburban in nature with single family residential being the main use.

- **Urban Residential (Medium to High Density)**
  This category includes areas of higher residential densities (1 du/ac and up). Different mix of housing types is encouraged, ranging from single family to multi-family.

- **Commercial**
  This category includes commercial and retail uses ranging from highway-oriented retail to center city main street retail.

- **Office and Institutional**
  This category is a combination of office and institutional uses. Employment generating uses such as downtowns, central business districts, office parks and public institutions are grouped under this category.

- **Industrial**
  This category includes light and heavy manufacturing, distribution and warehouse uses.

- **Urban Mixed Use**
  This category includes uses mixed vertically in one or more buildings at higher densities. Uses may include, but are not limited to residential, commercial, employment and institutional.

- **Suburban Mixed Use**
  This category includes uses mixed horizontally. Uses may include residential, commercial, employment and commercial.

Title: Land Use Conversion Table
Project Name: Hwy 64/49 Study
Project #: 1003004
Date: 3/25/2004

City/ County	Land Use Type	Jurisdiction's Classification	Jurisdiction's Description
Iredell County, NC			
	Rural Agricultural		N/A
	Suburban (Low Density)		N/A
	Urban (Medium-High Density)		Residential
			Mobile Homes
	Commercial		Commercial
			Retail
	Office and Institutional		N/A
	Industrial		Industrial
	Suburban Mixed Use		N/A
	Urban Mixed Use		N/A
	Conservation		Transitional
City of Statesville			
	Rural Agricultural	LDR	Low Density Residential
	Suburban (Low Density)		N/A
	Urban (Medium-High Density)	MDR	Medium Density Residential
		HDR	High Density Residential
	Commercial	COM	Commercial
	Office/ Institutional	CBD	Central Business District
		RI	Recreational/Institutional
	Industrial	IND	Industrial
	Suburban Mixed Use	MU	Mixed Use
	Urban Mixed Use		
	Conservation		N/A
Davie County, NC			
	Rural Agricultural	A	Agricultural
	Suburban (Low Density)	R	Residential
	Urban (Medium-High Density)	R/MU	Residential/ Mixed Use
	Commercial	C	Commercial
		C/MU	Commercial/ Mixed Use
	Office/ Institutional		N/A
	Industrial	I	Industrial
	Suburban Mixed Use		N/A
	Urban Mixed Use		N/A
	Conservation		N/A

City/ County	Land Use Type	Jurisdiction's Classification	Jurisdiction's Description
Town of Mocksville			
	Rural Agricultural	OSR	Open Space Residential
	Suburban (Low Density)		N/A
	Urban (Medium-High Density)	NR	Neigborhood Residential
		GR	General Residential
	Commercial	NC	Neighborhood Commercial
		HC	Highway Commercial
		SP	Special Commercial
	Office/ Instititutional	CB	Campus Business
		CI	Campus Institutional
	Industrial	GI	General Industrial
		GICD	General Industrial Conditional Use
	Suburban Mixed Use		N/A
	Urban Mixed Use	TC	Town Center
		TND	Traditional Neighborhood
	Conservation		N/A
Davidson County			
	Rural Agricultural		N/A
	Suburban (Low Density)		N/A
	Urban (Medium-High Density)		N/A
	Commercial		Commercial Service Centers
	Office/ Institutional		Communities
			Areas of Particular Economic Activity
	Industrial		Industrial Service Centers
	Suburban Mixed Use		N/A
	Urban Mixed Use		N/A
	Conservation		Park/Recreation Sites
Lexington			
	Rural Agricultural		Rural Planning Area
	Suburban (Low Density)	SN	Suburban Neighborhood
	Urban (Medium-High Density)	TN	Traditional Neighborhood
		NTN	Neo Traditional Neighborhood
	Commercial	LCC	Local Commerce Center
	Office/ Institutional	RE	Regional Employment
		UC	Uptown Activity Center
	Industrial	I	Industrial
	Suburban Mixed Use		N/A
	Urban Mixed Use		N/A
	Conservation	OS	Park/Greenway/Open Space

City/ County	Land Use Type	Jurisdiction's Classification	Jurisdiction's Description
Randolph County, NC			
	Rural Agricultural		Rural Growth Area
	Suburban (Low Density)		Secondary Growth Area
	Urban (Medium-High Density)		N/A
	Commercial		N/A
	Office and Institutional		N/A
	Industrial		N/A
	Suburban Mixed Use		Primary Growth Area
	Urban Mixed Use		N/A
	Conservation		N/A
City of Asheboro, NC			
	Rural Agricultural		N/A
	Suburban (Low Density)	CR	Conservation Residential
		SR	Suburban Residential
	Urban (Medium-High Density)	UR	Urban Residential
		NR	Neighborhood Residential
		WR	?Residential
	Commercial	AC	?Commercial
		C	Commercial
		EC	?Commercial
	Office and Institutional	OI	Office and Institutional
	Industrial	I	Industrial
	Suburban Mixed Use		N/A
	Urban Mixed Use		N/A
	Conservation	PG	Parks and Greenspace
			Zoo Environmental Area
Ramseur			
	Rural Agricultural		N/A
	Suburban (Low Density)	SR	Surburban Residential
		LR	Conservation Residential
	Urban (Medium-High Density)	UR	Urban Residential
		NR	Neighborhood Residential
	Commercial	C	Commercial
	Office/Institutional	C/C	Church/Cemetery
			Office & Institutional
	Industrial	I	Industrial
	Suburban Mixed Use		N/A
	Urban Mixed Use		N/A
	Conservation	OS	Open Space
		P	Parks

City/ County	Land Use Type	Jurisdiction's Classification	Jurisdiction's Description
Chatham County			
	Rural Agricultural		Hydrology
			Critical Area
			Local Watershed
			RCSA
			River Corridor
			WS-II BW
			WS-III BW
			WS-IV PA
	Suburban (Low Density)		N/A
	Urban (Medium-High Density)		N/A
	Commercial		N/A
	Office and Institutional		N/A
	Industrial		N/A
	Suburban Mixed Use		N/A
	Urban Mixed Use		N/A
	Conservation		N/A
Siler City			
	Rural Agricultural		Rural Residential
	Suburban (Low Density)		N/A
	Urban (Medium-High Density)	GRES	General Residential
	Office/Institutional	CBD	Central Business District
		PIR	Public and Institutional
	Commercial	GC	General Commercial
	Industrial	IND	Office/Light Industrial
		AIR	Airport
	Suburban Mixed Use		N/A
	Urban Mixed Use	MIX	Mixed Use Development
	Conservation	REC	Recreation and Open Space
Pittsboro			
	Rural Agricultural	RA	Rural Agricultural
	Suburban (Low Density)	SF	Single Family
		RSUB	Rural Subdivision
	Urban (Medium-High Density)	MF	Medium Density
	Commercial	TB	Thoroughfare Business
		TB - Term	
	Office/Institutional	DB	Downtown Business
			Traditional Neighborhood Cluster
	Industrial	LI	
		LI - Trades	Light Industry and Trades
		HM	Heavy Manufacturing
	Suburban Mixed Use	MIX	Mixed Use Traditional Neighborhood
	Urban Mixed Use		N/A
	Conservation	CONS	Conservation

City/ County	Land Use Type	Jurisdiction's Classification	Jurisdiction's Description
Wake County, NC			
	Rural Agricultural		N/A
	Suburban (Low Density)		Residential
	Urban (Medium-High Density)		N/A
	Commercial		N/A
	Office/ Institutional	OI	Office and Institution
		ORP	Office/Research Park
	Industrial	FLI	Forestry/Light Industry
		IND	Industrial
	Suburban Mixed Use		Neighborhood Activity Center
	Urban Mixed Use		Community Activity Center
	Conservation		Park/Recreation Facility
			Main Stream/Lake Area
Apex			
	Rural Agricultural		Very Low Density Residential
	Suburban (Low Density)		Low Density Residential
	Urban (Medium-High Density)		Medium Density Residential
			High Density Residential
	Commercial		Commercial
	Office/Institutional	OI	Office Institutional
	Industrial		Industrial Employment
	Suburban Mixed Use	TND	Traditional Neighborhood Development
	Urban Mixed Use		Activity Center
	Conservation		N/A
Cary			
	Rural Agricultural	VLDR	(Very Low Density Residential - less Than 1 du/ac)
	Suburban (Low Density)	LDR	Low Density Residential (1 to 3 du/ac)
	Urban (Medium-High Density)	MDR	Medium Density Residential (3 to 8 du/ac)
		MXDR	Mixed Density Residential (Downtown)
		HDR	High Density Residential (Mid-rise)
		HDR	High Desity Residential (25 du/ac)
		HDR	Garden
	Commercial	CLI	Commercial Low Intensity
		COM	Commercial
	Office/Institutional	CBR	Cottage Business Residential
		INS	Institutional
		OFC/INS	Office/Institutional
		Trans_OFC	Transitional Office
	Industrial	OFC/IND	Office/Industrial
	Suburban Mixed Use	MXD	Mixed Use
	Urban Mixed Use	HMXD	High Intensity Mixed Use - Downtown
	Conservation	LAK	Lake
		PK	Parks,Open Space

City/ County	Land Use Type	Jurisdiction's Classification	Jurisdiction's Description
Mecklenburg County			
	Rural Agricultural		N/A
	Suburban (Low Density)		N/A
	Urban (Medium-High Density)		Single family (up to 4 d.u.a)
			Mixed Housing (up to 8 d.u.a)
			Multi-family
	Commercial		Retail
	Office/ Institutional		Office
			Research
			Business Park
			Institutional
	Industrial		Industrial
	Suburban Mixed Use		N/A
	Urban Mixed Use		N/A
	Conservation		Park/Greenway
Cabarrus County			
(Eastern Area)			
	Rural Agricultural		N/A
	Suburban (Low Density)		Low Density Residential
	Urban (Medium-High Density)		Suburban Residential
			Mixed Residential
			Historic Residential
	Commercial		Neighborhood Commercial
			Commercial
	Office/ Institutional		Future Employment
			Institutional
			Office/ Service
	Industrial		Industrial
	Suburban Mixed Use		Village Mixed Use
	Urban Mixed Use		Town Center
			Mixed Use
	Conservation		Open Space
Cabarrus County			
(Midland Area)			
	Rural Agricultural		Agricultural/ Open Space
	Suburban (Low Density)		Low Density Residential
	Urban (Medium-High Density)		Countryside Residential
			Medium Density Residential
	Commercial		Limited Commercial
	Office/ Institutional		Future Employement
	Industrial		General Industrial
	Suburban Mixed Use		
	Urban Mixed Use		Mixed Use
	Conservation		N/A

City/ County	Land Use Type	Jurisdiction's Classification	Jurisdiction's Description
City of Concord			
	Rural Agricultural		N/A
	Suburban (Low Density)		Low Density Residential
	Urban (Medium-High Density)		Medium Density Residential
			High Density Residential
	Commercial		Commercial
	Office/ Institutional		Future Employment
			Institutional
	Industrial		Industrial
	Suburban Mixed Use		N/A
	Urban Mixed Use		N/A
	Conservation		Recreational
Town of Harrisburg			
	Rural Agricultural		Open Space Preservation
	Suburban (Low Density)		Suburban Residential
	Urban (Medium-High Density)		Mixed Residential
	Commercial		Commercial
			Neighborhood Commercial
	Office/ Institutional		Future Employment
			Office/ Service
			Institutional
	Industrial		Industrial
	Suburban Mixed Use		N/A
	Urban Mixed Use		Mixed Use
			Town Center
	Conservation		Recreation/ Open Space
Mount Pleasant			
	Rural Agricultural		Open Space
	Suburban (Low Density)		Low Density Residential
	Urban (Medium-High Density)		Suburban Residential
			Historic Residential
			Mixed Residential
	Commercial		Commercial
			Neighborhood Commercial
			Town Center
	Office/ Institutional		Future Employment
			Institutional
			Office/Service
	Industrial		Industrial
	Suburban Mixed Use		Village Mixed Use
	Urban Mixed Use		Mixed Use District
	Conservation		N/A

City/ County	Land Use Type	Jurisdiction's Classification	Jurisdiction's Description
Stanly County, NC			
	Rural Agricultural		Rural Agricultural
	Suburban (Low Density)		Secondary Growth Area
	Urban (Medium-High Density)		PrimaryGrowth Area
	Commercial		Commercial
	Office and Institutional		N/A
	Industrial		Industrial
	Suburban Mixed Use		N/A
	Urban Mixed Use		N/A
	Conservation		N/A
Richfield			
	Rural Agricultural		No Proposed Land Use Information available
	Suburban (Low Density)		N/A
	Urban (Medium-High Density)		N/A
	Commercial		N/A
	Office/ Institutional		N/A
	Industrial		N/A
	Suburban Mixed Use		N/A
	Urban Mixed Use		N/A
	Conservation		N/A

Title: Zoning Conversion Table
Project Name: Hwy 49/ 64 Study
Project #: Project #1003004
Date: 3/4/2004

City/ County	Land Use Type	Classification	Jurisdiction's Zoning Category
Iredell County, NC			
	Rural Agricultural	R-A	Residential-Agricultural
		RU-R	Rural Residential
	Residential	R-R	Resort Residential
		R-20	Single-Family Residential
		R-8	Two Family (Medium Density)
		R-8A	Multi-Family (High Density)
	Commercial	N-B	Neighborhood Business
		H-B	Highway Business
		S-C	Shopping Center
		G-B	General Business
	Office and Institutional	C-B	Community Business
	Industrial	M-1	Light Manufacturing
		M-2	Heavy Manufacturing
	Conservation		N/A
	Mixed Used		N/A
City of Statesville			
	Rural Agricultural	R-A	Rural Agricultural
	Residential	R-20	Suburban Residential
		R-15	Urban Fringe Low Density Residential
		R-15M	Urban Fringe Low Density Residential/ Manufactured housing
		R-10	Urban Low Density Residential
		R-10M	Urban Low Density Manufactured Housing Residential
		R-8	Medium Density Single-Family Residential
		R-8M	Medium Density Single-Family/ Manufactured Housing Residential
		R-8MF	Medium Density Multi-Family Residential
		R-5	High Density Single Family Residential
		R-5M	High Density Single Family/ Manufactured Housing Residential
		R-5MF	High Density Multi-Family Residential
	Commercial	B-1	Neighborhood Service
		B-2	Neighborhood Business
		B-3	Shopping Center
		B-4	Highway Business
		CB	Central Business
		CBP	Central Business Perimeter
		B-5	General Business
	Office/ Institutional	O-1	Office Single Lot
		O&I-2	Office and Institutional Complex
	Industrial	LI	Light Industrial
		HI	Heavy Industrial
	Conservation		N/A
	Mixed Used		N/A

City/ County	Land Use Type	Classification	Jurisdiction's Zoning Category
Davie County, NC			
	Rural Agricultural	R-A	Residential-Agricultural
	Residential	R-20	Residential District (Low Density)
		R-12	Residential-Suburban (Mid-Low Density)
		R-M	Residential-Mobile Home (SFR Are Permitted)
		R-8	Residential-Multiple Dwellings (High Density)
	Commercial	C-S	Community Shopping
		H-B	Highway Business
	Office/ Institutional		N/A
	Industrial	I-1	Industrial
		I-2	Industrial
		I-3	Industrial
		I-4	Industrial
	Conservation		N/A
	Mixed Used		N/A
Town of Mocksville, NC			
	Rural Agriculture	OSR	Open Space Residential (Cluster Development)
	Residential		
		GR	General Residential
		NR	Neighborhood Residential
		MF	Multi-Family
		MH	Manufactured Homes
	Commercial	HC	Highway Commercial
		CB	Campus Business
		SP	Special Purpose
	Office/ Instititutional	CI	Campus Institutional
	Industrial	GI	General Industrial
	Conservation	WS	Watershed Overlay
	Mixed Use	NC	Neighborhood Center
		TC	Town Center
		TND	Traditional Neighborhood
Davidson County, NC			
	Rural Agricultural	RA-1	Rural Agricultural
		RA-2	Rural Agricultural
		RA-3	Rural Agricultural
	Residential	RS	Low Intensity Residential
		RM-1	Medium Density Residential
		RM-2	High Density Residential
	Commercial	RC	Rural Commercial
		CS	Community Shopping
		HC	Highway Commercial
	Office/ Institutional	O/I	Office and Institutional
	Industrial	LI	Limited Industrial
		HI	Highway Commercial
	Conservation		N/A
	Mixed Use		N/A

City/ County	Land Use Type	Classification	Jurisdiction's Zoning Category
Lexington, NC			
	Rural Agricultural		N/A
	Residential	R-10	Low Density Residential
		R-8	Medium Density Residential
		R-6	High Density Residential
	Commercial	B-2	Neighborhood Business
		B-3	General Business
		B-4	Service Business
	Office/ Institutional	O-I	Office and Institutional
		B-1	Central Business
	Industrial	M-1	Manufacturing (Restricted)
		M-2	Manufacturing (Heavy Industrial)
	Conservation		N/A
	Mixed Use		N/A
Randolph County, NC			
	Rural Agricultural	RA	Residential Agricultural
		RA-CU	Residential Agricultural Conditional Use
		RLO	Rural Lot Subdivision Overlay
		RLO-CU	Rural Lot Subdivision Overlay-Conditional Use
	Residential	RR	Residential Restricted
		RR-CU	Residential Restricted-Conditional Use
		RM	Mixed Residential
		RM-CU	Mixed Residential-Conditional Use
		RE	Residential Exclusive
		RE-CU	Residential Exclusive-Conditional Use
		CLO	Cluster Subdivision Overlay
		CLO-CU	Cluster Subdivision Overlay-Conditional Use
		CVO	Conventional Subdivision Overlay
		CVO-CU	Conventional Subdivision Overlay-Conditional Use
	Commercial	CS	Community Shopping District
		CS-CU	Community Shopping District-Conditional Use
		HC	Highway Commercial
		HC-CU	Highway Commercial-Conditional Use
		CEO	Commercial Environmental Overlay
		CEO-CU	Commercial Environmental Overlay-Conditional Use
		RBO	Rural Business Overlay
		RBO-CU	Rural Business Overlay-Conditional Use
	Office/ Institutional	O-I	Office and Industrial
		OI-CU	Office and Industrial-Conditional Use
	Industrial	IO	Industrial Overlay
		LI	Light Industrial
		LI-CU	Light Industrial-Conditional Use
		HI	Heavy Industrial
		HI-CU	Heavy Industrial-Conditional Use
	Conservation	SCO	Scenic Corridor Overlay
		E-1	First Environmental
		E1-CU	First Environmental-Conditional Use
	Mixed Use		N/A

City/ County	Land Use Type	Classification	Jurisdiction's Zoning Category
Asheboro			
	Rural Agricultural	R40	Low Density Residential
	Residential	R15	Low Density Single Family Residential
		R10	Medium Density Residential
		R7.5	Medium Density Residential
		RA6	High Density Residential
	Commercial	B1	Neighborhood Business
		B-2	General Business
	Office and Institutional	B-3	Central Business
	Industrial	I1	Light Industrial
		I2	General Industrial
		I3	Limited Industrial
	Conservation		N/A
	Mixed Use		N/A
Ramseur			
Falls under Stanly County Zoning			
	Rural Agricultural		
	Residential		
	Commercial		
	Office and Institutional		
	Industrial		
	Conservation		
	Mixed Use		
Chatham County, NC			
	Rural Agricultural	RA-5	Residential Agricultural
		CU-RA-5	Residential Agricultural (Conditional Use)
		RA-90	Residential Agricultural
		CU-RA-90	Residential Agricultural (Conditional Use)
	Residential	RA-40	Residential Agricultural (Low to Moderate Density Residential)
		CU-RA-40	Residential Agricultural (Conditional Use)
	Commercial	B-1	General Business
		CU-B-1	General Business (Conditional Use)
	Office/ Institutional	O&I	Office and Institutional
		CU-O&I	Office and Institutional-(Conditional Use)
	Industrial	IND-L	Light Industrial
		CU-IND	Light Industrial (Conditional Use)
		IND-H	Heavy Industrial
		CU-IND-H	Heavy Industrial (Conditional Use)
	Conservation		N/A
	Mixed Use		N/A

City/ County	Land Use Type	Classification	Jurisdiction's Zoning Category
Siler City, NC			
Zoning document not available.			
Zoning description from GIS.			
	Rural Agricultural	A_R	Rural Agricultural
		A-R-C	Rural Agricultural
	Residential	R-10	Residential
		R-20	Residential
		R-20C	Residential
		R-6	Residential
		R-6C	Residential
	Commercial	B-1	Business District
		C-C	Commercial
		H-C	Highway Commercial
	Office/ Institutional	O_I	Office and Institutional
	Industrial	L-I	Light Industrial
		H-I	Heavy Industrial
	Conservation		N/A
	Mixed Use		N/A
Pittsboro, NC			
Zoning document not available.			
Zoning description from GIS.			
	Rural Agricultural	RA	Rural Agricultural
		RA2	Rural Agricultural
		RA5	Rural Agricultural
	Residential	R10	Residential
		R12	Residential
		R12M	Residential
		R15	Residential
	Commercial	C1	Commercial
		C2	Commercial
		C3	Commercial
		C4	Commercial
	Office/ Institutional	OI	Office and Institutional
	Industrial	M1	Light Industrial
		M2	Heavy Industrial
	Conservation		N/A
	Mixed Use		N/A
Wake County, NC			
	Rural Agricultural	R-80W	Residential-80W Callout Watershed Max 0.50 du/ac
		R-40W	Residential-40W Max 1.0 du/ac
	Residential	R-30	Residential-30 Max 1.45 du/ac
		R-20	Residential-20 Max 2.17 du/ac
		R-15	Residential-15 Max 2.90 du/ac
		R-10	Residential-10 Max 4.35 du/ac
		R-5	Residential-5 Max 8.70 du/ac
		HD	High Density
		MH	Mobile Homes
	Commercial	GB	General Business
		HC	Heavy Commercial
		SHD	Special Highway
	Office/ Institutional	OI	Office and Institutional
	Industrial	I-I	Industrial I
		I-II	Industrial II
		ED	Economic Development
	Conservation		N/A

City/ County	Land Use Type	Classification	Jurisdiction's Zoning Category
	Mixed Use		N/A

City/ County	Land Use Type	Classification	Jurisdiction's Zoning Category
Apex, NC			
	Rural Agricultural	RA	Rural Agricultural
		RR	Rural Residential
	Residential	LD	Low Density Residential
		MD	Medium Density Residential
		HDSF	High Density Single Family Residential
		HDMF	High Density Multi-Family
		MH	Manufactured Housing Residential
		MHP	Mobile Home Park District
	Commercial	B1	Neighborhood Business District
		B2	Downtown Business District
		PC	Planned Commercial District
	Office/ Institutional	O&I	Office and Institutional
	Industrial	LI	Light Industrial
	Conservation	CB	Conservation Buffer District
	Mixed Use	TND	Traditional Neighborhood District
		MEC	Major Employment Center District
		MORR	Mixed Office-Residential-Retail District
		PUD	Planned Unit Development
Cary, NC			
	Rural Agricultural	R-40	Rural Agricultural
	Residential	R-30	Residential
		R-12	Residential
		R-10	Residential
		R-8	Residential
		R-M	Residential Mixed
		R-MF-8	Multi-Family Residential
		D-R	Downtown Residential
		R-MF-12	Multi-Family Residential
		M-H	Mobile Home
	Commercial	B-2	Commercial
	Office/ Institutional	O&I	Office and Institutional
	Industrial	I-1	Light Industrial
		I-2	Heavy Industrial
	Conservation	R-C	Resource Conservation
	Mixed Use	B-1	Central Business
		PEC	Planned Employment Center

City/ County	Land Use Type	Classification	Jurisdiction's Zoning Category
Mecklenburg County, NC			
	Rural Agriculture		N/A
	Residential	R-3	Single Family Residential (Suburban)
		R-4	Single Family Residential (Suburban)
		R-5	Single Family Residential (Urban)
		R-6	Single Family Residential (Urban)
		R-6MF	Multi-Family Residential (Urban)
		R-6MFH	Multi-Family Residential (Urban)
		R-6PUD	Residential Planned Unit Development
		R-8	Single Family Residential (Urban)
		R-8MF	Multi-Family Residential
		R-9	Single Family Residential
		R-9MF	Multi-Family Residential
		R-9PUD	Residential Planned Unit Development
		R-12	Multi-Family Residential
		R-12MF	Multi-Family Residential
		R-12PUD	Multi-Family Planned Unit Development
		R-15	Single Family Residential (Urban)
		R-15MF	Multi- Family Residential
		R-15PUD	Multi-Family Planned Unit Development
		R-17MF	Multi-Family Residential
		R-20MF	Multi-Family Residential
		R-22MF	Multi-Family Residential
		R-43MF	Multi-Family Residential
		R-MH	Residential Mobile Home
		R-PUD	Residential Planned Unit Development
		R-RPUD	Resort Residential Planned Unit Development
		RR	Resort Residential
		UR-1	Urban Residential
		UR-2	Urban Residential
		UR-3	Urban Residential
		UR-C	Urban Residential Commercial
	Commercial	B-1	Neighborhood Business
		B-2	General Business
		CC	Commercial Center
	Office/ Institutional	INST	Institutional
		RE-1	Research
		RE-2	Research
		O-1	Office
		O-2	Office
		O-3	Office
		BP	Business Park
		B-D	Distributive Business
	Industrial	I-1	Light Industrial
		I-2	General Industrial
		U-I	Urban Industrial
	Conservation		Catawba River/Lake Wylie Watershed Overlay
	Mixed Use	MX-1	Mixed Use District
		MX-2	Mixed Use District
		MX-3	Mixed Use District
		UMUD	Uptown Mixed Use
		MUDD	Mixed Use Development District

City/ County	Land Use Type	Classification	Jurisdiction's Zoning Category
Cabarrus County, NC			
	Rural Agricultural	AG/O	Agricultural/ Open Space
		RE	Rural Estate
		CR	Countryside Residential
	Residential	LDR	Low Density Residential
		RC	Residential Compact
		MDR	Medium Density Residential
		HDR/MU	High Density Residential/ Mixed Use
	Commercial	GEN C	General Commercial
	Office/ Institutional	OF/LC	Office/ Limited Commercial
	Industrial	LIM 1 or I-1	Limited Industrial
		GEN 1 or I-2	General Industrial
	Conservation	PI	Public Interest
	Mixed Use		
City of Concord, NC			
	Rural Agricultural	RE	Rural Estate
	Residential	RL	Residential Low Density
		RM-1	Residential Medium Density
		RM-2	Residential Medium
		RV	Residential Village
		RC	Residential Compact
	Commercial	B-1	Neighborhood Community
		C-1	Light Commercial
		C-2	General Commercial
	Office/ Institutional	O-I	Office and Institutional
		CD	Campus Development
	Industrial	I-1	Light Industrial
		I-2	General Industrial
	Conservation	AG	Agricultural
	Mixed Use/ Downtown	CC	City Center
Town of Harrisburg, NC			
	Rural Agricultural	AG	Agricultural
		RE	Rural Estate
	Residential	RL	Residential Low Density
		RM-1	Residential Medium Density
		RM-2	Residential Medium Density
		RV	Residential Village
		RC	Residential Compact
	Commercial	B-1	Neighborhood Commercial
		C-1	Light Commercial
		C-2	General Commercial
	Office/ Institutional	O-I	Office and Institutional
		CD	Campus Development
	Industrial	I-1	Light Industrial
		I-2	General Industrial
	Conservation		N/A
	Mixed Use	CC	Center City

City/ County	Land Use Type	Classification	Jurisdiction's Zoning Category
Mount Pleasant			
	Rural Agricultural	AO	Agricultural Open Space
	Residential	RL	Residential Low Density
		RM	Residential Medium Density
	Commercial	C-1	Light Commercial
	Office/ Institutional		
	Industrial	I-1	Light Industrial
	Conservation		
	Mixed Use/ Downtown	RV	Residential Village (Resid. And Comm.)
		C-B	City Center District
Stanly County			
	Rural Agriculture	R-A	Residential-Agricultural
	Residential	R-20	SFR (Single Family Residential)
		R-10	SFR (Single Family Residential)
		R-8	Multi-family
		R-40	Single Family Residential
		R-MHP	Residential Manufactured Home Park
	Commercial	N-B	Neighborhood Business
		H-B	Highway Business
		S-C	Shopping Center
	Office/ Institutional	C-B	Central Business
	Industrial	M-1	Light Manufacturing
		M-2	Heavy Manufacturing
	Conservation	R-R	Rural Recreation
	Mixed Use		N/A
Richfield			
Falls under Stanly County Zoning			
	Rural Agriculture		
	Residential		
	Commercial		
	Office/ Institutional		
	Industrial		
	Conservation		
	Mixed Use		

APPENDIX C

Strip Analysis Report Summary Statistics for I-40, I-85, US 64, and NC 49

I-85 and I-40 Strip Analysis Report Summary Statistics

Roadway Segment	No. of Crashes	Length (mi.)	Crash Rate (CR)*	Fatal CR	Non-Fatal CR	Night CR	Wet Conditions CR
I-40 in Iredell Co.	**208**	**9.86**	**62.15**	**0.60**	**19.72**	**17.33**	**24.50**
All Interstate Routes	--	*N/A*	*88.70*	*0.62*	*29.07*	*23.92*	*19.47*
I-40 in Davie Co.	**436**	**19.30**	**59.59**	**0.27**	**17.49**	**15.85**	**25.97**
All Interstate Routes	--	*N/A*	*88.70*	*0.62*	*29.07*	*23.92*	*19.47*
I-40 in Forsyth Co.	**1099**	**23.15**	**67.01**	**0.73**	**20.97**	**19.57**	**17.19**
All Interstate Routes	--	*N/A*	*88.70*	*0.62*	*29.07*	*23.92*	*19.47*
I-40 in Guilford (from Forsyth Co. line to I-85)	**1540**	**14.51**	**104.22**	**0.14**	**40.13**	**26.12**	**21.18**
All Interstate Routes	--	*N/A*	*88.70*	*0.62*	*29.07*	*23.92*	*19.47*
I-40/85 in Guilford (from I-40/85 split to Alamance Co line)	**1527**	**15.06**	**103.14**	**0.68**	**39.45**	**30.40**	**30.26**
All Interstate Routes	--	*N/A*	*88.70*	*0.62*	*29.07*	*23.92*	*19.47*
I-40/85 in Alamance Co.	**1102**	**16**	**69.34**	**0.63**	**22.40**	**23.59**	**23.34**
All Interstate Routes	--	*N/A*	*88.70*	*0.62*	*29.07*	*23.92*	*19.47*
I-40/85 in Orange (from Alamance Co line to I-40/85 split)	**441**	**7.45**	**64.00**	**0.15**	**19.45**	**21.33**	**25.83**
All Interstate Routes	--	*N/A*	*88.70*	*0.62*	*29.07*	*23.92*	*19.47*
I-40 in Orange (from I-40/85 split to Durham Co line)	**336**	**11.77**	**44.04**	**0.26**	**6.95**	**15.07**	**6.95**
All Interstate Routes	--	*N/A*	*88.70*	*0.62*	*29.07*	*23.92*	*19.47*
I-40 in Durham Co.	**1533**	**12.78**	**115.36**	**0.60**	**26.41**	**25.51**	**17.91**
All Interstate Routes	--	*N/A*	*88.70*	*0.62*	*29.07*	*23.92*	*19.47*
I-40 - Wake Co. from Durham Co. line to I-440/US 1/US 64	**1495**	**10.18**	**113.18**	**0.30**	**31.95**	**21.58**	**22.48**
All Interstate Routes	--	*N/A*	*88.70*	*0.62*	*29.07*	*23.92*	*19.47*
I-40 in Wake Co.	**1495**	**10.18**	**113.18**	**0.30**	**31.95**	**21.58**	**22.48**
All Interstate Routes	--	*N/A*	*88.70*	*0.62*	*29.07*	*23.92*	*19.47*
I-85 - Meck. Co. (from US 29/49 Connector to Cabarrus Co. line)	**857**	**6.44**	**127.79**	**0.60**	**44.88**	**28.93**	**25.35**
All Interstate Routes	--	*N/A*	*88.70*	*0.62*	*29.07*	*23.92*	*19.47*
I-85 - Cabarrus Co. (from Meck. Co. line to Rowan Co. line)	**1041**	**14.20**	**93.51**	**0.45**	**28.47**	**22.99**	**21.56**
All Interstate Routes	--	*N/A*	*88.70*	*0.62*	*29.07*	*23.92*	*19.47*
I-85 - Rowan Co. (from Cabarrus Co. line to Davidson Co. line)	**1021**	**19.44**	**78.63**	**0.69**	**25.03**	**24.8**	**16.71**
All Interstate Routes	--	*N/A*	*88.70*	*0.62*	*29.07*	*23.92*	*19.47*
I-85 in Davidson Co.	**734**	**22.47**	**63.74**	**0.43**	**18.93**	**21.02**	**16.41**
All Interstate Routes	--	*N/A*	*88.70*	*0.62*	*29.07*	*23.92*	*19.47*
I-85 - Randolph Co. (from Davidson Co. line to Guilford Co. line)	**220**	**7.34**	**61.65**	**1.12**	**17.09**	**19.34**	**16.53**
All Interstate Routes	--	*N/A*	*88.70*	*0.62*	*29.07*	*23.92*	*19.47*
I-85 in Guilford Co. (from Randolph Co. line to I-40)	**434**	**11.65**	**57.27**	**0.40**	**22.43**	**19.53**	**15.31**
All Interstate Routes	--	*N/A*	*88.70*	*0.62*	*29.07*	*23.92*	*19.47*

* crash rate = accidents/million vehicle miles

Sources: 1. *I-85 and I-40 Strip Analysis Data - NCDOT (June 1, 2000- May 31, 2003)*
2. *Three Yr. Avg Crash Rates - NCDOT Traffic Engineering and Safety Systems Branch (2000-2002)*

US 64 and NC 49 Strip Analysis Report Summary Statistics

Roadway Segment	No. of Crashes	Length (mi.)	Total Crash Rate (CR)*	Fatal CR	Non-Fatal CR	Night CR	Wet Conditions CR	
NC 49 in Mecklenburg Co (from I-85 to Cabarrus Co. Line)	**626**	**5.16**	**326.82**	**0**	**119.56**	**84.05**	**72.05**	
Statewide Avg Rate for Urban NC Routes	--	*N/A*	*381.35*	*1.17*	*135.41*	*75.31*	*64.25*	
NC 49 in Cabarrus County	**629**	**23.12**	**177.47**	**3.10**	**67.71**	**35.83**	**30.19**	
Statewide Avg Rate for Rural NC Routes	--	*N/A*	*175.45*	*2.21*	*72.38*	*58.05*	*29.66*	
Statewide Avg Rate for Rural Primary Routes	--	*N/A*	*123.32*	*1.43*	*49.27*	*38.12*	*22.80*	More than 20% higher than NCDOT Rural Primary roads
NC 49 in Stanly County	**96**	**8.44**	**164.88**	**1.72**	**65.27**	**61.83**	**49.81**	
Statewide Avg Rate for Rural NC Routes	--	*N/A*	*175.45*	*2.21*	*72.38*	*58.05*	*29.66*	
Statewide Avg Rate for Rural Primary Routes	--	*N/A*	*123.32*	*1.43*	*49.27*	*38.12*	*22.80*	
NC 49 in Rowan County	**2**	**0.31**	**178.54**	**0.00**	**0.00**	**0.00**	**0.00**	
Statewide Avg Rate for Rural NC Routes	--	*N/A*	*175.45*	*2.21*	*72.38*	*58.05*	*29.66*	
Statewide Avg Rate for Rural Primary Routes	--	*N/A*	*123.32*	*1.43*	*49.27*	*38.12*	*22.80*	
NC 49 in Davidson County	**45**	**8.77**	**83.68**	**1.86**	**37.19**	**39.05**	**11.16**	
Statewide Avg Rate for Rural NC Routes	--	*N/A*	*175.45*	*2.21*	*72.38*	*58.05*	*29.66*	
Statewide Avg Rate for Rural Primary Routes	--	*N/A*	*123.32*	*1.43*	*49.27*	*38.12*	*22.80*	
NC 49 in Randolph County	**152**	**15.39**	**112.09**	**0.73**	**37.36**	**42.49**	**23.44**	
Statewide Avg Rate for Rural NC Routes	--	*N/A*	*175.45*	*2.21*	*72.38*	*58.05*	*29.66*	
Statewide Avg Rate for Rural Primary Routes	--	*N/A*	*123.32*	*1.43*	*49.27*	*38.12*	*22.80*	
US 64 in Davie County	**248**	**22.19**	**99.09**	**1.60**	**34.76**	**35.16**	**17.98**	
Statewide Avg Rate for Rural US Route	--	*N/A*	*128.34*	*1.45*	*53.53*	*37.27*	*23.57*	
US 64 in Davidson County	**326**	**20.41**	**118.59**	**2.18**	**53.48**	**24.01**	**21.46**	
Statewide Avg Rate for Rural US Route	--	*N/A*	*128.34*	*1.45*	*53.53*	*37.27*	*23.57*	
US 64 in Randolph County	**1086**	**31.36**	**178.68**	**0.99**	**72.06**	**35.70**	**33.07**	More than 20% higher than Rural US Route
Statewide Avg Rate for Rural US Route	--	*N/A*	*128.34*	*1.45*	*53.53*	*37.27*	*23.57*	
US 64 in Chatham County	**516**	**34.37**	**130.58**	**0.76**	**40.49**	**44.79**	**18.47**	
Statewide Avg Rate for Rural US Route	--	*N/A*	*128.34*	*1.45*	*53.53*	*37.27*	*23.57*	
US 64 in Wake County	**493**	**8.85**	**167.35**	**0.34**	**50.92**	**35.30**	**28.17**	More than 20% higher than Rural US Route
Statewide Avg Rate for Rural US Route	--	*N/A*	*128.34*	*1.45*	*53.53*	*37.27*	*23.57*	

* crash rate = accidents/million vehicle miles

Sources:
1. *US 64 and NC 49 Strip Analysis Data - NCDOT (June 1, 2000- May 31, 2003)*
2. *Three Yr. Avg Crash Rates - NCDOT Traffic Engineering and Safety Systems Branch (2000-2002)*

APPENDIX D

Existing Plus Committed Highway Improvement Projects

Table D.1: NCDOT FY 2004-2010 Transportation Improvement Programs

Project Name	Route	TIP Description	2002 Lane	2030 Lane	Work Type	Complete Year
I-2201	I-40-US 421 Guilford	SR 1850 (Squire Davis Road) to west of SR 1398 (Freeman Mill Road)	4-6	6-8	Lanes	2003
I-220*	I-40 Wake County	NC 147 (Exit 279) in Research Triangle Park to Bradshaw Freeway at Wade Avenue (Exit 289).	4-8	4-8	Lanes	2003
I-2304	I-85 Rowan- Davidson Counties	North of SR 2120 (Exit 81) in Rowan County to US 29-52-70/I-85 Business (Exit 87). (Project includes B-3833)	2-6	8	Lanes	2006
I-2402	Greensboro Bypass (Southern Loop) Guilford County	I-85 South of Greensboro to south of SR 3041 (Clapp Farm Road). Freeway on New Location.	2-4	6-8	New Location	2004
I-2511	I-85 Rowan County	US 29-601 Connector (Exit 68) to north of SR 2120 (Exit 81).	2-8	8	Completed	2004
I-2806	I-77 Iredell- Yadkin Counties	South of SR 1891 in Iredell County to south of SR 1125 in Yadkin County.	2-4	4	Rehabilitation	2003
I-2808	I-77 Yadkin- Surry Counties	South of SR 1125 (Mile Post 71) in Yadkin County to US 21 Bypass (Mile Post 83.5 in Surry County, Exit 83).	2-4	4	Rehabilitation	2005
I-0305*	I-40 Orange County	at Hillsborough to Durham County Line.	4-6	6	Lanes	2010
I-0306*	I-85 Durham County	Orange County Line to east of Midland Terrace Road on I-85, and east of Cheek Road on US 70 Bypass. .	2-6	6-8	Lanes	2004
I-3306	I-40 Orange- Durham Counties	I-85 in Orange County to NC 147 (Buck Dean Freeway) in Durham	4	6	Lanes	2004
I-3311	I-77 Mecklenburg County	5th Street in Charlotte to NC 73 (Sam Furr Road).	4	8	Lanes	2004
I-3802	I-95 Cabarrus -Rowan	NC 73 to US 29-601 Connector.	4	5-8	Lanes	2015
I-3803	I-85 Mecklenburg- Cabarrus Counties	US 29-NC 49 Connector in Mecklenburg County to NC 73 in Cabarrus County (Coordinates with U-3415)	4-8	8	Lanes	2004
I-4411	I-77 Iredell County	SR 1102 (Langtree Road). Convert grade separation to interchange	4	4	New interchange	2006
I-4721	I-85 Durham County	US 70 to Red Mill Rd	4	6	Lanes	2015
I-911	I-40 Davie- Forsyth Counties	West of NC 801 (Exit 180) to west of SR 1122.	4-6	6	Lanes	2003
R-Unknown (2608?)	Garden Pkwy Gaston County	I-485 to US-321	2	4	New Location	2030
R-2000*	I-540, Northern Wake Freeway	NC 55 west of Morrisville to US 64	2	6	New Location	2004
R-210	US 1 Moore-Lee Counties	US1 Bypass, north of Lakeview to 4 Lanes at SR 1180 south of Sanford	2	4	New Location	2004
R-210*	US 1 Moore- Lee Counties	US 1 Bypass, north of Lakeview to four lanes at SR 1180 south of Sanford.	2	4	Lanes	2003
R-2107B*	NC 24-27 Montgomery County	US 220a to US 220 in Biscoe. Widen to Multi-Lanes.	2	4	Lanes	2008
R-211	I-485 (Charlotte Southern Outer Loop) Mecklenburg County	Charlotte Southern Outer Loop, west of 1-77 to US 74. Four lane freeway	4	4	New Location	2007
R-2123	I-485 Charlotte Eastern Outer Loop Mecklenburg County	US 74 East (Independence Boulevard) to I-85 North (New Freeway)	2-4	4	New Location	2008
R-2201	King- Tobaccoville Road (Main Street). Haywood County	RJR Entrance to SR 1115	2	5	Lanes	1998

Table D.1: NCDOT FY 2004-2010 Transportation Improvement Programs

Project Name	Route	TIP Description	2002 Lane	2030 Lane	Work Type	Complete Year
R-2212	Carthage Bypass. Moore County	SR 1640 to SR 1653. Four lanes on new location	2	4	New Location	2009
R-2220*	US-64 Davidson- Randolph Counties	East of I-85 Business in Lexington to US 220	2-4	4-5	Lanes	2003
R-2231	New Facility Richmond- Montgomery Counties	South of SR 1448, south of Ellerbe to US 220a South of Emery. Four lanes divided on new location.	2	4	New Location	2004
R-2239*	US-421 Wilkes- Yadkin Counties	East of SR 1001 in Wilkesboro to I-77.	2	4	Lanes	2003
R-2246	Concord-Kannapolis, Westside Bypass Extension Cabarrus County	NC 49 to south of I-85.	2	4	Lanes	2009
R-2247	Winston-Salem Northern Beltway Forsyth County	I-40 to US 52. Four lane expressway on new location	2	4	New Location	2010
R-2247A	Winston-Salem Northern Beltway N/A	US 158 to I-40. Four lane expressway on new location.	2	4	New Location	2010
R-2248*	Charlotte Western Outer Loop Mecklenburg County	West of I-77 to I-85 North	2	6	New Location	2008
R-2300	NC 8 Davidson County	NC 49 to SR 2212 (Fairview Road).	2-5	2-5	Lanes	2005
R-2309	US 220 Guilford County	SR 2182 (Horsepen Creek Road) to US 220-NC 68 Connector (R-2413).	2-4	5	Lanes	2010
R-2320	US 52 Anson- Stanly Counties	US 74 in Wadesboro to NC 24-27 in Albemarle.	2-4	4	Lanes	2005
R-2413	US 220- NC 68 Guilford- Rockingham Counties	SR 2133 (Pleasant Ridge Road) to US 220-NC 68. Multi-Lane Connector, on New Location.	2	4	New Location	2010
R-2413*	US 220	SR 2133 (Pleasant Ridge Rd) to NC 86.	2-4	5	Lanes	2010
R-2417	Sanford Bypass Lee County	West of SR 1400 to NC 87 west of SR 1138.	2	4	New Location	2008
R-2420	City Boulevard Extension, Mecklenburg County	Relocated Mallard Creek Road to US 29 – NC 49	2	4	Lanes	2004
R-2501	US 1 Richmond County	South Carolina state line to SR 1001. Widen to multi-lanes with bypass of Rockingham on new location.	2	4	Lanes	2010
R-2502	US 1 Richmond- Moore Counties	SR 1001 to existing four lanes in Moore County.	2	4	Lanes	2005
R-2527*	NC 24-27 Montgomery County	Multi-lanes east of Pee Dee River to the Troy Bypass. Widen to multi-lanes.	2	4	Lanes	2010
R-2528	NC 24-27 Montgomery- Moore Counties	From US 220 to Carthage Bypass in Moore County	2	4	Lanes	2010
R-2529	NC 24-27 Moore- Harnett Counties	Carthage Bypass to NC 87. Widen to multi-lanes.	2	4	Lanes	2004
R-2530*	NC 24-27 Stanly County	SR 1963 (St. Martin Road) in Albemarle to west of the Pee Dee River.	2-4	4	Lanes	2009
R-2533	NC 49 Cabarrus- Stanly Counties	Harrisburg to Yadkin River.	2-4	4-5	Lanes	2010
R-2535	SR 1174 Randolph County	West of Farmer to Proposed Asheboro Southern Bypass	2	4	Lanes	2010
R-2536	Us 64 Asheboro Southern Bypass, Randolph County	US 64 West to US64 East, 4 Lanes with interchanges	2	4	New Location	2009
R-2540	NC 55, Wake-Harnett Counties	US 421 to US 401	2	4	Lanes	2015

Table D.1: NCDOT FY 2004-2010 Transportation Improvement Programs

Project Name	Route	TIP Description	2002 Lane	2030 Lane	Work Type	Complete Year
R-2547	Knightdale Bypass, Wake County	I-440 (Raleigh Beltline) to US 64 near SR 1003	2	6	New Location	2004
R-2552	Clayton Bypass. Wake- Johnston Counties	I-40 to US 70-70 Business. Freeway on new location	2	6	New Location	2006
R-2555	SR 2697 Mecklenburg Counties	NC 73 (Sam Furr Road) to east of SR 2195 (Torrence Chapel Rd.)	2-4	5	Lanes	2008
R-2560	NC 62 (Alamance Road) Alamance- Caswell- Rockingham Counties	SR 1430 (Ramada Road) to US 70 (Church Road).	2-4	4	Lanes	2005
R-2568	NC 109 Davidson- Forsyth Counties	South of I-85 Business in Thomasville to I-40/US 311 in Winston	2-5	5	Lanes	2005
R-2575	NC 86 Caswell- Person Counties	West of Yanceyville to SR 1159 (Thee Hester Road) West of Roxboro. Widen to multi-lanes.	2	4	Lanes	2005
R-2577*	US 158 Forsyth- Guilford Counties	North of US 421/I-40 Business in Winston-Salem to US 220. Widen to multi-lanes.	2-4	4	Lanes	2010
R-2580*	US 158 Guilford- Rockingham Counties	US 220 to US 29 Business (Freeway Drive).	2	5	Lanes	2007
R-2585	SR 1159 (Thee Hester Road) Person- Granville Counties	West of Roxboro to Oxford Outer Loop. Widen to multi-lanes with bypass of Roxboro on new location.	2	4	New Location	2010
R-2586	US 29 Rockingham- Caswell Counties	NC 14 to NC 86 west of Yanceyville.	2	4	Lanes	2005
R-2606	Freeway on New Location Randolph Counties	South of SR 1920 to US 220 north of Asheboro.	2	4	New Location	2008
R-2610*	US 421 Chatham County	Four Lanes at Gulf Rd. to the Siler City Bypass.	2	4	Lanes	2004
R-2611	SR 2007 Guilford County	Colfax to NC 68.	2-4	5	Lanes	2009
R-2628	US 15-501 Chatham County	Pittsboro, NC 87 to US 64. Two Lanes on multi-lane right of way	2	2	New Location	2010
R-2632A	NC73	I-77 to SR 2693 (Davidson-Concord Road).	2	4	Lanes	2004
R-2635	Western Wake Freeway Wake County	US 1 (South) north to NC 55. Freeway	2	6	New Location	2008
R-2704	NC 67 Yadkin County	I-77 to SR 1355 (Messick Road). Widen to provide center turn lane	2-3	3	Lanes	2004
R-2705	Lincolnton Bypass Lincoln County	US 321 to NC 73 at SR 1356. Extend two lanes on new location.	2	2	New Location	2004
R-2706	Mecklenburg County	SR 1356 in Lincoln County to SR 2145	2	4	Lanes	2004
R-2709	Peters Creek Pkwy (NC 150), Forsyth County	From W. Clemmonsville Rd to Davidson Co.	2-4	4	Lanes	2025
R-2721	I-540 (Southern Wake Expressway), Wake County	From NC 55 Bypass to US 401 (South)	2	6	New Location	2025
R-2809	Wake Forest Bypass Wake County	West of SR 1923 (Thomson Mill Road) to East of SR 2053.	2	4	New Location	2007
R-2812	NC 211 Moore County	NC 73 in West End to Pinehurst traffic circle.	2	4	Lanes	2007
R-2814	US 401 Wake- Franklin Counties	North of SR 2044 (Ligon Mill Road) to NC 39 in Louisburg.	2-4	4	Lanes	2009
R-2825	N. Churton St. Orange County	I-40 to Eno River. Widen to multi-lanes and Widen bridge No. 240 over Southern Railroad.	2	4	Lanes	2005

Table D.1: NCDOT FY 2004-2010 Transportation Improvement Programs

Project Name	Route	TIP Description	2002 Lane	2030 Lane	Work Type	Complete Year
R-2828	I-540 (Southern Wake Expressway), Wake County	US 401 (South) to I-40 (South)	2	6	New Location	2025
R-2829	I-540 (Eastern Wake Expressway), Wake County	I-40 (South) to US 64 Bypass	2	6	New Location	2025
R-2903	US 52 Stanly- Cabarrus- Rowan Counties	South of NC 49 at Richfield to I-85 north of Salisbury. Four lanes divided on new location. (Coordinated With I-2511)	2	4	New Location	2001
R-2904	NC 54 Durham County	SR 1999 (Davis Drive) to SR 1959 (Miami Boulevard)	2-4	4-8	Lanes	2008
R-2905	NC 55 Wake County	SR 1448 (Bobbitt Road) to north of SR 1158 (Hughes Street).	2	5	Lanes	2005
R-2906	NC 55 Wake- Durham Counties	US 64 in Wake County to SR 1121 (Cornwallis Road) in Durham	2-4	4	Lanes	2007
R-2907	NC 55 Wake County	SR 1108 (Wake Chapel Road) in Fuquay-Varina to SR 1114 (Ralph Stevens Road)	2	5	Lanes	2003
R-2910	US 70 Alamance-Guilford Counties	US 70 Bridge widening at St Marks Church Rd	2-4	5	Lanes	2025
R-2911	US 70 Iredell- Rowan Counties	SR 2318 in Statesville to US 601 in Salisbury. Widen to multi-lanes, Part on new location.	2-4	4	Lanes	2009
R-2918	SR 1829 (Strickland Rd) Ext. Wake County	US 70 to East of SR 1822 (Leesville Rd)	2	2	New Location	2010
R-3111	Mocksville Bypass Davie County	US 64 Bypass of Mocksville-	2	4	New Location	2015
R-3325	New Route Chatham County	Siler City Airport to US 421. Two lanes on new location.	2	2	New Location	2010
R-3329	New Route Mecklenburg- Union Counties	Charlotte Outer Loop to US 74 (Monroe Bypass). Multilane freeway	2	4	New Location	2010
R-3416	NC 67 Yadkin County	SR 1355 (Messick Road) to US 601 in Boonville.	2	4	Lanes	2006
R-3418	NC 86 Caswell County	From US 158 to Virginia State Line	2	3	Lanes	2005
R-3427	US 601 Yadkin County	Davie County Line to Yadkinville South city limits.	2	4	Lanes	2005
R-3441	US 52 Forsyth County	From Northern Beltway to Surry County	4	4	Upgrade	2025
R-3602	US 64, Davie-Davidson Counties	From US 601 South of Mocksville to US 52 in Lexington.	2-4	4	Lanes	2004
R-3833	SR 1100 Iredell County	SR 1177 (River Loop Road) to US 21.	2	3-4	Lanes	2007
R-609	US 311 Bypass Guilford- Forsyth- Randolph Counties	High Point "East Belt," South of SR 1920 East	2	4	Lanes	2005
R-623	Troy Bypass Montgomery County	SR 1138 to East of Little River. Four lanes, part on new location.	2	4	New Location	2009
R-623*	Troy Bypass N/A	SR 1138 to East of Little River. Four lanes, part on new location.	2	4	New Location	2009
R-942	US 15-501, Chatham- Orange Counties	Proposed Pittsboro Bypass to Chapel Hill Bypass	2-4	4	Lanes	2004
R-967*	NC 24-27 Stanly County	West City Limits of Locust to SR 1963 (St. Martin Road) in Albemarle.	2-4	4	Lanes	2005
U-2009	Westside Bypass Cabarrus County	South of I-85 to SR 1616 (Tuckaseegee Road)	2	5	New Location	2004
U-203	Little Rock Rd Mecklenburg County	I-85 to Charlotte-Douglas International Airport	2	4	New Location	2007

Table D.1: NCDOT FY 2004-2010 Transportation Improvement Programs

Project Name	Route	TIP Description	2002 Lane	2030 Lane	Work Type	Complete Year
U-209*	US 74-NC 27 (Independence Boulevard) Mecklenburg County	Brookshire Freeway to NC24-27	6	6	HOV	2003
U-209B*	US 74 (Independence Boulevard), Mecklenburg County	NC 24-27 (Albemarle Road) to NC24-27	6	6	Lanes	2010
U-2102	NC 157 (Guess Road) Durham County	SR 1407 (Carver Street) to SR 1449 (Umstead Road)	2-4	5	Lanes	2005
U-2200	US 220 Business Randolph County	Pritchard Street to SR 2261 (Old Liberty Road). Widen to Five Lanes.	2	5	Lanes	2018
U-2405	MLK Pkwy New Hanover-Pender-Onslow Counties	NC 55 to Cornwallis	2	4	New Location	2025
U-2406	Western Alamance Pkwy Alamance County	Westbrook Ave. to US 70	2	4	New Location	2005
U-2412	SR 4121 (Greensboro-High Point Road) Guilford County	Hilltop Road to proposed US 311 Bypass	2-4	4	Lanes	2009
U-2507	SR 2467 (Mallard Creek Road) Mecklenburg County	SR 2480 (Sugar Creek Rd) to SR 2472	2-4	4	Lanes	2006
U-2508	SR 2472 and SR 2833 (Mallard Creek Church Road), Mecklenburg County	I-85 TO NC 49 at SR 2939	2	4	Lanes partly new location	2004
U-2510A	NC 16 (Providence Road) Mecklenburg- Union Counties	Rea Road Extension in Union County to south of Charlotte Outer Loop	2	4	Lanes	2006
U-2512	NC 49 (York Road) Mecklenburg County	Buster Boyd Bridge at the South Carolina Line to north of Tyvola Road	2-4	4-5	Lanes	2003
U-2524	Western Loop Guilford County	North of I-85 to Lawndale Drive. Construct Freeway on new location.	2	4-8	New Location	2009
U-2525	Eastern Loop Guilford County	North of I-85 to Lawndale Drive. Construct freeway	2	4	New Location	2010
U-2537	Westside Thoroughfare Randolph- Davidson- Guilford Counties	I-85 to US 311 Bypass (R-609). multi-lane	2	5	New Location	2010
U-2545	New Route Davidson County	US 29-52-70/I-85 Business to SR 2212 (Fairview Road)	2	2	New Location	2010
U-2546	US 70 Alamance County	Haw River Bypass to Mebane City Limits.	2	4-5	Lanes	2014
U-2579	Winston-Salem Northern Beltway (Future I-74) Forsyth County	US 52 to I-40. Multi-Lane Freeway on New Location.	2	6	New Location	2010
U-2579A	Winston-Salem Northern Beltway (Future I-74) Forsythe County	US 52 to I-40. Multi-Lane Freeway on new location	2	6	New Location	2010
U-2581	US 70 Guilford County	SR 2581 (Penry Road) to SR 3056 (Rock Creek Dairy Road)	2-4	5	Lanes	2003
U-2717	SR 1113 (Kivett Drive) Guilford County	Pendleton Street to US 29-70.	2-4	5	Lanes	2005
U-2719	I-40 Wake County	US 1/64 to Wade Ave	2-4	4	Lanes	2015
U-2800	SR 2601 Forsyth County	SR 2601 to SR 1005. Part new location. Convert grade separation at I-40 Business to interchange	2	5	Lanes	2009
U-2803	SR 1919 Orange County	SR 1919 to Bridge #88 in Orange County	2-4	4	Lanes	2005
U-2807	US 15/501 Durham-Orange Counties	Bypass to I-40	4-6	6	Lanes	2025

Table D.1: NCDOT FY 2004-2010 Transportation Improvement Programs

Project Name	Route	TIP Description	2002 Lane	2030 Lane	Work Type	Complete Year
U-2815	Bryan Blvd Guilford County	Innam Rd to NC 68. Relocate	2	4	New Location	2005
U-2815C	Bryan Boulevard, Guilford County	Inman Road to NC 68.	2	4	Relocate	2001
U-2823	US 70 (Glenwood Avenue) Wake County	West of SR 1664 (Duraleigh Road) to West of SR 1876 (Triangle Drive). Upgrade roadway to improve capacity	4	6	Capacity	2009
U-2826	US 52 Forsyth County	I-40 Bypass to proposed Western Loop interchange.	2-4	2-8	New Location	2007
U-2833	Dale Earnhardt Blvd Cabarrus County	Widening from I-85 interchange to NC 136	4	5	Lanes	2005
U-2901	NC 55 Wake County	US 1 to US 64	2	5	Lanes	2015
U-2905	St Marks Church Road Alamance County	SR 1146 (Kirkpatrick Road) to US 70. Multilanes	2	4	New Location	2004
U-2906	NC 62 (Alamance Road) Alamance County	SR 1430 (Ramada Road) to US 70 (Church Street).	2-4	5	Lanes	2005
U-2913	SR 1546 (Guilford College Road) Guilford County	SR 4121(High Point Road) to south of Hornaday Road	2-4	5	Lanes	2005
U-2923	SR 2747 (Clemmonsville Road) Forsyth County	SR 3011 (Old Salisbury Road) to South Main Street	4	4	Lanes	2007
U-2924	University Pkwy (SR 4000) Forsyth County	North Point Blvd (SR 3973) to Hanes Mill Road.	2-4	4	Lanes	2025
U-2930	US 21 Iredell County	Widening from US 64 to SR 1933 in Statesville	2-4	5	Lanes	1998
U-3100	SR 1009 (Hillsborough Road), Orange County	Lorraine Street to SR 1107	2	2	Widen	2010
U-3101	US 1-64 Wake County	US 64 to south of SR 1313 (Walnut Street).	4	6	Lanes	2006
U-3109	NC 119 Relocation Alamance County	I-85 to south of SR 1917.	2	4	New Location	2008
U-3110	New Route, Alamance County	US 70 to NC 100. Multi-Lanes, Part on new location.	2	4	New Location	2004
U-3111	Tryon Rd Ext Wake County	Old Garner Rd to Rock Quarry Rd	2-4	4	New Location	1998
U-3119	SR 1103 (Lewisville-Clemmons Road) Forsyth County	SR 1891(Peace Haven Road) To north of US 421.	2-4	4	Lanes	2007
U-3303	SR 1306 SR 1363 (Mebane Street) Alamance County	SR 1158 (Huffman Mill Road) to NC 54	2	4	Lanes	2007
U-3304	Grand Oaks Boulevard Extension Alamance County	SR 1146 (Kirkpatrick Road) to NC62	2	4	New Location	2008
U-3306	SR 1733 (Weaver Dairy Road) Orange Hill	NC 86 to SR 1734 (Erwin Road)	2	5	Widen	2005
U-3308	NC 55 (Alston Avenue) Durham County	NC 147 (I.L. "Buck" Dean Freeway) to US 70-NC98.	2-4	4	Widen	2008
U-3309	SR 2028 (T.W. Alexander Drive) Durham County	SR 1121(Cornwallis Road) to SR 1959	2-4	4	Lanes	2008
U-3313	SR 1129 (Groometown Road) Guilford County	SR 1383 (Wiley Davis Road) to SR 1479	2-4	5	Lanes	2006
U-3326	Bus US 29 (Freeway Dr), Rockingham County	S. Scales St to Richardson Dr to NC 14	2-4	4	Lanes	2005
U-3343	SR 1002 (Aviation Parkway), Wake County	NC 54 to I-40.	2	4	Lanes	2003
U-3344	SR 3015 (Airport Boulevard), Wake County	NC 54 to I-40. Widen to multi-lanes	2-4	5	Lanes	2005

Table D.1: NCDOT FY 2004-2010 Transportation Improvement Programs

Project Name	Route	TIP Description	2002 Lane	2030 Lane	Work Type	Complete Year
U-3407	Southern Alamance Pkwy Alamance County	NC 87 to Monroe Holt Rd.	2	4	New Location	2020
U-3445	SR 1007 (Mebane Oaks Road) Alamance County	I-85 to NC 119 (Fifth Street).	2	5	Lanes	2003
U-3447	NC 51, Mecklenburg County	South Carolina State Line to SR 3645 (Downs Circle).	2	4	Lanes	2007
U-3457	Broad St (NC 66) Forsyth County	Wallasey Rd (SR 2170) to Park St	2	3	Lanes	2025
U-3515	Davidson Highway Cabarrus County	Concord Parkway N. to ten miles west on Davidson Highway	2-4	6-8	Lanes	2005
U-3600	US 220 Business (North Fayetteville Street) Randolph County	SR 2261 (Old Liberty Road) to US 220 at US 311. Widen to Five Lanes	2-4	5	Lanes	2010
U-3603	NC 24-27 (Albemarle Road) Mecklenburg County	Pierson Drive to Reddman Road. .	4	5	Lanes	2005
U-3612	SR 1424 (Hilltop Road) Guilford County	SR 1546 (Guilford College Road) to Adams Farm Parkway	2	5	Lanes	2006
U-3615	SR 1003-SR 1820 (Skeet Club Road), Guilford County	US 311to NC 68 (Eastchester Drive)	2-4	5	Lanes	2009
U-3628	NC 24-27 Moore County	Courthouse west of NC 22 (Macneill Street) to US 15-501. Widen to three lanes.	2	3	Lanes	2009
U-3808	Elizabeth Brady Road Ext Orange County	South of US 70 Business to north of US 70	2	4	New Location	2009
U-4010	NC 98 (Holloway Street) Durham County	East of US 70 to east of Junction Rd	4	5	Lanes	2004
U-4011	SR 1959 (South Miami Boulevard) Durham County	South of SR 2112 (Methodist Street) to North of SR 1960.	4	5	Lanes	2008
U-4012	US 15-501 Durham County	North of Mt. Moriah Road to South of Garrett Road	2-6	6	Lanes	2005
U-4015	SR 1556 (Gallimore Dairy Road), Guilford County	NC 68 to SR 1008 (Market St.)	2	4	Lanes	2009
U-4026	SR 1613-SR 1999 (Davis Drive) Wake- Durham County	SR 3014 (Morrisville-Carpenter Rd.) in Wake County to NC 54 in Durham County	2-4	4	Lanes	2004
U-4411	Randolph St (NC 109) " Davidson County	Royal Oaks St to W. Colonial Dr.	2	5	Lanes	2020
U-4720	US 70 Durham County	Widening from Lynn Rd to Wake Co. Line	4	6	Lanes	2015
U-4722	Northern Durham Pkwy Durham County	US 70 to I-85	2	4	New Location	2015
U-4723	Roxboro Rd (501 N) Durham County	Duke St to Goodwin Rd	4	4-6	Lanes	2025
U-4736	NC 109 Davidson County	Thomasville to Denton	2-4	4	Lanes	2005
U-71	East End Connector Durham County	NC 147 (Buck Dean Freeway) to NC 98.	2-4	6	Lanes	2010

Table D.2: Long-Range Transportation Plan Projects in US 64-NC 49 Corridor

Project Name	LRTP Route	LRTP_From	LRTP_To	2002 Lane	2030 Lane	Work Type	Complete Year
Mecklinburg-Union MPO							
22	Fred Alexander Blvd.	NC 16	NC 27 (Freedom)	2	4	New Location	2010
35	I-77 HOV Project	I-277	I-485	6	6	HOV	2010
51	Lawyers Rd	Albermarle Rd	McAlpine Rd	2-4	4	Lanes	1998
57	NC 115	Harris Blvd	I-485	2	4	Lanes	2020
58	NC 115	Statesville Rd	Harris Blvd	2	6	Lanes	2010
59	NC 16	I-85	Hoskins Rd	2	4	Lanes	2010
66	NC 160	I-485	NC 49	2	4	Lanes	2020
67	NC 160 (West Blv)	US 521	I-485	2-4	4	Lanes	2010
71	NC 27 (Freedom Dr)	EdgeWood Dr	Fred D. Alexand	2-4	4-8	Lanes	2010
72	NC 49 (S. Tryon)	I-77	Yorkmont Rd	2-4	6	Lanes	2020
73	NC 49	US 29	I-485	2-4	6	Lanes	2020
74	City Blvd	US 29	I-85	2	6	New Location	2010
79	NC 51	Matthews Byps	Lawyers Rd	2	4	Lanes	2020
85	Old Concord Rd	Harris Blvd	Mallard Creek Blvd	2	4	Lanes	2010
115	Lawyers Rd	Little Rock Rd.	I-485	2-6	6	Lanes	2010
116	US 29/NC 49	I-277	I-277	4	6	Lanes	2010
118	US 521	Josh Birmingham	I-85	2	6	Lanes	2020
154	NC 27 (Mt Holly)	I-485	Belmeade Dr	2	4	Lanes	2020
155	Lawyers Rd	McAlpine Creek	NC 51	2	4	Lanes	2020
157-60	US 74	Village Lake	I-485	2-6	6	Lanes	2020
409	US 21	Gilead Rd	Catawaba Ave	4	4	Lanes	1998
432	NC 27 (Mt Holly)	Ventner Ct	I-485	2	6	Lanes	2010
433	NC 27 (Freedom Dr)	Fred D. Alexande	Ventner Ct	2	4	Lanes	2010
450	NC 160	NC 49	I-485	2	4	Lanes	1998
454	US 21	Old Statesville	Statesville Rd	2	4	New Location	2020
High Point MPO							
AB	W. Lexington Ave	Western Throughway	Westchester Dr	2	5	Lanes	2020
AG	NC 109 Connector	NC 109	Western Throughway	2	5	New Location	2025
Capital Area MPO (Raleigh)							
CA_A12	Falls of Neuse Rd	Falls of Neuse Blvd	Raven Ridge Rd	2	6	Lanes	2005
CA_A131	NC96	NC98	Zebulon	2	2-3	Lanes	2025
CA_A142	Greenfield Pkwy	Timber Dr	US 70 East	2	4	New Location	2015
CA_A144	NC 50	Timber Dr	NC 42	2-3	3	Lanes	2015
CA_A146	NC 98 Bypass	NC 96	NC 97	2	4	New Location	2015
CA_A16	Rock Quarry Rd	Holloway Rd	Southgate Dr	2	4	Lanes	2015
CA_A167	Wendell Northern	US 64 Bus East	US 64 Bus West	2	2	Completed	2015
CA_A173	NC 751/New Hill	Chatham Co.	US 1 (South)	2	4	Lanes	2025
CA_A174	NC 751	Green Level Ch	NC 751	2	4	New Location	2015
CA_A178	Olive Chapel Rd	NC 751	NC 55	2	4	Lanes	2015
CA_A195	Creedmore Rd	Glenwood Ave	Strickland Rd	2-4	2-6	Lanes	1998
CA_A196	Lynn Rd	US 70	Duraleigh Rd	2	4	New Location	2015
CA_A198	Tryon Rd Extension	Old Garner Rd	Wilmington St	2	5	New Location	2015
CA_A201	Rock Quarry Rd	Auburn-Knightdale	I-40	2	4	Lanes	2025
CA_A219	McCrimmon Pkwy Extension	NC 54	New Western Thoroughfare	2	4	New Location	2025
CA_A221	NC 54	N. W. Maynard	S. of Cary Pkwy	2-4	4	Lanes	2015
CA_A222	NC 54	Cary Pkwy	Page-Hobson Rd	2	4	Lanes	2025
CA_A228	NC 50	Timber Dr	US 70	3	3	Lanes	2015
CA_A235	US 1A	US 1	NC 98 Bypass	2	5	Lanes	2025

Table D.2: Long-Range Transportation Plan Projects in US 64-NC 49 Corridor

Project Name	LRTP Route	LRTP_From	LRTP_To	2002 Lane	2030 Lane	Work Type	Complete Year
CA_A237	NC 54	NW Maynard Rd	NE Maynard Rd	4	4	Completed	2015
CA_A30	Guess Road	Davis Dr	NC 55	2	4	New Location	2015
CA_A45	Tryon Rd	Dillard Dr	Lake Wheeler Rd	2-4	3-5	Lanes	1998
CA_A46	Tryon Rd	Lake Wheeler	Dillard Dr	2	5	Lanes	1998
CA_F11	US 1	I-540	NC 98	2-4	6	Lanes	2005
CA_F12	Triangle Prkway	I-540	NC 147	2	4-6	New Location	2025
CA_F16	I-440	I-40-US 1- US 64	Wade Ave	2-4	6	Lanes	2015
Winston-Salem MPO							
B30	S. Stratford Rd	Bus. I-40	NC 67	3	3	Lanes	2025
B36	N. Main St	E. Mountain St	N. Main St	2	4	New Location	2025
C7	US 311 Connector	I-40	US 421 – Bus 40	2	4	New Location	2020
C11	N. Main St	NC 66	Smith Edwards Rd	2	3	Lanes	2025
C12	S. Straford Rd	NC 67	I-40	4	6	Lanes	2025
C15	Regional Airport	N. Beltway	Linville Springs	2	6	New Location	2020
C20	Bus I-40	Northen Beltway	Guilford Co	2-4	4	Lanes	2025
D3	Hopkins Rd	W. Mountain St	Old Winston St	2	4	Lanes	2025
D6	US 421	Lewisville-Clemm	Yadkin Co	4	6	Lanes	2025
D10	Regional Airport	Linville SpringRds	Guilford County	2	4	New Location	2025
D14	Walkertown Bypass	US 311	NC 66	2	2	New Location	2025
D15	I-40	US 311	Guilford Co	4	6	Lanes	2025
Durham Chapel Hill MPO							
DCHC100		Watkins Rd	US 15/501	2	4	New Location	2015
DCHC101	NC 54	NC 54	Rizzo Conf. Dr	2	4	New Location	2005
DCHC109	US 15/501 Bypass	Pickett Rd	Morreene Rd	2-4	6	Lanes	2025
DCHC11	Churchton Connector	Old NC 86	NC 86	2	4	New Location	1998
DCHC112	US 70 Bypass	NC 86	I-85	2	4-6	Lanes	2015
DCHC12	Cornwallis Rd	Alexandria Dr	Alexander Dr	2-4	4	Lanes	2015
DCHC22	Fayetteville Pkwy	South Point	Woodcraft Pkwy	2	4	Lanes	2015
DCHC24	Garrett Rd	US 15/501	NC 751	2-4	3-4	Lanes	1998
DCHC4	Alexander	NC54	Cornwallis Rd	2-4	4	Lanes	2015
DCHC59	MLK Prkway	Old Chapel Hill	NC 55	2	4	New Location	2005
DCHC62	I-40	East End Connector	I-40	4	4-6	HOV	2024
DCHC63	NC 147	I-40	County Line	2	6	New Location	2025
DCHC64	NC 54	Burning Tree Rd	Barbie Chapel Rd	2-4	2-6	Lanes	2005
DCHC65	NC 54	Miami Blvd	Wake Co.	2	4	Lanes	2015
DCHC73	NC 751	US 64 MAB	Durham County	2-4	4	Lanes	2025
DCHC76	NC 86	Miami Blvd	Wake County	2	4	Lanes	2015
DCHC77	NC 86	US 70 Bypass	NC 57	2	4	Lanes	2015
DCHC98	SW Durham Rd	Rizzo Conf. Dr	I-40	2	2	New Location	2015
DCHC99	SW Durham Rd	Farrington Rd	Old Chapel Hill	2	2	New Location	2015
Greensboro MPO							
G_A11	NC 86	West Market Rd	Gallimore Dairy Rd.	2-4	6	Lanes	2004
G_A12	Elm-Eugene St	Southern Urban Loop	Vandalia Rd	2	5	Lanes	2004
G_B23	Vandalia Rd	Pleasant Garden Rd	Wiley Lewis Rd	2	3	New Location	2025
G_B28	Battleground Ave	Cotswald Rd	Westridge Rd	4-6	7	Lanes	2025
G_B9	Vandalia Rd	Elm-Eugene St.	Pleasant Garden Rd	2	5	Lanes	2025
G_C2	Airport Pkwy	NC 68	Pleasant Ridge Rd	2	4	New Location	2021
G_C5	US 158 Bypass	New location Stokesdale	New location Stokesdale	2	5	New Location	2025

Table D.2: Long-Range Transportation Plan Projects in US 64-NC 49 Corridor

Project Name	LRTP Route	LRTP_From	LRTP_To	2002 Lane	2030 Lane	Work Type	Complete Year
Burlington-Graham MPO							
9_BG	Northern Alamance Pkwy	Cherry Ln	Graham-Hopedale Rd	2	4	New Location	2020
O_BG	NC 87	Thomasville Rd	MPO Boundary	2-4	4	Lanes	1998
14_BG	Northern Alamance	Apple St	Lower Hopedale	2	4	New Location	2025
FF_BG	NC 87	Cherry Lane	Cheek Lane	2	4	New Location	2025
24_BG	North Alamance Prky	Durham St Ext	Glencoe Rd	2	4	New Location	2025
Northwest Piedmont MPO							
NPPrio1	US 601	I-40	SR 1408 (Cana Rd)	2-4	4	Lanes	2012
Piedmont Triad MPO							
7_RPONT	US 158; NC 86	E. of Yanceyville	NC 119 &Mebane	2-3	3	Lanes	2005
9_RPONT	NC 150	Forsythe County Line	US 64	2	3	Lanes	2005
Triangle J Council of Governments							
1_TJ	US 70 Bypass	Orange/Durham Co.	US 79/I-85 Connector	2	4	Lanes	2012
Cabarrus-S. Rowan MPO							
CR_7	Cabarrus Ave	US 29	NC 136	2-4	4	Lanes	2025
CR_8	Church St	US 29	Todd Rd	2-4	5	Lanes	2025
CR_9	Church St	Douglas Ave	Cabarrus Ave	2	3	Lanes	2025
CR_11	NC 73	Gold Hill Rd	US 64/MAB	2	5	Lanes	2025
CR_12	NC 73	US 29	US64/MAB	2	5	Lanes	2025
CR_13	NC 136	US 64/MAB	Loop Road	2	3	Lanes	2025
CR_14	NC 136	Dale Earhardt Bl	NC 73	2	5	Lanes	2025
CR_16	Union St	NC 136	US 601	2	5	Lanes	2025
CR_17	Concord Pky N	NC 136	MPO limits	2-6	0-7	Lanes	2025
CR_23	US 601	US 29	S. Union St	2	4	Lanes	2025

APPENDIX E

NCDOT Facility Type and Control of Access Definitions

Facility Type & Control of Access Definitions

April 2005

INTRODUCTION

The NCDOT Facility Types and Control of Access Definitions document was prepared to create a set of easy to understand and consistent definitions for all roadways for NCDOT and its partners to use in the planning, design, and operations processes. The definitions are primarily based on the function of the roadway, level of mobility and access, and whether the facility has traffic signals, driveways, and/or medians. These definitions were developed from a committee comprised of members from the Federal Highway Administration and the following NCDOT branches: Traffic Engineering, Highway Design, Project Development, and Transportation Planning. The North Carolina Board of Transportation adopted these definitions on September 2, 2004 as a part of the Statewide Transportation Plan.

The facility type definitions are identical to those used in a Comprehensive Transportation Plan (CTP), which the exception of Thoroughfares. In a CTP, Thoroughfares are further broken down to Major Thoroughfares and Minor Thoroughfares. In this document, both Major and Minor Thoroughfares fall into the general Thoroughfares description.

The first section this document provides descriptions of the different facility types with examples as they exist at the time this document was created. The facility types are listed in order of the level of mobility provided (highest to lowest). This is followed by the definitions of the different types of control of access and a comparison chart. The second section of this document provides illustrative examples that show various elements of each of the different facility types. These illustrations are not drawn to any particular scale.

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
FACILITY TYPES

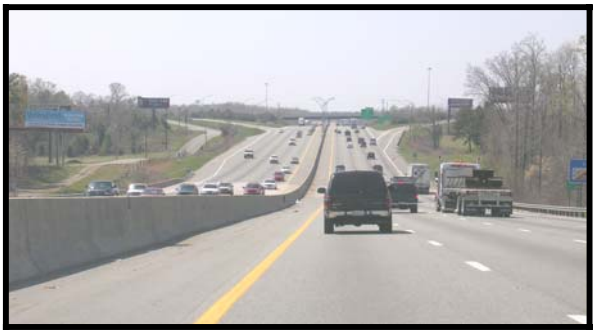
Listed in Order of Mobility Function

Adopted by the North Carolina Board of Transportation
September 2, 2004

Freeways

US 74 in Waynesville

US 264 east of I-95 (Wilson Bypass)



I-40/85 in Orange County

US 64 in Rocky Mount

- **Functional Purpose:** High Mobility, Low Access
- **AASHTO Design Classification:** Interstate or Freeway
- **Posted Speed Limit:** 55 mph or greater
- **Control of Access:** Full
- **Traffic Signals:** Not Allowed
- **Driveways:** Not Allowed
- **Cross-Section**: Minimum 4 Lanes with a Median
- **Connections:** Provided only at Interchanges; All Cross Streets are Grade-Separated
- **Median Crossovers:** Public-use Crossovers Not Allowed; U-turn Median Openings for Use by Authorized Vehicles Only when Need is Justified
- ***Examples:*** *I-40, I-95, US 64 between Rocky Mount and Williamston, US 52 between Lexington and Mount Airy, US 70 between Kinston and New Bern, US 74 near Waynesville, US 264 east of I-95 (Wilson Bypass), US 1 between Raleigh and Sanford*

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
FACILITY TYPES

Listed in Order of Mobility Function

Adopted by the North Carolina Board of Transportation
September 2, 2004

Expressways-Type I

US 221 (Marion Bypass)

US 220 in Rockingham County

US 321 south of Lenoir

US 117 north of I-40

- **Functional Purpose:** High Mobility, Low Access
- **AASHTO Design Classification:** Arterial
- **Posted Speed Limit:** 50 mph to 60 mph
- **Control of Access:** Limited
- **Traffic Signals:** Not Allowed
- **Driveways:** Not Allowed
- **Cross-Section:** Minimum 4 Lanes with a Median
- **Connections:** Provided only at Interchanges for Major Cross Streets and At-Grade Intersections for Minor Cross Streets; Use of Acceleration and Deceleration Lanes for At-Grade Intersections
- **Median Crossovers:** Allowed; Minimum Spacing between All-movement Crossovers is 2000 feet
- ***Examples:*** *US 221 (Marion Bypass), US 220 in Rockingham County, US 321 south of Lenoir, US 117 north of I-40*

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
FACILITY TYPES

Listed in Order of Mobility Function

Adopted by the North Carolina Board of Transportation
September 2, 2004

Expressways-Type II

US 74 west of Waynesville

US 29 in Guilford County

US 301 north of Wilson

US 64 in Apex

- **Functional Purpose:** High Mobility, Moderate Access
- **AASHTO Design Classification:** Arterial
- **Posted Speed Limit:** 50 mph to 60 mph
- **Control of Access:** Partial
- **Traffic Signals:** Not Allowed
- **Driveways:** Allowed (Up to One Driveway Connection per Parcel); Consolidate and/or Share Driveways and Limit Access to Connecting Streets or Service Roads; Restrict to Right-in/Right-out only
- **Cross-Section:** Minimum 4 Lanes with a Median
- **Connections:** Provided only at Interchanges for Major Cross Streets and At-Grade Intersections for Minor Cross Streets; Use of Acceleration and Deceleration Lanes for At-Grade Intersections
- **Median Crossovers:** Allowed; Minimum Spacing between All-movement Crossovers is 2000 feet
- ***Examples:*** *US 74 just east of I-277 in Charlotte, US 74 west of Waynesville, US 29 in Guilford County, US 301 north of Wilson, US 64 in Apex*

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
FACILITY TYPES

Listed in Order of Mobility Function

Adopted by the North Carolina Board of Transportation
September 2, 2004

Boulevards-Type I

NC 11 (Kenansville Bypass)

US 70 east of Clayton

US 70 near Havelock

NC 24 (Harris Boulevard) in Charlotte

- **Functional Purpose:** Moderate Mobility, Low Access
- **AASHTO Design Classification:** Arterial or Collector
- **Posted Speed Limit:** 30 mph to 55 mph
- **Control of Access:** Limited
- **Traffic Signals:** Allowed
- **Driveways:** Not Allowed
- **Cross-Section:** Minimum 2 Lanes with a Median
- **Connections:** At-Grade Intersections for Major and Minor Cross Streets (Occasional Interchange at Major Crossing); Use of Acceleration and Deceleration Lanes
- **Median Crossovers:** Allowed; Minimum Spacing between All-movement Crossovers is 2000 feet (posted speed limit of 55 mph or greater) or 1200 feet (posted speed limit of 45 mph or less)
- ***Examples:*** *US 70 between Clayton and Smithfield, NC 55 (Holly Springs Bypass), NC 11 (Kenansville Bypass), NC 87 (Elizabethtown Bypass), US 158 (Murfreesboro Bypass), US 70 near Havelock, NC 24 (Harris Boulevard) in Charlotte*

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
FACILITY TYPES

Listed in Order of Mobility Function

Adopted by the North Carolina Board of Transportation
September 2, 2004

Boulevards-Type II

US 70 east of Goldsboro

Cary Parkway

Lochmere Drive in Cary

US 74 near Ranger

- **Functional Purpose:** Moderate Mobility, Moderate Access
- **AASHTO Design Classification:** Arterial or Collector
- **Posted Speed Limit:** 30 mph to 55 mph
- **Control of Access:** Partial or None
- **Traffic Signals:** Allowed
- **Driveways:** Allowed; Encourage Consolidation and/or Sharing of Driveways and Limiting Access to Connecting Streets or Service Roads; Restrict to Right-in/Right-out only, if possible
- **Cross-Section:** Minimum 2 Lanes with a Median
- **Connections:** At-Grade Intersections for most Major and Minor Cross Streets (Occasional Interchange at Major Crossing); Use of Acceleration and Deceleration Lanes
- **Median Crossovers:** Allowed; Minimum Spacing between All-movement Crossovers is 2000 feet (posted speed limit of 55 mph or greater) or 1200 feet (posted speed limit of 45 mph or less)
- ***Examples:*** *US 1 (Capital Blvd) in Raleigh, US 74 through Monroe, US 117 south of Goldsboro, US 70 east of Goldsboro, Cary Parkway, NC 132 (College Road) in Wilmington, Lochmere Drive in Cary, US 74 near Ranger*

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
FACILITY TYPES

Listed in Order of Mobility Function

Adopted by the North Carolina Board of Transportation
September 2, 2004

Thoroughfares

Old Concord Road in Charlotte

Hillsborough Street in Raleigh

Shamrock Road in Charlotte

Trinity Road in Raleigh

- **<u>Functional Purpose</u>:** Moderate to Low Mobility, High Access
- **<u>AASHTO Design Classification</u>:** Collector or Local
- **<u>Posted Speed Limit</u>:** 25 mph to 55 mph
- **<u>Control of Access</u>:** None
- **<u>Traffic Signals</u>:** Allowed
- **<u>Driveways</u>:** Allowed with Full Movements; Consolidate or Share Connections, if possible
- **<u>Cross-Section:</u>** Minimum 2 Lanes; No Median; Includes All Facilities with a Two Way Left Turn Lane
- **<u>Connections</u>:** Primarily At-Grade Intersections
- **<u>Median Crossovers</u>:** Not Applicable
- *<u>Examples</u>: Old Concord Road in Charlotte, Hillsborough Street in Raleigh, Shamrock Road in Charlotte, Trinity Road in Raleigh*

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
CONTROL OF ACCESS DEFINITIONS

Listed in Order of Mobility Function

Adopted by the North Carolina Board of Transportation
September 2, 2004

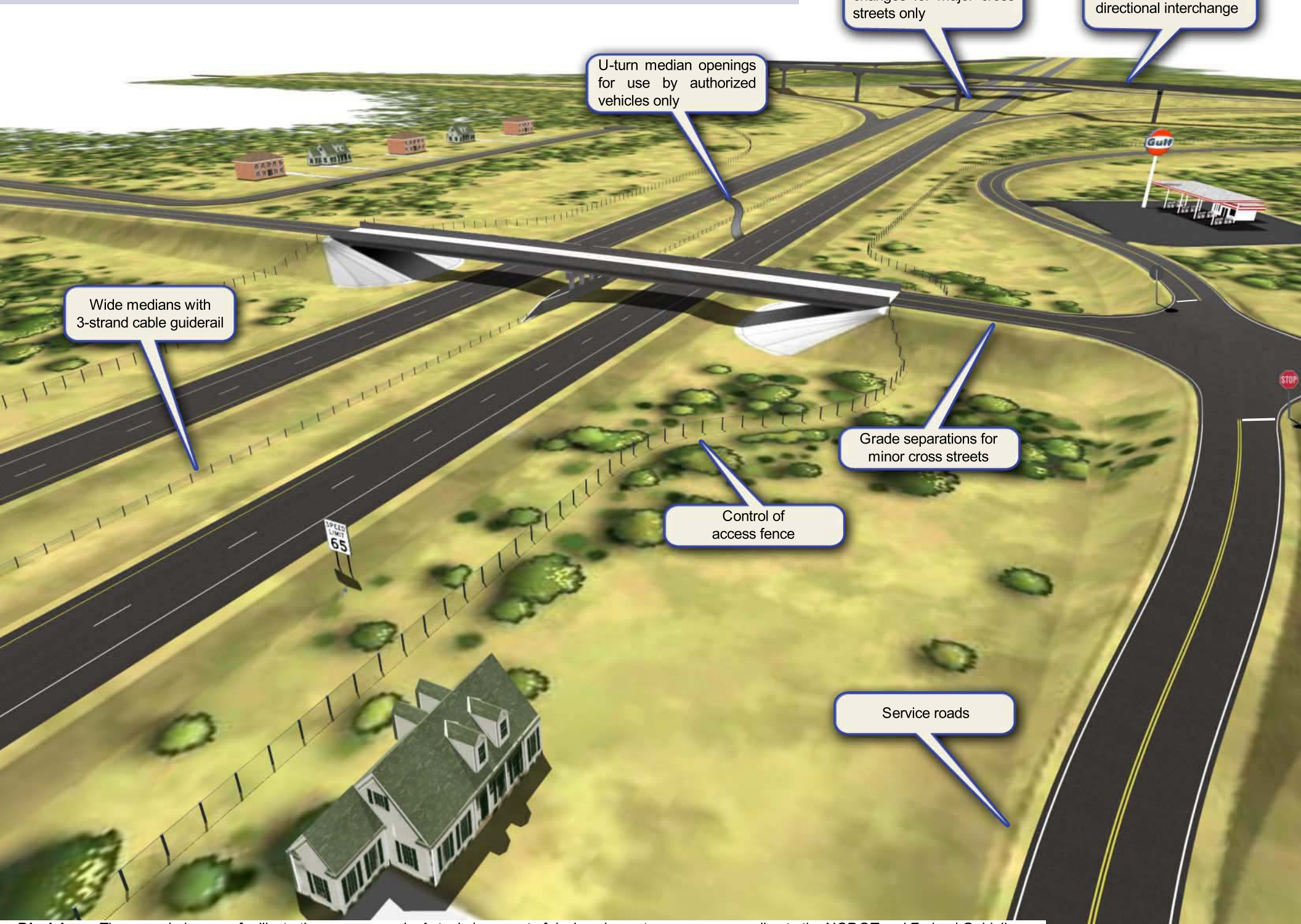
Full Control of Access
Connections to a facility provided only via ramps at interchanges. All cross-streets are grade-separated. No private driveway connections allowed. A control of access fence is placed along the entire length of the facility and at a minimum of 1000 feet beyond the ramp intersections on the Y lines (minor facility) at interchanges (if possible).

Limited Control of Access
Connections to a facility provided only via ramps at interchanges (major crossings) and at-grade intersections (minor crossings and service roads). No private driveway connections allowed. A control of access fence is placed along the entire length of the facility, except at intersections, and at a minimum of 1000 feet beyond the ramp intersections on the Y lines (minor facility) at interchanges (if possible).

Partial Control of Access
Connections to a facility provided via ramps at interchanges, at-grade intersections, and private driveways. Private driveway connections are normally defined as a maximum of one connection per parcel. One connection is defined as one ingress and one egress point. The use of shared or consolidated connections is highly encouraged. Connections may be restricted or prohibited if alternate access is available through other adjacent public facilities. A control of access fence is placed along the entire length of the facility, except at intersections and driveways, and at a minimum of 1000 feet beyond the ramps terminals on the minor facility at interchanges (if possible).

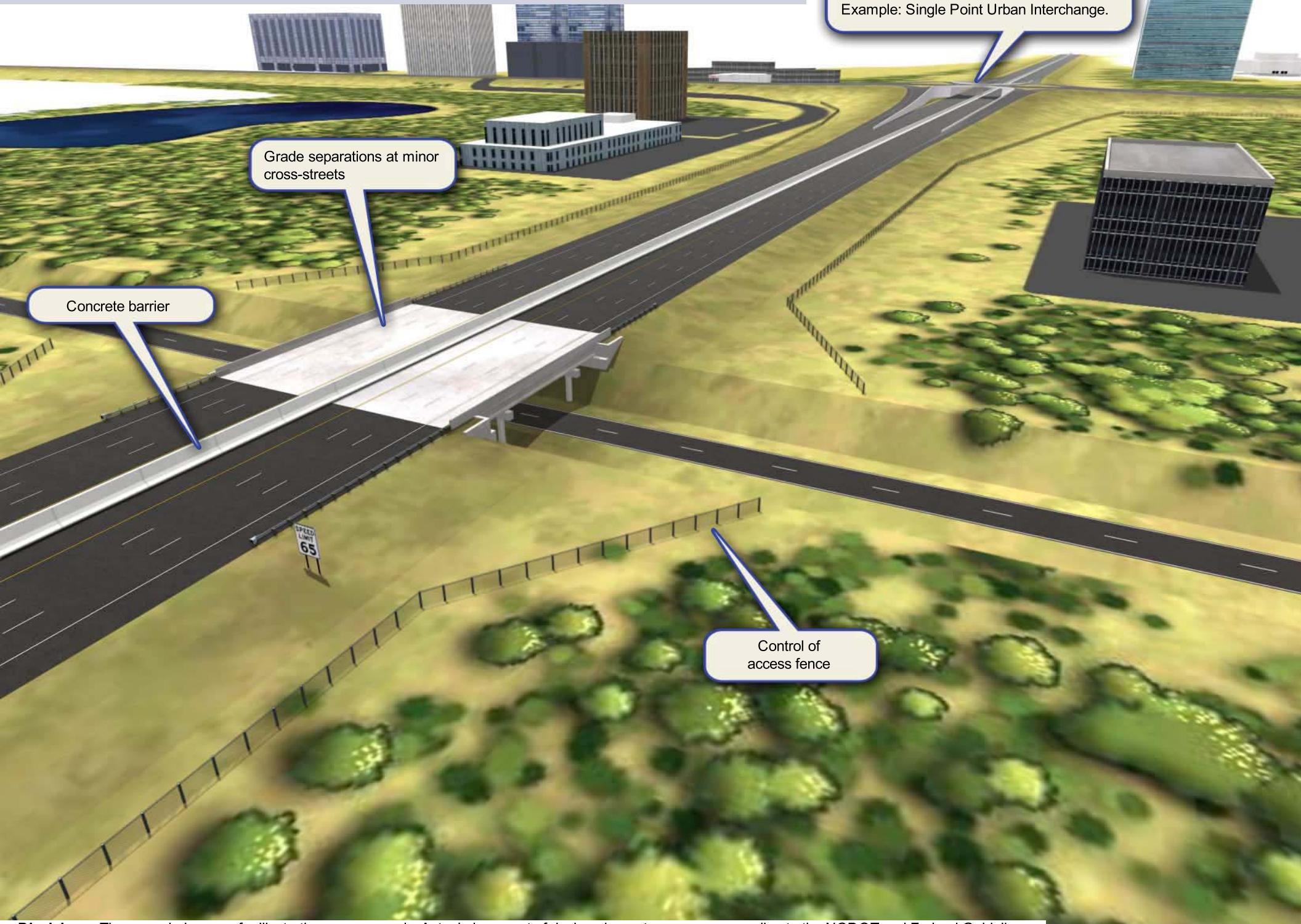
No Control of Access
Connections to a facility provided via ramps at interchanges, at-grade intersections, and private driveways. No physical restrictions, i.e., a control of access fence, exist. Normally, private driveway connections are defined as one connection per parcel. Additional connections may be considered if they are justified and if such connections do not negatively impact traffic operations and public safety.

Freeway - Full Control of Access (Illustrative Example in Rural Setting)



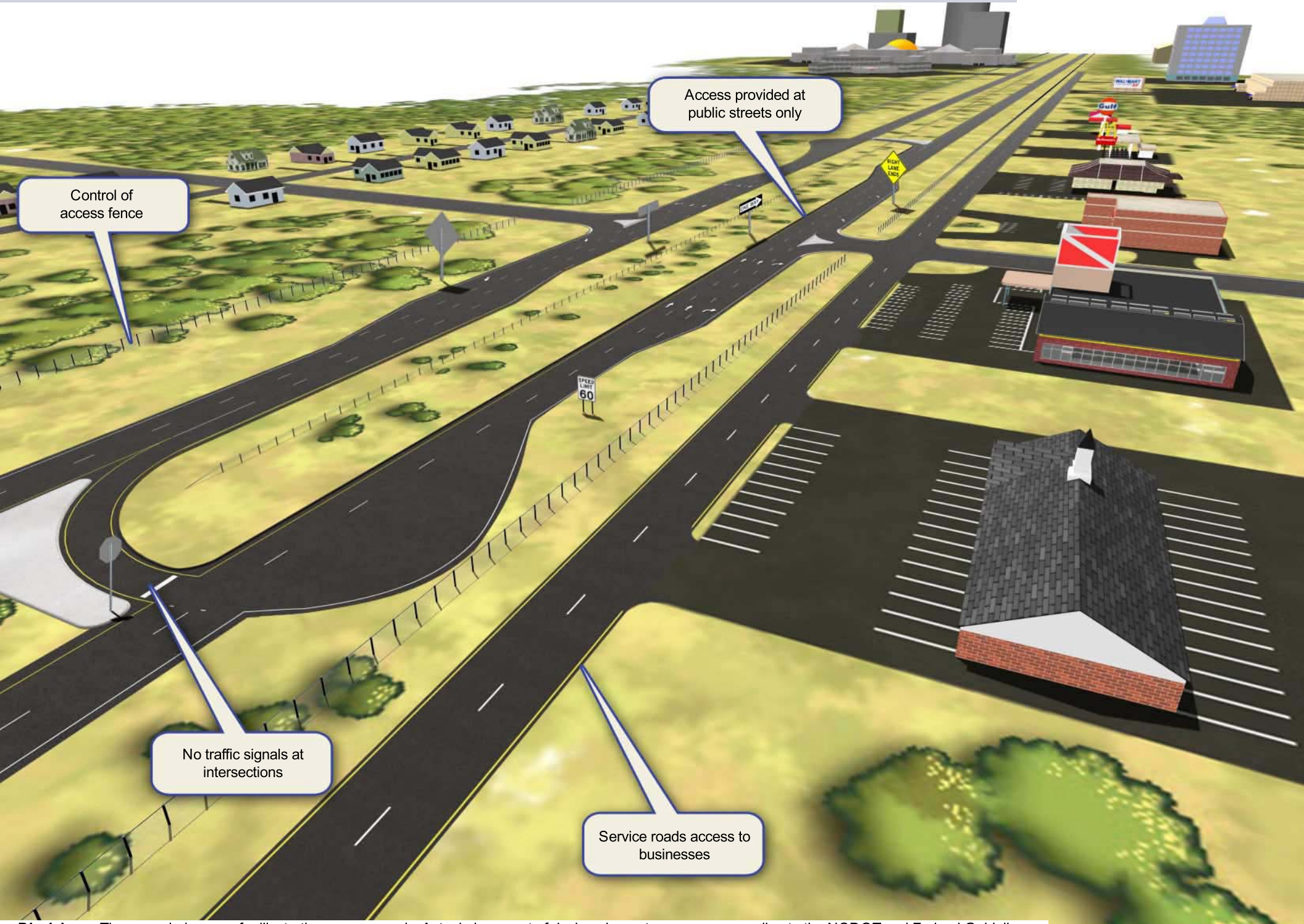
Disclaimer: These renderings are for illustrative purposes only. Actual placement of design elements may vary according to the NCDOT and Federal Guidelines.

Freeway - Full Control of Access (Illustrative Example in Urban Setting)



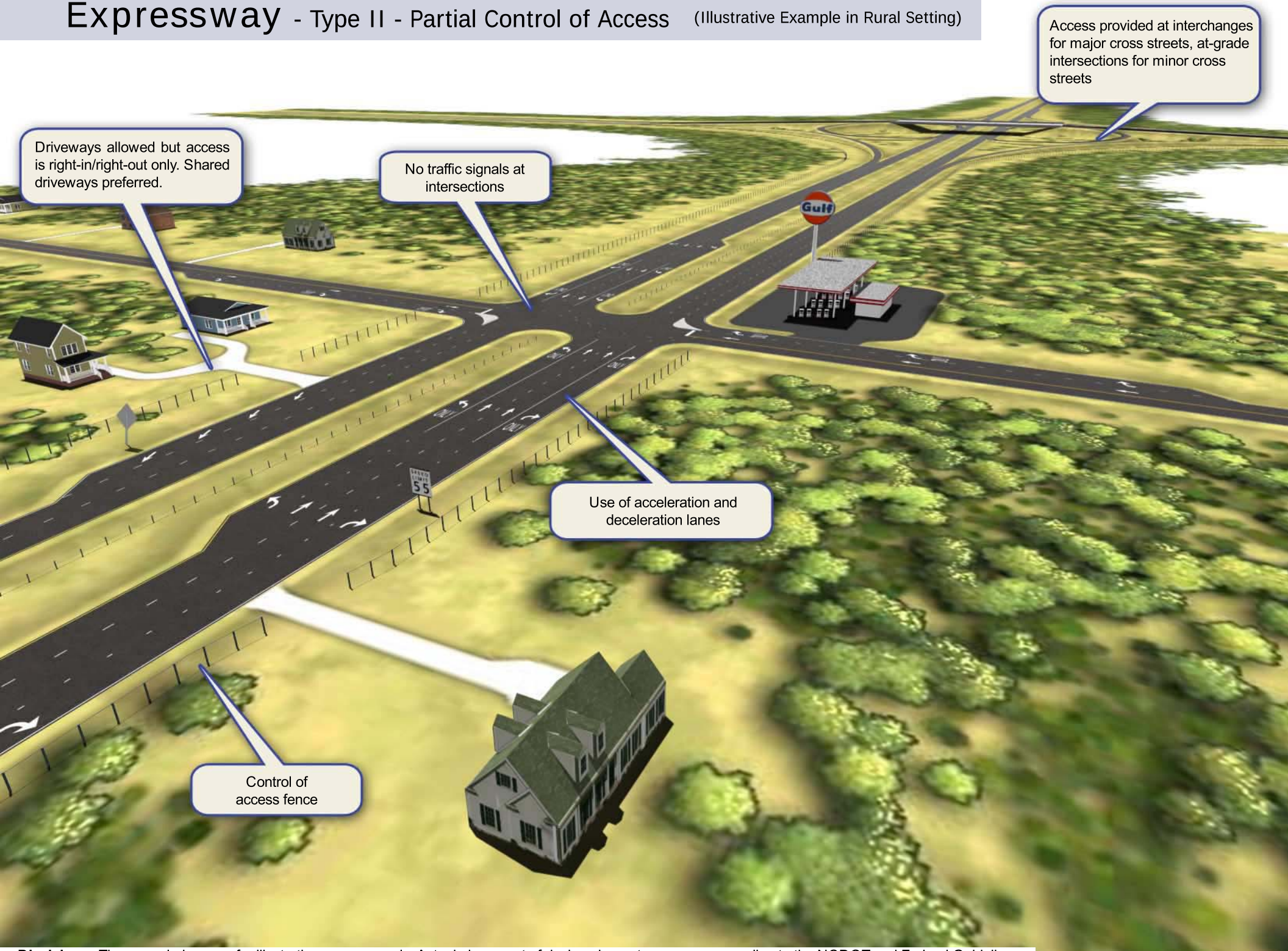
Disclaimer: These renderings are for illustrative purposes only. Actual placement of design elements may vary according to the NCDOT and Federal Guidelines.

Expressway - Type I - Limited Control of Access (Illustrative Example in Urban Setting)



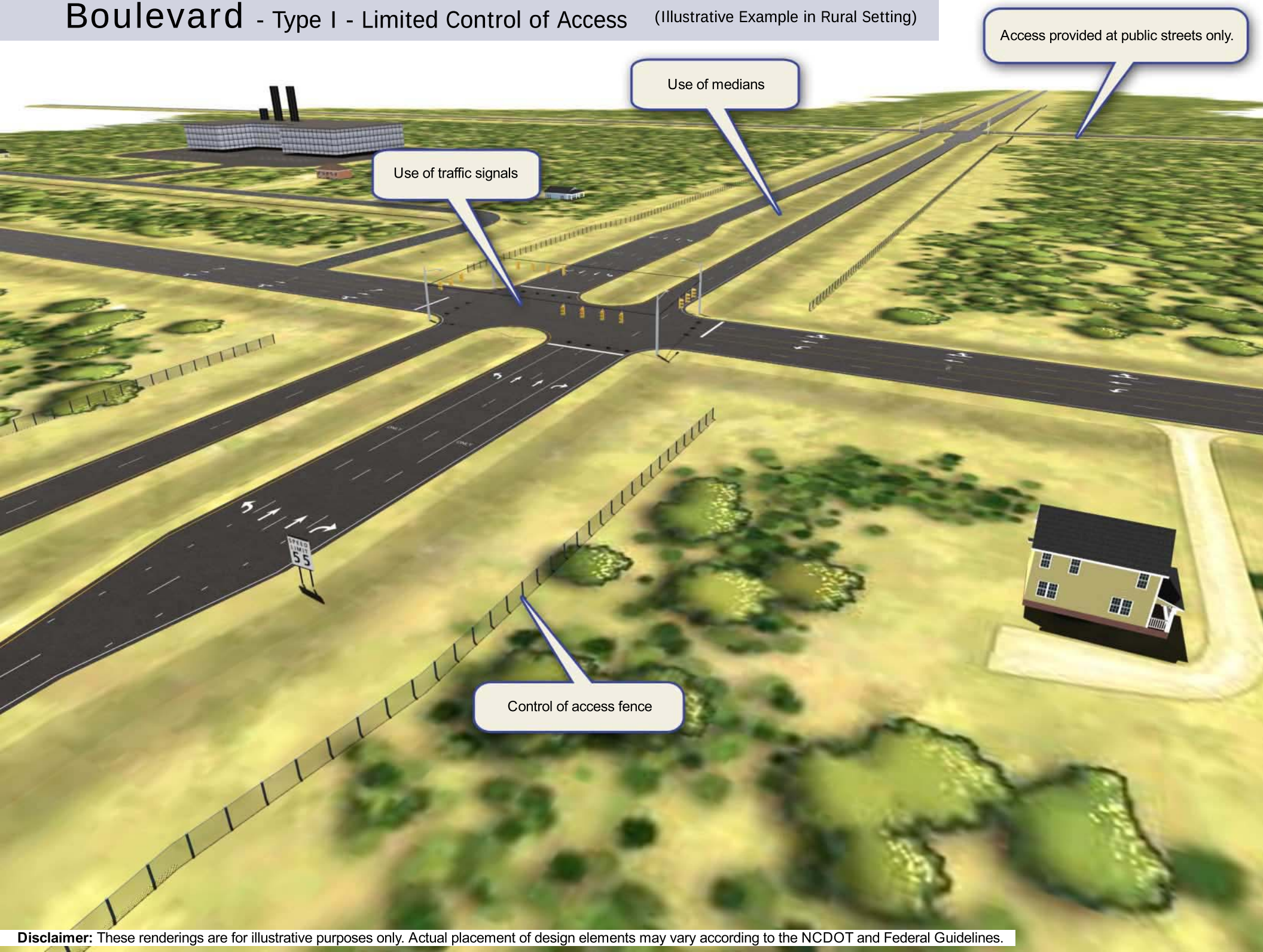
Disclaimer: These renderings are for illustrative purposes only. Actual placement of design elements may vary according to the NCDOT and Federal Guidelines.

Expressway - Type II - Partial Control of Access (Illustrative Example in Rural Setting)



Disclaimer: These renderings are for illustrative purposes only. Actual placement of design elements may vary according to the NCDOT and Federal Guidelines.

Boulevard - Type I - Limited Control of Access (Illustrative Example in Rural Setting)



Disclaimer: These renderings are for illustrative purposes only. Actual placement of design elements may vary according to the NCDOT and Federal Guidelines.

Boulevard - Type II - Partial Control of Access (Illustrative Example in Urban Setting)

Disclaimer: These renderings are for illustrative purposes only. Actual placement of design elements may vary according to the NCDOT and Federal Guidelines.

Thoroughfare - No Control of Access (Illustrative Example in Urban Setting)

Disclaimer: These renderings are for illustrative purposes only. Actual placement of design elements may vary according to the NCDOT and Federal Guidelines.

Thoroughfare - No Control of Access (Illustrative Example in Rural Setting)

Disclaimer: These renderings are for illustrative purposes only. Actual placement of design elements may vary according to the NCDOT and Federal Guidelines.

REFERENCES

1. American Association of State Highway and Transportation Officials (AASHTO), *A Policy on Geometric Design of Highways and Streets*, 4th Edition, 2001

2. North Carolina Department of Transportation (NCDOT), *Design Manual*, 2002

3. North Carolina Department of Transportation (NCDOT), *Policy on Street and Driveway Access to North Carolina Highways*, 2003

4. North Carolina Department of Transportation (NCDOT), *Median Crossover Guidelines*, 2004

APPENDIX F

Example Multi-governmental Agreements

Multi-Governmental Agreement Examples

Example One:

NC 73 Corridor Transportation / Land Use Plan has recently been completed. The corridor goes through one of the rapidly growing areas around Lake Norman, in Charlotte's metro area. It presents significant challenges in land use and transportation for residents and people who travel in that area.

The Memorandum of Understanding (MOU) between thirteen participating jurisdictions and agencies is a vehicle to carry forward common goals and objectives in the form of policies.

Memorandum of Understanding

Each of thirteen participating jurisdictions and agencies were requested to approve a Memorandum of Understanding for the NC 73 Corridor Transportation/Land Use Plan, committing themselves to follow the recommendations of the Plan and to cooperate with each other in implementing the Plan. The Memorandum of Understanding is not a legal contract. Rather, it is a statement of intent by each jurisdiction. The approval of the Memorandum of Understanding can generally be considered to be acknowledgement that they:

- Adopt the MOU, as a statement of intent on behalf of the jurisdiction;
- Adopt a Council of Planning, agreeing to appoint a participant who can represent the jurisdiction's interests in the plan, can work cooperatively with the other jurisdictions, and can oversee the implementation of the recommendations within the jurisdiction;
- Accept the recommendations within their jurisdiction as guidance for land use and other actions to implement the Plan; and
- Acknowledge that their portion of NC 73 and any related roads in their jurisdiction is an integral part of an overall Corridor, and that actions taken that affect NC 73 within their jurisdiction that affect NC 73 in other jurisdictions as well, and must be made cooperatively.

The draft of the Memorandum of Understanding that was presented to each of the jurisdictions for adoption is as follows:

Memorandum of Understanding

Background

In February 2003, the North Carolina Department of Transportation ("NC DOT"), three counties, five municipalities, three Chambers of Commerce, two Metropolitan Planning Organizations and one Regional Planning Organization engaged the Centralina Council of Governments ("COG") to administer a study of the NC 73 Corridor from Interstate Highway 85 in Cabarrus County to US Highway 321 in Lincoln County. Funds for this Corridor Study came from NC DOT, as well as from the counties, municipalities and private sector sources along the Corridor. [The term "Corridor" in the Memorandum means the area lying roughly within one-half (1/2) mile of the centerline of the NC 73 right of way between the highway's intersections with Interstate 85 in Cabarrus County, and with US 321 in Lincoln County.]

The impetus for the NC 73 Transportation/ Land Use Corridor Plan (the "Plan") was the recognition that increased development pressures along the Corridor, and the resulting vehicular burdens, have stressed the roadway's capacity to serve as a reliable transportation facility for its many users. Moreover, all of the funding partners recognized two key factors: 1) considerable physical improvement will be required to "fix" the corridor; and 2) the current and foreseeable land uses along the Corridor need to be evaluated <u>before</u> undertaking any capital investment in "fixing" the roadway itself.

Beginning with this broad consensus, COG and NC DOT selected a team of planners to undertake the details of this study. The contract of these planning services was executed in April 2003, and the planning team's analysis began shortly thereafter.

Public meetings have been held in Cabarrus, Lincoln and Mecklenburg Counties during November 2003 and March 2004. The planning team's work has been guided by a steering committee comprised of COG and representatives of all municipalities or counties having land use planning jurisdiction over property along the Corridor, as well as representatives of economic development or planning organizations affected by the NC 73's capacity. In addition, the planning team has hosted a series of land use planning charrettes with the local planning staffs for each of the municipalities and counties having land use jurisdiction along the Corridor. The planning team has also held briefings for the elected officials in each of those communities.

The resulting Plan consists of maps, drawings and other graphics that are incorporated within a Plan Report. In particular, maps corresponding to various Corridor segments show the existing and proposed land uses for each such segment. These segment maps also display the recommended improvements to the NC 73 roadway and to roads and streets connected to NC 73 and within the Corridor.

Understanding

1. Parties to this Understanding:

The Parties are:

a.) The municipalities and the counties having jurisdiction over 1) land use ordinances and determinations whether land uses along the NC 73 Corridor are in compliance with such ordinances; or 2) public investments along the corridor.

b.) The inter-governmental planning organizations having jurisdiction for transportation planning along the NC 73 Corridor.

c.) COG.

d.) NC DOT.

2. Current Land Uses: Each Party commits to accept and abide by the component of the Plan that falls within that Party's land use jurisdiction (including its extra-territorial jurisdiction) along the Corridor. Each Party's relevant component of the Plan is attached to this Memorandum, and is incorporated herein.

3. Inducements to Other Parties: Each Party understands that its commitment to its respective component of the Plan has induced other Parties to make like commitments for their respective segments of the Plan insofar as that Party has jurisdiction over the land uses within its Plan segment. Based on this understanding, each Party commits its best efforts to maintain its land use designations as shown in its respective segment of the Plan.

4. Future Collaboration Among Parties:

The Plan designates certain areas along the Corridor where further planning is needed. In most cases, those areas require collaboration among various Parties where their land use jurisdiction boundaries converge. In such cases, each Party commits its best efforts to undertake that collaborative planning, including providing direction to its

planning staff and/ or consultants engaged for such planning purposes. At the conclusion of any such collaborative planning process, each Party commits to adopt and abide by the land use ordinances determined appropriate and consistent with the Corridor Plan.

5. Council of Planning: The Parties agree that periodic reviews of the land uses and public investments along the Corridor will be required over time. In the spirit of effective collaboration and prudent long range planning, the Parties agree to establish a Council of Planning for the Corridor. This Council shall be comprised of at least one representative knowledgeable in regional planning issues from each Party. The
Council shall meet periodically to review and discuss land uses development trends, transportation operations and public investment requirements.

6. Future Actions Affecting Land Uses Along the Corridor: All parties recognize that future governmental entities may not be contractually bound by the adoption of this Memorandum of Understanding. In recognition of this limitation, the Parties commit to review the status of land use and public investment decisions along the Corridor periodically. Furthermore, the Parties, in good faith, commit to: **1)** review the recommendations of the Council of Planning; and **2)** meet periodically with other Parties regarding emerging issues along the Corridor. The intent of this commitment is to promote periodic discussions of municipal and/or county **goals**, plans and strategies for maintaining effective development patterns, public investment and transportation flow along NC 73.

IN WITNESS WHEREOF, the Parties, through their duly authorized representatives, have executed this Memorandum of Understanding and have attached maps relating to their respective jurisdictions, effective this _____ day of _____, 2004.

COUNTY OF CABARRUS

By

_____

_____

(Title)

COUNTY OF LINCOLN

By

_____

_____

(Title)

COUNTY OF MECKLENBURG

By

_____

_____

(Title)

CITY OF CONCORD

By

_____

_____

(Title)

CITY OF KANNAPOLIS

By

_____

_____

(Title)

TOWN OF CORNELIUS

By

_____

_____

(Title)

TOWN OF DAVIDSON

By

_____

_____

(Title)

TOWN OF HUNTERSVILLE

By

_____

_____

(Title)

CABARRUS – ROWAN METROPOLITAN PLANNING COMMISSION

By

_____

_____

(Title)

CENTRALINA COUNCIL OF GOVERNMENTS

By

_____

_____

(Title)

LAKE NORMAN RURAL PLANNING ORGANIZATION

By

_____

_____

(Title)

MECKLENBURG – UNION METROPOLITAN PLANNING ORGANIZATION

By

_____

_____

(Title)

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

By

_____

_____

(Title)

Funding, Design and Construction

The key to implementation of the roadway improvements is having the NC 73 Corridor on the NCDOT Transportation Improvement Program (TIP). The TIP is the programming document for expenditures of State and Federal transportation funds. It identifies priorities for planning, design, right-of-way, and construction of roadway projects throughout the State, through a very prescribed process.

Currently, two sections of NC 73 are on the TIP, but neither is funded. The two sections are:

- TIP No. R-2236 A, from I-77 to Davidson-Concord Road in Mecklenburg County, and
- TIP No. R-2706 from SR 1356 in Lincoln County to SR 2145 in Mecklenburg County.

The TIP is fiscally constrained, meaning that the projected revenues match the projects programmed. This requires that project requests include a cost estimate. The implication of this for NC 73 is that addition of NC 73 improvements within the seven year horizon of the TIP would require removing or delaying other projects to maintain the funding ceiling set by the equity formula for the region. The Board of Transportation member decides if a project gets put into the TIP, with or without a completed feasibility study. A NCDOT feasibility study determines the scope of a given project, including a Right-of-way and construction cost estimate.

A project can only be recommended for inclusion on the TIP through the mutual concurrence of the Metropolitan Planning Organization (MPO) and NCDOT. Each MPO develops its own needs list which is submitted to the NCDOT. Through a series of joint meetings, a Local TIP (LTIP) is developed. Because of the equity formula and the requirement for fiscal constraint, only the highest priority needs are likely to be included in the State TIP.

There are two steps that will be necessary to have all of NC 73 added to the TIP List:

1. NCDOT Feasibility Study. The recommended approach for NC 73 is to request the N. C. Department Transportation to accept The NC 73 Corridor Transportation/Land Use Plan and Memorandum of Understanding as the feasibility study for NC 73. It is recommended that the full NC 73 Corridor, from US 321 to I-85, be a single feasibility study, because of the integrated nature of all of the segments, including the network roads in addition to NC 73 itself. The feasibility study for R-2705 was done in 1991 and the study for R-2155 was done in

1995, so they would need to be included as part of the overall NC 73 feasibility study, since they are outdated. The NCDOT would need to prepare a right-of-way and probable cost estimate to complete the feasibility study.

2. Add NC 73 to the Local TIP. It is recommended that one of the first actions of the Council of Planning be to initiate negotiations with MUMPO, Cabarrus-Rowan MPO and Lake Norman RPO for inclusion on their LTIP's. It will be very important for each of the LTIP's to include NC 73 as a high priority project, which will aid in having it added to the State TIP List. Once NC 73 has been added to the State TIP, it follows the prescribed process for funding, planning, design, right-of-way acquisition and construction. The priority given by the North Carolina Board of Transportation helps determine the priority of projects on the State TIP.

Jurisdiction Responsibilities

Local jurisdictions will be responsible for implementing the land use portions of the NC 73 Corridor Transportation/Land Use Plan. The kind of commitments that will be needed include:

- Maintain land use plans that are the basis for the Corridor Plan, or make changes with the concurrence of the Council of Planning that the changes would not have an adverse effect on the rest of the corridor
- Undertake area plans at locations identified in the segment plans, jointly with abutting communities where the area plans are in more than one jurisdiction
- Coordination with abutting jurisdictions to undertake area plans and to participate in the Council of Planning
- Maintain or adopt development policies that will maintain the right-of-way necessary for the appropriate road typology
- Require that developments follow the Corridor access guidelines as part of the land use and zoning approval process
- Require as part of the land use and zoning approval process that some road be funded and built as part of the developments, as indicated on the segment plans

The local jurisdictions will likely be requested to take responsibility for implementing some aspects of the roadway projects. This could place responsibility on local jurisdictions for some of the following:

- Require some pedestrian/bike trails as part of development approvals

- Possibly pay for landscape and urban design elements
- Possibly pay for sidewalks and pedestrian/bike trails
- Maybe some right of way acquisition
- Possibly maintenance of "amenities" in the right of way

The Centralina Council of Governments commitment includes:

- Participation in the NC 73 Council of Planning; and
- "Reminding" member communities of their commitments

The MPO and RPO commitment includes:

- Transportation Plan amendments as necessary to incorporate NC 73 elements.
- Supporting the NC 73 Corridor Plan through inclusion of the Corridor on the LTIP; and
- Working for inclusion of the NC 73 Corridor on the State TIP.

The NCDOT commitment includes:

- Making its "best effort" to include the recommendations set forth in the NC 73 Corridor Plan in its long range planning for the corridor; and
- Following the road typologies, access management strategy and segment plan recommendations as guidelines for the design of NC 73 projects.

Recommendations for the Council of Planning

- **COG as Convener and Staff**: It is recommended that the Centralina Council of Governments ("COG") serve as the convener for, and provide the staff functions to, the Council of Planning. Such staff functions include (but not limited to) the proposing operating by-laws, regular meeting dates and places, and minutes of meetings.

- **Communication Protocol among Jurisdictions**: With COG's assistance, the Council of Planning should recommend to the jurisdictions along the Corridor methods and frequencies of communicating information important to the Corridor's users, planners and funders. Specifically, the Council of Planning should present "State of the Corridor" reports to 1) NC Board of Transportation members having responsibility along the Corridor, 2) governing bodies of the Corridor's respective jurisdictions, and 3) economic development and planning organizations interested in the Corridor.

- **Small Area Plan Updates**: Municipalities having designated responsibilities for directing, or participating in, the development of small area plans identified in the Corridor Plan should report regularly to the Council of Planning on their planning progress (e.g., selection of consultants, scope of work, project schedule, and impacts on land uses and/or traffic volume and flow along the Corridor).

- **Developing Funding Priorities**: The Council of Planning should coordinate with the respective Metropolitan Planning Organizations and with the Lake Norman Rural Planning Organization to develop priorities among the various Corridor segments for the Local Transportation Improvement Program. Included in this coordination and prioritization process would be considering the impact of segment funding priorities to any revisions of the Thoroughfare Plan.

- **Update of Corridor Plan**: The Council of Planning should recommend updates to the NC DOT, the respective jurisdictions and planning organizations, as needed.

Recommended TIP Projects

State and Federal guidelines for TIP projects require that they begin and end at "logical termini," referring generally to major roads or highways where notable changes in traffic volumes could be expected to occur.

The following division of the 35 mile NC 73 corridor into TIP projects is based on the locations where notable changes in traffic volume are expected. The "logical termini" of these recommended project locations in most instances result in TIP projects that overlap jurisdictions. It is anticipated that this overlap will encourage the

continued and ongoing cooperation of the various county, municipal, MPO/RPO, NCDOT division and private sector jurisdictions and agencies in order to secure funding for the projects which directly affect each of them.

1. **US 321 to new NC 16, Lincoln County.** This project would all be within unincorporated Lincoln County. It is all in the jurisdiction of Lake Norman RPO (LNRPO), and all in NCDOT Division 12. Anticipated traffic volumes through this section range from 14,000 near US 321 to 36,000 near the new NC 16. Traffic east of the new NC 16 is anticipated to be notably higher than to the west. This TIP project would include the section on new alignment from US 321 to Low Bridge Road and the potential section on new alignment from Reinhardt Circle to Maxwell Farm Lane, which is the reason it is recommended as a single TIP project. Other than construction needed in the immediate vicinity of the NC 73 Bypass, recommended improvements to Salem Church Road and Hill Road should be required as part of commercial and employment center development. Because the section on new alignment from US 321 to near Airport Road would provide notable relief to the existing NC 73/NC 27, this could potentially be two TIP projects:

   1a. US 321 to Airport Road, Lincoln County, and

   1b. Airport Road to new NC 16

2. **New NC 16 to new Gilead Road (SR 2136), Lincoln and Mecklenburg Counties.** This project would be partly within unincorporated Lincoln County, partly within unincorporated Mecklenburg County, and partly within the Town of Huntersville. It is partly in the jurisdiction of LNRPO and partly in Mecklenburg-Union MPO (MUMPO). It is partly in NCDOT Division 12, and partly in Division 10. It includes a major crossing of the Catawba River. Anticipated traffic volumes range from 36,000 near new NC 16 to 50,000 near new Gilead Road. Because of the improvements proposed to Gilead Road for access to I-77 and to I-485 via Vance Road, traffic volumes are anticipated to drop from 50,000 to approximately 25,000 in each direction at this intersection. NC 73 portions of this section are all on existing alignment. Recommended improvements of Little Egypt Road from NC 73 to old NC 16, of old NC 16 and Pilot Knob Road from NC 73 to old NC 16 are recommended to be included as part of this TIP project, as they have a direct bearing on the functionality of NC 73 in the West Lake Norman segment. Other recommended roads shown as part of the bypass south of NC 73 and NC 16 should be required to be built as part of developments in the area.

3. **New Gilead Road (SR 2136) to Davidson-Concord Road (SR 2693), Mecklenburg County.** This project falls partly within each of the Town of Huntersville, the Town of Cornelius, the Town of Davidson and unincorporated Mecklenburg County. It is in the jurisdiction of MUMPO, and NCDOT Division 10. Anticipated traffic volumes range from approximately 25,000 at new Gilead Road to 32,000 at Davidson-Concord Road, peaking at I-77 in the middle of the section. Because this is the central link of the limited network for the NC 73 corridor through Huntersville, Cornelius and Davidson, it is recommended to be a single TIP project for long-range planning purposes. This section is all on existing alignment. Recommended improvements to US 21 should be included as part of this TIP project, as they have a direct bearing on the functionality of NC 73. Recommended improvements to NC 115 should be part of the transit oriented development at the proposed NC 73/NC 115 commuter rail station.

4. **Davidson-Concord Road (SR 2693) to Odell School Road (SR 1601), Mecklenburg and Cabarrus Counties.** This project falls partly with each of the Town of Davidson, unincorporated Mecklenburg County and unincorporated Cabarrus County. It is also with areas expected to eventually be annexed by the City of Kannapolis and the City of Concord. It is partly in the jurisdiction of MUMPO and partly in Cabarrus-Rowan MPO (CRMPO), and is in NCDOT Division 10. Anticipated traffic volume ranges from 38,000 at David-Concord Road to 30,000 at Odell School Road. This section is all on existing alignment. Recommended improvements to Odell School Road south of NC 73 should be included as part of this TIP project, since it is part of the Untz Road southern alternative route and will relieve traffic on NC 73, resulting in a smaller and less expensive NC 73 project. Recommended improvements to Poplar Tent Church Road/Shiloh Church Road and to Odell School Road north of NC 73 should be part of the area plan development at those two locations.

5. **Odell School Road (SR 1601) to I-85, Cabarrus County.** This project falls partly within unincorporated Cabarrus County and partly within the City of Concord. It is also with areas expected to eventually be annexed by the City of Kannapolis and the City of Concord. It is all within the jurisdiction of CRMPO and NCDOT Division 10. Anticipated traffic volume ranges from 28,000 at Odell School Road to 44,000 at I-85. Because the recently completed Kannapolis Parkway has the potential to redirect some NC 73 traffic south to I-85, this section could potentially be two TIP projects:

5a. Odell School Road (SR 1601) to Kannapolis Parkway (SR 1430), and

5b. Kannapolis Parkway (SR 1430) to I-85

This project is all on existing alignment. Recommended improvements to Odell School Road and Untz Road should be included as part of this TIP project, since they are part of the southern alternative route and will relieve traffic on NC 73, resulting in a smaller and less expensive NC 73 project.

6. **Gilead Road (SR 2136) from NC 73 to I-77, Mecklenburg County.** This project falls partly within the Town of Huntersville and partly within unincorporated Mecklenburg County. It is all within the jurisdiction of MUMPO and NCDOT Division 10. This project is the western half of the southern leg of the limited network for NC 73 through Huntersville. Anticipated traffic volumes are in the 25,000 to 35,000 range. This section is mostly on existing alignment, except for approximately the first ½ mile south of NC 73.

7. **Gilead Road (SR 2136), Huntersville-Concord Road (SR 2448) and Ramah Church Road (SR 2439) from I-77 to the proposed Prosperity Church Road Extension, Mecklenburg County.** This project falls partly within the Town of Huntersville and partly within unincorporated Mecklenburg County. It is all within the jurisdiction of MUMPO and NCDOT Division 10. This project is the eastern half of the southern leg of the limited network for NC 73 through Huntersville. Anticipated traffic volumes are in the approximately 15,000 to 20,000 range. This section is mostly on existing alignment, except for the connection between Huntersville-Concord Road and Ramah Church Road.

8. **Catawba Avenue (SR 5544) and Westmoreland Road (SR 2147) from NC 73 to US 21, Mecklenburg County.** This project falls partly within the Town of Huntersville, partly within the Town of Cornelius and partly within unincorporated Mecklenburg County. It is all within the jurisdiction of MUMPO and NCDOT Division 10. This project is the eastern half of the northern leg of the limited network for NC 73 through Huntersville. Anticipated traffic volumes are in the approximately 25,000 to 30,000 range. This section is all on existing alignment.

9. **US 21, Bailey Road and Davidson-Concord Road (SR 2693) from Westmoreland Road to NC 73, Mecklenburg County.** This project is the western half of the northern leg of the limited network for NC 73 through Huntersville. The Bailey Road and Davidson-Concord Road sections have been proposed by the Town of Cornelius and the Town of Davidson as part of the Cornelius East & Davidson-Concord Road Vision Plan. This portion of the limited network is included for informational purposes only, and is not proposed as a TIP project.

Recommended TIP Project Priorities

The priorities for the TIP projects are shown separately for NCDOT Division 10 and Division 12, since they are accounted separately under the equity formula.

Division 10 Priorities

Priority 1: New Gilead Road (SR 2136) to Davidson-Concord Road (SR 2693), Mecklenburg County. This project is currently the most congested in the corridor, with the largest projected population and the highest anticipated traffic volumes.

Priority 2: New NC 16 to new Gilead Road (SR 2136), Lincoln and Mecklenburg Counties. This project is anticipated to carry 50,000 vehicles per day by 2025. It has the potential to become a major bottleneck.

Priority 3: Davidson-Concord Road (SR 2693) to Odell School Road (SR 1601), Mecklenburg and Cabarrus Counties. This project is in the section of the corridor with the highest rate of projected population growth. It is already experiencing peak period congestion problems.

Priority 4: Odell School Road (SR 1601) to I-85, Cabarrus County. This project serves a commercial and business corridor that currently experiences congestion and access management issues. If planned as two TIP projects, 4a. from Kannapolis Parkway to I-85 would be the higher priority of the two.

Priority 5: Gilead Road (SR 2136) from NC 73 to I-77, Mecklenburg County. This project will be needed to provide diversion of traffic from NC 73. Without this project, NC 73 from Catawba Avenue to I-77 would have to be a much bigger and more expensive road project.

Priority 6 Catawba Avenue (SR 5544) and Westmoreland Road (SR 2147) from NC 73 to US 21, Mecklenburg County. This project is also needed to provide diversion of traffic from NC 73. Without this project, NC 73 from Catawba Avenue to I-77 would have to be a much bigger and more expensive road project.

Priority 7 Gilead Road (SR 2136), Huntersville-Concord Road (SR 2448) and Ramah Church Road (SR 2439) from I-77 to the proposed Prosperity Church Road Extension, Mecklenburg County. This project is needed to eventually divert traffic from NC 73 so that NC 73 will not have to be a bigger and more expensive project. The timing of this project will be affected by the Prosperity Church Road Extension and the construction of the link between Huntersville-Concord Road and Ramah Church Road as part of development in that area.

Priority 8 US 21, Bailey Road and Davidson-Concord Road (SR 2693) from Westmoreland Road to NC 73, Mecklenburg County. The priority for this section of the NC 73 corridor will be determined by the Towns of Cornelius and Davidson as part of the development of the Cornelius East & Davidson-Concord Road Area Plan.

Division 12 Priorities

Priority 1 New NC 16 to new Gilead Road (SR 2136), Lincoln and Mecklenburg Counties. This project is necessary to relieve existing congestion in the vicinity of NC 73 and old NC 16, which is steadily increasing due to the rate of development in West Lake Norman. Further, it is anticipated to carry 50,000 vehicles per day by 2025 and has the potential to become a major bottleneck.

Priority 2 US 321 to new NC 16, Lincoln County. This project will relieve congestion on existing NC 27 between NC 73 and US 321. It will also support economic development in the area around the Lincoln County Airport and between US 321 and existing NC 73. If planned as two TIP projects, 1a. from US 321 to Airport Road would be the higher priority.

Example Two:

Paris Pike, US 27/68 is a major road connecting two fast growing areas in the Lexington region. The corridor transverses Kentucky's bluegrass country of rolling hills, rock fences, lush foliage, horse farms, and older mansions. Due to growth pressures there was tremendous pressure (1 week) for widening the two lane road. Original plans to widen the road by Kentucky Transportation Cabinet would do significant damage to the cultural resources as well as open the land for undesirable development.

A Multi-jurisdiction Agreement (MOA) was thus created to control the land uses along the corridor and therefore protect the scenic heritage - see following detailed description of MOA.

Lexington – Paris Pike, KY

Inter-Local Cooperation Agreement

"The Lexington – Fayette Urban County, Bourbon County, and the city of Paris entered into an inter-local agreement under Kentucky law to create a Paris Pike Commission. The Commission is separate administrative entity whose purposes are to prepare small area land use plan for the corridor, secure its adoption by the participating city and county planning commissions, review all land use applications or proposals in the corridor as to conformity to the small area plan, and to devise a Paris Pike Corridor District Ordinance to preserve and protect the character integrity of the Paris Pike Corridor."

- Case Studies from Transportation Corridor Management: Are we Linking Transportation and Land Use Yet?

APPENDIX G

State of Florida Model Ordinance for Protecting Corridors and Right-of-way

MODEL ORDINANCE
PROTECTION OF CORRIDORS AND RIGHTS-OF-WAY

Notes to Users:

General:

This model ordinance is provided for adoption, in whole or in part, into the local land development code. Florida's local governments represent a range of size, character, and unique local situations. Thus, local governments should modify standards or procedures for consistency with local conditions and practice. Text in parentheses and italics is intended to be replaced with appropriate local terminology, such as the name of the jurisdiction, citations of plan policies, and so forth.

The model ordinance begins with general provisions and then provides the user with two options – the first option is intended for system wide application and the second option is a corridor protection overlay district. The system wide option includes numbered sections for consistency of proposed development with the long-range transportation map, right-of-way dedication, right-of-way preservation, and right-of-way acquisition. These are followed by an alternative option for designation of a corridor protection overlay district. Although a numbering system is provided here for the purposes of the model, the user should use a numbering system and format consistent with the local land development code, or other local land development regulations.

Relationship to the comprehensive plan:

This ordinance is intended to carry out the local government comprehensive plan. The user should examine the comprehensive plan to determine that an adequate planning foundation has been established for these regulations. If additional plan language is desirable, model plan language is provided as guidance for a plan amendment.

Issues related to access to corridors:

This model ordinance does not specifically address access management. The user is directed to the Model Land Development & Subdivision Regulations that Support Access Management.[1] *In adopting corridor preservation regulations, the user should consider the CUTR/FDOT model access management regulations together with other regulations of this model ordinance.*

Administrative procedures:

Separate administrative procedures are not specified in this model ordinance. The local government should integrate the regulations of this model ordinance into existing review and approval procedures for developments, because the preservation and protection measures are

[1] Williams, Kristine M., Daniel E. Rudge, Gary Sokolow, and Kurt Eichin, *Model Land Development and Subdivision Regulations That Support Access Management for Florida Cities and Counties,* CUTR and FDOT, 1994.

"triggered" by a development application in or near a protected corridor. For additional assistance on administrative procedures, the user is directed to the Model Land Development Code for Florida Cities and Counties,[2] *Article XII, or Section 23 of the Model Land Development Regulations That Support Access Management.*

The user should review variance procedures for the jurisdiction. Separate variance procedures are not included in this model ordinance, under the assumption that the opportunity would be available for variance from these provisions.

SECTION I. GENERAL PROVISIONS

1.1 *FINDINGS*

A. The *(city/county)* has adopted within the *(comprehensive plan)* a Future Transportation Map, a Long-Range Traffic Circulation Map, *(and/or)* a Thoroughfare Corridor and Right-Of-Way Protection Map to assure *(city/county)*-wide continuity of the transportation system.

Note: The *local government must have the Future Transportation Map pursuant to various provisions of* 9J-5. *It may choose to have a separate map for identifying corridors and rights-of-way to be protected, with a longer range time period than the Future Transportation Map. Each community may have a different name for the above maps. The appropriate maps should be referenced in this finding. However, it should be noted that the courts refer to the "Thoroughfare Map*".

B. It is in the best interests of the public and citizens of *(city/county)* to anticipate future needs in areas where right-of-way does not exist, in order to establish harmonious, orderly, efficient development of *(city/county)* and ensure a safe and efficient transportation system.

C. The preservation, protection, or acquisition of rights-of-way and corridors is necessary to implement coordinated land use and transportation planning, to provide for future planned growth, and to ensure that the transportation system is adequate to meet future needs, and complies with the concurrency requirements of the *(comprehensive plan)* and this land development code.

D. The interim use of land in future rights-of-way provides a means for economic use of land until that land is needed for transportation purposes.

E. Future corridors and rights-of-way must be protected from permanent encroachment to ensure availability consistent with long-range plans for the *(city/county)*.

Note: The user should include any additional findings that are appropriate to the local circumstances.

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[2] McPherson, John, David Coffey, and Gail Easley, 1989. Model Land Development Code for Florida Cities and Counties. Florida Department of Community Affairs, Tallahassee.

1.2 *INTENT AND PURPOSE*

The intent of this ordinance is to preserve, protect, and/or acquire rights-of-way and transportation corridors that are necessary to provide future facilities and facility improvements to meet the needs of growth projected in the *(city/county)* comprehensive plan and to coordinate land use and transportation planning. These rights-of-way and corridors are part of a network of transportation facilities and systems, which provide mobility between and access to businesses, homes, and other land uses throughout the jurisdiction, the region, and the state. The *(governing body of city/county)* recognizes that the provision of an adequate transportation network is an essential public service. The plan for that transportation network is described in the *(city/county)* comprehensive plan, and implemented through a capital improvements program, other policies and procedures, and through regulations on land use and development as well as regulations to preserve and protect the corridors and rights-of-way for the transportation network. The purpose of this ordinance is to foster and preserve public health, safety, comfort, and welfare and to aid in the harmonious, orderly, and beneficial development of the (*city/county)* in accordance with the comprehensive plan.

1.3 *RELATIONSHIP TO COMPREHENSIVE PLAN, OTHER PLANS, REGULATIONS, LAND STATUTES*

A. The adoption of this ordinance implements the following goals, objectives, and policies of the *(city/county)* comprehensive plan. In addition, this ordinance is a part of the land development code for *(city/county).*

Note: The user should specify those objectives and policies of the local comprehensive plan which support this ordinance, including those contained in the future land use, transportation, and capital improvements elements.

B. This ordinance is consistent with policies of the *(name)* Metropolitan Planning Organization and the policies of the Florida Department of Transportation set forth in the Florida Transportation Plan.

Note: The user should specify the MPO by name; if the local government is not within an MPO area, none of the references to MPO should be used. In addition, the user may wish to cite specific statutory authority for corridor designation as support for this implementing ordinance.

1.4 *APPLICABILITY*

This ordinance shall apply to all land within the jurisdiction of *(city/county)* which abuts or is located within existing or future corridors and rights-of-way as identified in *(insert name of appropriate plan, map, or other document that identifies applicability, such as the Future Transportation Map, Long Range Traffic Circulation Map, a Major Thoroughfare Map, or other document).*

1.5 *SEVERABILITY*

If any section, subsection, paragraph, sentence, clause, or phrase of this ordinance is for any reason held by a court of competent jurisdiction to be unconstitutional or otherwise invalid, the validity of the remaining portions of this ordinance shall continue in full force and effect.

1.6 *EFFECTIVE DATE*

This ordinance shall be effective on *(date)*.

OPTION ONE

SECTION 2. CONSISTENCY OF PROPOSED DEVELOPMENT WITH LONG RANGE TRAFFIC CIRCULATION MAP

A. All development shall be consistent with the Major Thoroughfare Map or Future Transportation Map.

B. Conceptual, preliminary, and final site plans and preliminary or final subdivision plats submitted for review shall include information regarding the location of any corridors designated on the *(city/county)* Major Thoroughfare Map or Future Transportation Map which cross, abut, or are within 1000' of the property of the proposed project. During the review process, the *(name of reviewing body, such as Technical Review Committee, Development Review Committee, or Planning Commission)* shall consider the proximity of the proposed project to future corridors for purposes of assessing the impact, if any, of the project on future corridors.

C. Either preliminary or final approval shall include findings regarding the consistency of the proposed project with the future corridor, and shall note any impacts that may be anticipated from the proposed project, along with recommendations for mitigating such impacts. If the proposed project is inconsistent with the future corridor location, it may be necessary for the applicant to modify the proposed project or to propose an amendment to the *(city/county)* comprehensive plan. However, it is intended that corridor locations shall have some flexibility so as to be compatible with proposed development, so long as the basic intent to provide continuity of the corridor is met.

Note: This section is concerned primarily with corridors where studies have not yet been done to establish the alignment. Most jurisdictions have within their development review process requirements to identify specific and detailed information regarding existing roads and planned improvements [within the TIP and/or the CIE]. Therefore, such information is not presented herein. The user is directed to such documents as the Model Land Development Code from DCA or the Model Land Development Regulations that Support Access Management from the Center for Urban Transportation Research for additional assistance in the latter situation.

It is suggested that this language, or a modification of this language, be included in the section of the local government land development code which deals with development review, whether site plan review, major development review, or subdivision plat review.

SECTION 3. RIGHT-OF-WAY DEDICATION

A. Projects proposed adjacent to or abutting a right-of-way for which improvements are shown in the current five-year Capital Improvements Program, shall, as a condition of approval, dedicate lands within the project site which are necessary for that right-of-way to *(city/county).* Such dedication shall occur by recordation on the face of the plat, deed, grant of easement, or other method acceptable to *(city/county).* Land to be dedicated shall be only that shown by engineering study and/or design to be necessary for the planned improvements. The amount of land required to be dedicated also shall not exceed the amount that is roughly proportionate to the transportation impacts to be generated by the proposed project unless the landowner is to be compensated in some fashion for any additional dedicated land.

Note: This section provides for the mandatory dedication of right-of-way for projects proposed adjacent to roads with planned improvements within the next five years [the time period of the adopted Capital Improvements Element]. The local government may prefer to use three years to coincide with the time period used for concurrency determinations. The important feature is that the planned improvement be considered imminent, as opposed to long range and therefore potentially less certain.

Local governments must tailor their dedication requirements to comply with Dolan v. City of Tigard, 1994 WL 276693 (June 24, 1994). *In* Dolan, *the United States Supreme Court held that mandatory dedications of land as a condition of development approval must be related both in nature and extent to the impact of the proposed development. Although the Court stated that no precise mathematical calculation is required, it held that the amount of the dedication must be roughly proportionate to the project's impacts.*

B. The value of dedicated right-of-way shall be a credit against transportation impact fees assessed to the proposed project. In the event that the impact fees calculated for the proposed project are greater than the lands within the project site (the site prior to any dedication or other set-aside) needed for future right-of-way, only the amount of land representing a value approximately equal to the impact fee shall be required to be dedicated.

Note: Generally, credits for right-of-way donations are offered only when the impact fee ordinance included right-of-way costs in the computation of the impact fee structure.

C. The *(reviewing agency)* may consider the transfer of development rights, based on the gross density or intensity allowable on the site prior to any set-aside for future right-of-way. The transfer will be from land to be dedicated to other portions of the site. Approval of transfer of development rights may include consideration of variances from site design standards necessitated by the increased net density or intensity of the portions of the site receiving the transfer of development rights.

Note: The provision for transfer of development rights is based upon a transfer within the site, rather than to another parcel of land. Should the local government have a TDR program that

allows parcel-to-parcel transfer or the issuance of TDR certificates, paragraph (C) should be modified for consistency.

D. The *(reviewing agency)* may grant approval of transportation capacity (for concurrency purposes) based upon the approved density or intensity for the project. Such preliminary approval of transportation concurrency and capacity shall be specified as a total number of vehicle trips allowable for the site. The preliminary concurrency approval shall be valid for three years, and eligible for renewal for a period of two years.

Note: The concurrency approved should be expressed in the same terms as the concurrency calculations in use by the local government, which may or may not be vehicle trips. In addition, there should be a specific expiration date, consistent with the concurrency management system in place for the local government.

SECTION 4. RIGHT-OF-WAY AND CORRIDOR PRESERVATION

4.1 *PROTECTION FROM ENCROACHMENT*

A. Corridors designated in the *(city/county)* comprehensive plan shall be protected from encroachment by structures, parking areas, or drainage facilities except as otherwise allowable in this ordinance and the comprehensive plan.

B. Where an alignment has been established by engineering study and/or design, the setbacks of section *(cross-reference to that portion of the local government land development regulations which identify setbacks from roads and rights-of-way)* shall be considered sufficient for preservation of the right-of-way.

C. Where an alignment has not been established, the following techniques shall be considered for protecting the corridor from encroachment:

(1) The applicant may propose and *(city/county)* shall establish an approximate alignment, consistent with the need to provide continuity of the corridor as well as to meet conceptual site planning needs of the project.

(2) The approximate alignment shall be the basis for applying normal setbacks as specified in section *(cross-reference number)*. When the specific alignment is later established through engineering study and design, the setback may be reduced through administrative approval up to, but not exceeding, 10.0% of the otherwise required setback, provided that such reduction is necessitated solely by the final alignment of the right-of-way.

Note: It is the intent that corridors through vacant land be compatible with the proposed development, and that the specific alignment have flexibility, so long as the intent to provide continuity of the corridor as well as the ability of the future facility to function are both met.

(3) Clustering of structures may be allowable in order to retain full development rights while sitting structures, so as to avoid encroachment into the corridor. Clustering of structures under this provision of *(local government code)* may include administrative approval to reduce setbacks between buildings within a project site, reduction of buffers within a project site, or variation of other site design requirements. This provision is not intended to reduce perimeter bufferyards designed to ensure compatibility of adjacent uses.

Note: This provision should be used where clustering is not already allowable in the site design standards of the local government. This ensures that clustering, which may reduce standards for space between buildings within a site, or result in a greater net density on the portion of the site developed, is allowable.

(4) Reduction of required setbacks, other than adjacent to the corridor, may be considered, in order to ensure that the location of structures does not encroach into future corridors. A reduction of up to, but not exceeding, 10.0% of the otherwise required setback may be approved administratively, provided such reduction is necessitated solely by the proposed alignment of the corridor. Greater reductions must be reviewed by the *(name of reviewing agency which considers variances).*

4.2 *INTERIM USES TO BE RELOCATED*

A. The purpose of this section is to allow certain uses for a specified period of time within portions of a site designated as future right-of-way, or within a future corridor. The allowance of uses on an interim basis allows the property owner to make economic use of the property until such time as the right-of-way is needed for facilities or improvements.

B. The following uses, directly related to the primary use of the project site, may be allowable on an interim basis:

(1) Stormwater retention, wet or dry, to serve the project site.
(2) Parking areas to serve the project.
(3) Entry features for the project such as signage, gatehouses, architectural features, fountains, walls, and the like.
(4) Temporary sales or leasing offices for the project site.

C. The following conditions shall apply to the approval of interim uses specified in section 4.2.B:

(1) As a condition of preliminary or final development order, the applicant agrees to relocate these uses elsewhere on the project site. A developer's agreement shall specify the terms and conditions, including timing, of the relocation required by this section.

(2) Relocation of approved interim uses shall be beyond the setback area, subject to the provisions of section 4.1.C (2) above.

(3) Relocation sites shall be identified on the development plans submitted with the preliminary or final development order application. Sites identified for future relocation shall be reserved for that purpose.

D. The stormwater retention facility may, at the discretion of *(city/county and/or FDOT)*, be incorporated into the design of the future transportation facility retention facilities. Should this option be chosen by the *(city/county and/or FDOT),* the developer need not relocate the storm water retention facility.

4.3 *INTERIM USES TO BE DISCONTINUED*

A. The following interim uses, not necessarily directly related to the principal use of the site, may be allowable:

(1) Recreational facilities such as playgrounds, ball fields, outdoor courts, exercise trails, walking paths, bridal paths, and similar outdoor recreational uses.

(2) Produce stands, produce markets, farmers markets, and the like.

(3) Periodic uses such as boat shows, automobile shows, RV shows, "tent" sales, and the like.

(4) Periodic events such as festivals, carnivals, community fairs, and the like.

(5) Plant nurseries and landscape materials yards.

(6) Agricultural uses, such as pasture, crop lands, tree farms, orchards, and the like, but not including stables, dairy barns, poultry houses, and the like.

(7) Storage yards for equipment, machinery, and supplies for building and trades contractors, and similar outdoor storage.

(8) Outdoor advertising.

(9) Golf driving ranges.

(10) RV or boat storage yards.

Note: It is the intent in this section to list those uses that have a relatively low investment in structural improvements to the site. However, the local government may wish to include other uses - such as mini-storage facilities or other warehousing - where the investment in structural improvements is amortized over a relatively short period of time. If such uses are included, additional language in the developer's agreement should specify that the eventual acquisition of the land for right-of-way does not include acquisition of the structures, nor does the future value of the land include value of the structures. The intent is to recognize that a potentially wider range of uses may be allowable provided that the developers agreement recognizes the discontinuance, and that the government is not willing to pay for the structures, but is willing to allow a long enough interim use period for the owner to amortize the investment.

B. The following conditions shall apply to interim uses specified in section 4.3.A:

(1) As a condition of preliminary or final development order, the applicant agrees to discontinue these uses on the project site by a specified date. A developer's agreement shall specify the terms and conditions of both the approval of interim uses pursuant to this section and the discontinuance of interim uses as required in this section.

Note: It may be desirable to include a time period within the ordinance. Such period should be sufficient to allow economically feasible use of the site. Time periods may be as long as 10 or more years for new corridor locations. The designation of a date for discontinuance is most likely a negotiable issue and should be capable of being extended.

(2) Bufferyards shall be provided, consistent with provisions of section *(cross-reference buffer section of the local land development code),* in order to ensure compatibility of interim uses with other uses adjacent or nearby.

(3) Interim uses shall meet site design requirements for setbacks for the district.

(4) Impervious surface ratios for interim uses shall not exceed 20.0% of the specified interim use site.

Note: Because the list of interim uses includes a wide range of intensities and impact, it may be desirable to specify a buffer rather than to rely on existing bufferyard standards. It may also be desirable to include conditions regarding locations of access drives, percent of the site to be devoted to the interim use, parking standards, lot area, and so on.

SECTION 5. RIGHT-OF-WAY ACQUISITION

5.1 *VOLUNTARY DEDICATION OF FUTURE RIGHT-OF- WAY*

A. The provisions of this section apply to projects proposed adjacent to or abutting a future corridor or right-of-way for which improvements are anticipated beyond the five-year period of the Capital Improvements Program. A property owner may, at any time during the application process for preliminary, conceptual, or final approval of a project, voluntarily dedicate lands within the project site that are in the future corridor or right-of-way.

B. Where an alignment has been established by engineering study or design, lands to be dedicated shall be within the designated future right-of-way.

C. Where an alignment has not been established, an approximate alignment shall be established.

Note: It is the intent that corridors through vacant land be compatible with the proposed development, and that the specific alignment have flexibility, so long as the intent to provide continuity of the corridor as well as the ability of the future facility to function are both met.

5.2 *PURCHASE OF FUTURE CORRIDORS AND RIGHTS-OF- WAY*

A. The *(city/county/other agency)* may enter into an agreement to purchase, in fee simple, the lands designated as a future corridor or right-of-way.

B. The *(city/county/other agency)* may enter into an agreement to purchase the development rights to lands designated as a future corridor or right-of-way. Development rights are defined as either the number of residential units allowable on the portion of the site designated, or as the total floor area allowable in non- residential use of the portion of the site designated.

Note: If the local government has a program to purchase development rights, it should be referenced in this section. If no program exists, and the local government wishes to establish one for this purpose, the following issues should be addressed: method of establishing fair market value, timing of purchase, whether or not the rights purchased are available for purchase by other developers in other parts of the jurisdiction, and approval processes for the purchase.

C. The *(city/county/other agency)* may enter into an agreement to purchase a perpetual easement including lands designated as a future corridor or right-of- way. Land included within the easement shall be either that land designated through engineering study or design as necessary for future right-of-way, or that land established as an approximate right-of-way. An approximate right-of-way shall be consistent with the need to provide continuity of the corridor as well as to meet conceptual site planning needs of the project.

Note: The *agreement should specify the uses granted with the easement to the local government and the interim uses remaining with the property owner. If this section is to be used, the local government should establish a method for determining the value of the easement.*

OPTION TWO

SECTION 2. CREATION OF A CORRIDOR PROTECTION OVERLAY DISTRICT

2.1 *PURPOSE*

The purpose of the corridor protection overlay district is to impose special development regulations on areas of *(city/county)* which have been designated in the *(city/county comprehensive plan)* as future transportation corridors. The general location of these corridors has been established through inclusion on the Future Transportation Map of the *(city/county)* comprehensive plan. In order to ensure the availability of lands within the corridor to meet

needs as shown in the comprehensive plan, additional review is required of proposed development which potentially lies within or adjacent to the designated corridor.

2.2 *PERMISSIBLE AND PROHIBITED USES*

The underlying uses, as determined by the applicable land use district on the Future Land Use Map and the *(zoning code or other use regulation)* remain undisturbed by the creation of this overlay district.

2.3 *DENSITY AND INTENSITY OF DEVELOPMENT*

The gross density and intensity of development shall be that allowable by the underlying land use and zoning district. However, as a condition of approval of the development, such density and intensity shall be transferred to portions of the site that lie outside the corridor. Such transfer may result in a greater net density on the developed portion of the project. This section is not intended to grant approval to the location of development in environmentally sensitive or otherwise protected lands within the project site. It is intended to allow approval of the transfer of development rights within the contiguous lands of the project, without additional review procedures beyond the review for a preliminary or final development order.

2.4 *SITE DESIGN REQUIREMENTS*

A. In order to protect the future corridor from potential encroachment by structures, parking areas, or drainage facilities, setbacks will be required from the approximate alignment. This approximate alignment shall be consistent with the need to provide continuity of the corridor as well as to meet conceptual site planning needs of the project. The normal setbacks shall be as required by the underlying land use *(or zoning district - specify cross-reference to the appropriate section of the code).* When the final alignment is established through engineering study and design, the setback may be reduced through administrative approval up to, but not exceeding, 10.0% of the otherwise required setback, provided that such reduction is necessitated solely by the final alignment of the corridor.

B. Clustering of structures may be allowable in order to retain full development rights while sitting structures so as to avoid encroachment into the corridor. Clustering of structures under this provision of the *(local government code)* may include administrative approval to reduce setbacks between buildings within a project site, reduction of buffers within a project site, or variation of other site design requirements. This provision is not intended to reduce perimeter bufferyards designed to ensure compatibility of adjacent uses.

2.5 *REVIEW OF PROPOSED DEVELOPMENT FOR CONSISTENCY WITH THE COMPREHENSIVE PLAN*

A. Conceptual, preliminary, and final site plans and preliminary or final subdivision plats submitted for review shall include information regarding the location of any corridors

designated on the *(city/county)* Major Thoroughfare Map or Future Transportation Map which cross, abut, or are within 1,000 feet of the property of the proposed project. During the review process, the *(name of reviewing body, such as Technical Review Committee, Development Review Committee, or Planning Commission)* shall consider the proximity of the proposed project to future corridors for purposes of assessing the impact, if any, of the project on future corridors.

B. Either preliminary or final approval shall include findings regarding the consistency of the proposed project with the future corridor, and shall note any impacts that may be anticipated from the proposed project, along with recommendations for mitigating such impacts. If the proposed project is inconsistent with the future corridor location, it may be necessary for the applicant to modify the proposed project or to propose an amendment to the *(city/county)* comprehensive plan. However, it is intended that corridor locations shall have some flexibility so as to be compatible with proposed development, so long as the basic intent to provide continuity of the corridor is met.

Note: If the local government chooses to use the Overlay District Option, it may nevertheless use this section alone. It may also use Section 3 (R.O.W. Dedication). If Section 4 is used, some modification may be necessary to acknowledge differences between the underlying land uses and the interim uses.

Source: Prepared by Hennigar &Ray, Inc., Hamilton Smith & Associates, and Apgar, Pelham, Pfeiffer & Theriaque, for the Florida Department of Transportation, as amended 12/1/01.