US 1 Corridor Study

No. CAMPO 2005-02

Final Report
November 2006

RS&H Architects-Engineers-Planners, Inc.

In Association with:

Mulkey Engineers and Consultants
Kittelson & Associates, Inc.
Urban Collage, Inc.
Kimley-Horn & Associates, Inc.

Capital Area Metropolitan Planning Organization

TTA

Town of Wake Forest

RS&H Team
Architects-Engineers-Planners, Inc.

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Capital Area Metropolitan Planning Organization
North Carolina Department of Transportation
Triangle Transit Authority
City of Raleigh
Town of Wake Forest

Consultant Team: RS&H Architects-Engineers-Planners, Inc.

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City of Raleigh North Carolina
State of North Carolina Department of Transportation
RS&H Team Architects-Engineers-Planners, Inc.

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E.0 Executive Summary

This document summarizes the results of the US 1 Corridor Study. A copy of the full report is contained in the compact disc at the end of this report.

E.1 Introduction

The US 1 corridor is located in the northeastern part of the Raleigh, North Carolina metropolitan area and is important for the movement of people and goods in the region. Regional and local development pressure along the corridor has increased traffic congestion along portions of US 1. In an effort to plan and manage future land use and transportation within the corridor the Capital Area Metropolitan Planning Organization (Capital Area MPO) has developed this comprehensive corridor management plan for US 1. This corridor management plan establishes the goal of preserving the functional integrity of this facility and managing development within the study corridor. This coordinated approach to land use and transportation planning will enable state and local governments to provide a framework for the orderly and efficient development of various land uses within the corridor study area while providing for the transportation needs of both local and regional travel along US 1.

E.1.1 Project Description and Project History

US 1 is a multi-lane roadway that travels through the City of Raleigh and northeastern Wake County, where it is referred to as Capital Boulevard. It is one of the primary north-south highways serving a rapidly growing area within the Raleigh – Durham Metropolitan Region. The US 1 study corridor includes both highway and rail facilities beginning at I-540 in Raleigh, and extends northward to Park Avenue (US 1A North) in Franklin County. The study corridor serves multiple travel purposes. The route carries interstate travel linking Raleigh with I-85. The route is also a regional link for commuters traveling between downtown Raleigh and the northeastern suburban area. With the extension of I-540 to the east, its role in commuter travel will continue to serve regional trips and connectivity in the Greater Raleigh area. Finally, this section of US 1 serves as a local circulation route for north-south travel in northeastern Wake and southern Franklin counties, since the secondary road system is not complete. The North Carolina Department of Transportation (NCDOT) includes US 1 in its list of Strategic Highway Corridors and proposes to upgrade the facility between I-540 and I-85 to an urban freeway in the future. Although this future freeway project is part of Capital Area MPO's Long Range Transportation Plan, the improvements are not yet included (unfunded) in the current NCDOT 2006-2012 Transportation Improvement Program (TIP).

E.1.2 Project Purpose

The US 1 Corridor Study project developed an integrated multimodal transportation plan that provides for a high level of mobility along the US 1 Corridor while maintaining a high quality environment for the surrounding communities by providing for well-planned and sustainable growth along this corridor.

E.1.3 Oversight and Study Teams

Oversight Team Meeting

The Capital Area MPO, through an inter-agency agreement between the City of Raleigh, NCDOT, the Town of Wake Forest, and the Triangle Transit Authority (TTA), has retained RS&H Architects-Engineers-Planners, Inc. (RS&H) to complete this project. The Capital Area Metropolitan Planning Organization served as the lead agency and was responsible for initiating the corridor study and establishing both the oversight and technical oversight committees that were responsible for guiding the development of the study. The oversight committees were made up of representatives from various state and local agencies, as well as citizens living within the study area.

RS&H was the prime consultant for the project, responsible for the technical issues and analysis of various transportation alternatives, ultimately arriving at the locally preferred alternative. Mulkey Engineers and Consultants led the functional design, developed engineering cost estimates, and identified and evaluated cultural and natural features along the corridor. Kittelson & Associates, Inc. provided the transit modeling, analysis and alternatives recommendations. Urban Collage, Inc. collected existing land use and zoning information including identifying future potential land use opportunities. Urban Collage also created several conceptual site development plans and photomontages depicting how the US 1 corridor could develop and look in the future. Kimley-Horn & Associates, Inc. led the traffic and transit modeling efforts to evaluate different multimodal transportation alternatives.

E.1.4 Study Objectives

The product of this project was the development of a locally preferred alternative that is best suited to meet the corridor's transportation needs, while minimizing impacts to the surrounding environment. The US 1 Corridor project achieved the following objectives:

1. Established a **clear vision** of the transportation role(s) of the US 1 corridor with respect to mobility: trip purpose and distribution (work, non-work, through travel), trip length (interstate, regional, or local travel), and travel mode (auto, truck, transit, pedestrian, bicycle).
2. Formulated a **multimodal transportation plan** that incorporated highway, transit, pedestrian and bicycle modes and complements the proposed land use and development patterns while sustaining mobility within and throughout the region.
3. Analyzed the **physical layout** and number of general purpose travel lanes needed to serve the US 1 corridor travel demand in 2030.
4. Considered **community character** and potential impacts throughout the planning process.

E.2 Existing Conditions

The US 1 study corridor is located in Wake and Franklin Counties. The project study area started south of I-540 and extended north to the Park Avenue (US 1A) intersection in Franklin County, a length of approximately 14 miles. Three cities were included in the study area: the City of Raleigh, the Town of Wake Forest, and the Town of Youngsville.

E.2.1 US 1 Highway

The Capital Area MPO classifies US 1 (Capital Boulevard) as a major thoroughfare/freeway within the study area. The US 1 facility is primarily a four-lane divided highway, north of I-540. The right-of-way varies between 200 and 450 feet in the study corridor; however, the majority is only 200 feet wide. Some non-contiguous two-way frontage roads exist in the corridor. Inside and outside safety shoulders exist throughout the corridor. The median is generally 30 feet wide and depressed to handle the open drainage system for the highway. There are two existing interchanges, at I-540 and, at NC 98 and one interchange that is now opened at the new NC 98 Bypass in the Town of Wake Forest. When the study began 13 signalized intersections existed along the corridor. Over 100 access points currently exist and directly connect to US 1.

E.2.2 CSX Railroad

The rail line within the study area is the CSX 'S' line and runs from Hamlet, North Carolina to Henderson, North Carolina. This CSX corridor is also part of the future Southeast High Speed Rail corridor from Washington DC to Charlotte, North Carolina. Also, the TTA is considering plans to use a portion of this rail corridor for future commuter rail service.

The CSX railroad alignment basically parallels US 1 in the study area. The railroad alignment is a single-track system currently providing freight service with a frequency of less than five trains per day. The railroad right-of-way within the study area varies between 70 and 180 feet, the majority being approximately 100 feet wide and only approximately 70 feet wide through downtown Wake Forest. The CSX rail alignment potentially may provide a possible transit feature in the study area.

E.2.3 Traffic Analysis

The 2005 existing conditions capacity analysis was derived by comparing North Carolina Level of Service high-speed arterial capacity thresholds with the 2005 annual average daily traffic (AADT) count data. The majority of the 2005 AADT was obtained from NCDOT and supplemented by several 24-hour traffic counts conducted by the City of Raleigh.

The section between I-540 and Gresham Lake Road has high traffic volumes. However, the current six travel lanes and control of access right-of-way provide acceptable Level of Service conditions for this section of US 1 (Level of Service D). The arterial capacity analysis indicated that on the study corridor between Gresham Lake Road and South Main Street (US 1A South), traffic demand either approaches or exceeds the roadway capacity limits (Level of Service E or F). The section of US 1 between South Main Street in Wake County and Sprint Headquarters' entrance in Franklin County has four travel lanes, lower traffic volumes and greater signal spacing, functions at Level of Service D. From the Sprint Headquarters' entrance to the northern project limits, Park Avenue, US 1 generally operates at LOS C conditions where existing traffic are low. Level of Service E was considered the threshold for exceeding capacity. The three following segments along US 1 exceed the arterials capacity:

- Between Gresham Lake Road and Durant Road
- Between Durant Road and Burlington Mills Road
- Between Burlington Mills Road and South Main Street (US 1A)

Re-occurring Afternoon Peak Period Traffic Congestion

E.2.4 Safety Conditions

The US 1 Corridor Study included an evaluation of the crashes that have occurred along US 1 from south of I-540 in Wake County to north of Park Avenue in Franklin County. Crash data was obtained from NCDOT for the 36-month period from November 2001 through October 2004. There were approximately 1,100 crashes for this area during the three-year study period.

The US 1 Corridor was divided into eight segments to analyze safety needs along the corridor. The safety analysis calculated the crash rates along the US 1 study corridor by segment and compared the results with the statewide averages. Five out of eight segments were above the statewide crash average rates, indicating an existing safety concern in these sections.

E.3 Public Involvement

A proactive public involvement program, provided opportunities for the public and various interest groups, to participate in the investigation of corridor alternatives and ultimately provided guidance in forming the locally preferred alternative.

Public Outreach at Triangle Town Center

The input received during project meetings proved that people want to have a say in transportation-decision making for their community. Public involvement for the project followed guidelines established by the Capital Area Metropolitan Planning Organization (Capital Area MPO).

The US 1 Corridor Study public involvement program addressed the need to have an ongoing information exchange from the very beginning of the study throughout its end. Major components of the program included the following:

- Developing a detailed website with study updates and electronic comment feedback
- Creating two printed newsletters
- Developing a database list of interested parties and emailing notices and updates
- Conducting two public information workshops in March and July, 2006
- Direct outreach using a storefront display at the Triangle Town Center Mall
- Advertising in the Raleigh News & Observer, the Carolinian, Que Pasa and Wake Weekly newspapers
- Sending press releases via the City of Raleigh Public Affairs Office
- Advertising in Spanish formats

First Public Information Workshop

E.4 Potential Development Opportunities

The study area has tremendous potential for attracting growth and development based on its location and land availability. While the 2030 Long Range Transportation Plan anticipates mostly commercial development along US 1, recent trends show a large number of single-family, duplex and townhouse communities currently underway. Based on the team's analysis, future growth is anticipated to be both infill redevelopment projects and the development of vacant land. Prominent infill areas within the corridor are located at the Gresham Lake Industrial Park, which could support higher-density uses, and the Towns of Youngsville and Wake Forest. Infill development should be sensitive to the historic fabric and compatible with the existing scale and architecture of the Towns. Additionally, there are numerous opportunities for redeveloping older retail uses or apartment complexes; with many such properties having direct access to US 1.

Opportunities for developing vacant land can be found throughout the study area; with a significantly greater amount of vacant land in southwestern Franklin County, the northernmost section of the study area. While the study area has over 3,500 acres of vacant land and 2,900 acres of agricultural or forested land, new development should aim to preserve environmental resources and be focused at strategic locations with adequate infrastructure. The interchange at I-540 and the south side of the NC 98 Bypass are such locations appropriate for higher intensity uses.

E.5 Conceptual Transit Alternatives

The transit elements considered during the US 1 Corridor study included the Southeast high-speed rail line, TTA Regional rail, bus rapid transit, commuter bus, and local bus service. Ultimately the corridor plan included two commuter bus routes from downtown Wake Forest to downtown Raleigh and the Research Triangle Park (RTP). Each route would operate only during the weekday AM and PM peak period at a 20-30 minute frequency; with limited off-peak runs (in the future). Additional long range transit improvements included an extension of the regional rail system north of Spring Forest Road. This would only be feasible after phase one of the rail system is developed and land use density was sufficient along the corridor to support this service.

Commuter Bus Option

E.6 Screening Process

The size and diversity of the US 1 corridor make it likely that a variety of transportation improvements will be needed for the existing system to meet all of the corridor's future needs. Therefore, the study examined a variety of transportation modes and improvements. A screening process was used based on an understanding of the corridor conditions, needs, and goals. The process enabled the study team to evaluate alternatives using both general and detail criteria to screen from four alternatives to a final locally preferred alternative.

The US 1 Corridor Study used a three-phase process to screen, evaluate and select viable alternatives. This three-phase screening process, allowed assembly of a large array of competing criteria in matrix format for evaluation. The screening process gave the project team the ability to sort a large array of complex alternatives to obtain several viable comprehensive, long-range land use and transportation alternatives suitable for further analysis. The Phase One process provided a first-cut analysis of the alternatives to screen out the "fatally flawed" concepts so that only viable corridor alternatives are carried forward into the Phase Two analysis. The locally preferred alternative is done as an outcome of the Phase Three analysis. The results from each step of the screening process were presented to and discussed by the oversight teams, coordination with NCDOT, and the evaluations of opinions and concerns expressed at the public meetings. This coordination enabled the project team to identify and present a locally preferred alternative (LPA).

The US 1 Corridor Oversight Team and the US 1 Technical Oversight Group had determined the inclusion or elimination of specific transportation and land-use elements to produce a single comprehensive, long-range multi-modal transportation plan for the US 1 Corridor. The transportation plan takes into account cost, constructability, environmental impacts and construction staging. The analysis of the alternatives led to the conclusion that all of the major components evaluated in this corridor study (general purpose lanes, special purpose lanes, transit and compatible land use) are necessary elements of the LPA. The LPA provides congestion relief by having an acceptable LOS throughout the corridor. The new controlled access freeway design presents a great opportunity to improve public safety in the corridor; and coordinates well with the Triangle Transit Authority's (TTA's) and Capital Area Transit's (CAT's) plans for transit in the corridor and promotes economic development along the corridor with the implementation of an improved local roadway system. The Capital Area MPO Transportation Advisory Committee (TAC) is the policy board that will be ultimately responsible for adopting the LPA.

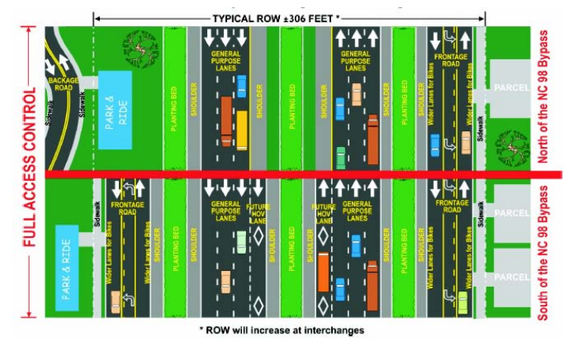
E.7 The Locally Preferred Alternative

Alternative III-A including highway plus transit alternatives was selected as the locally preferred alternative whose elements are listed below. Exact alignments and interchange/grade separation locations, will be decided during the future design phases. A conceptual planning cross-section of the LPA is shown in Figure ES-1.

- Three general-purpose lanes in each direction from I-540 to US 1A North, Franklin County, plus auxiliary lanes where appropriate
- Either one special use HOV lane or one additional general purpose lane in each direction from I-540 to NC 98 (Durham Road)
- Two-way, three lane frontage roads paralleling US 1 or backage roads in each direction to provide access to adjacent properties
- Sufficient right-of-way to accommodate an ultimate eight-lane freeway facility, three-lane frontage roads and raised landscaped planting beds
- Ten interchanges (three existing) at major cross-streets
- Nine grade separations (two existing) to provide east-west multimodal connectivity
- Wide outside traffic lanes for shared motorized vehicles and cyclist use for the proposed frontage and backage roads
- Sidewalks along the frontage or backage roads, adjacent to the development
- Park and ride lots and transit stops along the frontage or backage roads

Figure ES-1 provides a cross section diagram of the Locally Preferred Alternative and Figure ES-2 at the back of the report illustrates the improvements:

Figure ES-1:
Typical Plan
Locally Preferred Alternative



E.7.1 Transit Locally Preferred Alternative Components

The locally preferred alternative for transit in the US 1 corridor focuses on the initial development of limited premium bus service (in the form of commuter bus service) to downtown Raleigh and the Research Triangle Park. As development density increases in the US 1 corridor over time, the commuter bus service could be transformed into more of a bus rapid transit operation, still with limited stops given the conversion of US 1 to a freeway facility south of NC 98, but with improved service frequency and hours of operation. Also over time added fixed-route bus service on cross streets in the US 1 corridor would be provided as development density increases and the street network develops. Continued paratransit service will be provided to serve lower density areas and to serve the elderly and handicapped that can't use regular fixed-route service. The plan calls for the development of key transit stations along the US 1 corridor south of NC 98, with smaller park-and-ride facilities developed initially to support the commuter bus service and to encourage added formation of carpools and vanpools. With development increases in the future, these park-and-rides would be expanded as needed, potentially becoming structured facilities perhaps tied to adjoining transit-oriented development.

In the long-term, the configuration of the transit system in the US 1 corridor will be influenced by whether or not regional rail is extended into the corridor. If regional rail is extended north of Spring Forest Road, a

logical terminus would be at the NC 98 Bypass on the south side of Wake Forest, with an intermediate station at Burlington Mills Road to intercept US 1 traffic from the north. With regional rail service, the bus service along US 1 should be viewed as a support service to regional rail, serving areas between the regional rail stations, with greater service frequency and hours of operation. This could take the form of bus rapid transit service along US 1 and/or local bus service on the US 1 frontage roads.

These proposed transit improvements should be coupled together with the highway improvement as identified in the LPA.

E.7.2 Pedestrian and Bicycle Facilities

Within the US 1 corridor there are various existing and proposed pedestrian and bicycle facilities. Future greenway and bikeway plans along the corridor include the following primary features:

- Rerouting the Mountains to Sea Trail to cross beneath US 1 at the Neuse River crossing
- Constructing the Perry Creek Greenway
- Constructing the Richland Creek Greenway
- Various new on-road and off road bicycle routes and greenways in the vicinity of the US 1 corridor, including the Town of Wake Forest, Wakefield and the Triangle Town Center Mall
- Frontage and backage roads along US 1 between I-540 and Park Avenue in Franklin County with widened outside lanes for bicycles and sidewalks for pedestrians

Enhanced pedestrian and bicycle connections are suggested to be maintained across the US 1 Corridor at the seven proposed grade-separated crossings., Grade-separated crossings will generally be more pedestrian and bicycle-friendly than interchanges due to the size of the structure, higher vehicular cross-street volumes and heavy ramp movements associated with entering and exiting traffic from US 1. Therefore pedestrian and bicycle movements should be encouraged and integrated into the design at all the grade-separated crossings except at the CSX railroad.

E.7.3 Land Use and Economic Development Opportunities

New development will occur over several years, but planning a framework for the integration of land use and transportation improvements is a key objective of the US 1 Corridor Study. While the scope of the effort did not allow for a detailed Future Land Use Plan, key considerations affecting land use and zoning have emerged from the analysis and input of stakeholders and interests. Given the length of the corridor, future land use and development will, as today, likely vary from more intense urban development near I-540 to less intense development and more rural preservation on the periphery of the study area to the north.

E.7.4 Planning Construction and Right of Way Cost Estimates

Planning-level construction cost estimates were developed for the locally preferred alternative. The right-of-way and construction cost estimates were based on 2006 average unit costs obtained from the NCDOT's Project Services Unit.

Table ES-1 summarizes the Year 2006 planning-level construction and right-of-way cost estimates. The below LPA estimate, however does not include the estimated costs associated with the US 1 and I-540 interchange reconstruction or the three sets of raised landscaped planting beds along the corridor.

Table ES-1:
Right-of-Way and Construction Estimates

Parcels Impacted	343
Total Takes	37
Total Acreage Taken	296 Acres
Right-of-Way Costs	$103,716,000
Construction Costs	$383,311,000
Total Estimated Costs	$487,027,000

Proposed US 1 at Gresham Lake Road

E.7.5 Implementation of the Recommended Locally Preferred Alternative

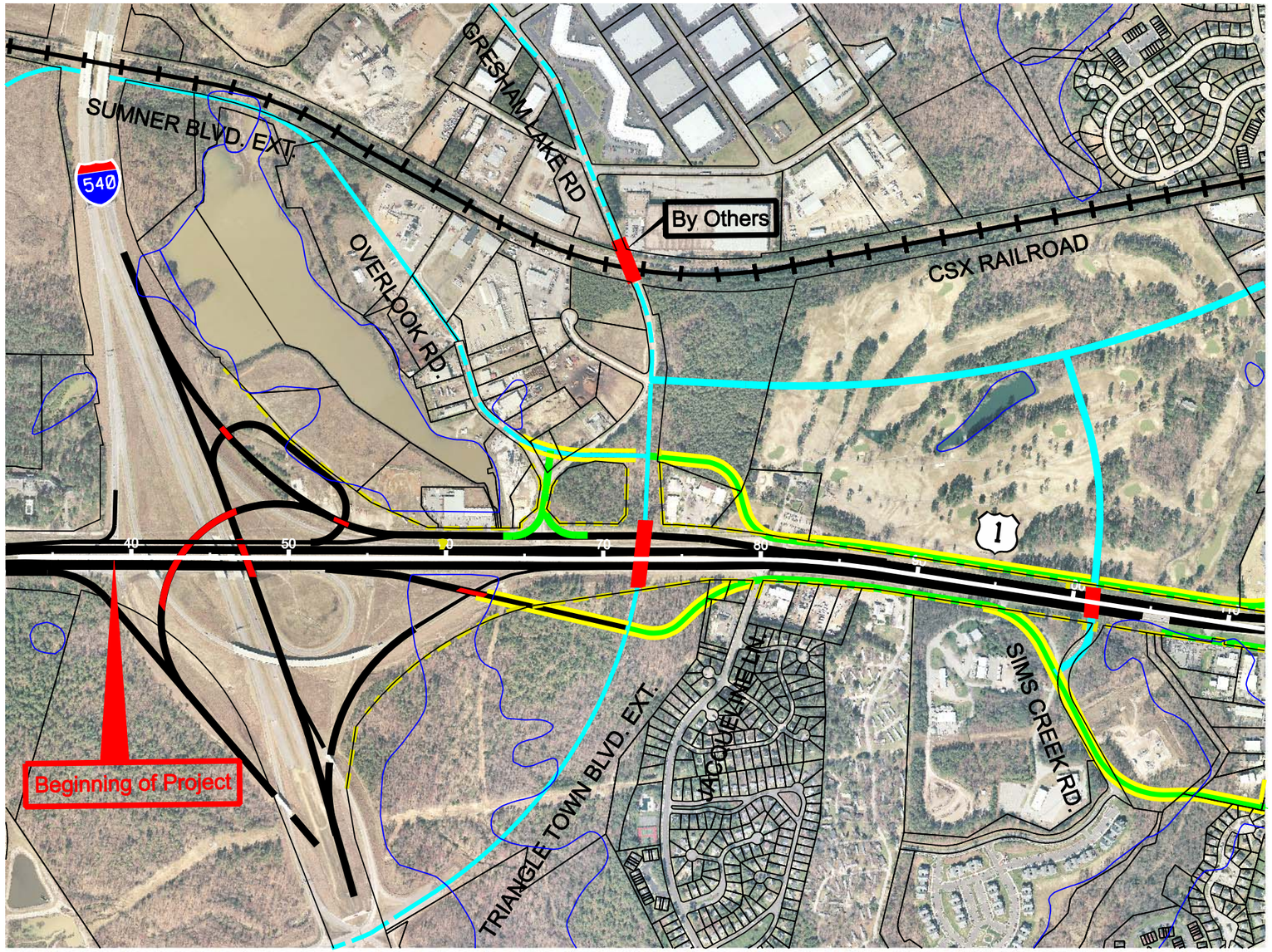
The planning process focused on ensuring that the US 1 corridor would accommodate multiple modes of transportation, and a set of land uses that would enable people and goods to move through the corridor efficiently. The locally preferred alternative is displayed in a series of ten maps in Figure ES-2. The implementation sequence for this plan has been outlined as follows:

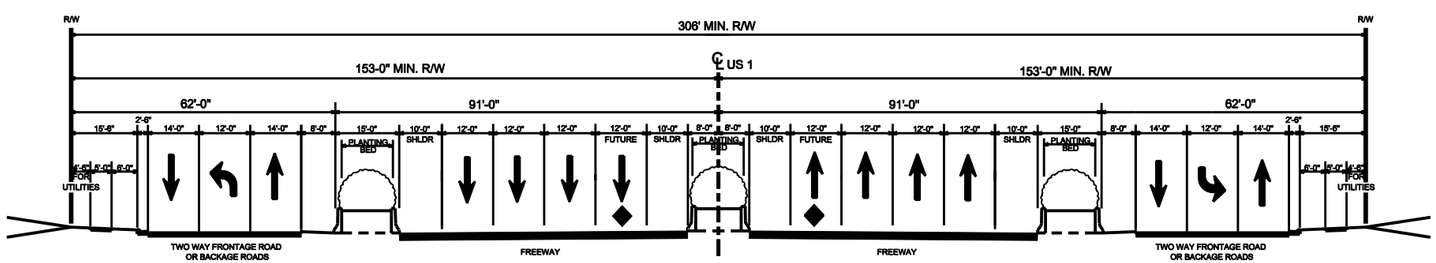
- LPA adoption by the Capital Area MPO Transportation Advisory Council
- Local jurisdictions execute the Memorandum of Understanding
- NCDOT access management, traffic signal system and ITS planning
- NCDOT schematic design and environmental documentation
- TTA and CAT transit planning
- NCDOT plans, specifications, and estimates
- Construction

US 1 at Gresham Lake Road Today

E.8 US 1 Corridor Memorandum of Understanding

The Memorandum of Understanding, drafted by the participating local planning agencies is a key step in realizing the interrelationship of transportation facility design, development standards and desired land use. Through the Memorandum of Understanding, participating agencies would use the organizing committee as a forum to jointly agree upon land use changes to realize the multimodal transportation and land use vision of the US 1 Corridor Study. This agreement could be supplemented over time with more detailed considerations of area-specific land use, zoning and transportation improvements. While the Memorandum of Understanding will provide the framework for future land use changes, the study team recommends that the constituent jurisdictions conduct an additional localized study into specific future land use, zoning modifications and local street/access networks. As of November 2006, the Memorandum of Understanding is under consideration for adoption by participating local jurisdiction.





TYPICAL SECTION - Between Gresham Lake Road and NC 98 (Durham Rd)

3 GENERAL PURPOSE LANES AND 1 SPECIAL PURPOSE LANE IN EACH DIRECTION, WITH TWO-WAY FRONTAGE OR BACKAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES AND OUTSIDE PLANTING BEDS WILL NOT BE CONTINUOUS

LEGEND

- EXISTING R/W
- PROPOSED R/W
- CSX RR
- STREAMS, RIVER, WETLANDS
- PARCEL BOUNDARY
- PROPOSED FREEWAY IMPROVEMENTS
- PROPOSED TWO -WAY FRONTAGE ROADS
- EXISTING TWO -WAY FRONTAGE ROADS
- EXISTING LOCAL ROADS
- PROPOSED LOCAL ROADS
- PROPOSED STRUCTURES

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Capital Area Metropolitan Planning Organization

MULKEY ENGINEERS & CONSULTANTS

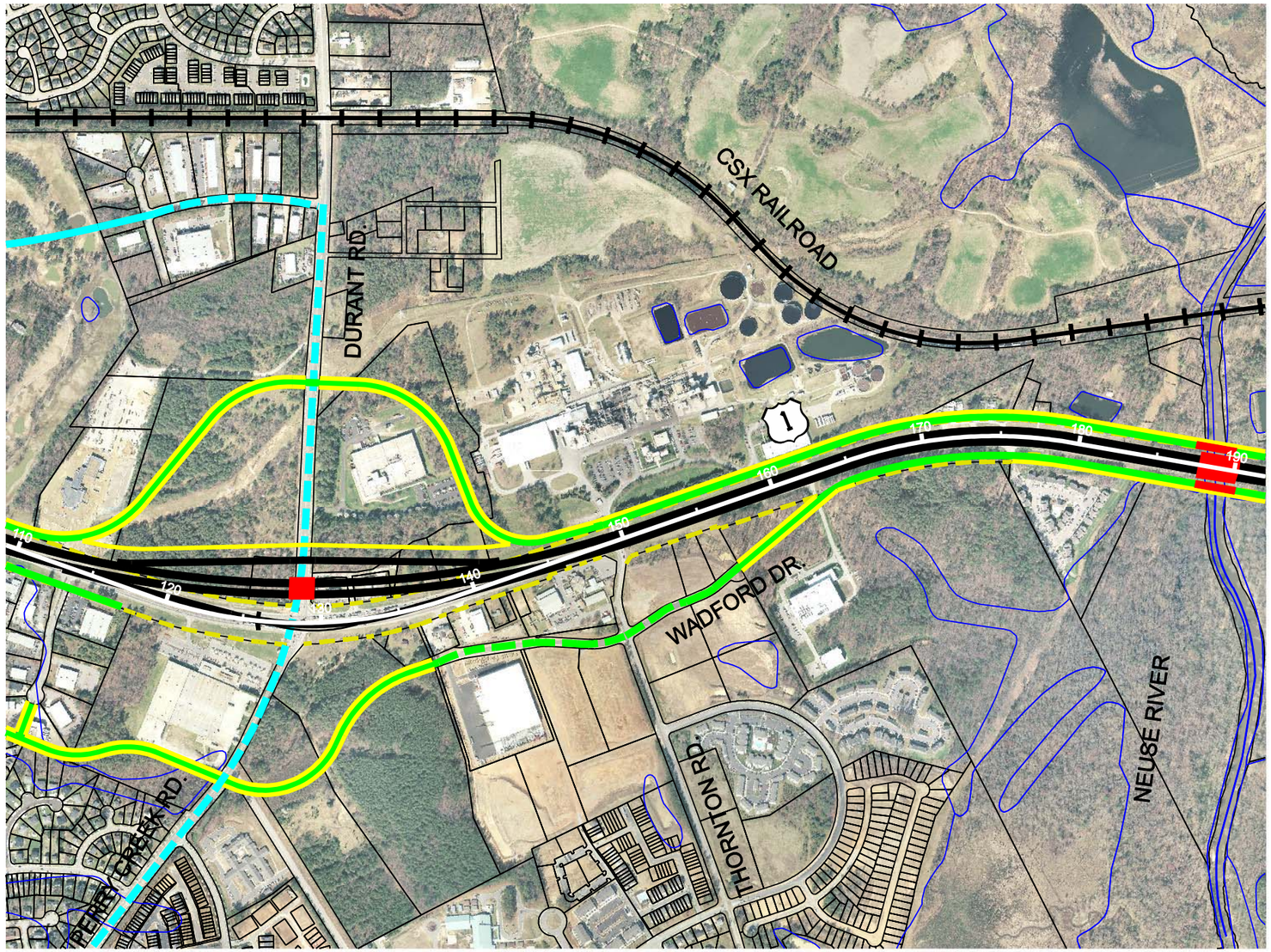
RS&H Architects - Engineers - Planners, Inc. Team

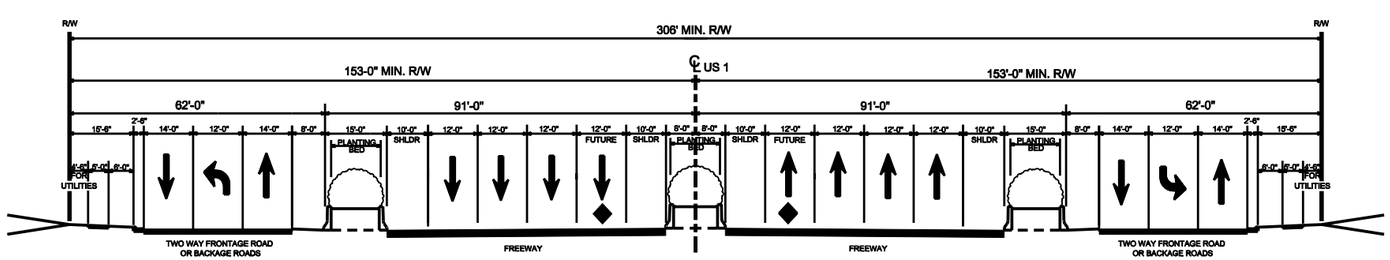
PHASE 3 ANALYSIS

Alternative III-A
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-2
Sheet 1 of 10





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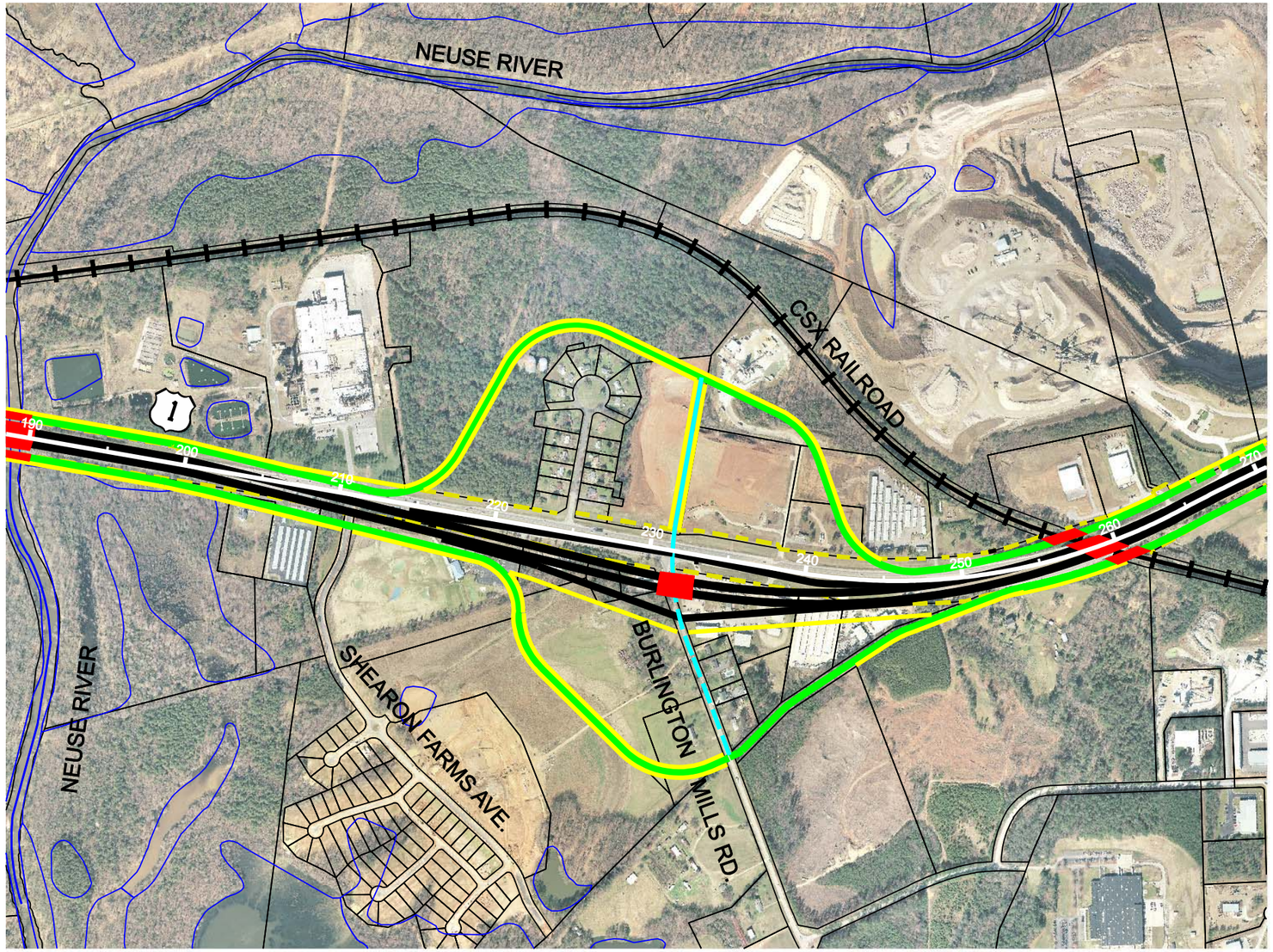
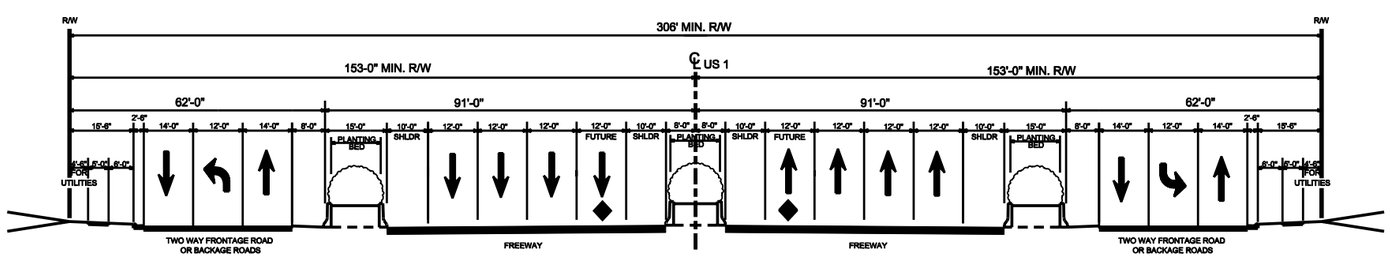
PHASE 3 ANALYSIS

Alternative III-A
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-2
Sheet 2 of 10





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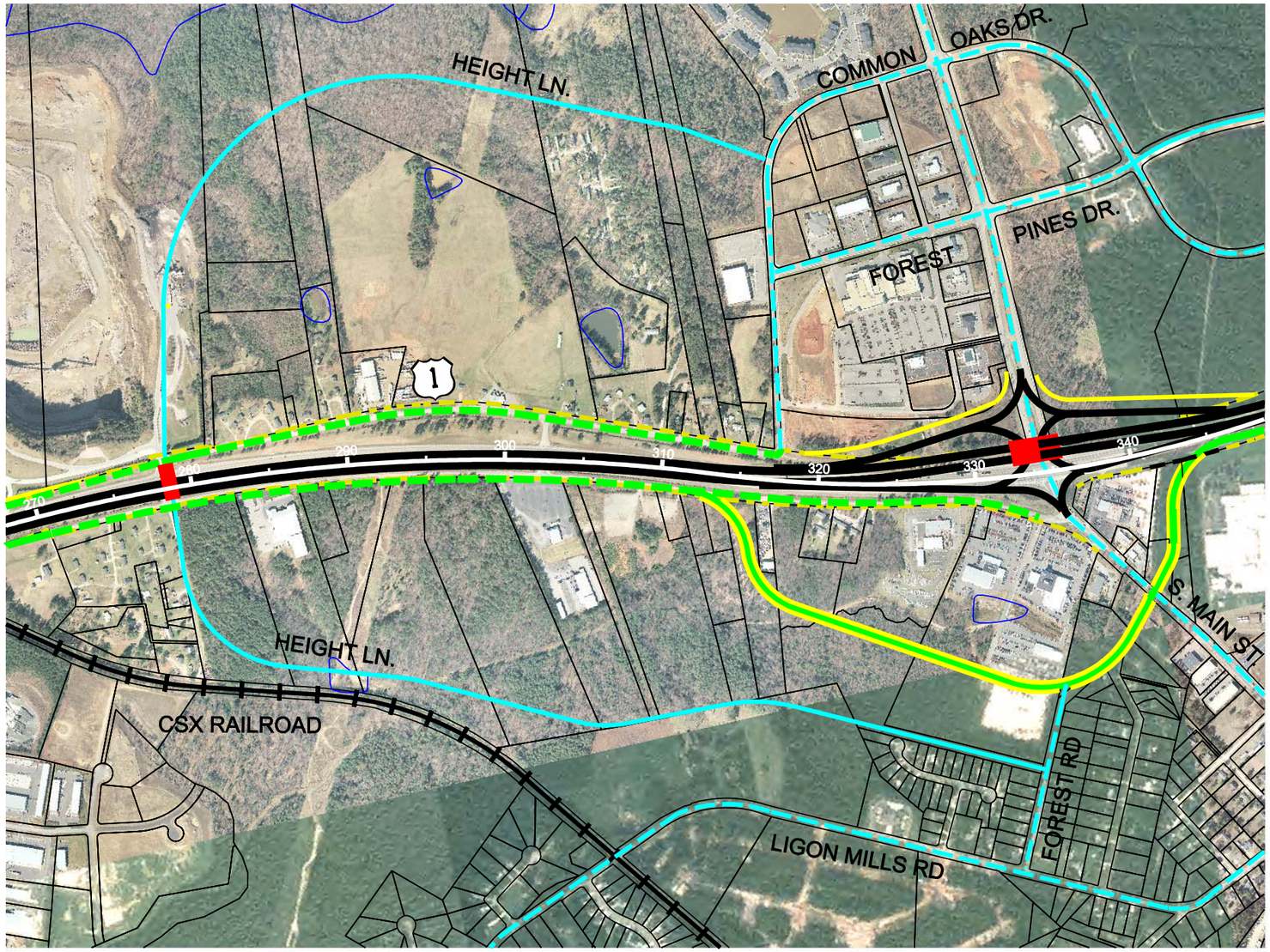
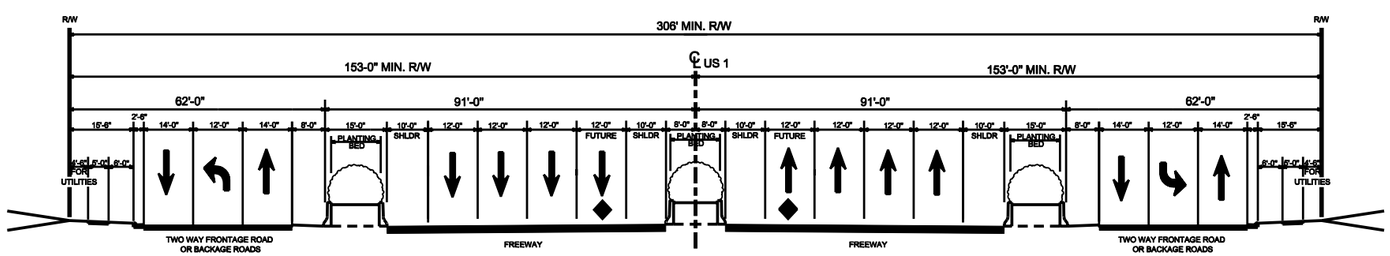
PHASE 3 ANALYSIS

Alternative III-A
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-2
Sheet 3 of 10





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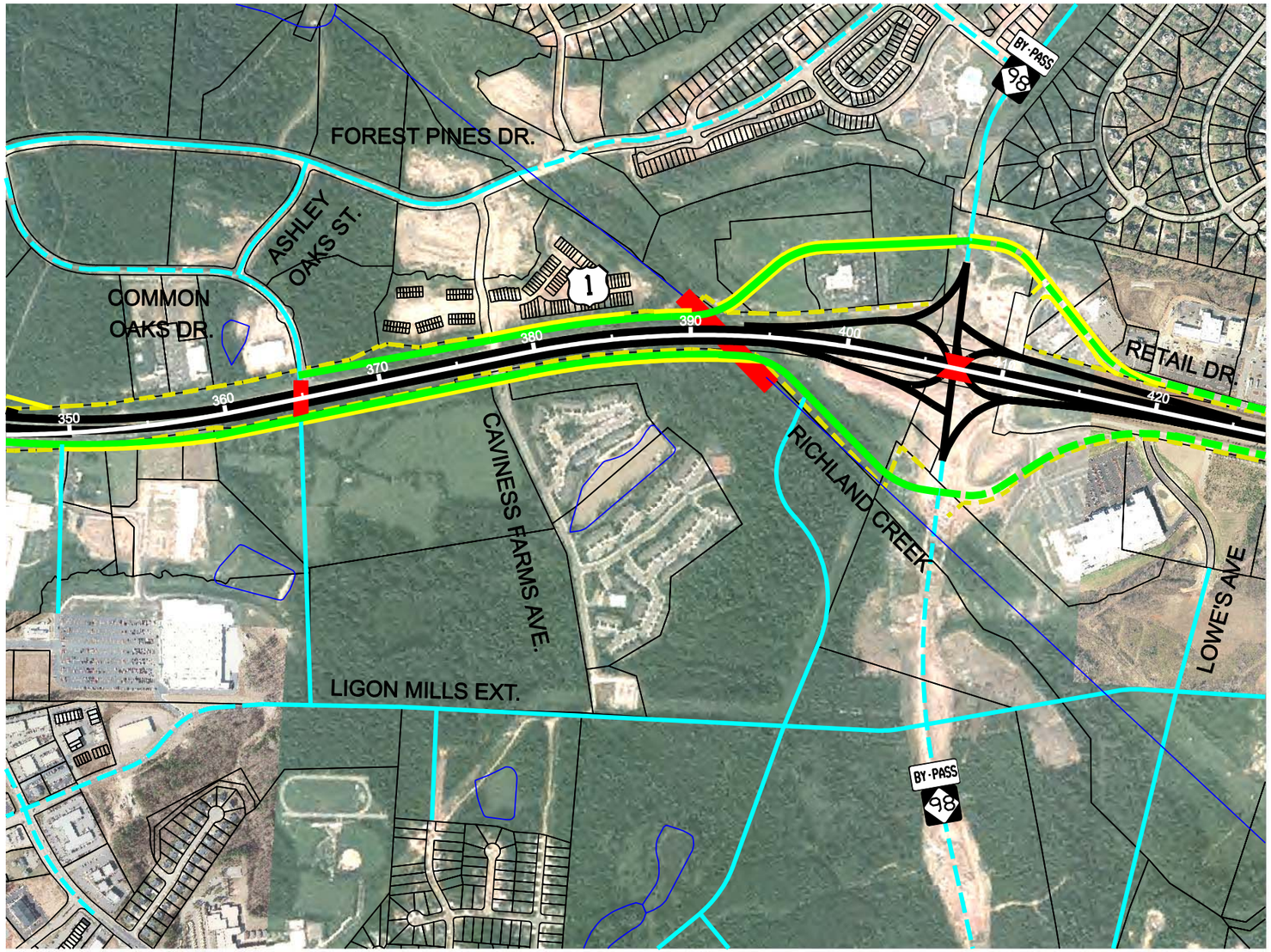
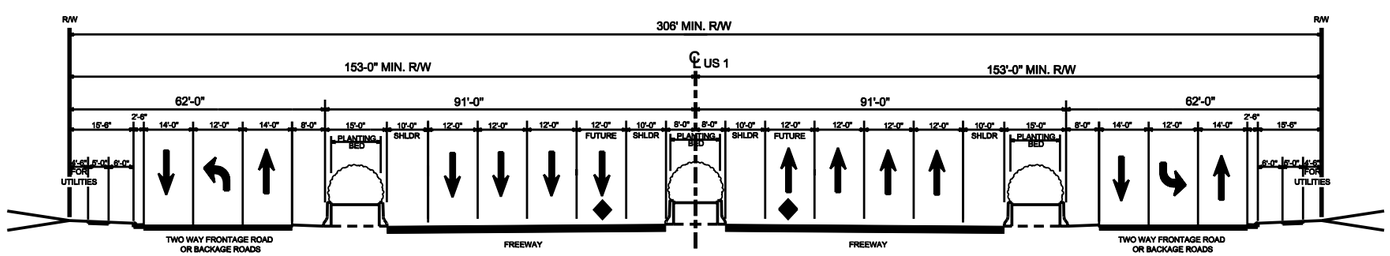
PHASE 3 ANALYSIS

Alternative III-A
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-2
Sheet 4 of 10





TYPICAL SECTION - Between Gresham Lake Road and NC 98 (Durham Rd)

3 GENERAL PURPOSE LANES AND 1 SPECIAL PURPOSE LANE IN EACH DIRECTION, WITH TWO-WAY FRONTAGE OR BACKAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES AND OUTSIDE PLANTING BEDS WILL NOT BE CONTINUOUS

LEGEND

- EXISTING R/W
- PROPOSED R/W
- CSX RR
- STREAMS, RIVER, WETLANDS
- PARCEL BOUNDARY
- PROPOSED FREEWAY IMPROVEMENTS
- PROPOSED TWO -WAY FRONTAGE ROADS
- EXISTING TWO -WAY FRONTAGE ROADS
- EXISTING LOCAL ROADS
- PROPOSED LOCAL ROADS
- PROPOSED STRUCTURES

0 400 800 1600
Feet

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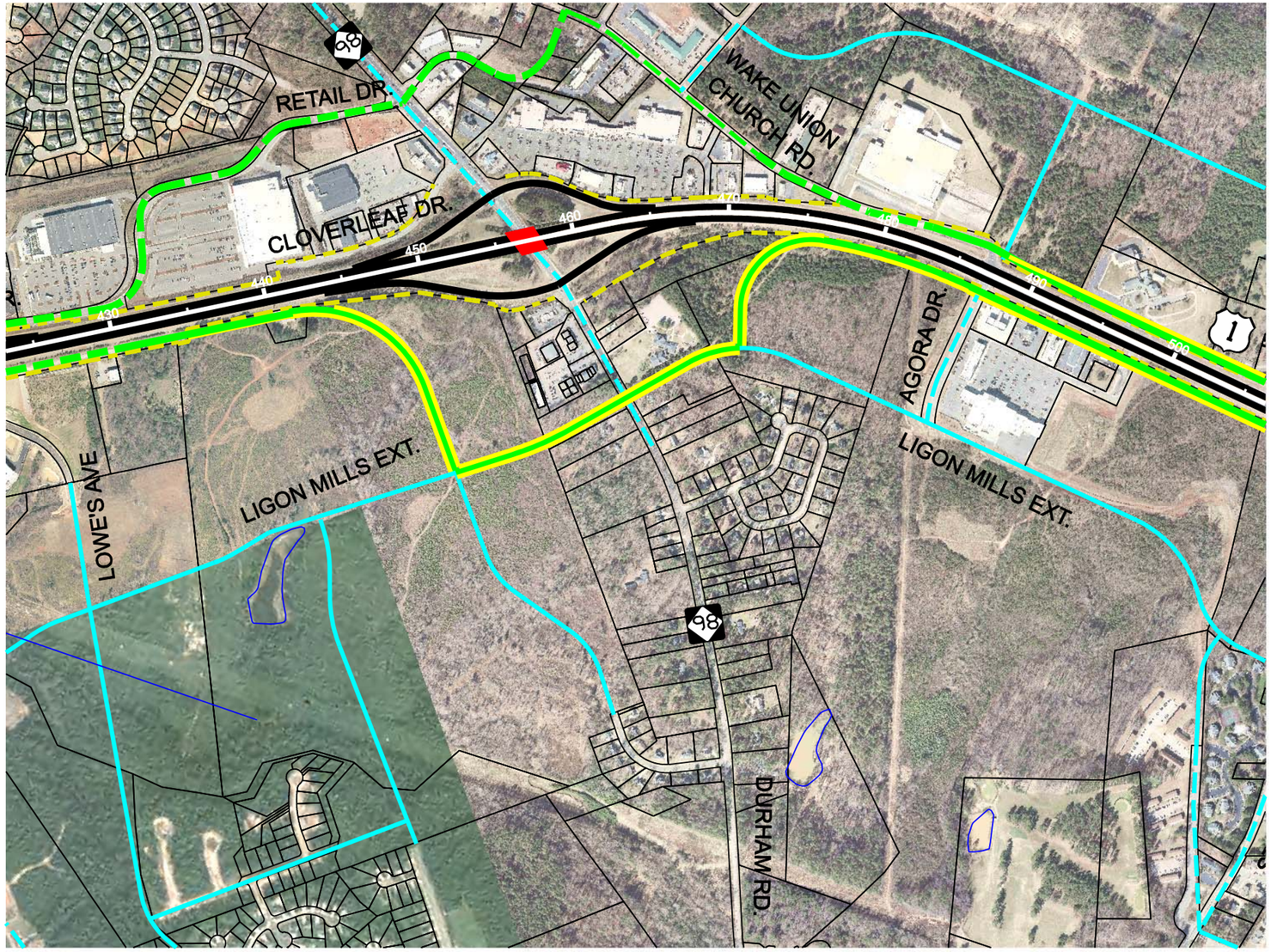
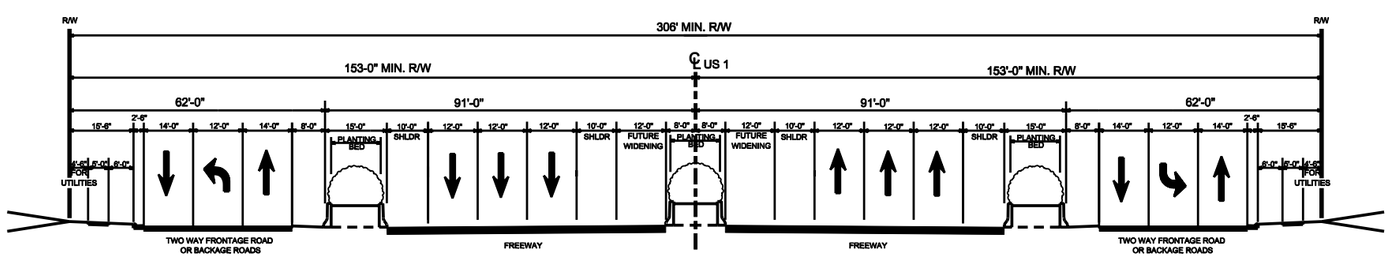
PHASE 3 ANALYSIS

Alternative III-A
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-2
Sheet 5 of 10





TYPICAL SECTION - Between NC 98 (Durham Rd) and US 1A, North (Park Ave.)

3 GENERAL PURPOSE LANES WITH TWO-WAY FRONTAGE OR BACKAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES AND OUTSIDE PLANTING BEDS WILL NOT BE CONTINUOUS

LEGEND

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- PROPOSED R/W
- CSX RR
- STREAMS, RIVER, WETLANDS
- PARCEL BOUNDARY
- PROPOSED FREEWAY IMPROVEMENTS
- PROPOSED TWO -WAY FRONTAGE ROADS
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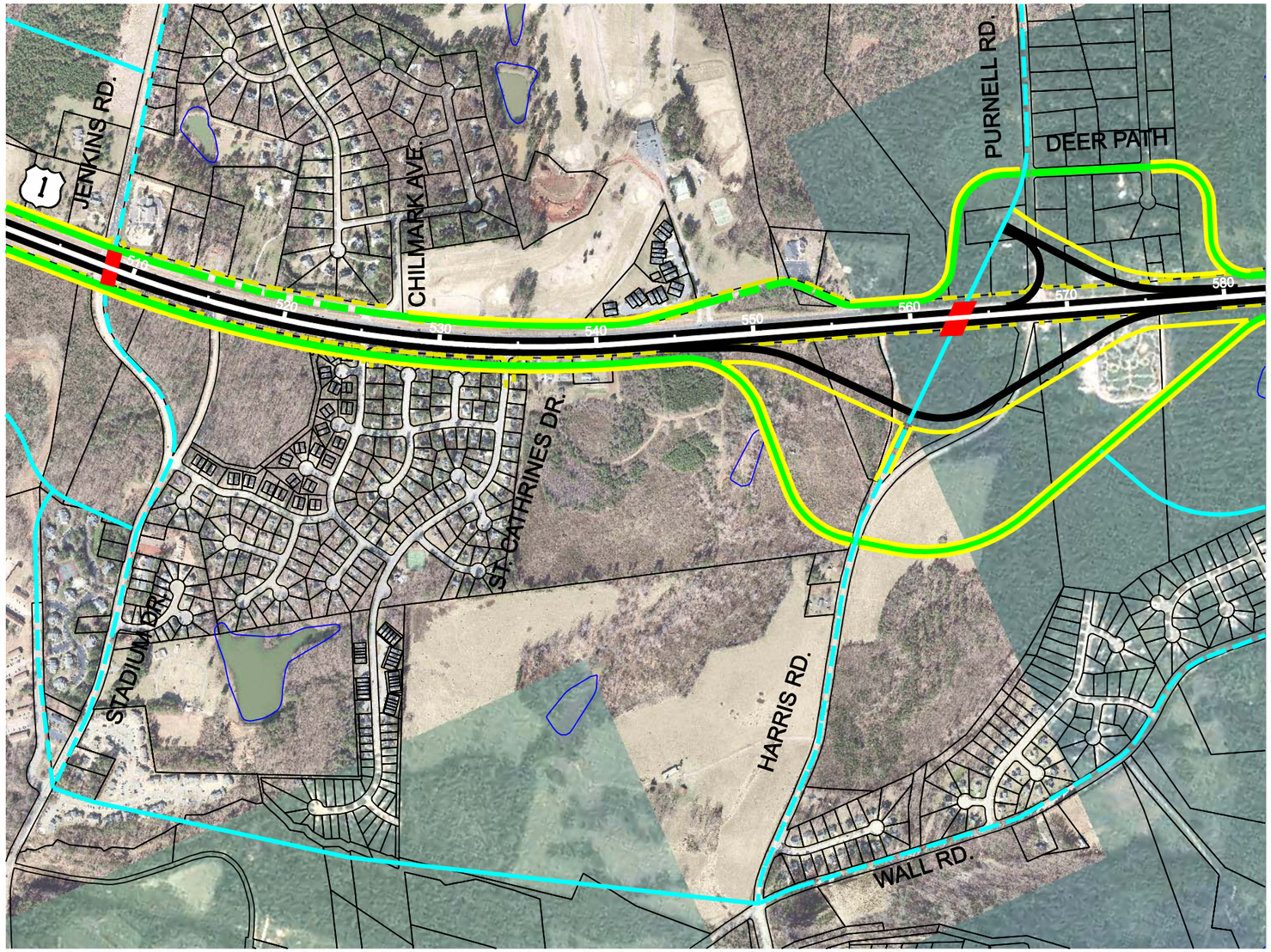
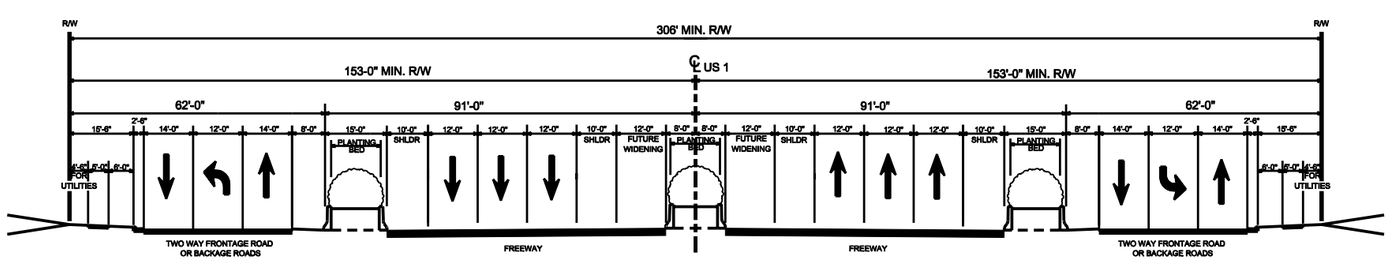
PHASE 3 ANALYSIS

Alternative III-A
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-2
Sheet 6 of 10





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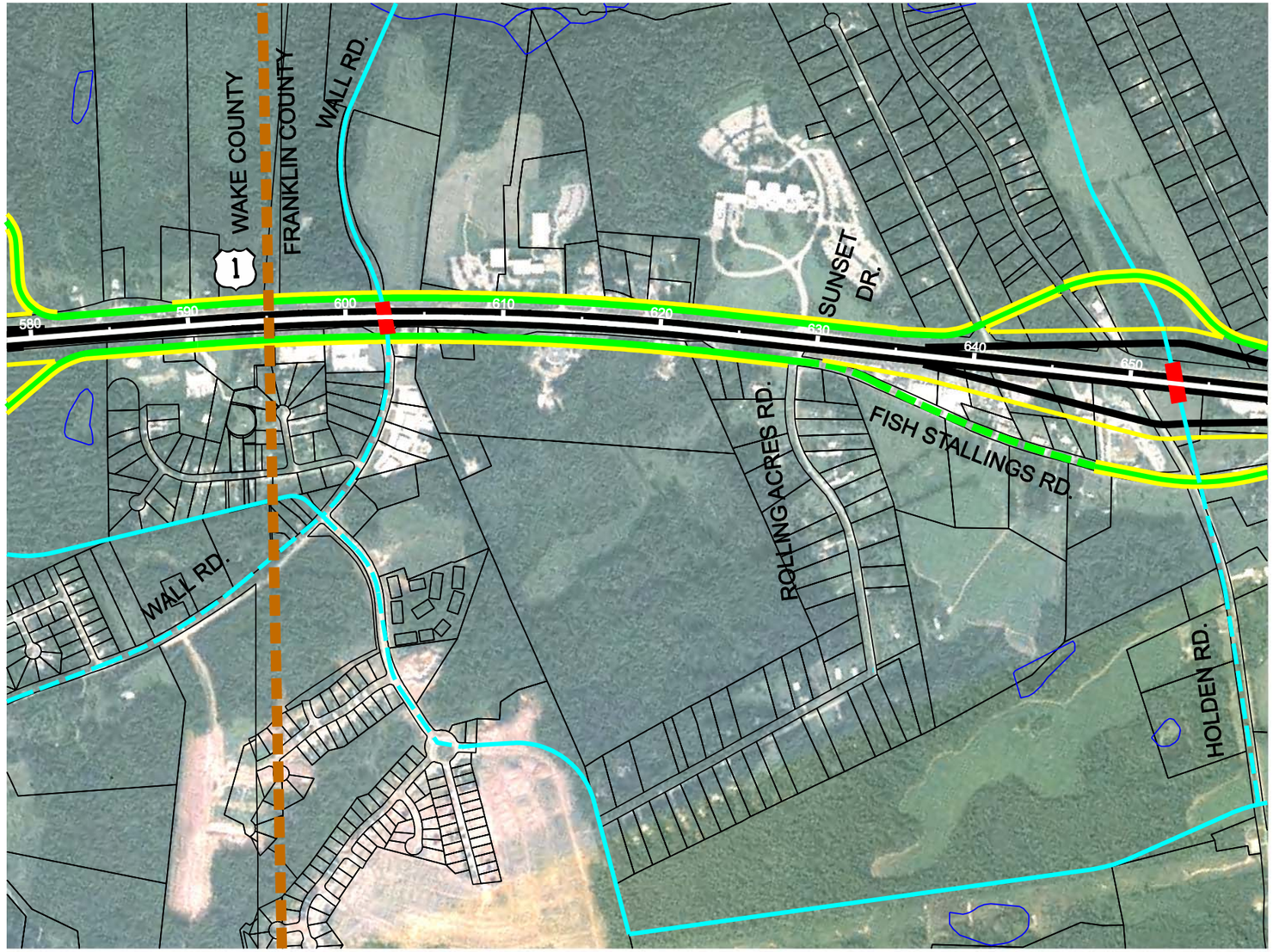
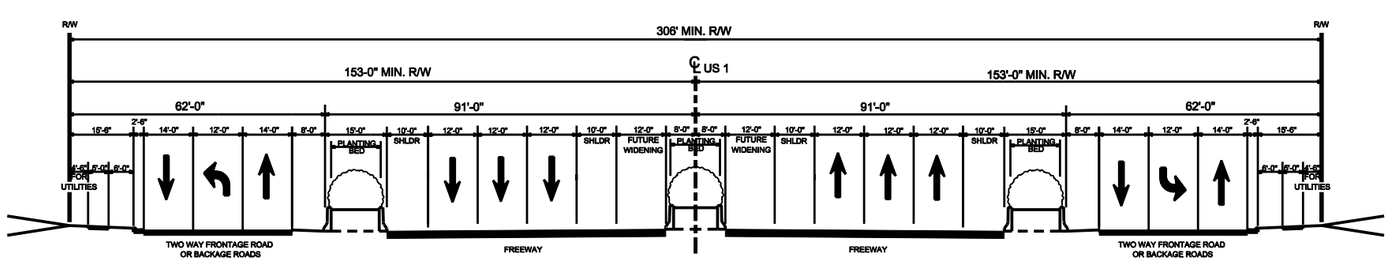
Alternative III-A
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-2
Sheet 7 of 10





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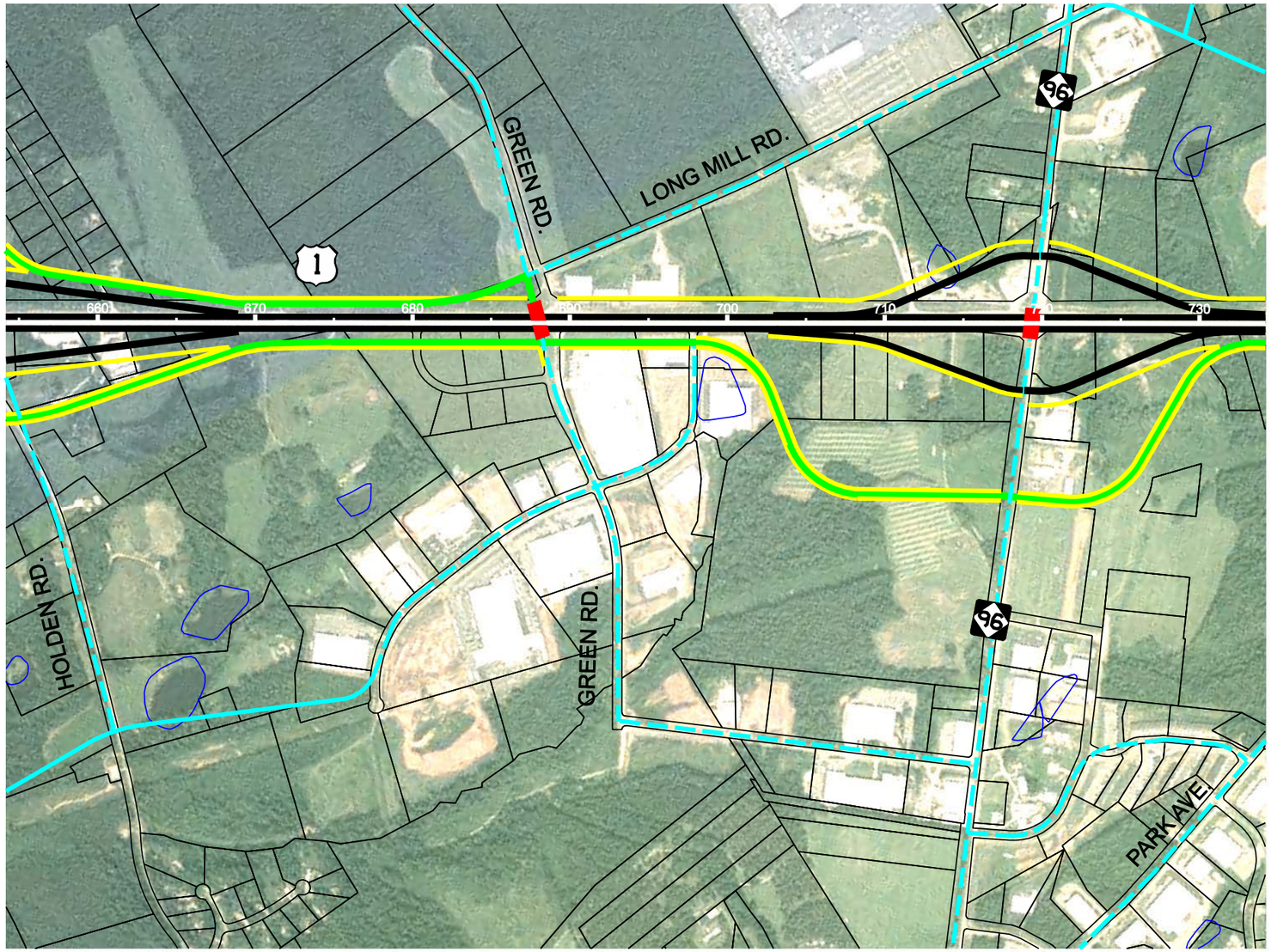
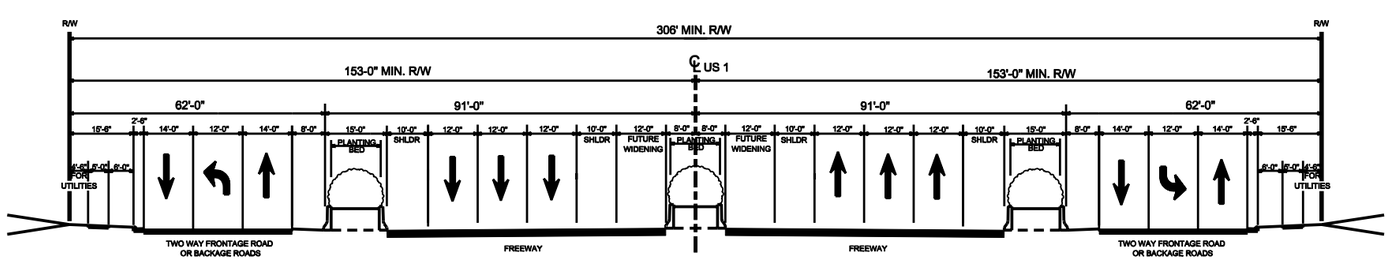
PHASE 3 ANALYSIS

Alternative III-A
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-2
Sheet 8 of 10





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Feet

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PHASE 3 ANALYSIS

Alternative III-A
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-2
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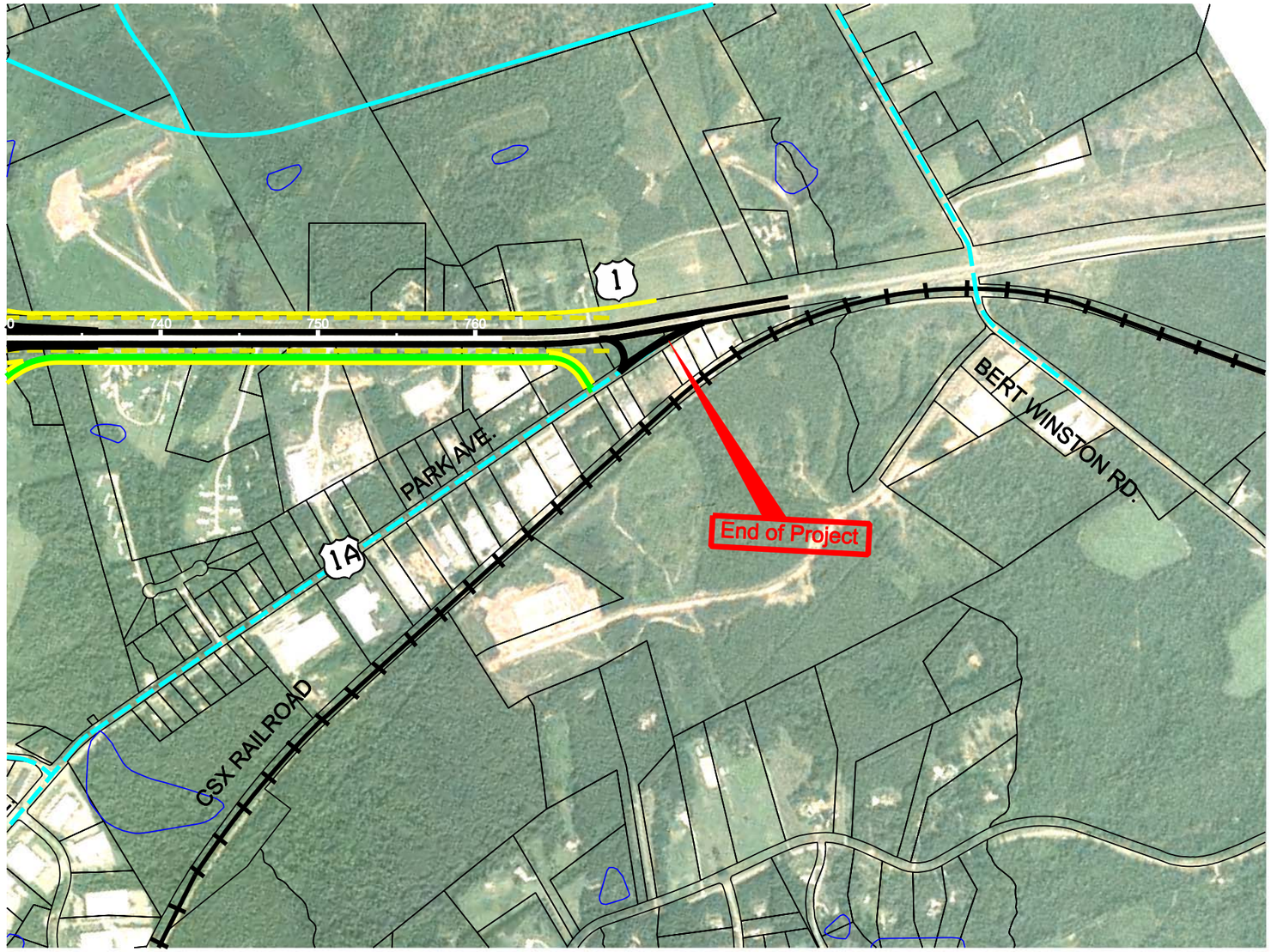

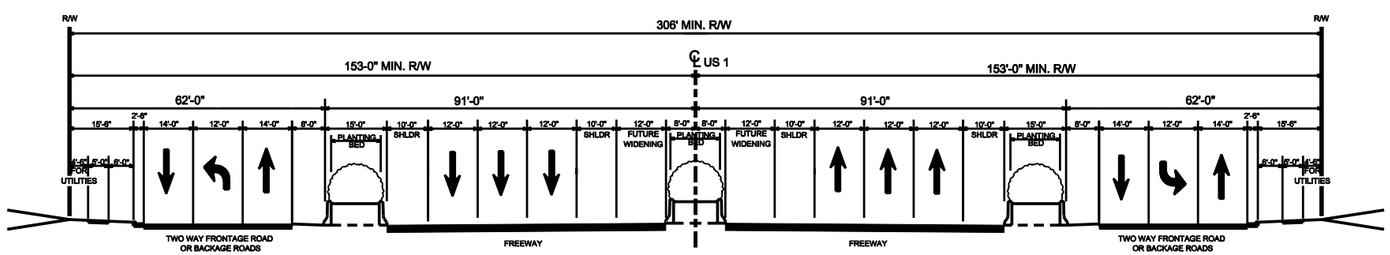

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3 GENERAL PURPOSE LANES WITH TWO-WAY FRONTAGE OR BACKAGE ROADS

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PHASE 3 ANALYSIS

Alternative III-A
Locally Preferred Alternative

US 1 CORRIDOR STUDY

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CHAPTER 1.0
INTRODUCTION

1.0 Introduction

The US 1 facility in the northeastern part of the Raleigh, North Carolina metropolitan area is an important corridor in the north-south movement of people and goods in the region. The North Carolina Department of Transportation (NCDOT) has designated the US 1 corridor as one of its Strategic Highway Corridors. Because of the increasing pressures of development in this area and the current traffic congestion along portions of US 1, the Capital Area Metropolitan Planning Organization (MPO) has been motivated to develop a comprehensive corridor management plan for US 1. The goal of this plan is to preserve the functional integrity of this facility and to manage the overall growth within the study corridor.

This coordinated approach to land use and transportation planning will enable state and local governments to provide a framework for the orderly and efficient development of various land uses within the corridor study area while providing for the transportation needs of both local and regional travel along US 1.

1.1 Project Description and Project History

US 1 is a multi-lane, regionally significant corridor that traverses through the City of Raleigh, where it is referred to as Capital Boulevard; and extends northward through the states of Virginia and Maryland (see Figure 1-1. The US 1 Corridor study area includes both highway and rail facilities beginning at I-540 in Raleigh, and extends northward to Park Avenue (US 1A) in Franklin County. The US 1 study corridor includes both highway and rail facilities beginning at I-540 in Raleigh, and extends northward to Park Avenue (US 1A) in Franklin County. The study corridor serves multiple travel purposes. The route carries interstate travel linking Raleigh with I-85. The route is also a regional link for commuters traveling between downtown Raleigh and the northeastern suburban area. With the extension of I-540 to the east, its role in commuter travel will continue to serve regional trips and connectivity in the Greater Raleigh area. The US 1 Corridor in Wake and Franklin Counties, between I-540 in Raleigh and the northern intersection of US 1/Park Avenue (US 1A) in Franklin County is 14 miles long.

The NCDOT includes US 1 in its list of Strategic Highway Corridors and proposes to upgrade the facility from I-85 to I-540 to an urban freeway in the future. Although this freeway project is part of the Capital Area MPO's Long Range Transportation Plan, the improvements are not yet included in the current NCDOT 2006-2012 Transportation Improvement Program (TIP). Future proposed projects in the area that are included in the 2004-2010 TIP are as follows:

- NC 98 Bypass around Wake Forest (project number R-2809)
- I-540 extension between US 1 Capital Blvd and US 64 Bypass (R-2000 F & G; R-2641) – scheduled completion Fall 2006
- US 401 between Ligon Mill Road and NC 39, Louisburg (R-2814)

The NC 98 Bypass project includes a grade separated single point diamond interchange with US 1 that will replace a signalized intersection at Galaxy Drive. The bypass from US 1 to the east was completed and opened to traffic in May 2006. The southeast extension of I-540 east of the US 1 corridor will have a large regional effect on travel routes in northeast Raleigh. US 401, which is located to the east and parallel to US 1, is proposed for multi-lane widening and could divert some traffic from the US 1 corridor. The 2030 long-range transportation model includes these major facility improvements.

US 1, south of I-540, is a six/eight lane major thoroughfare in an urban setting with traditional at-grade signalized intersections and many driveways providing access to individual properties and strip development. Existing development along this section of US 1 is intense (fully developed between intersections), generating many trips, including a large regional shopping mall located in the southeast quadrant of the I-540/US 1 interchange.

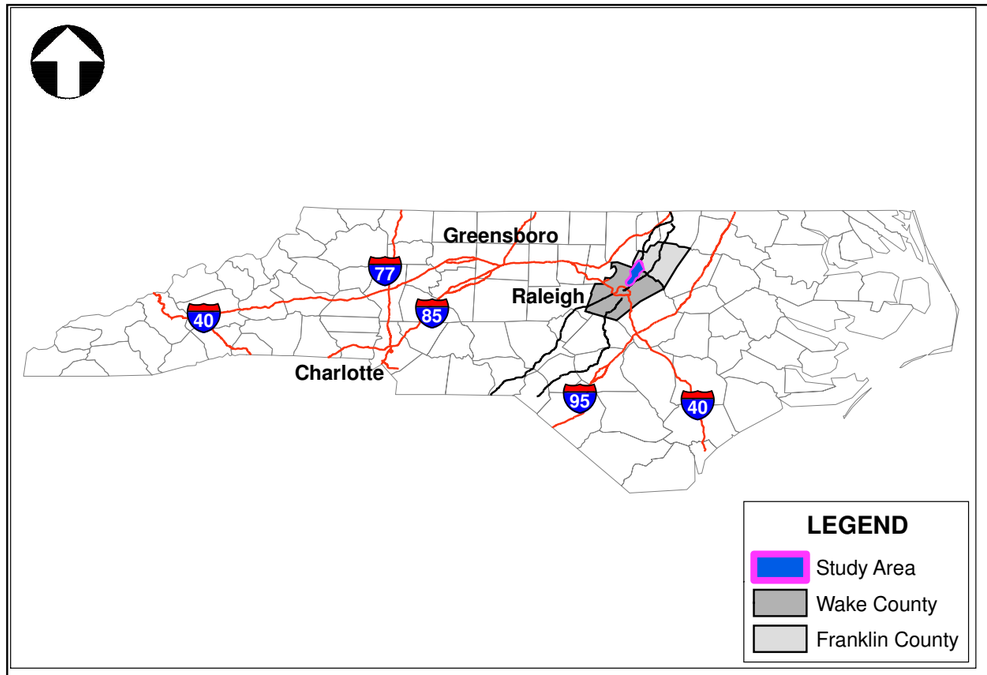
The US 1, north of I-540, is primarily a four-lane thoroughfare within the study corridor passing through areas of rapid commercial and residential suburban growth, primarily occurring around interchanges and signalized intersections. The Capital Area MPO served as the lead agency for the project, and was responsible for initiating the Corridor Study. The Capital Area MPO also established the US 1 Oversight Team and US 1 Technical Oversight Group that were responsible for guiding the development of the study. Currently there are varying degrees of access management existing along the corridor, along with coordinated plans for making land use decisions. These land use decisions will ultimately impact traffic volumes and the roadway's overall efficiency. Accordingly, local governments and agencies have partnered to perform a comprehensive land use/transportation study for US 1 suitable for implementation at the local and state level. Fortunately, this partnership was created in order to ensure that the corridor performance does not deteriorate with increased growth pressures. These partners are listed below and are titled project stakeholders:

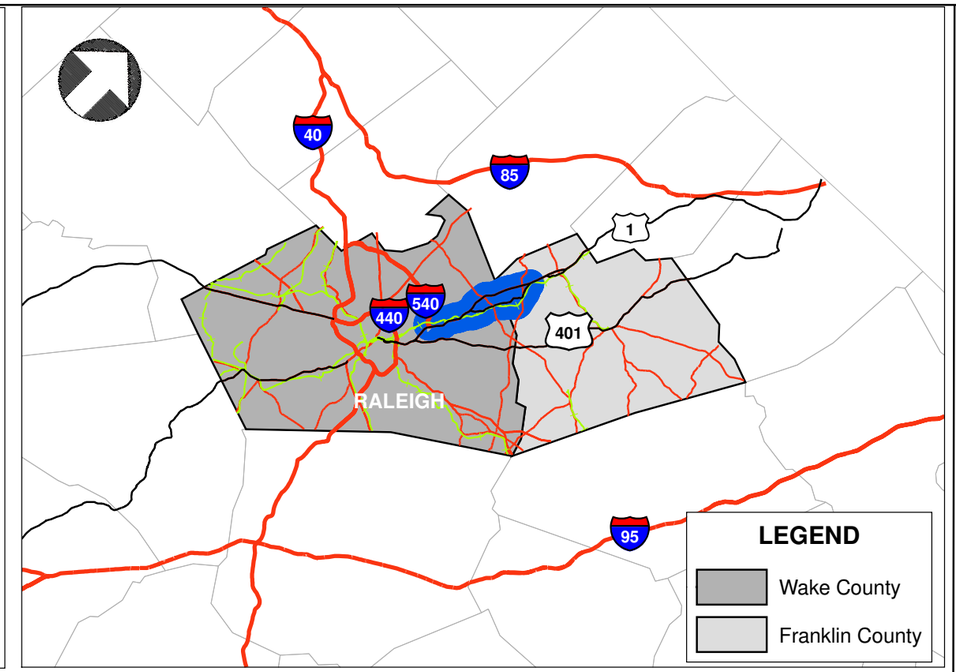
- City of Raleigh
- Town of Wake Forest
- North Carolina Department of Transportation
- Capital Area MPO
- Triangle Transit Authority (TTA)

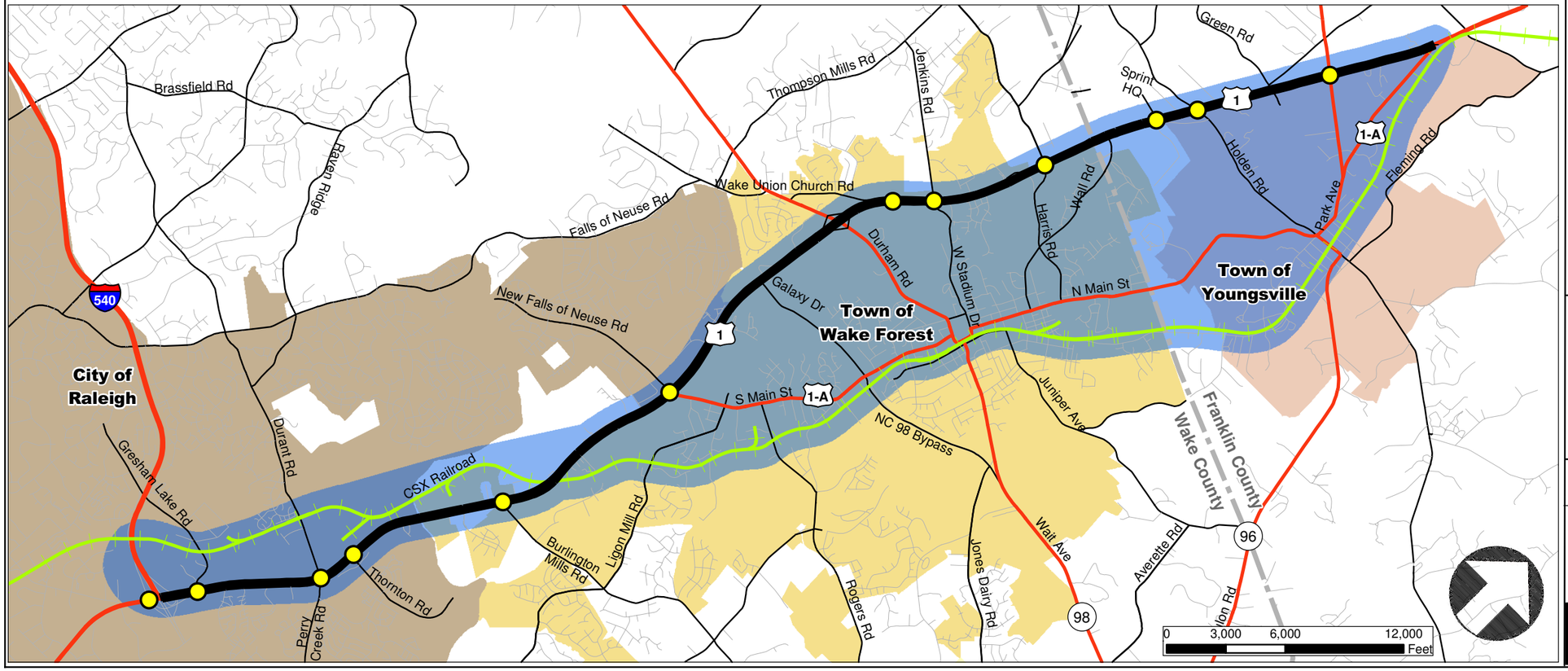
Capital Area MPO, through an inter-agency agreement between the City of Raleigh, NCDOT, the Town of Wake Forest, and the Triangle Transit Authority (TTA), has retained RS&H Architects-Engineers-Planners, Inc. (RS&H) to develop a coordinated multimodal transportation plan for the US 1 Corridor. The Capital Area Metropolitan Planning Organization served as the lead agency and was responsible for initiating the corridor study and establishing both the Oversight and Technical Oversight Committees that were responsible for guiding the development of the study. The Oversight Committees were made up of representatives from various state and local agencies, as well as citizens living within the study area. RS&H was the prime consultant for the project, responsible for the technical issues and analysis of various transportation alternatives, ultimately arriving at the locally preferred alternative. Mulkey Engineers and Consultants led the functional design, identified and evaluated cultural and natural features along the corridor. Kittelson & Associates, Inc. provided the transit modeling, analysis and alternatives recommendations. Urban Collage, Inc. collected existing land use and zoning information including identifying future potential land use opportunities. Urban Collage also created several site development plans and photomontages depicting how the US 1 corridor could develop and look in the future. Kimley-Horn & Associates, Inc. led the traffic and transit modeling efforts to evaluate different multi-modal transportation alternatives.

The study area, shown in Figure 1, has the following project limits:

The US 1 corridor in Wake and Franklin Counties, between I-540 in Raleigh and the northern intersection of US 1/ Park Avenue (US 1A) in Franklin County, is approximately 14 miles.







LEGEND

- Study Area
- US 1 Study Corridor
- Primary Roads
- Secondary Roads
- CSX Railroad
- Signalized Intersections
- City of Raleigh ETJ
- Town of Rolesville ETJ
- Town of Wake Forest ETJ
- Town of Youngsville ETJ

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INTRODUCTION

Study Area

US 1 CORRIDOR STUDY

Figure 1-1
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1.2 Related Past and Current Studies

The Study Team conducted a review of past and current studies guiding the US 1 study area, including engineering reports, planning documents, and Geographic Information Systems (GIS) data and analysis. These previous studies and information give the background for this planning study and provide a foundation for creating strategies to manage future travel and growth in the US 1 corridor. Following are brief synopses of nine of the most important studies that guide the US 1 Corridor Study. Each synopsis reviews the core objectives of the study and extracts important conclusions that are relevant to the US 1 Corridor Study. A complete annotated bibliography and a complete GIS data bibliography are available in Appendix A.

1.2.1 Raleigh Comprehensive Plan – City of Raleigh, North Carolina, January 2006 update

The Raleigh Comprehensive Plan covers a wide range of topics, including, but not limited to transportation, land use, small area and neighborhood plans. For the US 1 Corridor Study, the following sections were the most helpful and are summarized below.

The **Transportation Plan** lists US 1 as a key growth area that must be monitored for freeway upgrades and as a future regional rail transit corridor. The five-year transit plan recommends the continuation of the Triangle Town Center Connector bus route that intersects US 1 at Durant Road; no other transit services are planned within five years. In the study area, recreational bicycle routes connecting to Perry Creek Road are recommended in the northeast quadrant of the US 1 at I-540 interchange. Additional bicycle routes are recommended in the study area along Durant Road/Perry Creek Road and along Dunn Road and the proposed Dunn Road extension. Future interchange locations along US 1 in the study area are recommended to be at I-540, Gresham Lake Road, Durant Road/Perry Creek Road, Burlington Mills Road, South Main Street (US 1A) and NC 98 Bypass.

The **Northeast District Plan** includes strategies for the Northeast Regional Center and for the Triangle Town Center. The *Northeast Regional Center Plan* designates the area around the interchanges of US 1 at I-540 as a regionally-significant commercial hub. Each of the four quadrants functions as a center for development. Land use recommendations within each quadrant include various combinations of mid-to-higher density developments. Mixed-use commercial, office, residential, and supporting retail and service developments are proposed. A major regional mall is located in the southeast quadrant of the US 1 at I-540 interchange, while a future transit hub is planned for the northwest quadrant. A circular thoroughfare loop is planned that would connect all four quadrants, creating interchanges at I-540/Triangle Town Boulevard and US 1/Gresham Lake Road. Sections of Sumner Boulevard, Gresham Lake Road, and Triangle Town Boulevard would be extended to form this loop thoroughfare. The plan emphasizes pedestrian-oriented development and pedestrian and bicycle facilities to support the regional transit hub that is planned in the northwest quadrant. The intersection of US 1 at Durant Road/Perry Creek Road is emphasized as a Community Focus Area.

The *Triangle Town Center Small Area Plan* recommends future strategies for the area south of I-540 and east of US 1. This is a critical activity center for which US 1 will act as a gateway and access point. This area is divided into four quadrants in which development should be clustered. A circular thoroughfare loop would connect the four development clusters, and a network of pedestrian and bikeway facilities would connect this area with the proposed transit hub in the west.

1.2.2 2030 Long Range Transportation Plan (LRTP) – Capital Area Metropolitan Planning Organization

The *2030 Long Range Transportation Plan (LRTP)* is a long range guide for major transportation investments by the Capital Area MPO. The LRTP recommends major transportation projects, systems, policies, and strategies that will maintain and improve the existing transportation system in order to meet future travel demands. The 2030 LRTP identifies the US 1 corridor from I-440 to Wake Forest as requiring a corridor study in order to access the feasibility of High Occupancy Vehicle (HOV) lanes and review access management options due to US 1's current congestion levels.

The 2030 LRTP recommends four options to be considered for managing congestion along US 1:

- US 1 (Capital Blvd)
- Express Bus Service
- High Occupancy Vehicle (HOV) lanes
- Extend Triangle Transit Authority (TTA) Rail to Durant Road or Wake Forest

1.2.3 Wake Forest Transportation Plan – Town of Wake Forest, North Carolina, January 2003

The Wake Forest Transportation Plan identifies multimodal transportation system improvement recommendations and strategies that will accommodate increased travel demand in this rapidly growing community. US 1, NC 98, the NC 98 Bypass and US 401 are identified as the major thoroughfares that are most important for regional access to Wake Forest.

The Wake Forest Transportation Plan identifies five corridors as being congested:

- Boulevard) US 1 (Capital
- NC 98 (Durham Road)
- Stadium Drive
- South Main Street (US 1A)
- Burlington Mills Road

The Wake Forest Transportation Plan recommends that given the current and increasing importance of US 1 for regional travelers, this corridor needs to be studied to for possible conversion to a freeway. The study recommends various forms of access management to and from US 1 as an interim congestion management strategy. In the long term, the study recommends eliminating at-grade median crossovers, construction of additional interchanges, new grade separations, and the completion of existing discontinuous service roads that are adjacent and parallel to US 1. Additional interchange locations are planned at: Burlington Mills Road, South Main Street (US 1A), NC 98 Bypass and Purnell Road. Potential grade separation crossovers are designated at Wake Union Church Road and Jenkins Road//West Stadium Drive.

1.2.4 Wake County Thoroughfare Plan

The Wake County Thoroughfare Plan Atlas designates the roles of each roadway within Wake County. This plan designates existing and planned collectors, minor/major thoroughfares, expressways and freeways. The thoroughfare plan strives to encourage a tighter network and connectivity of narrower roadways instead of a more non connected roadway system of higher-volume major thoroughfares. The plan reviews roadway travel, transit, pedestrian, bicycle, and design elements affecting the local transportation network.

The US 1 Corridor is highlighted as a high-priority major freeway corridor that provides regional access to Raleigh from the north. In planning a passenger rail network within the Raleigh region, the study designates the US 1/CSX Corridor as a future extension of the TTA regional rail service, where initial service could be provided by commuter bus service along US 1 before higher density population allows for a rail commuter transit option.

1.2.5 Franklin County Thoroughfare Plan – Franklin County, 2002

The Franklin County Thoroughfare Plan designates the roles of each roadway within Franklin County. In the vicinity of the US 1 Corridor Study, the Franklin County Thoroughfare Plan recommends constructing left-turn lanes at median openings on US 1 and recommends widening US 401 and NC 96. In addition, the Mountains to Sea Trail should be maintained as an important pedestrian and bicycle link within the county.

1.2.6 Youngsville Thoroughfare Plan – Town of Youngsville, 1991

The Youngsville Thoroughfare Plan designates the roles of each roadway within the Town of Youngsville. In the vicinity of the US 1 Corridor Study, the Town of Youngsville Thoroughfare Plan recommends constructing an interchange at the intersection of US 1 at NC 96. Better connectivity through Youngsville will be accomplished with additional roadway connections as well as the proposed NC 96 Bypass.

1.2.7 Phase I Regional Rail System Durham and Wake Counties, North Carolina Final Environmental Impact Statement (EIS) and Section 4(F) Evaluation – Triangle Transit Authority, November 2002

This study evaluates the feasibility of a regional rail system in the Raleigh-Durham region to meet future mobility needs. This EIS defines the Minimum Operable Segment (MOS) of the rail corridor as a corridor paralleling NC 147 and NC 54, beginning at 9th Street in Durham, passing through the Research Triangle Park, Morrisville, Cary, and terminating in downtown Raleigh. Additional sections are evaluated for a northern extension along US 1 to Spring Forest Road, a western extension to the Duke Medical Center, and an extension further north on US 1 to Durant Road. This study evaluates the feasibility of the regional rail system, and reviews potential impacts of this investment to the surrounding environment. Planning efforts for the regional rail system will continue to review the feasibility of including the US 1 corridor as a rail-transit corridor in the Raleigh-Durham region.

1.2.8 Southeast High Speed Rail –North Carolina Department of Transportation Rail Division, October 2005 update

The Southeast High Speed Rail Corridor is planned to extend from Washington, D.C. to Charlotte, NC via Richmond, VA and Raleigh, NC. Since trains would travel at average speeds between 85 and 90 mph with top speeds of 110 mph, high-speed rail service would offer travel alternatives for trips between 100 and 500 miles. Alternatives for sections of the Southeast High Speed Rail Corridor are being studied in sections on an ongoing basis. With the parallel rail line in the US 1 corridor leading into Raleigh from the north, the Southeast High Speed Rail Corridor is important to consider in the US 1 corridor study.

1.2.9 Bicycle & Pedestrian Plan –Capital Area Metropolitan Planning Organization, March 2003

This plan recommends policies and standards that might achieve the overall goal of fully integrating bicycles and pedestrians into the transportation system. The Bicycle and Pedestrian Plan ensures compliance with governmental regulations, promotes transportation benefits of bicycling and walking, and strives to make bicycling and walking viable transportation alternative. US 1 is identified as a US Highway with Bicycle Needs. Bikeways in the vicinity of the US 1 study area include Durant Road, Perry Creek Road, Falls of the Neuse Road, New Falls of the Neuse Road, NC 98 (Durham Road), Camp Kanata Road, and Purnell Road.

1.2.10 NC 98 Bypass Master Plan Report – Town of Wake Forest, August 2003

This study focuses on a 1-mile wide study area along the proposed NC 98 Bypass from Thompson Mill Road, west of US 1 to Jones Dairy Road. The study examines four goals of the corridor: facilitating transportation, creating a visually pleasing corridor, encouraging development, and establishing east-west pedestrian and bicycle routes that connect north and south of the NC 98 corridor. The study goes into great depth about the visual quality of the corridor. This study emphasizes that NC 98 should focus on smaller-scale, community-oriented commercial development, while the higher intensity regional commercial centers should be focused along US 1.

1.2.11 US 1 Corridor Plan –Town of Wake Forest, November 1999

This study focuses on a 1-mile wide study area along US 1 between the Neuse River and the Franklin County line. The study examines three goals of the corridor: facilitating transportation, creating a visually pleasing corridor, and encouraging development. This plan is an urban design and streetscape study that gives a vision of what US 1 should look like in the future. This plan focuses on aesthetics and the sense of livability within the US 1 Corridor.

1.3 Project Purpose

The US 1 Corridor Study purpose is to develop an integrated transportation plan that provides for a high level of mobility along the US 1 Corridor while maintaining a high quality environment for the surrounding communities by providing for well-planned and sustainable growth along this corridor.

1.4 Background and Objectives

The US 1 Corridor project was conducted to achieve the following objectives:

Develop a **clear vision** of the transportation role(s) of the US 1 corridor with respect to mobility: trip purpose and distribution (work, non-work, through travel), trip length (interstate, regional, or local travel), and travel mode (auto, truck, transit, pedestrian, bicycle).

Formulate a **multimodal transportation plan** that incorporates highway, transit, pedestrian and bicycle modes and complements the proposed land use and development patterns while sustaining mobility within and throughout the region. A key element of this study was to develop corridor management strategies that consider multimodal/transit options that are effective in enhancing suburban mobility and threfore, reducing traffic volumes and added capacity improvements to major roadways in the study area. This analysis included a comparative review of a range of transit alternatives including commuter bus concepts,

extension of the planned commuter rail system (TTA Phase 1 initiative), and the role of proposed Southeast High Speed Rail service (which has as part of its potential route a segment of the CSX rail corridor located within the study corridor). A comparative summary of various transit alternatives is documented in the Phase One Analysis – Transit section of this study.

Analyze the **physical layout** and number of general purpose travel lanes needed to serve the US 1 corridor travel demand in 2030. The study team evaluated the alignment of the existing route to determine if adding lanes, upgrading to a freeway or relocating the facility would best meet future travel needs. The study determined the right-of-way requirements for the proposed improvements. Alternative special use lanes (HOV, truck-only, variable use, managed lanes) auxiliary lanes and ITS improvements that could minimize right-of-way requirements through impacted areas were considered. Recommendations included interchange configurations, closing existing at-grade intersections, implementing frontage roads and/or backage roads to service abutting US 1 properties, grade separation structures, reducing the number of driveway openings, ITS improvements and other access control measures.

Consider **community character** and potential impacts throughout the planning process. Changes in access to and across the US 1 corridor could allow better cohesion between the eastern and western areas along the corridor. The aesthetic values relative to the recommended transportation improvements were also considered. To ensure that community impacts and growth management issues are addressed, neighborhood input and community involvement was included as part of the public participation program.

1.5 Report Organization

The report is divided into the following sections:

Introduction presents background information pertaining to the US 1 Corridor Plan, such as purpose and need for the project, project objectives, and summary of related past and current projects. This section provides the justification for pursuing the corridor alternatives analysis. Elements presented include design, and capacity deficiencies, safety concerns, multimodal considerations, and land use opportunities.

Existing Conditions describes the land use and transportation conditions in the US 1 Corridor study area in 2005 (traffic crash data available 2001-2003). Physical and environmental conditions are presented here and form the basis of the evaluation of alternatives. Existing travel conditions are also included in this section and are the basis for evaluating future travel conditions**.**

Public Involvement Process documents the public information process and public input to the project analyses and evaluations.

Phase 1 Analysis identifies the conceptual designs of freeway, transit, pedestrian and bicycle components of the US 1 Corridor. The Phase 1 Analysis describes the physical, environmental, and forecasted operational conditions of the proposed corridor concepts. This section details the process by which alternative evaluation was performed, including the methodology applied and the results.

Phase 2 Analysis describes the alternatives that pass the Phase 1 Analysis level of evaluation and provides conceptual construction and right-of-way cost estimates for these alternatives. A locally preferred Alternative (LCA) is identified and carried into the Phase 3 Analysis.

Phase 3 Locally Preferred Alternative fully documents the physical, environmental, and forecasted operating conditions of the Locally Preferred Alternative (LPA). Recommendations for the LPA are summarized within the report and they incorporate the necessary modifications based on the comments received during the second Public Information Workshop and stakeholder review process.

Implementation summarizes the multimodal transportation plan and economic development opportunities recommendations including probable implementation costs and phasing of these long-term improvements. Short-term transportation system improvements are also identified.

CHAPTER 2.0
EXISTING CONDITIONS

2.0 Existing Conditions

The existing conditions section evaluates current land use and economic development, travel patterns, roadway/transit facilities constraints, and environmental characteristics within the US 1 study area and form the basis for developing the plan that supports future corridor conditions.

2.1 General Project Surroundings

The US 1 study corridor lies in Wake and Franklin Counties for a distance of approximately 10.5 and 3.5 miles, respectfully. The project limits start south of I-540 and extend north to the Park Avenue (US 1A) intersection in Franklin County, a length of approximately 14 miles. The southern end of the study area from I-540 to just north of Thornton Road is in the City of Raleigh's corporate city limits. Between the City of Raleigh and the Wake/Franklin County line, various sections of the study area share jurisdictions with Wake County, the Town of Wake Forest, and the City of Raleigh, of which the Town of Wake Forest has jurisdiction of the study area for approximately 6.0 miles. In Franklin County, the study area shares jurisdiction with both Franklin County and the Town of Youngsville.

2.2 Primary Transportation Features

The sections below describe the two primary transportation facilities within the study corridor: US 1 Highway and CSX Railroad.

2.2.1 US 1 Highway

The Capital Area Metropolitan Planning Organization (Capital Area MPO) classifies US 1 (Capital Boulevard) as a major thoroughfare/freeway within the study area. The US 1 facility is primarily a four-lane divided highway, north of I-540. The right-of-way varies between 200 and 450 feet in the study corridor however the majority is only 200 feet wide. Some non-contiguous two-way service roads exist in the corridor. Inside and outside safety shoulders exist throughout the corridor. The median is generally 30 feet wide and depressed to handle the open drainage system for the highway. There are three existing interchanges, at I-540, at NC 98, and the newly opened interchange at the new NC 98 Bypass. When the study began 13 signalized intersections existed along the corridor, however with the completion of the NC 98 Bypass interchange the traffic signal at Galaxy Drive was removed. The remaining 40 at-grade public street intersections are either full median openings or ones with directional openings restricting certain traffic movements. Approximately 68 existing private driveways connect to US 1. Figure 2-1 summarizes the current facility characteristics and the numerous driveways and access points along the corridor.

2.2.2 CSX Railroad

The rail line within the study area is the CSX 'S' line and runs from Hamlet, North Carolina to Henderson, North Carolina. This CSX corridor is also part of the future Southeast High Speed Rail corridor from Washington DC to Charlotte, North Carolina. Also, the Triangle Transit Authority is considering plans to use a portion of this rail corridor for future commuter rail service.

The CSX railroad alignment basically parallels US 1 in the study area. The railroad alignment is a single-track system currently providing freight service with a frequency of less than five trains per day. The railroad right-of-way within the study area varies between 70 and 180 feet, the majority being approximately 100 feet wide. The CSX rail alignment potentially may provide a possible transit feature in the study area. South of Height Lane the railroad alignment is west of US 1. The CSX alignment crosses under US 1, near Height Lane and heads northeast through the center of the Towns of Wake Forest and Youngsville. Along the length of the rail line, there are a total of 12 at-grade crossings and two grade-separated crossings. In the study area, the speed limit for trains generally is 40 mph. The major industries served by this corridor in the study area include wood and wood products, liquid nitrogen and other chemicals, cement and rock.

2.3 Surrounding Roadway Network

The interrelationship of the study corridor with the surrounding transportation network is central to a corridor study. Both crossroad and parallel facilities affect traffic operations within the study corridor. Likewise, alternative travel options within the area can provide relief from congestion of the study corridor facilities and deferring transportation improvements to the study corridor projects.

Three elements of the surrounding roadway network are affected by the congestion on US 1 and provide alternative travel opportunities to US 1: the roads crossing the corridor; the roads paralleling the corridor; and other multimodal facilities. The following is a brief description of the crossroads in the study corridor that are impacted by the congestion on US 1. This crossroads discussion is followed by descriptions of the major roadway facilities that parallel the study corridor. This section concludes with general information on the existing multimodal options with the study corridor.

2.3.1 Cross-streets

Data collected and analyzed for the major cross streets identifies roadway facilities with direct access to US 1. Beginning at the southern project limits the major streets crossing US 1 are as follows:

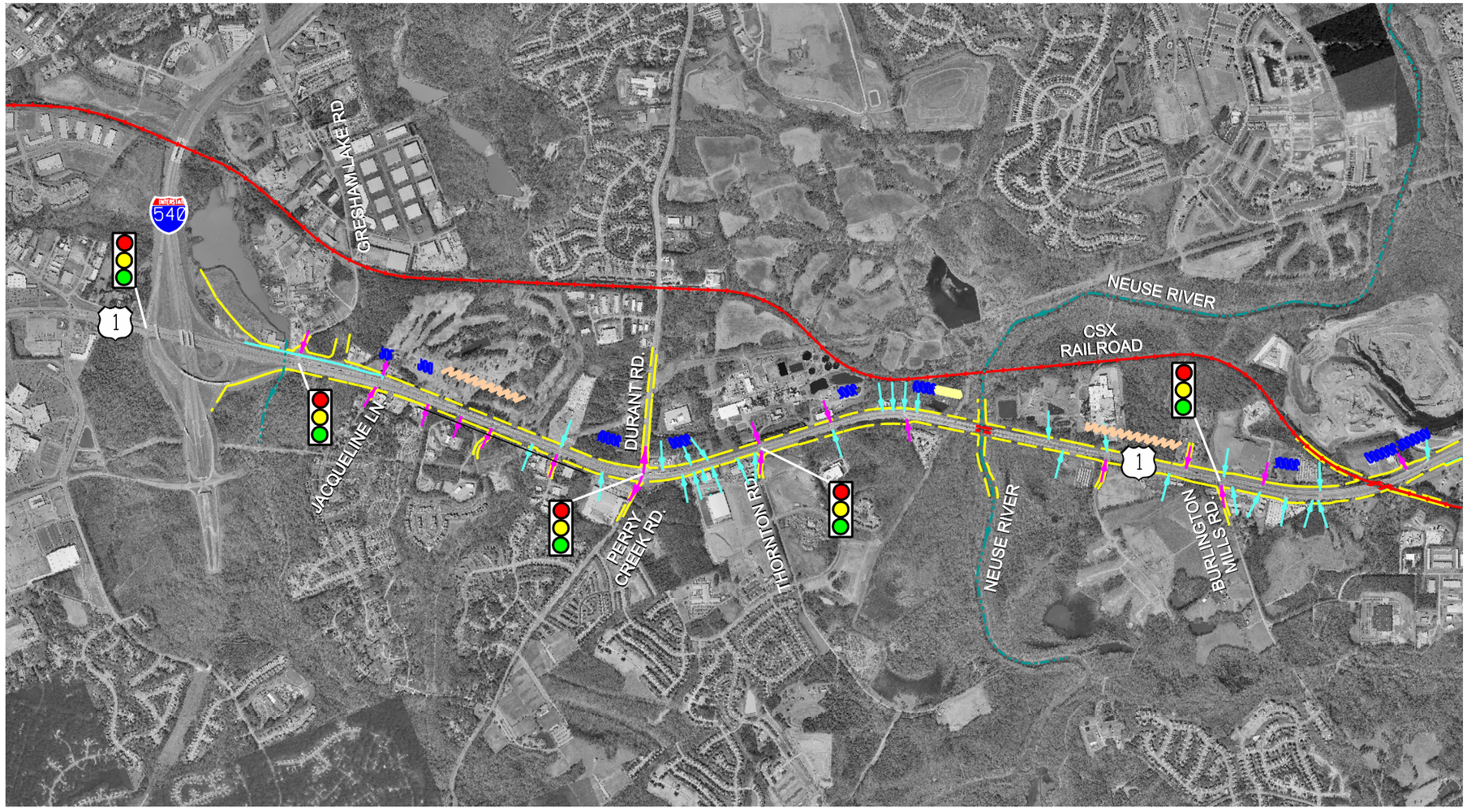
I-540 is the outer beltway for the Raleigh area. This limited access six-lane interstate facility which currently connects I-40 to the west with US 1 extends to the Triangle Town Boulevard. The section of the I-540 eastern extension between US 1 and the US 64 Bypass is scheduled for opening December 2006.

Gresham Lake Road is a two-lane, east-west roadway that extends from south of I-540 to US 1, where it intersects at a signalized tee intersection. Land uses along this roadway range from industrial to commercial. The Raleigh Comprehensive Plan shows Gresham Lake Road to be realigned as it crosses US 1 with a possible grade separated interchange. Gresham Lake Road also plans to be extended east and connect to Triangle Town Boulevard.

Durant Road/Perry Creek Road is a two to five-lane, east-west major thoroughfare in Wake County. West of the signalized intersection with US 1, this roadway is called Durant Road, while east of the intersection; it is called Perry Creek Road. Durant Road intersects with US 1 and continues west parallel to I-540. Perry Creek Road connects US 401 with US 1.

Thornton Road is a two-lane, east-west residential street. This roadway serves several neighborhoods east of US 1 and is controlled by a traffic signal.

Burlington Mills Road is a two-lane, east-west major thoroughfare in Wake County. In the vicinity of the study corridor, Burlington Mills Road has a posted speed limit of 45 mph. This roadway runs from US 1 to US 401 to the east. At its intersection with US 1, Burlington Mills is a signalized tee intersection. Land uses along Burlington Mills Road range from low-density, rural residential, agricultural, and even include some commercial near the intersection at US 1. Increased development is anticipated near the intersection of US 1 at Burlington Mills Road according to the Wake Forest Transportation Plan.



LEGEND

- STREAMS
- TWO WAY SERVICE ROAD
- DRIVEWAYS
- 'T' INTERSECTIONS
- STREET CROSSING
- SUBSTANDARD PAVED SHOULDER
- SUBSTANDARD RADIUS
- SUBSTANDARD SIGHT DISTANCE
- SUBSTANDARD GRADE
- STRUCTURES
- RAILROAD
- RIGHT OF WAY

NOT TO SCALE

Capital Area Metropolitan Planning Organization

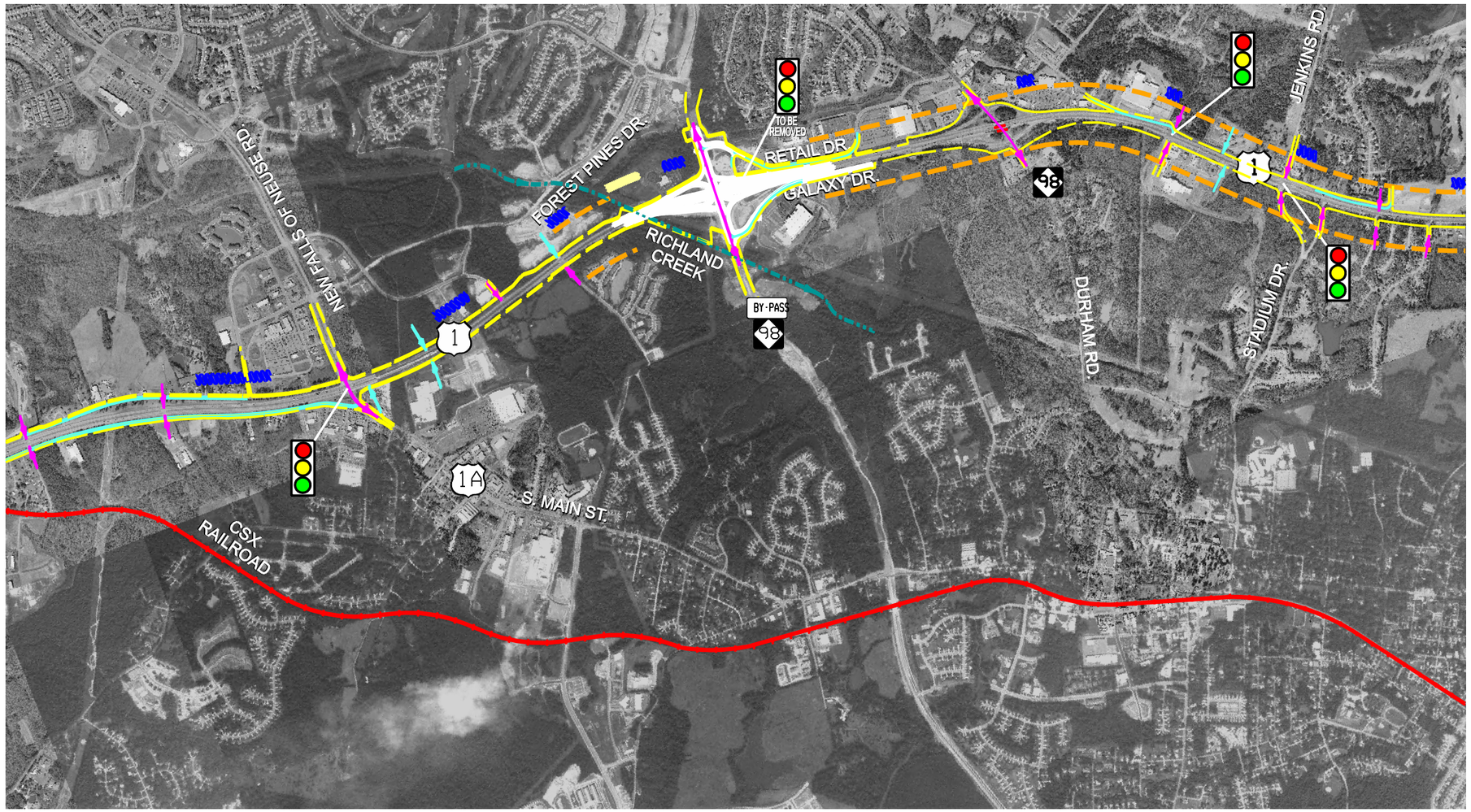
RS&H Architects - Engineers - Planners, Inc. Team

EXISTING CONDITIONS

Access Points and Geometric Features

US 1 CORRIDOR STUDY

Figure 2-1
Sheet 1 of 3



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Capital Area Metropolitan Planning Organization

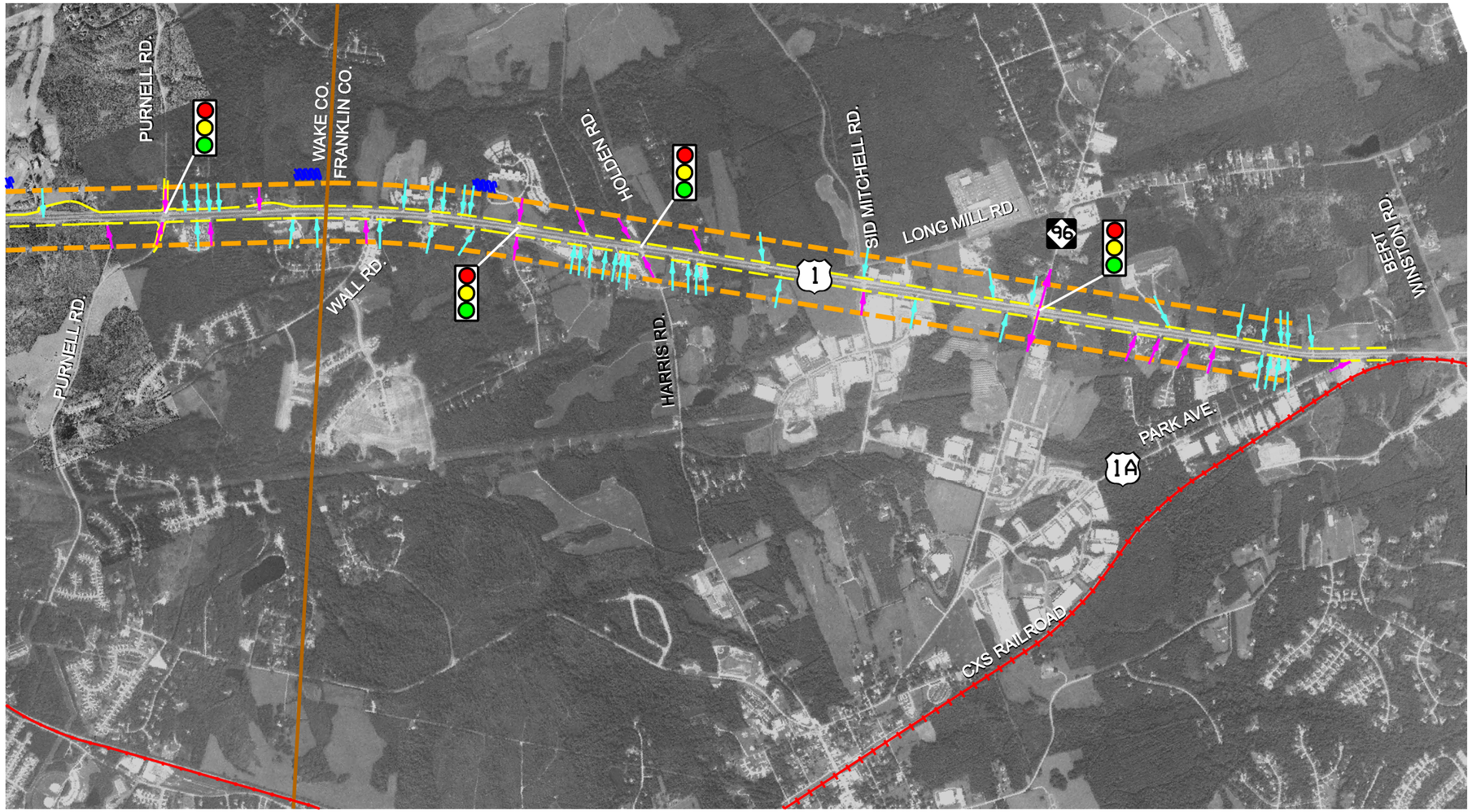
RS&H Team
Architects - Engineers - Planners, Inc.

EXISTING CONDITIONS

Access Points and Geometric Features

US 1 CORRIDOR STUDY

Figure 2-1
Sheet 2 of 3



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NOT TO SCALE

Capital Area Metropolitan Planning Organization

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EXISTING CONDITIONS

Access Points and Geometric Features

US 1 CORRIDOR STUDY

Figure 2-1
Sheet 3 of 3

New Falls of Neuse Road is a four-lane divided, east-west major thoroughfare that extends from near (but not connecting to) the Falls of the Neuse Road and continues to the intersection of US 1 at South Main Street (US 1A). Land uses along this roadway include residential, commercial uses, and vacant land. This roadway is planned to extend west to the Falls of the Neuse Road according to the Wake County Northeast District Comprehensive Plan by 2012. The City of Raleigh is currently studying and designing the western extension of New Falls of Neuse Road.

US 1A (Main Street/Park Avenue) is predominantly a two-lane, north-south major thoroughfare that extends through the Town of Wake Forest and the Town of Youngsville. Main Street (US 1A) has recently been widened to a five-lane section from US 1 to Rogers Road. South Main Street (US 1A) is primarily a busy downtown street along which historic downtown Wake Forest has developed. Further north, in Franklin County, US 1A changes names from Main Street to Park Avenue at the intersection with Holden Road, before reconnecting with US 1 (Capital Boulevard) at an unsignalized intersection. US 1A is both a cross-street and a parallel facility to US 1 because it parallels US 1 near the Towns of Wake Forest and Youngsville and it intersects with US 1 at two locations.

NC 98 Bypass is a new four-lane divided major east-west primary thoroughfare being constructed by NCDOT. The Bypass is located south of NC 98 around the town of Wake Forest. Once fully completed this major roadway will run from NC 98/Thompson Road to Jones Dairy Road/East Wait Avenue approximately 4.7 miles. The section from US 1 east, to Wait Avenue opened in May 2006. A single point urban interchange provides access to US 1. The section west of US 1, where the Bypass will connect back to NC 98, is scheduled to be completed by 2010.

Durham Road (NC 98) varies from a two to five-lane major roadway within the study area. This facility is a major east-west thoroughfare that extends through the Town of Wake Forest and intersects with US 1 at a diamond interchange with traffic signals before continuing to Durham. The majority of Durham Road is a rural two-lane highway with posted speed limits of up to 55 mph along the majority of its extent. However, in the Town of Wake Forest, Durham Road is a busy downtown street with lower posted speed limits. Land uses vary: in the Town of Wake Forest this roadway is lined with strip commercial development, while outlying areas include more single-family residential homes. Traffic volumes increase, including several signalized intersections on Durham Road west of US 1, due to the commercial activity in the area coupled with the US 1 interchange.

Jenkins Road/Stadium Drive is a two-lane, east-west major thoroughfare that extends from Thompson Mill Road to Rock Springs Road. West of the intersection with US 1, this roadway is called Jenkins Road, while east of the intersection with US 1, it is called Stadium Drive. This roadway has a posted speed limit of 45 mph in the vicinity of the study corridor. Jenkins Road/Stadium Drive connects the Town of Wake Forest with US 1, intersecting with US 1 at a signalized intersection. The land uses along Jenkins Road/Stadium Drive are primarily residential, changing from larger to smaller lot-sizes as one gets closer to the Town of Wake Forest. Much growth is anticipated along this roadway according to the Wake Forest Transportation Plan, especially if a potential interchange is constructed at US 1.

Purnell Road/Harris Road is a two-lane, major east-west thoroughfare with a posted speed limit of 45 mph in the vicinity of the study corridor. West of the intersection with US 1, this roadway is called Purnell Road, while east of the intersection with US 1, it is called Harris Road. Purnell Road/Harris Road connects North Main Street (US 1A) with US 1 at a signalized intersection. This roadway includes light residential and agricultural land uses and has many opportunities for new development according to the Wake Forest Transportation Plan.

Wall Road is a two-lane, east-west roadway that extends from Main Street (US 1A) in the town of Wake Forest to US 1 in Franklin County. At its intersection with US 1, traffic on Wall Road is controlled by a stop sign. Land uses along this roadway are primarily agricultural and undeveloped, but future development is expected especially near the junction with US 1 (according to Franklin County Planning officials).

Sprint Headquarters Road is a private four-lane divided roadway servicing the regional headquarters of a Sprint /Mid-Atlantic Telecommunications facility. This roadway intersects with US 1 as a signalized tee intersection.

Holden Road is a two-lane, east-west minor thoroughfare with a posted speed limit of 45 mph. in the vicinity of the study corridor. Holden Road intersects at US 1 at a signalized intersection and extends through Franklin County and the Town of Youngsville before connecting to Granville County. Land uses along Holden Road are primarily low-density residential.

NC 96 (Zebulon Road) is a two-lane, east-west primary major thoroughfare with a posted speed limit of 45 mph. This roadway connects the Town of Youngsville to US 1 to the west with US 401 to the east. The intersection of US 1 and NC 96 is signalized. Current land uses along this highway include low-density residential and agricultural; significant additional development is expected in the near future where NC 96 intersects US 1 according to the Franklin County Planning Department.

2.3.2 Parallel Facilities

For the purposes of this study, parallel facilities are those routes that could serve as reasonable alternatives to US 1 for area travelers. In most instances, the routes identified are within three miles either side of the study corridor. There are no parallel facilities that serve the entire corridor. However, several parallel facilities serve subsections of the corridor. Below are descriptions of the primary parallel facilities to the US 1 Corridor in the vicinity of the study area. Roadways are ordered from west to east.

Falls of the Neuse Road is a two-lane, north-south major thoroughfare that extends from downtown Raleigh, interchanges with I-540, and continues towards the north near NC 98. Land use along Falls of the Neuse Road includes primarily single family residential developments, such as the major Wakefield Plantation community. Raleigh is conducting a corridor study for this facility.

Thompson Mills Road is a two-lane, north-south roadway that extends from NC 98 to just north of Purnell Road. This roadway parallels US 1 to the west, connecting Falls of the Neuse Road with Purnell Road and northern Wake County. Land use along Thompson Mills Road includes primarily single family residential development.

Frontage Roads are located on northbound and southbound sections of US 1 in disconnected locations along the corridor. All frontage roads are two-way, two-lane roadways that provide access to properties adjacent to US 1. The locations are as follows:

- Southbound service road starting at Jacqueline Lane and ending at the I-540 WB to US 1 SB ramp
- Southbound service road starting at Common Oaks Drive and ending at Height Lane
- Northbound service road starting at Ponderosa Service Road and ending at South Main Street (US 1A)
- Southbound Service road starting at Country Club Road and ending at the tee-intersection of US 1 with Stadium Drive

Ligon Mill Road is a two-lane, north-south major thoroughfare that extends from US 401 to Main Street (US 1A) in the vicinity of the Town of Wake Forest. This roadway parallels US 1 to the east and intersects with Burlington Mills Road. An extension of this roadway as identified in Wake Forest's Transportation Plan will continue northward to NC 98 (Durham Road). Once extended, Ligon Mills will become an important parallel facility to compliment US 1, carrying shorter local trips in the study corridor. Land uses along Ligon Mill Road are primarily residential subdivisions that are expected to continue growing and will probably also include light commercial development. Land use along Ligon Mill Road includes primarily single family residential development and various open spaces.

US 401 (Louisburg Road) varies between two and four travel lanes in the corridor. US 401 is a north-south major thoroughfare with posted speeds of up to 55 mph and is a popular route for commuters traveling to and from Raleigh. Recent improvements by NCDOT include the widening of US 401 to a six-lane divided highway from Ligon Mill Road to US 1. Land use along US 401 includes single family residential development, commercial development, and various open spaces.

2.4 Multimodal Facilities

2.4.1 Fixed-Route Bus Service

Today, neither Capital Area Transit (CAT) nor the Triangle Transit Authority (TTA) has fixed-route bus service along the US 1 study corridor. CAT's bus route #25C circulator route crosses the study corridor at Durant Road, and serves destinations off of the corridor such as the WakeMed North Healthplex, Wake Technical College North, and the Triangle Town Center Mall. The #25C route operates Monday through Saturday from 6:20 AM to 8:20 PM, with 60-minute headways. Average weekday ridership on the #25C route in March 2006 was 103 passengers.

The nearest fixed-route bus service along US 1 is the Capital Area Transit's (CAT's) #1 Route. This route travels from downtown Raleigh and along Capital Boulevard before turning east onto Sumner Boulevard to serve the Triangle Town Center.

In addition to public bus service offered by CAT in the study corridor, there are currently two paratransit service providers.

2.4.2 Park and Ride

There are no public park-and-ride facilities in the US 1 study corridor today. The closest park-and-ride facility is operated by CAT at Millbrook Exchange Park, on Spring Forest Road south of I-540, served by the #25C route.

2.4.3 Paratransit Service

Through its Accessible Raleigh Transportation program, the City of Raleigh provides paratransit (demand-response) service for people with disabilities. Two types of paratransit service are offered:

Tier 1 – for permanent Raleigh residents, with no driver's license, and identified with a physical or mental disability. Trips must begin and end within the City of Raleigh. Riders can purchase books of coupons worth $25 for $12.

Tier II – available to persons who qualify under ADA, if taxi or handicab trip begins and ends within ¾ miles of CAT bus stops. In the US 1 corridor, this service area extends from Homestead Road to Riverstream Road. One-way fares are $1.50 per trip.

2.4.4 Carpool/Vanpool

A carpool matching program in the Raleigh area is provided through *Share the Ride North Carolina*. This is a statewide matching service for carpools and vanpools that provides information on the location of transit and bicycle routes and park-and-ride facilities.

TTA provides support to individuals and employers related to carpool and vanpool formation and operation in the Raleigh area. For vanpools, TTA provides vans, pays for gas and insurance, and arranges, oversees, and pays for all maintenance. Riders pay a low monthly fare based on the average daily round-trip mileage. The vanpools are for fewer than seven commuters that share approximately the same work hours. One leg of the trip must begin or end in Wake, Durham, or Orange County. There currently is one TTA-sponsored vanpool in the US 1 corridor, operating between Wake Forest and Research Triangle Park.

The Wake County Good Neighbor Commuter Initiative is a coalition of Wake County employers, where the employers have a priority to reduce the number of employees who drive to work alone. Employers develop and maintain, with TTA assistance, a Commute Trip Reduction Program. TTA provides free consulting, free materials and services and in some cases financial subsidies. At each employer, a Transportation Coordinator is appointed that coordinates and distributes travel information about commuter alternatives. Also with TTA assistance, benchmarks are identified for measuring the success of future reduced drive-alone travel.

2.4.5 Pedestrian and Bicycle Facilities

Various pedestrian and bicycle facilities are available within the US 1 Corridor Study area. Pedestrian facilities are located along roadways in downtown Wake Forest, while US 1 and its cross-streets do not have sidewalks. Though not available at intersections with US 1, existing sidewalks are located on portions of South Main Street (US 1A), Wait Avenue, and Stadium Drive.

Bicycle routes in the US 1 study area include routes designated by the Capital Area MPO, the City of Raleigh, NCDOT, and the Town of Wake Forest, not all of which designate exclusive travel space for bicycles. The Capital Area MPO Bicycle and Pedestrian Plan identifies US 1 as a *US Highway with Bicycle Needs*. Within the study corridor the Capital Area MPO denotes *Bicycle Corridors of Lesser Needs* to include Durant Road, New Falls of the Neuse Road, Thompson Mill Road, and Camp Kanata Road. Capital Area MPO *Priority Bicycle Corridors of Greater Needs* include Perry Creek Road, Falls of the Neuse Road and NC 98 (Durham Road). NCDOT's Bicycle Route #2 is located in the vicinity of US 1 along Purnell Road and Jackson Road, crossing US 1 at Holden Road in Franklin County. In addition, the Town of Wake Forest has designated bicycle routes that include Ligon Mill Road, Burlington Mills Road, South Main Street (US 1A), Rogers Road, NC 98, Wake Union Church Road, Jenkins Road/Stadium Drive, and Purnell Road/Harris Road. Most of the existing bicycle routes described above however, are not signed.

North Carolina's Mountains to Sea Trail, a statewide pedestrian and bicycle trail, crosses the US 1 corridor. This trail extends from the North Carolina western mountains to the North Carolina Outerbanks to the east, sharing the same route with the NCDOT's Bicycle Route #2 within the US 1 study area. In the vicinity of the study area, these routes travel north along the Falls of the Neuse River and Thompson Mill Road, east on Purnell Road, north on Jackson Road, cross US 1 on Holden Road and continue east. Figure 6-4 in the

Phase 3 Analysis Chapter documents existing and future Bikeways and Greenways within the US 1 corridor.

2.5 Existing Geometric Features

The existing (as-built) US 1 roadway design plans were retrieved from NCDOT's plan library. The current facility was designed to fairly high standards (i.e., mail line design speed 70 mph). To determine if there were any design deficiency; the as-built drawings were compared with today's NCDOT's desirable design standards. Table 2-1 summarizes NCDOT's desirable design criteria for freeways, loop ramps, ramps and frontage roads which was used to evaluate US 1's as-built physical features. The roadways physical features evaluated included the right-of-way, typical section, design speed, horizontal alignment, vertical alignment and structures.

Table 2-1
US 1 Desirable Design Criteria

Design Criteria	US 1	Loops	Ramps	Frontage Roads
Classification	Freeway	Freeway	Freeway	Local
Terrain Type	Rolling	Rolling	Rolling	Rolling
Design Speed	70 Mph	30 Mph	50 Mph	40 Mph
Posted Speed	65 Mph	25 Mph	45 Mph	35 Mph
Control Of Access	Full Control	Full Control	Full Control	No
Lane Width	12'	16'	16'	12'
Sidewalks	Na	Na	Na	Yes (Outside)
Bicycle (Share The Road)	NA	NA	NA	Yes (Wide Outside Ln.)
Median Width	36'	Na	Na	Na
Median Protection	Concrete Barrier	Na	Na	Na
Shoulder Width				
Inside	12'	Curb & Gutter	12'	8'
Outside W/O Guard Rail	12'	12'	14'	16' Berm
Outside W/ Guard Rail	15'	NA	17'	N/A
Paved Shoulder				
Outside Total / FDPS	10'/10' FDPS	4'/4' FDPS	4'/4' FDPS	2'/2' FDPS
Inside Total / FDPS	10'/10' FDPS	Na	4'/4' FDPS	2'/2' FDPS
Grade				
Maximum	4.0%	6.0%	5.0%	10.0%
Minimum	0.3%	0.3%	0.3%	0.3%
K Value				
Sag	181	37	96	64
Crest	247	19	84	44
Horizontal. Align.				
Max. Superelvation	8%	8%	8%	8%
Min. Radius	1810'	230'	760'	444'
Spiral (Y/N)	Yes	Yes	Yes	No
Cross Slopes Extend Shale				
Pavement	0.02	0.02	0.02	0.02
Paved Shoulder	0.04	0.02	0.02	0.02
Turf Shoulder	0.08	0.08	0.08	0.08

2.5.1 Right of Way

The right-of-way width varies by location within the corridor, but generally falls between 200 feet and 475 feet. The wider right-of-way is in the southern section of the corridor between I-540 and NC 98, Durham Road, where there are occasional service roads adjacent to the facility. North of Highway 98, the right-of-way remains primarily 200 feet. Figures 2-1 and Figure 2-2 show the typical right-of-way widths throughout the corridor.

2.5.2 Typical Section

US 1 varies from a six lane facility to a four-lane facility within the study area. There are two roadway typical sections in the corridor. From the southern project limit at I-540 to Jaqueline Lane on the southbound lanes and Perry Creek Road on the northbound lanes, the typical section consists of six 12-foot through lanes divided by a 46-foot grass median. The section has 8-foot inside shoulders (6-foot paved) and 12-foot outside shoulders (variable 10-foot to 12-foot paved). North of Jaqueline Lane on the southbound lanes and Perry Creek Road on the northbound lanes, the typical section is four lanes, 12-feet wide, divided by a grassed median, 44-feet-wide, with inside shoulders 10-feet wide (variable 2-feet to 4-feet paved), and outside shoulders 12-feet to 14-feet wide (variable 2-feet to 10-feet paved). Figure 2-3 illustrates the two existing typical cross-sections.

2.5.3 Design Speed

The design speed is the maximum safe maintainable speed of a facility under the design conditions. Both horizontal and vertical design elements are affected by the design speed of a given roadway. US 1 was designed for a design speed of 60 and 70 miles per hour (mph) with a posted speed limit of 55 mph. Design criteria for existing conditions were evaluated with respect to the current 60 mph design speed. Table 2-1 summarizes the design criteria used in the evaluation of physical features.

2.5.4 Horizontal Alignment

The design elements reviewed during evaluation of the existing horizontal alignment included minimum radius, minimum spiral length, maximum superelevation rate of the roadway surface and horizontal clearance to adjacent obstacles. The specific horizontal elements noted in the study area are illustrated in Figure 2-2. US 1 has a primarily north-south alignment. Of the 11 horizontal curves within the study corridor, only the transition spirals are considered substandard. Superelevation within the corridor ranges from 0.02 to 0.075 feet per foot, which meets the requirements for a maximum superelevation rate of 0.08 for this type of facility and design speed.

2.5.5 Vertical Alignment

As vertical alignment was reviewed, the following were analyzed: grade (in percent); length of vertical curve; K value (sag or crest), the design speed and stopping sight distance. Of the 39 vertical curves on the 14-mile study segment, two sag vertical curves had substandard stopping sight distances. The existing roadway grades within the corridor are sufficient for the 60 mph design speed, although there are two instances of grades that are slightly substandard. The substandard design elements occurred at the following locations: near the River Haven Place intersection, near the Caviness Farm Road intersection, the Homestead Drive intersection, and the Shearon Farms Avenue intersection. Figure 2-2 includes vertical alignment data.

2.5.6 Structures

There are seven structures in the US 1 study corridor. The first set of dual structures crossing the Neuse River was built and rebuilt in 1978 and 1986. The second set of dual structures crossing Seaboard Coast Line Railroad was built and rebuilt in 1941 and 1981. The third set of dual structures crossing NC 98 (Durham Road) was rebuilt in 1994. The sufficiency ratings along the corridor range from 62.2 (US 1 northbound crossing Seaboard Coast Line Railroad bridge) to a high of 100.0 (the new structure at the NC 98 Bypass). Table 2-3 summarizes the current bridge conditions in the corridor.

Table 2-2
Bridge Structures Evaluation Table

Bridge Number	Facility Carried	Facility or Feature Intersected	Year Built/ Rebuilt	No. of Span	Bridge Roadway Width/Deck Width (Feet)	Sufficiency Rating	Minimum Vertical Clearance (Feet)	Horizontal Under Clearance (Feet)
91306	US 1	Neuse River	1986	5	36.0 / 38.8	85.1	31	N/A
91305	US 1	Neuse River	1978	5	40.0 / 42.8	98.4	33	N/A
91560	US 1	Seaboard Coast Line Railroad	1981	3	40.0 / 42.8	98.8	22.5	14
91312	US 1	Seaboard Coast Line Railroad	1941	5	35.9 / 38.1	62.2	21	9.7
TBD	NC 98 BYPASS	US 1	2006	2	84.0 / 94.0	100	17	20
91672	US 1	NC 98 (Durham Road)	1994	3	38.0 / 41.4	100	17.7	19
91314	US 1	NC 98 (Durham Road)	1994	3	38.0 / 41.1	100	16.1	18.3

2.6 Capacity Conditions

The objective of this analysis is to quantify the capacity analysis deficiency for the existing facility and then evaluate the effectiveness of the proposed improvements in solving the deficiency and improving the travel conditions in the study area.

The following describes the mainline capacity analysis methodology as well as the results of the 2005 Existing Conditions capacity analyses for the US 1 Corridor Study.

2.6.1 Methodology

Mainline capacity (either for an arterial or freeway) is influenced by several roadway characteristics such as: number of access points (signalized intersections, driveways, or interchanges), area type (urban or rural), percentage of heavy vehicles, lane width and etc. The mainline capacity analysis in this study was performed using the North Carolina Level of Service model, known as NC LOS. NC LOS is a recently developed planning tool created by NCDOT in cooperation with the Institute of Transportation Research and Education (ITRE) in 2005. Table 2-4 summarizes US 1's LOS as compared to its carrying capacity as derived from the NC LOS.

This software generates the roadway capacity by considering the following parameters:

- Traffic characteristics (K-factor, D-factor, peak hour factor, percentage of heavy vehicles, flow rates)
- Geometric characteristics (area type, lane width, length, percentage of grade, turning bays)
- Roadway characteristics (high-speed arterial or freeway, at-grade intersections or interchange, access management)
- Signalization characteristics (number of signals, through g/C ratio, arrival type, signal type)

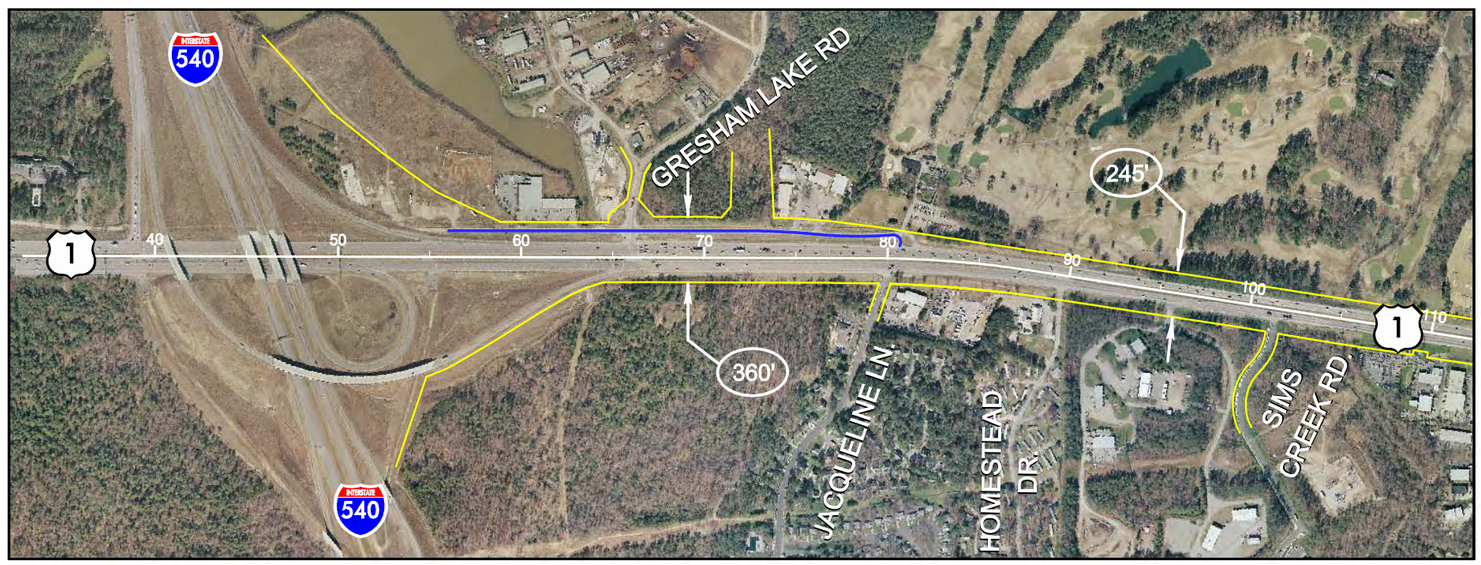
Table 2-3
North Carolina Level of Service Parameters Used for US 1 Capacity Analysis

Parameter	High-Speed Arterial	Freeway
Peak hour factor	0.90	0.90
Driver population factor	N/A	1
K-factor (peak hour factor)	0.09	0.09
D-factor (directional distribution factor)	0.60	0.60
Percentage of heavy vehicles (trucks)	N/A	88
Percentage of recreational vehicles	N/A	0
Traffic arrival type	1	N/A
Traffic turning left form mainline	10 %	N/A
Lane Width	N/A	12
Typical intersection cycle length	140 seconds	N/A
Typical g/C ratio for mainline through movements	0.60	N/A
Free-flow speed	55 mph	N/A
Shoulder width	N/A	10
Number of interchanges per mile	N/A	1.0
Number of signals per mile	1.5	N/A
Terrain	N/A	Level

These roadway specific parameters are used to define two measures of congestion: the volume to capacity ratio (v/c) and the level of service (LOS). The volume to capacity ratio (v/c) reflects the proportion of a roadway's capacity used by traffic demand. The v/c ranges from 0.0 to 1.0 with 1.0 indicating that the traffic demand fully utilizes a roadway's carrying capacity.

SOUTHBOUND

		I-540	GRESHAM LAKE RD.	JACQUELINE LN.	HOMESTEAD DR.	SIMS CREEK RD.
	DESIGN SPEED (mi/hr)	-1.9180% 2.0128%				70mph
VERTICAL ALIGNMENT	GRADE (%)	-2.3804%	NO DATA	3.0302%	(-4.0956% R2000EB)(-4.60% 8.1486803)	1.958%
	LENGTH OF CURVE (ft)		288.0	1752.0'		950'
	K VALUE		283(S)	246 (C)		145 (S)
	STOPPING SIGHT DISTANCE (ft)	782'	782'	728'		559'
HORIZONTAL ALIGNMENT	RADIUS (ft)	283(S) 131.0'		200' SP 7671.50' 200' SP		
	SUPERELEVATION			0.02		
CROSS SECTION	NUMBER OF LANES	5 NB / 4 SB	4 NB / 4 SB	2 NB / 2 SB		
	INSIDE SHOULDER (ft) PAVED / TOTAL	6' PS / 8' TS				4' PS / 10' TS
	OUTSIDE SHOULDER (ft) PAVED / TOTAL	10' PS / 12' TS				10' PS / 12' TS
R/W	EXISTING ROAD R/W (ft)	VARIABLE 245' - 375'				



NORTHBOUND

	DESIGN SPEED (mi/hr)	-1.8584% 1.9446%				70mph
VERTICAL ALIGNMENT	GRADE (%)	-2.3841%	NO DATA	3.0967%	(-4.0956% R2000EB)(-4.60% 8.1486803)	1.958%
	LENGTH OF CURVE (ft)		338.0	1870.0'		950'
	K VALUE		293(S)	260 (C)		145 (S)
	STOPPING SIGHT DISTANCE (ft)	795	796	749		559
HORIZONTAL ALIGNMENT	RADIUS (ft)	293(S) 154.0'		200' SP 7671.50' 200' SP		
	SUPERELEVATION			0.02		
CROSS SECTION	NUMBER OF LANES	5 NB / 4 SB	3 NB / 3 SB	3 NB / 3 SB		
	INSIDE SHOULDER (ft) PAVED / TOTAL	6' PS / 8' TS				6' PS / 10' TS
	OUTSIDE SHOULDER (ft) PAVED / TOTAL	10' PS / 12' TS				10' PS / 12' TS
R/W	EXISTING ROAD R/W (ft)	VARIABLE 245' - 375'				

LEGEND

- SUBSTANDARD DESIGN
  Source: A Policy on Geometric Design of Highways and Streets 2004, American Association of State Highway and Transportation Officials, Washington, D.C.
- SERVICE ROADS
- STRUCTURES
- RAILROAD
- RIGHT OF WAY
- RIGHT OF WAY WIDTH — 360'

0 400 800 1600
Feet

Capital Area Metropolitan Planning Organization

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EXISTING CONDITIONS

US 1 CROSS SECTION AND GEOMETRIC DATA

US 1 CORRIDOR STUDY

Figure 2-2
Sheet 1 of 10

SOUTHBOUND

		PARAGON PARK RD.	SR 2006	SR 2043	RIVER HAVEN PL
	DESIGN SPEED (mi/hr)	70mph			
VERTICAL ALIGNMENT	GRADE (%)	1.958%	1.6506%	-2.04%	-3.48% / -0.22%
	LENGTH OF CURVE (ft)	600'	1300'	550'	500'
	K VALUE	1952 (C)	352 (C)	382 (C)	135 (S)
	STOPPING SIGHT DISTANCE (ft)	2052'	872'	908'	575'
HORIZONTAL ALIGNMENT	RADIUS (ft)	300' SP / 2864.789' / 300' SP		300' SP / 2864.789' / 300' SP	
	SUPERELEVATION	0.075		0.075	
CROSS SECTION	NUMBER OF LANES	2 NB / 2 SB			
	INSIDE SHOULDER (ft) PAVED / TOTAL	4' PS / 10' TS			
	OUTSIDE SHOULDER (ft) PAVED / TOTAL	10'/12' PS / 12' TS			
R/W	EXISTING ROAD R/W (ft)	VARIABLE 245' - 270'			

NORTHBOUND

	DESIGN SPEED (mi/hr)	
VERTICAL ALIGNMENT	GRADE (%)	1.958% / 1.6506% / -2.04% / -3.48% / -0.22%
	LENGTH OF CURVE (ft)	600' / 1300' / 550' / 500'
	K VALUE	1952 (C) / 352 (C) / 382 (C) / 135 (S)
	STOPPING SIGHT DISTANCE (ft)	2052' / 872' / 908' / 575'
HORIZONTAL ALIGNMENT	RADIUS (ft)	300' SP / 2864.789' / 300' SP / 300' SP / 2864.789' / 300' SP
	SUPERELEVATION	0.075 / 0.075
CROSS SECTION	NUMBER OF LANES	2 NB / 2 SB
	INSIDE SHOULDER (ft) PAVED / TOTAL	4' PS / 10' TS
	OUTSIDE SHOULDER (ft) PAVED / TOTAL	12' PS / 12' TS
R/W	EXISTING ROAD R/W (ft)	VARIABLE 245' - 270'

LEGEND

SUBSTANDARD DESIGN

Source: A Policy on Geometric Design of Highways and Streets 2004, American Association of State Highway and Transportation Officials, Washington, D.C.

SERVICE ROADS

STRUCTURES

RAILROAD

RIGHT OF WAY

RIGHT OF WAY WIDTH — 360'

0 400 800 1600
Feet

Capital Area Metropolitan Planning Organization

MULKEY RS&H Architects - Engineers - Planners, Inc. Team

EXISTING CONDITIONS

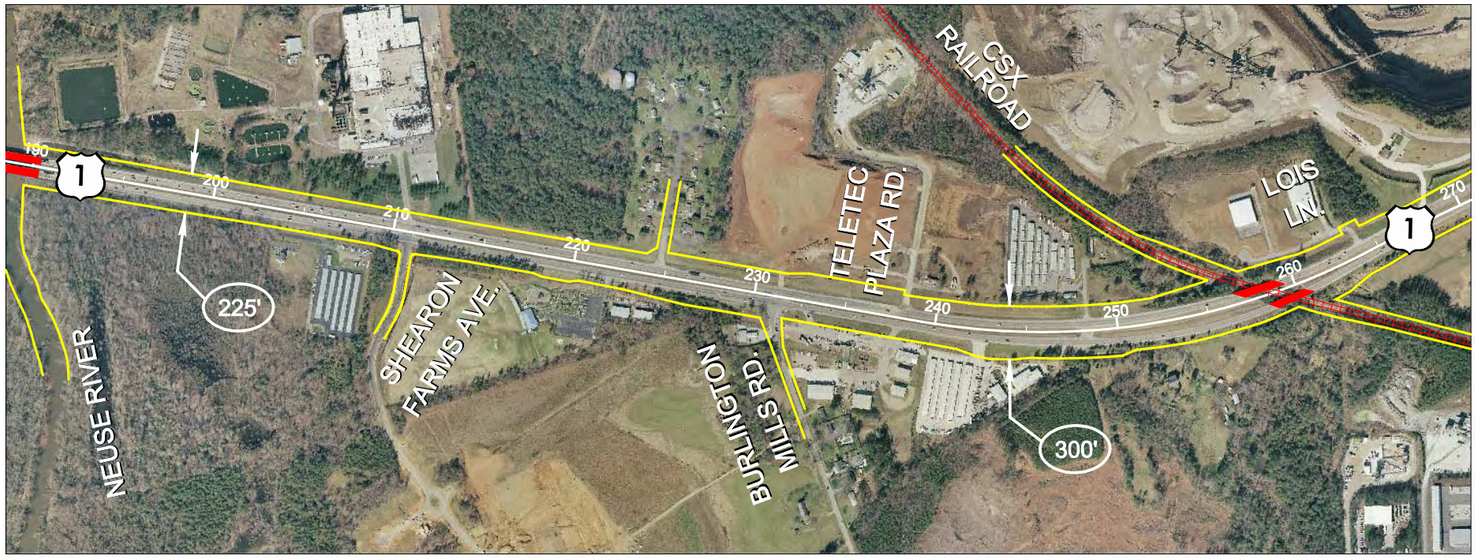
US 1 CROSS SECTION AND GEOMETRIC DATA

US 1 CORRIDOR STUDY

Figure 2-2
Sheet 2 of 10

SOUTHBOUND

				SHEARON FARMS AVE.		SR 2115	SR 2045	TELETEC PLAZA RD			LOIS LN	
	DESIGN SPEED (mi/hr)	70mph										
VERTICAL ALIGNMENT	GRADE (%)	-0.22%		4.22%		0.2806%			2.08%		0.211%	
	LENGTH OF CURVE (ft)		900'		1000'			500'		600'		400'
	K VALUE		203 (S)		254 (C)			278 (S)		321 (C)		431 (S)
	STOPPING SIGHT DISTANCE (ft)		661'		740'			774'		832'		
HORIZONTAL ALIGNMENT	RADIUS (ft)						200' SP	3819.719'		200' SP	200' SP	9549.297'
	SUPERELEVATION							0.055				
CROSS SECTION	NUMBER OF LANES	2 NB / 2 SB										
	INSIDE SHOULDER (ft) PAVED / TOTAL	4' PS / 10' TS										
	OUTSIDE SHOULDER (ft) PAVED / TOTAL	12' PS / 14' TS										
R/W	EXISTING ROAD R/W (ft)	VARIABLE 218' - 300'										



NORTHBOUND

											0.10%	
	DESIGN SPEED (mi/hr)	70mph										
VERTICAL ALIGNMENT	GRADE (%)	-0.22%		4.22%		0.2806%			1.94%	NO DATA	1.14%	
	LENGTH OF CURVE (ft)		900'		1000'			600'		500'		
	K VALUE		203 (S)		254 (C)			362 (S)		481 (S)		
	STOPPING SIGHT DISTANCE (ft)		661'		740'			883'		1019'		
HORIZONTAL ALIGNMENT	RADIUS (ft)						300' SP	3274.045'		300' SP	200' SP	9549.297'
	SUPERELEVATION							0.055				
CROSS SECTION	NUMBER OF LANES	2 NB / 2 SB										
	INSIDE SHOULDER (ft) PAVED / TOTAL	4' PS / 10' TS										
	OUTSIDE SHOULDER (ft) PAVED / TOTAL	12' PS / 12' TS										
R/W	EXISTING ROAD R/W (ft)	VARIABLE 218' - 300'										

LEGEND

SUBSTANDARD DESIGN

Source: A Policy on Geometric Design of Highways and Streets 2004, American Association of State Highway and Transportation Officials, Washington, D.C.

SERVICE ROADS

STRUCTURES

RAILROAD

RIGHT OF WAY

RIGHT OF WAY WIDTH 360'

0 400 800 1600
Feet

Capital Area Metropolitan Planning Organization

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EXISTING CONDITIONS

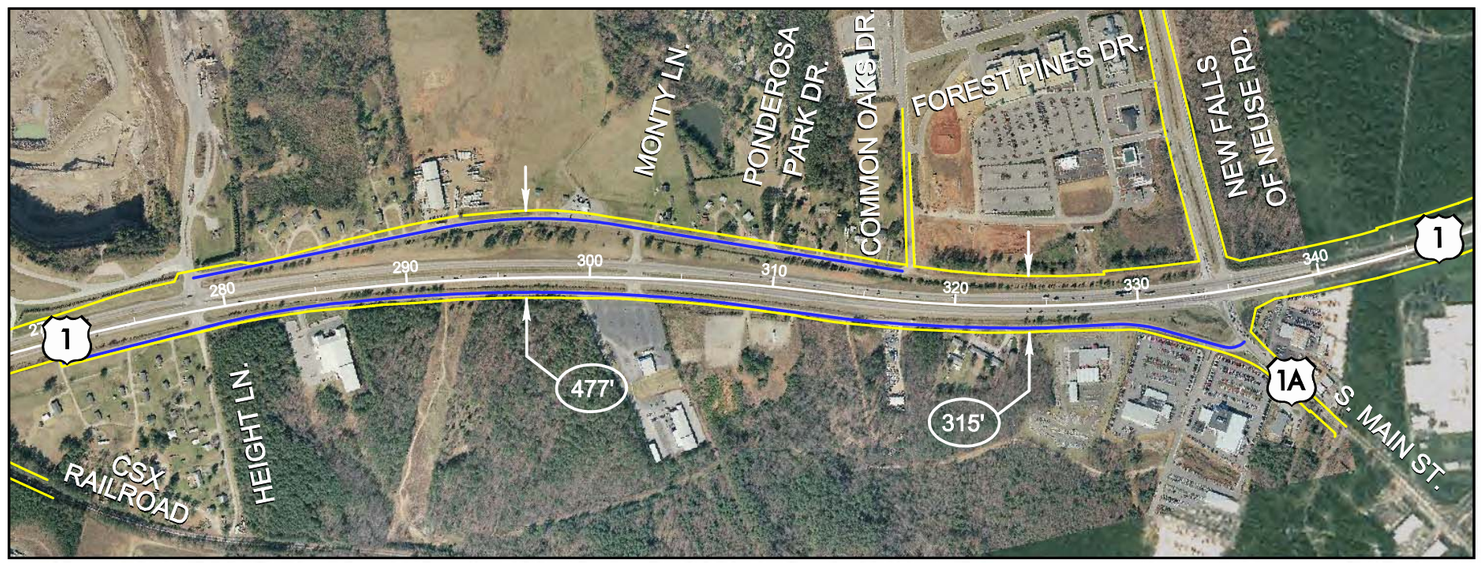
US 1 CROSS SECTION AND GEOMETRIC DATA

US 1 CORRIDOR STUDY

Figure 2-2
Sheet 3 of 10

SOUTHBOUND

		0.211%	HEIGHT LN		MONTY LN	PONDEROSA PARK DR	COMMON OAKS DR	NEW FALLS OF THE NEUSE RD/ US 1 S. MAIN ST
	DESIGN SPEED (mi/hr)	60mph						
VERTICAL ALIGNMENT	GRADE (%)	1.14%		-0.40%		-1.480%		
	LENGTH OF CURVE (ft)	400'	800'		600'			
	K VALUE	431 (S)	519 (C)		319 (S)			
	STOPPING SIGHT DISTANCE (ft)	964'	1059'		1095'			
HORIZONTAL ALIGNMENT	RADIUS (ft)	9549.297'				200' SP	200' SP	7639.437'
	SUPERELEVATION							0.035
CROSS SECTION	NUMBER OF LANES							
	INSIDE SHOULDER (ft) PAVED / TOTAL	4' PS / 10' TS						
	OUTSIDE SHOULDER (ft) PAVED / TOTAL	10'/12' PS / 14' TS						
R/W	EXISTING ROAD R/W (ft)	VARIABLE 231' - 477'						



NORTHBOUND

	DESIGN SPEED (mi/hr)	60mph						
VERTICAL ALIGNMENT	GRADE (%)	1.14%		-0.40%		-1.480%		
	LENGTH OF CURVE (ft)		800'		600'			
	K VALUE		519 (C)		319 (S)			
	STOPPING SIGHT DISTANCE (ft)		1059'		1095'			
HORIZONTAL ALIGNMENT	RADIUS (ft)	9549.297'				200' SP	200' SP	7639.437'
	SUPERELEVATION							0.035
CROSS SECTION	NUMBER OF LANES							
	INSIDE SHOULDER (ft) PAVED / TOTAL	4' PS / 10' TS						
	OUTSIDE SHOULDER (ft) PAVED / TOTAL	10' PS / 12' TS						
R/W	EXISTING ROAD R/W (ft)	VARIABLE 231' - 477'						

LEGEND

SUBSTANDARD DESIGN

Source: A Policy on Geometric Design of Highways and Streets 2004, American Association of State Highway and Transportation Officials, Washington, D.C.

SERVICE ROADS

STRUCTURES

RAILROAD

RIGHT OF WAY

RIGHT OF WAY WIDTH 360'

0 400 800 1600
Feet

Capital Area Metropolitan Planning Organization

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EXISTING CONDITIONS

US 1 CROSS SECTION AND GEOMETRIC DATA

US 1 CORRIDOR STUDY

Figure 2-2
Sheet 4 of 10

SOUTHBOUND

		COMMON OAKS DR			CAVINESS FARM RD			RETAIL DR	
	DESIGN SPEED (mi/hr)	60 mph		BEGIN SB GRADE	70 mph			END SB GRADE	
VERTICAL ALIGNMENT	GRADE (%)	-1.480%	-2.9298%	-2.9298%	-3.5611	3.4695		3.3984	1.5925%
	LENGTH OF CURVE (ft)		226.6'		200.0'	860.0'		200.0'	1200.0'
	K VALUE		156 (C)		317 (C)	122 (S)		2812 (C)	664 (S)
	STOPPING SIGHT DISTANCE (ft)	581'			827'	514'		2464'	1197'
HORIZONTAL ALIGNMENT	RADIUS (ft)	7639.437'	200' SP	200' SP	5729.578'		200' SP		
	SUPERELEVATION	0.035			0.03				
CROSS SECTION	NUMBER OF LANES	2 NB / 2 SB							
	INSIDE SHOULDER (ft) PAVED / TOTAL	4' PS / 10' TS		2' PS / 8' TS					
	OUTSIDE SHOULDER (ft) PAVED / TOTAL	10' PS / 12' TS		2' PS / 10' TS					
R/W	EXISTING ROAD R/W (ft)	VARIABLE 218' - 476'							

NORTHBOUND

		COMMON OAKS DR			CAVINESS FARM RD			RETAIL DR	
	DESIGN SPEED (mi/hr)	60 mph			70 mph				
VERTICAL ALIGNMENT	GRADE (%)	-1.48%	-2.9298%		-3.5474%	3.5591%		3.3984%	1.5925%
	LENGTH OF CURVE (ft)		226.6'		200.0'	860.0'		200.0'	1200.0'
	K VALUE		156 (C)		323 (C)	121 (S)		1245 (C)	664 (S)
	STOPPING SIGHT DISTANCE (ft)	581'			836'	511'		1639'	1197'
HORIZONTAL ALIGNMENT	RADIUS (ft)	7639.437'	200' SP	200' SP	5729.578'		200' SP		
	SUPERELEVATION	0.035			0.03				
CROSS SECTION	NUMBER OF LANES	2 NB / 2 SB							
	INSIDE SHOULDER (ft) PAVED / TOTAL	4' PS / 10' TS				2' PS / 8' TS			
	OUTSIDE SHOULDER (ft) PAVED / TOTAL	10' PS / 12' TS				2' PS / 10' TS			
R/W	EXISTING ROAD R/W (ft)	VARIABLE 218' - 476'							

LEGEND

- SUBSTANDARD DESIGN
  Source: A Policy on Geometric Design of Highways and Streets 2004, American Association of State Highway and Transportation Officials, Washington, D.C.
- SERVICE ROADS
- STRUCTURES
- RAILROAD
- RIGHT OF WAY
- RIGHT OF WAY WIDTH — 360'

0 400 800 1600
Feet

Capital Area Metropolitan Planning Organization

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EXISTING CONDITIONS

US 1 CROSS SECTION AND GEOMETRIC DATA

US 1 CORRIDOR STUDY

Figure 2-2
Sheet 5 of 10

SOUTHBOUND

BEGIN GRADE SB — NC 98 — END GRADE SB — 0.2748% — -0.369% — SR 1929 — BEGIN GRADE SB

	DESIGN SPEED (mi/hr)	60mph
VERTICAL ALIGNMENT	GRADE (%)	1.5925% / 2.325% / 0.2748% / 0.6204% / 0.2748% / 0.2748% / 0.4817%
	LENGTH OF CURVE (ft)	200' / 900' / 200' / 266' / 200' / 200'
	K VALUE	273 (S) / 439 (C) / 579 (S) / 413 (C) / 311 (S) / 967 (S)
	STOPPING SIGHT DISTANCE (ft)	768' / 973' / 1118' / 944' / 819' / 1444'
HORIZONTAL ALIGNMENT	RADIUS (ft)	200' (579 (S)) / 200' SP / 3819.719' / 200' SP (200' (1118'))
	SUPERELEVATION	0.04
CROSS SECTION	NUMBER OF LANES	2 NB / 2 SB
	INSIDE SHOULDER (ft) PAVED / TOTAL	2' PS / 8' TS
	OUTSIDE SHOULDER (ft) PAVED / TOTAL	2' PS / 10' TS
R/W	EXISTING ROAD R/W (ft)	VARIABLE 200' - 320'

NORTHBOUND

	DESIGN SPEED (mi/hr)	60mph
VERTICAL ALIGNMENT	GRADE (%)	1.5925% / 2.325% / 0.2748% / 0.4817%
	LENGTH OF CURVE (ft)	200' / 900' / 500'
	K VALUE	273 (S) / 439 (C) / 2417 (S)
	STOPPING SIGHT DISTANCE (ft)	768' / 973' / 2284'
HORIZONTAL ALIGNMENT	RADIUS (ft)	200' SP / 3819.719' / 200' SP
	SUPERELEVATION	0.04
CROSS SECTION	NUMBER OF LANES	2 NB / 2 SB
	INSIDE SHOULDER (ft) PAVED / TOTAL	2' PS / 8' TS
	OUTSIDE SHOULDER (ft) PAVED / TOTAL	2' PS / 10' TS
R/W	EXISTING ROAD R/W (ft)	VARIABLE 200' - 320'

LEGEND

- SUBSTANDARD DESIGN
  Source: A Policy on Geometric Design of Highways and Streets 2004, American Association of State Highway and Transportation Officials, Washington, D.C.
- SERVICE ROADS
- STRUCTURES
- RAILROAD
- RIGHT OF WAY
- RIGHT OF WAY WIDTH — 360'

0 400 800 1600
Feet

Capital Area Metropolitan Planning Organization

MULKEY RS&H Architects - Engineers - Planners, Inc. Team

EXISTING CONDITIONS

US 1 CROSS SECTION AND GEOMETRIC DATA

US 1 CORRIDOR STUDY

Figure 2-2
Sheet 6 of 10

SOUTHBOUND

		SR 1926	STADIUM DR	TEMPLERIDGE RD	SAINT CATHERINES DR	END SB GRADE	SR 1931	SR 1909
	DESIGN SPEED (mi/hr)	60mph						
VERTICAL ALIGNMENT	GRADE (%)	0.4817%		-0.4610%		0.4290%		0.8447%
	LENGTH OF CURVE (ft)		600'	200'		200'		
	K VALUE		636 (C)	225		481 (S)		
	STOPPING SIGHT DISTANCE (ft)		1172'	696'		1019'		
HORIZONTAL ALIGNMENT	RADIUS (ft)	200' SP	7639.437'		200' SP			
	SUPERELEVATION	RC						
CROSS SECTION	NUMBER OF LANES	2 NB / 2 SB						
	INSIDE SHOULDER (ft) PAVED / TOTAL	2' PS / 8' TS						
	OUTSIDE SHOULDER (ft) PAVED / TOTAL	2' PS / 10' TS						
R/W	EXISTING ROAD R/W (ft)	VARIABLE 200' - 400'						

NORTHBOUND

	DESIGN SPEED (mi/hr)	60mph						
VERTICAL ALIGNMENT	GRADE (%)	0.4817%		-0.4610%		0.4290%		0.8447%
	LENGTH OF CURVE (ft)		600'		360'	200'		
	K VALUE		636 (C)	405 (S)		481 (S)		
	STOPPING SIGHT DISTANCE (ft)		1172'		934'	1019'		
HORIZONTAL ALIGNMENT	RADIUS (ft)	200' SP	7639.437'		200' SP			
	SUPERELEVATION	RC						
CROSS SECTION	NUMBER OF LANES	2 NB / 2 SB						
	INSIDE SHOULDER (ft) PAVED / TOTAL	2' PS / 8' TS						
	OUTSIDE SHOULDER (ft) PAVED / TOTAL	2' PS / 10' TS						
R/W	EXISTING ROAD R/W (ft)	VARIABLE 200' - 400'						

LEGEND

SUBSTANDARD DESIGN
Source: A Policy on Geometric Design of Highways and Streets 2004, American Association of State Highway and Transportation Officials, Washington, D.C.

SERVICE ROADS

STRUCTURES

RAILROAD

RIGHT OF WAY

RIGHT OF WAY WIDTH — 360'

0 400 800 1600
Feet

Capital Area Metropolitan Planning Organization

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EXISTING CONDITIONS

US 1 CROSS SECTION AND GEOMETRIC DATA

US 1 CORRIDOR STUDY

Figure 2-2
Sheet 7 of 10

SOUTHBOUND

| | | |

SOUTHBOUND

GREEN ROAD | NC 96

	DESIGN SPEED (mi/hr)	60mph																					
VERTICAL ALIGNMENT	GRADE (%)	2.5061%		-0.7975%		0.8674%		-0.6018%		-1.9941%		-0.5414%		-0.7757%									
	LENGTH OF CURVE (ft)		1000'		500'		900'		900'		300'		200'										
	K VALUE		303 (C)		300 (S)		612 (C)		646 (C)		413 (S)		•	854 (C)									
	STOPPING SIGHT DISTANCE (ft)		808'		805'		1150'		1181'		668'		•	1357'									
HORIZONTAL ALIGNMENT	RADIUS (ft)																						
	SUPERELEVATION																						
CROSS SECTION	NUMBER OF LANES	2 NB / 2 SB																					
	INSIDE SHOULDER (ft) PAVED / TOTAL	2' PS / 8' TS																					
	OUTSIDE SHOULDER (ft) PAVED / TOTAL	2' PS / 10' TS																					
R/W	EXISTING ROAD R/W (ft)	VARIABLE 200' - 214'																					

NORTHBOUND

	DESIGN SPEED (mi/hr)	60mph																					
VERTICAL ALIGNMENT	GRADE (%)	2.5061%		-0.7975%		0.8674%		-0.6018%		-1.9941%		-0.5414%		-0.7757%									
	LENGTH OF CURVE (ft)		1000'		500'		900'		900'		300'		200'										
	K VALUE		303 (C)		300 (S)		612 (C)		646 (C)		413 (S)		•	854 (C)									
	STOPPING SIGHT DISTANCE (ft)		808'		805'		1150'		1181'		668'		•	1357'									
HORIZONTAL ALIGNMENT	RADIUS (ft)																						
	SUPERELEVATION																						
CROSS SECTION	NUMBER OF LANES	2 NB / 2 SB																					
	INSIDE SHOULDER (ft) PAVED / TOTAL	2' PS / 8' TS																					
	OUTSIDE SHOULDER (ft) PAVED / TOTAL	2' PS / 10' TS																					
R/W	EXISTING ROAD R/W (ft)	VARIABLE 200' - 214'																					

LEGEND

SUBSTANDARD DESIGN

Source: A Policy on Geometric Design of Highways and Streets 2004, American Association of State Highway and Transportation Officials, Washington, D.C.

SERVICE ROADS

STRUCTURES

RAILROAD

RIGHT OF WAY

RIGHT OF WAY WIDTH 360'

0 400 800 1600
Feet

Capital Area Metropolitan Planning Organization

MULKEY RS&H Team Architects - Engineers - Planners, Inc.

EXISTING CONDITIONS

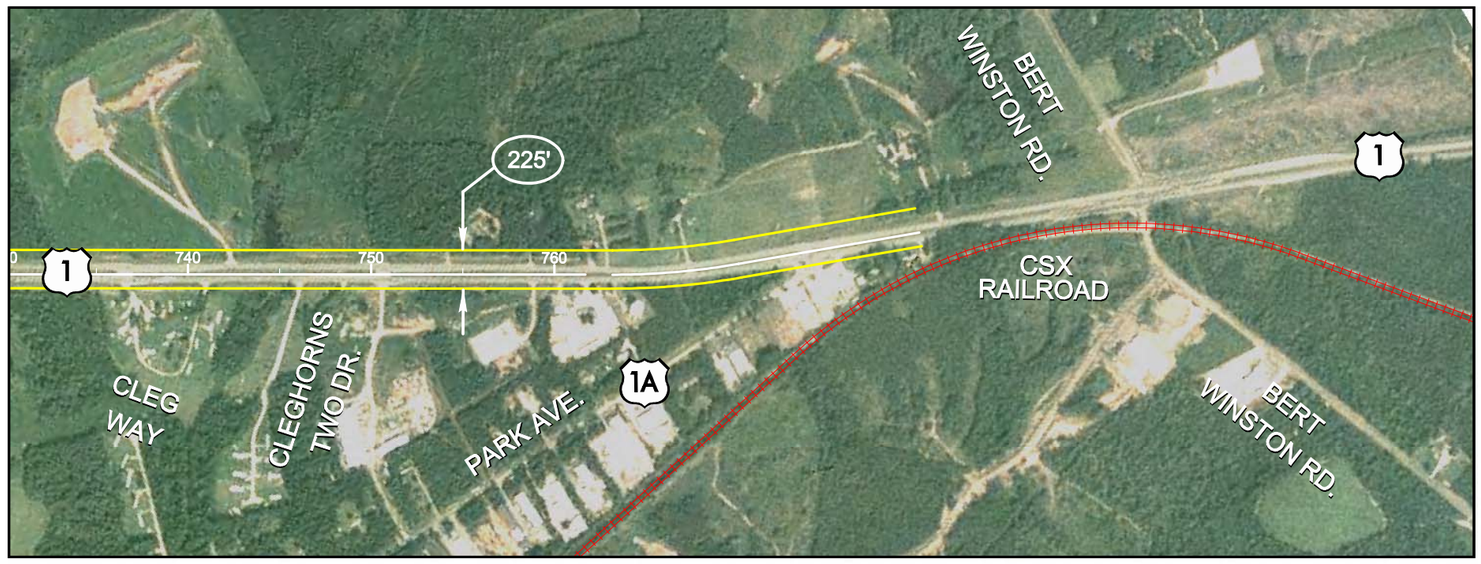
US 1 CROSS SECTION AND GEOMETRIC DATA

US 1 CORRIDOR STUDY

Figure 2-2
Sheet 9 of 10

SOUTHBOUND

		CLEGHORNS TWO DRIVE			US 1A		BERT WINSTON ROAD
	DESIGN SPEED (mi/hr)				END GRADE	60mph	
VERTICAL ALIGNMENT	GRADE (%)	-0.7757%	1.0360%		3.4528%		
	LENGTH OF CURVE (ft)		600'		500'		
	K VALUE		331 (S)		207 (C)		
	STOPPING SIGHT DISTANCE (ft)		845'		767'		
HORIZONTAL ALIGNMENT	RADIUS (ft)						
	SUPERELEVATION						
CROSS SECTION	NUMBER OF LANES	2 NB / 2 SB					
	INSIDE SHOULDER (ft) PAVED / TOTAL	2' PS / 8' TS					
	OUTSIDE SHOULDER (ft) PAVED / TOTAL	2' PS / 10' TS					
R/W	EXISTING ROAD R/W (ft)	200'					



NORTHBOUND

	DESIGN SPEED (mi/hr)				END GRADE	60mph	
VERTICAL ALIGNMENT	GRADE (%)	-0.7757%	1.0360%		3.4528%		
	LENGTH OF CURVE (ft)		600'		500'		
	K VALUE		331 (S)		207 (C)		
	STOPPING SIGHT DISTANCE (ft)		845'		767'		
HORIZONTAL ALIGNMENT	RADIUS (ft)						
	SUPERELEVATION						
CROSS SECTION	NUMBER OF LANES	2 NB / 2 SB					
	INSIDE SHOULDER (ft) PAVED / TOTAL	2' PS / 8' TS					
	OUTSIDE SHOULDER (ft) PAVED / TOTAL	2' PS / 10' TS					
R/W	EXISTING ROAD R/W (ft)	200'					

LEGEND

- SUBSTANDARD DESIGN
  Source: A Policy on Geometric Design of Highways and Streets 2004, American Association of State Highway and Transportation Officials, Washington, D.C.
- SERVICE ROADS
- STRUCTURES
- RAILROAD
- RIGHT OF WAY
- RIGHT OF WAY WIDTH — 360'

0 400 800 1600
Feet

Capital Area Metropolitan Planning Organization

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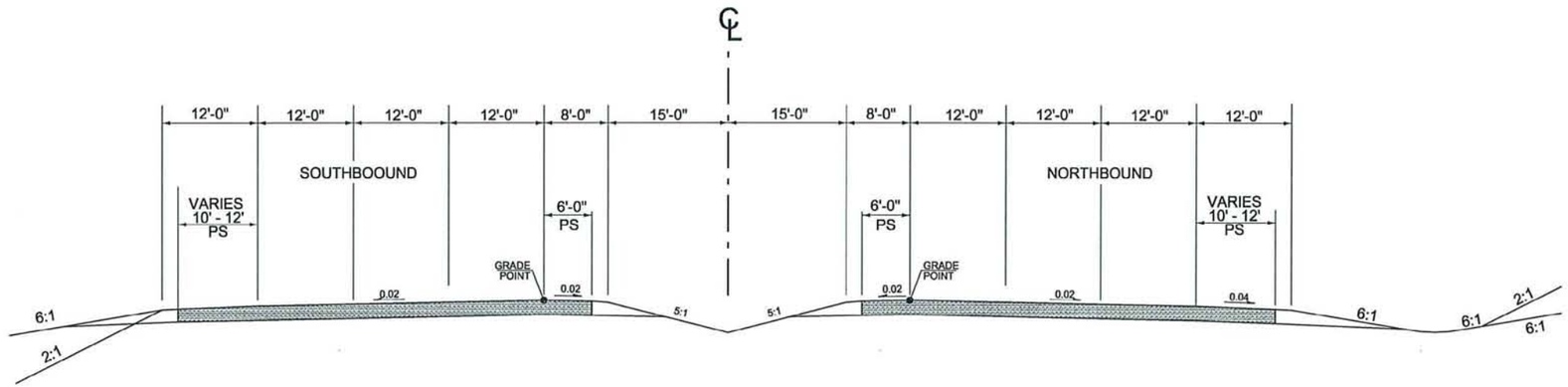
EXISTING CONDITIONS

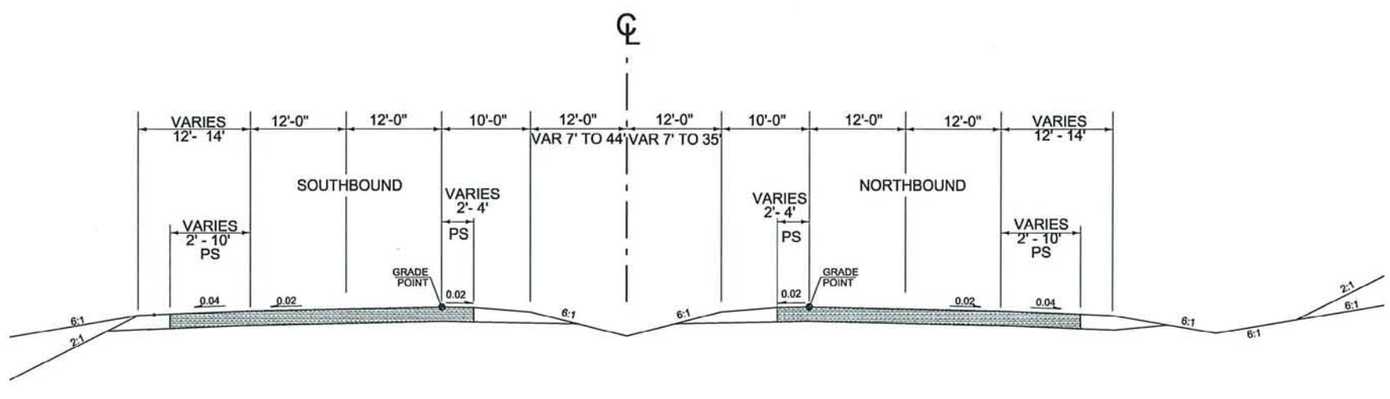
US 1 CROSS SECTION AND GEOMETRIC DATA

US 1 CORRIDOR STUDY

Figure 2-2
Sheet 10 of 10



TYPICAL SECTION
I-540 TO JAQUELINE LANE



TYPICAL SECTION
JAQUELINE LANE TO US 1A (PARK AVENUE), FRANKLIN COUNTY

Capital Area Metropolitan Planning Organization

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EXISTING CONDITIONS

US 1 TYPICAL SECTIONS

US 1 CORRIDOR STUDY

Figure 2-3
Sheet 1 of 1

According to Highway Capacity Manual (HCM), level of service is a quantitative measure describing operational conditions within a traffic stream based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience. An analyst of traffic conditions takes into account the levels of service identified along the corridor. Levels of services are defined as A through "F", with A being least congested and F being the most congested. For this planning study LOS C conditions are considered acceptable which is defined as flowing traffic and not congested. Table 2-4 summarizes the US 1's level of service as compared to its carrying capacity as derived from NC LOS.

Table 2-4
Mainline Level of Service Thresholds

Facility Type	No. of Lanes	Level of Service Thresholds (vehicles per day)				
		A	B	C	D	E
High-Speed Arterial	4	- -	- -	31,900	42,100	45,400
	6	- -	- -	47,900	63,200	68,100
Freeway	4	22,200	36,300	52,400	66,100	74,700
	6	34,100	55,800	80,300	100,200	112,700
	8	46,500	76,200	109,000	134,800	151,300

Source: NC LOS, North Carolina Department of Transportation, 2005.

2.6.2 Analysis

The 2005 existing conditions capacity analysis was derived by comparing NC LOS high-speed arterial capacity thresholds with the 2005 annual average daily traffic (AADT) count data. The majority of the 2005 AADT was obtained from NCDOT and supplemented by several 24-hour traffic counts conducted by the City of Raleigh.

The arterial capacity analysis indicated that on the study corridor between Gresham Lake Road and South Main Street (US 1A), traffic demand either approaches or exceeds the roadway capacity limits (level of service E or F and volume-to-capacity ratios above 0.95). The section between I-540 and Gresham Lake Road has high traffic volumes. However, the current six travel lanes and control of access right-of-way provide acceptable level of service conditions for this section of US 1 (level of service D and volume-to-capacity ratio of 0.75). The section of US 1 between South Main Street (US 1A) in Wake County and Sprint Headquarters' entrance in Franklin County has four travel lanes, lower traffic volumes and greater signal spacing. The roadway functions at level of service D. From the Sprint Headquarters' entrance to the northern project limits US 1 generally operates at LOS C conditions.

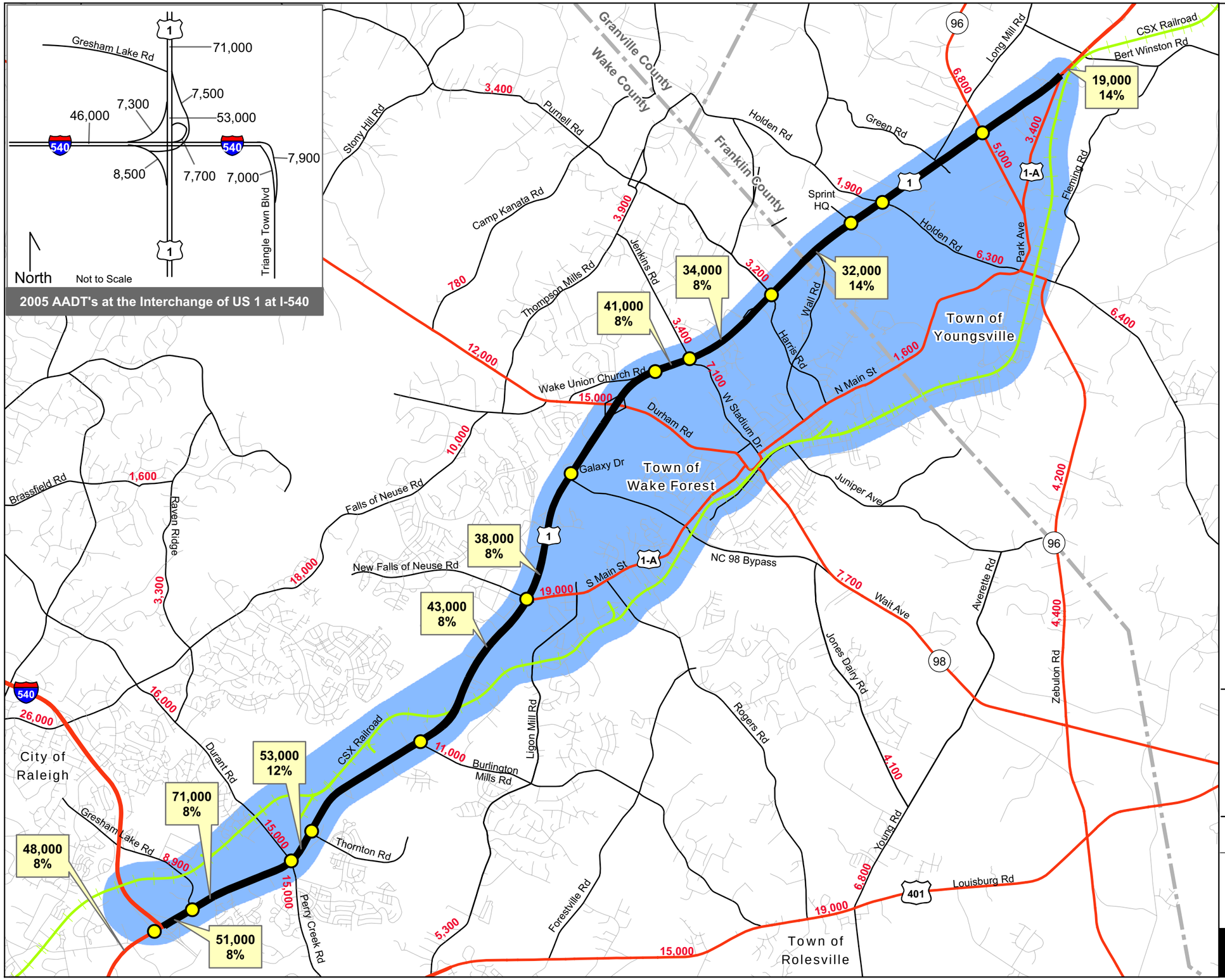
During the field visits in the morning and evening peak periods along the study corridor, the team observed heavy congestion on the corridor between Gresham Lake Road and South Main Street (US 1A). During these field visits it was also observed that all the four traffic signals on US 1 between Durant Road and South Main Street (US 1A) were failing with long queue lengths (i. e. the peak traffic demand required three or more traffic signal cycles to cross the intersection). The heavy traffic movement was towards Raleigh (US 1 southbound) during the morning peak period and vice versa during the evening peak period. North of the intersection of US 1/South Main Street (US 1A), the traffic was flowing with sufficient gaps between vehicles indicating an acceptable level of service. Figure 2-5 shows the 2005 AADT on the US 1 corridor and 2003 AADT on the surrounding roadway system in the study area.

The results of the existing arterial capacity analysis are presented in Table 2-5. Level of Service E was considered the threshold for exceeding capacity. The three following segments along US 1 exceed the arterials capacity:

- Between Gresham Lake Road and Durant Road
- Between Durant Road and Burlington Mills Road
- Between Burlington Mills Road and South Main Street (US 1A)

Table 2-5
Year 2005 US 1 Arterial Capacity Analysis Results

US 1 Segment		No. of Lanes	Capacity (LOS E)	AADT	V/C Ratio	LOS
From	To					
I-540 EB Ramps	Gresham Lake Rd	6	68,100	51,000	0.75	D
Gresham Lake Rd	Durant Rd	5	56,750	71,000	1.25	F
Durant Rd	Burlington Mills Rd	4	45,400	53,000	1.17	F
Burlington Mills Rd	S. Main St (US 1A)	4	45,400	43,000	0.95	E
S. Main St (US 1A)	NC 98	4	45,400	38,000	0.84	D
NC 98	Jenkins Rd	4	45,400	41,000	0.90	D
Jenkins Rd	Harris Rd	4	45,400	34,000	0.75	D
Harris Rd	Sprint Head Quarters Entrance	4	45,400	32,000	0.70	D
Sprint Head Quarters Entrance	NC 96	4	45,400	31,000	0.68	C
NC 96	Park Avenue (US 1A)	4	45,400	19,000	0.42	C



EXISTING CONDITIONS

Traffic Volumes

US 1 CORRIDOR STUDY

Figure 2-4
Sheet 1 of 1

2.6.3 Heavy Vehicles Truck Traffic

The Highway Capacity Manual defines heavy vehicles as any vehicle with more than four wheels touching the pavement during normal operation. NCDOT's Traffic Survey Unit conducted traffic counts including vehicle classification along the US 1 Study Corridor in October and December 2005. This data was supplemented by the Highway Performance Monitoring data obtained from the Federal Highway Administration (FHWA). This data indicated that the percentage of trucks on this study corridor ranges from moderate to high: approximately 7 to 8 % trucks (approximately 5,700 trucks) between I-540 and Durant Road and 12 to 14 % trucks (approximately 4,500 trucks) between Durant Road and Park Avenue (US 1A North), Franklin County. These high truck volumes may contribute to safety concerns and heavy congestion along the study corridor. Figure 2-4 also shows the 2005 mainline percentage of heavy vehicles along the US 1 study corridor.

2.7 Safety Conditions

The US 1 Corridor Study included an evaluation of the crashes that have occurred along US 1 from south of I-540 in Wake County to north of Park Avenue (US 1A) in Franklin County. Crash data was obtained from NCDOT for the 36-month period from November 2001 through October 2004. There were approximately 1,100 crashes for this area during the three-year study period.

The US 1 study corridor traffic safety conditions were analyzed using two different screening approaches. The first approach focused on the crash rate per corridor segment and crash frequency per individual signalized intersection. The crash rate analysis determines high crash locations along the corridor. The second approach was based on the crash types at these high crash locations to help determine the primary causes for the crashes. The analysis of crash type provided an indication of possible deficiencies in geometric conditions within the study corridor and possible engineering solutions to reduce these crashes.

Crash rate is one measure of the relative safety of a roadway. Higher crash rates indicate a deficiency in safety or capacity conditions. Crash rates for the study corridor were calculated from the AADT and the number of reported crashes along the US 1 study corridor. Crash rates at intersections were calculated using the AADT entering the intersection and the number of recorded crashes within 150 feet of each study intersection approach.

NCDOT uses a crash rate based upon the number of crashes per 100 million vehicle miles of travel for roadways. Average statewide crash rates for US highways for the years 2001 through 2003 were obtained from the Traffic Safety Systems Management Unit of the Traffic Engineering and Safety Systems Branch at NCDOT. NCDOT does not publish average statewide crash rates for intersections because of the wide variations in the types of roadways, geometric layouts, and the different traffic control that exist at intersections. Total number of crashes per year at each traffic signal intersection was determined to prioritize high crash intersections. Crash types were grouped into the following five categories:

- Rear-end
- Left-turn/Right-turn and Angle
- Rear-end
- Loss of control
- Sideswipe
- Other
- Pedestrian and Pedal cyclist

In summary, the rear-end and left-turn/right-turn/angle crashes were the two most common types of crashes that occurred along the US 1 corridor. Rear-end crashes commonly occur at locations that experience periods of congestion. They are often the result of sudden stops coupled with inadequate following distance. Left-turn/right-turn/angle crashes are often the result of drivers misjudging the speed and/or distance of oncoming traffic and mistakenly turning in front of or into an oncoming vehicle. This crash type is likely to occur in the following situations:

- When drivers disregard or fail to see a traffic control device, such as stop sign or traffic signal; or
- When inadequate sight distance exists due to a physical obstruction or geometric condition
- When drivers become impatient due to heavy congestion and long stop (waiting) times

2.7.1 Crash Analysis

The US 1 study corridor was divided into eight (8) segments for the crash analysis. It should be noted that each of the segments in this analysis has an approximate 10% overlap of area. Therefore, the total number of crashes along the US 1 study corridor is less than the sum of crashes for each of the eight segments.

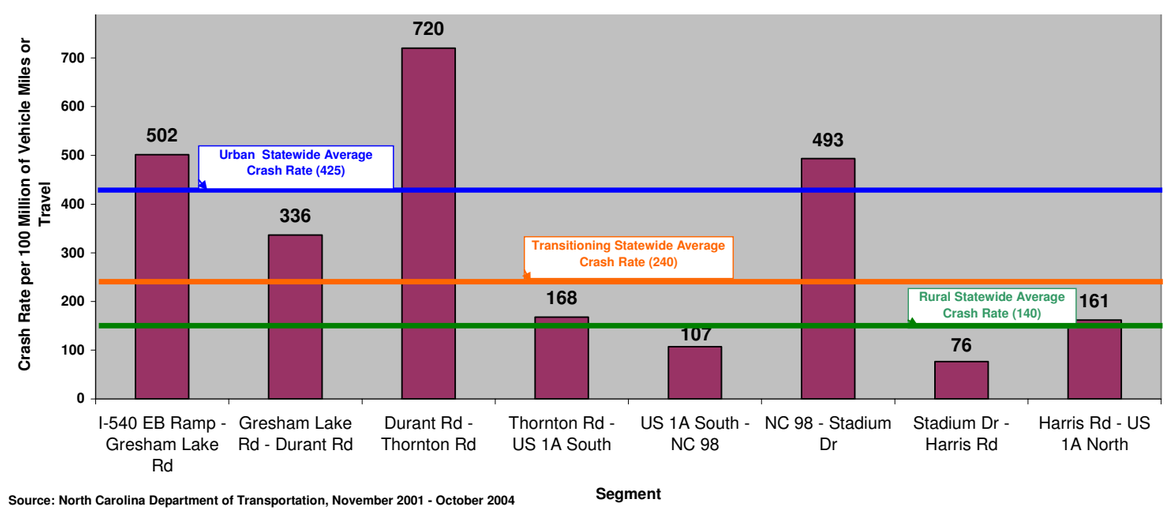
Table 2-6 presents the number and percentage of crashes by type and the crash rate for the eight segments along the US 1 study corridor for the three-year study period. As shown in Table 2-6, the most common types of crashes were rear-end (48%) and left-turn/right-turn/angle (22%) crashes. Also, there was 11% loss-of-control, 9% sideswipe, 9% other and less than 1% (two crashes) pedestrian crashes during the study period. Of the 1,100 crashes, five resulted in fatalities, 340 resulted in personal injuries, and 752 resulted in property damage only.

Table 2-6
US 1 Crashes by Type
November 2001 to October 2004

US 1 Segment	Total for Three-Years	Crash Rate (Per 100 Million of Vehicle Miles of Travel)	Rear-end		Left/Right/ Angle		Loss of control		Sideswipe		Other*		Pedestrian /Bicyclist	
			No.	% of Total	No.	% of Total	No.	% of Total	No.	% of Total	No.	% of Total	No.	% of Total
I-540 EB Ramp Gresham Lake	93	502	53	57	10	11	12	13	12	13	5	5	1	1
Gresham Lake Rd Durant Rd	269	336	152	57	57	21	14	5	33	12	13	5	0	0
Durant Rd - Thornton Rd	144	720	97	67	24	17	8	6	8	6	7	5	0	0
Thornton Rd - US 1A South	299	168	133	44	74	25	35	12	29	10	27	9	1	0
US 1A South - NC 98	100	107	35	35	25	25	17	17	14	14	9	9	0	0
NC 98 - Stadium Dr	136	493	42	31	78	57	4	3	4	3	8	6	0	0
Stadium Dr - Harris Rd	33	76	8	24	8	24	7	21	3	9	7	21	0	0
Harris Rd - US 1A North	192	161	42	22	78	41	34	18	11	6	26	14	1	1
Total	**1,097**	**187**	**525**	**48**	**244**	**22**	**123**	**11**	**103**	**9**	**100**	**9**	**2**	**0**

** Other includes accidents caused by head-on collisions; or collisions with animal, parked vehicle, or pedestrian.*
Number of Crashes in the "Total" row is less than the sum of number of crashes for individual segments. This is due to the overlap between the adjacent segment.
Source: North Carolina Department of Transportation, November 2001 - October 2004

Figure 2-5
Crash Rate by Segment Compared to Statewide Average



Source: North Carolina Department of Transportation, November 2001 - October 2004

Based on year 2001 land use conditions and development in the vicinity of the study corridor, US 1 was categorized as follows:

- Urban area (almost fully developed): US 1 south of I-540 (not part of this study)
- Transitioning Area (rapidly developing): US 1 between I-540, Wake County and Stadium Drive, Wake County
- Rural area (sparse development): US 1 between Stadium Drive, Wake County and Park Avenue (US 1A), Franklin county

The 2001 land use condition was chosen because this date coincided with the beginning crash data time period used for this analysis. Of the eight US 1 study corridor segments, six fall into a criteria transitioning from rural to urban setting. The remaining two sections towards the northern limits of the study corridor are classified as rural conditions. NCDOT statewide average crash rates for US highways with four or more travel lanes with a divided median and no access control are as follows:

- Urban areas - 425 crashes per 100 million vehicle miles of travel
- Transitioning areas - 240 crashes per 100 million vehicle miles of travel
- Rural areas - 140 crashes per 100 million vehicle miles of travel

For the section of the study corridor identified as transitioning, the "statewide average crash rates for all areas" was used. For the section of the study corridor identified as rural area, the "statewide average crash rates for rural areas" was used. Figure 2-5 summarizes the crash rates along the US 1 study corridor by segment and compares them to the above statewide averages.

Five out of eight segments were above the statewide crash average rates. A brief summary of the crash characteristics on these five segments is given below:

Segment 1: Between I-540 and Gresham Lake Road (transitioning area)

The total number of crashes for this segment was 93 during the three-year study period with a crash rate of 502 crashes per 100 million vehicle miles of travel.

The highest number of crashes by type was rear-ending (57%) crashes.

The primary causes of these crashes may be attributed to heavy traffic congestion and multiple lanes at the I-540 interchange contributing to the driver's confusion.

Segment 2: Between Gresham Lake Road and Durant Road (transitioning area)

The total number of crashes for this segment was 269 the three-year study period with a crash rate of 336 crashes per 100 million vehicle miles of travel.

The highest number of crashes by type was rear-end (57%), and left-turn/right-turn/angle (21%) crashes.

The primary causes of these crashes may be attributed to heavy traffic congestion, high concentration of traffic accessing the unsignalized intersections at Jacqueline Lane and Homestead Drive and lane changing associated with I-540 interchange ramps.

Segment 3: Between Durant Road and Thornton Road (transitioning area)

The total number of crashes for this segment was 144 the three-year study period with a crash rate of 720 crashes per 100 million vehicle miles of travel.

The highest number of crashes by type was rear-end (67%), and left-turn/right-turn/angle (17%) crashes.

The primary causes of these crashes may be attributed to heavy congestion and numerous driveways within this section.

Segment 6: Between NC 98 and Stadium Drive (transitioning area)

The total number of crashes for this segment was 136 during the three-year study period with a crash rate of 493 crashes per 100 million vehicle miles of travel.

The highest number of crashes by type were left-turn/right-turn/angle (57%) and rear-end (31%) crashes.

The primary causes of these crashes may be attributed to roadway geometry and concentrated traffic associated with Wake Forest Crossing Shopping Center located at the intersection of US 1/Wake Union Church Road.

Segment 8: Between Harris Road and Park Avenue (US 1A) (transitioning area)

The total number of crashes for this segment was 192 during the three-year study period with a crash rate of 162 crashes per 100 million vehicle miles of travel.

The highest number of crashes by type were left-turn/right-turn/angle (41%), rear-end (22%), and sideswipe (18%) crashes.

The primary causes of these crashes may be attributed to the high number of access points (more than 50 access points in approximately four miles) along this segment.

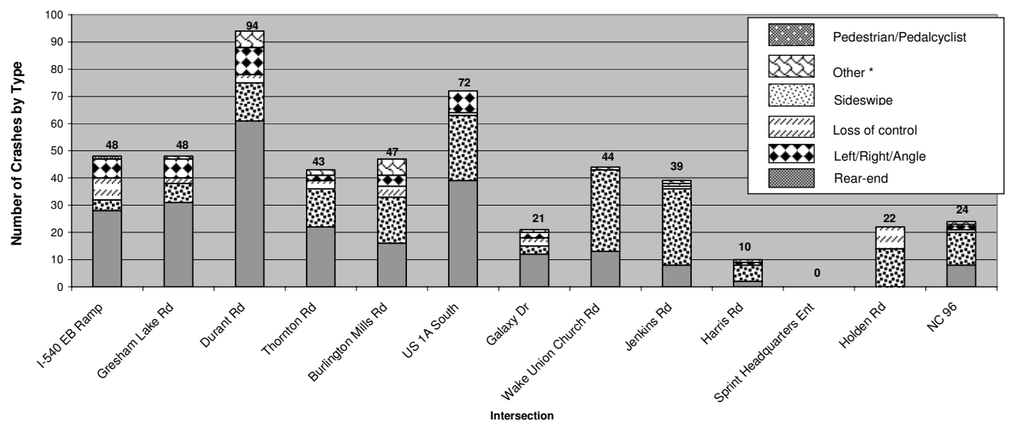
In summary, the roadway segment crash data indicates that approximately seven miles of the 14 mile long study corridor operates above the statewide average rates (see Figure 2-4). Overall, the most common types of crashes were rear-end (48%) and left-turn/right-turn/angle (22%) crashes. The primary causes of these crashes may be attributed to heavy congestion, numerous driveways (more than 110 access points in approximately 13 miles), high concentration of traffic accessing several unsignalized intersections/shopping centers along the study corridor, heavy truck traffic and substandard roadway geometry at several locations.

It should be noted that NCDOT has done several improvements along the US 1 study corridor in the past three years (e.g. median left-overs) and this most likely have improved the safety conditions along the study corridor. Due to the crash analysis time period, this study could not document these improvements.

2.7.2 High Crash Intersections Summary

The US 1 Corridor Study also includes an evaluation of crashes that had occurred at the 13 signalized intersections along the study corridor during the three-year study period. Figure 2-6 summarizes the number of crashes by type for the 13 signalized intersections.

Figure 2-6
Number of Crashes by Type and Intersection



Source: North Carolina Department of Transportation, November 2001 - October 2004

To prioritize high crash intersections along the corridor so that possible safety improvements can be identified, the study intersections are categorized as follows based on the annual crash frequency:

- Highest-intersections with annual crash frequency equal to or more than 15 crashes per year (five intersections)
- Moderate - intersections with annual crash frequency between 10 and 14 (three intersections)
- Lowest - intersections with annual crash frequency less than 10 (five intersections)

A brief summary of the crash conditions at the highest accident locations (five intersections) along the US 1 study corridor is given below:

US 1 at I-540 Eastbound Ramp (average 16 crashes per year)

The total number of crashes for this intersection was 48 during the three-year study period.

The highest number of crashes by type were rear-end (58%), loss of control (17%), and sideswipe (15%) crashes.

The primary causes of these crashes may be attributed to heavy traffic congestion, and concentrated traffic associated with several shopping centers south of this intersection.

US 1 at Gresham Lake Road (average 16 crashes per year)

The total number of crashes for this intersection was 48 during the three-year study period.

The highest number of crashes by type were rear-end (65%), left-turn/right-turn/angle (15%), and sideswipe (15%) crashes.

The primary causes of these crashes may be attributed to heavy congestion and multiple lanes at the I-540 interchange contributing to the driver's confusion and expectation.

US 1 at Durant Road (average 32 crashes per year)

The total number of crashes for this intersection was 94 during the three-year study period.

The highest number of crashes by type were rear-end (65%), and left-turn/right-turn/angle crashes (15%).

The primary causes of these crashes may be attributed to heavy congestion resulting from an inadequate following distance.

US 1 at Burlington Mills Road (average 16 crashes per year)

The total number of crashes for this intersection was 47 during the three-year study.

The highest number of crashes by type were left-turn/right-turn/angle (36%) and rear-end (34%) crashes.

The primary causes of these crashes may be attributed to restricted sight distance due to substandard roadway horizontal/vertical alignment and higher travel speeds.

US 1 at South Main Street (US 1A)/New Falls of The Neuse Road (average 24 crashes per year)

The total number of crashes for this intersection was 72 during the three-year study.

The highest number of crashes by type were rear-end (54%), left-turn/right-turn/angle (33%) and sideswipe (11%) crashes.

The primary causes of these crashes may be attributed to heavy congestion and a long traffic signal cycle length.

Summary

In summary, approximately 80% of the crashes at these five intersections are either left-turn/right-turn/angle or rear-end. As discussed earlier in this section, the primary contributing factors associated with angle crashes include speeding, intersections with signals having long cycle lengths (exceeding 150 seconds), restricted sight distance, drivers misjudging the speed and/or distance of oncoming vehicles. The rear-end crashes generally occur at signalized intersections which experience heavy traffic congestion resulting from an inadequate following distance. With current geometry and the presence of traffic signals at these intersections, no other cost effective mitigation measures could be recommended to improve the travel conditions at this time.

2.8 Existing Land Use and Economic Development Conditions

Land use and economic development context was analyzed as part of the existing conditions analysis and includes the assessment of all parcels within a half-mile buffer of the US 1 Corridor and the CSX railroad corridor (defined as the study area for the first phase of the US 1 Corridor study). The analysis evaluated current land use, existing zoning districts, regional development trends and opportunities for future development.

Land use and zoning data was compiled through GIS information and zoning maps received from jurisdictions within the study area; including the City of Raleigh, Wake County, Franklin County and the Town of Wake Forest. Overall, the study area parcels include a blend of old and new development, with older development mostly restricted to the historic sections of the Towns of Wake Forest and Youngsville.

2.8.1 Land Use

Existing land use conditions reflect a clear pattern of concentrated development at the southern end of the study area between NC 98 and Durham Road and within the Towns of Youngsville and Wake Forest. The sections of the US 1 Corridor connecting these developed pockets are mostly occupied by vacant or farm land. For evaluating land use, the Team verified data through a windshield survey conducted in November 2005. The data was further consolidated into twelve distinct land use categories as illustrated in Figure 2-7. Overall the US 1 Corridor displays a suburban character with one-parcel deep commercial and industrial uses transitioning to residential development. The CSX railroad corridor fronts industrial uses and bisects through the historic sections of Wake Forest and Youngsville.

The study area includes a variety of residential land use types such as single-family detached, single family attached (including townhouses and duplexes) and multifamily housing. Numerous recent or under-construction single-family community projects are interspersed along the corridor, some of which include multiple residential products within the same development. Prominent amongst these are projects along Perry Creek Road, in the Wakefield Plantation community and in the Town of Wake Forest. The Wakefield Plantation, covering over 2,200 acres of residential, commercial and institutional uses, is the only planned major mixed-use project in this area. The older towns have many historically significant houses which are protected through local preservation ordinances. Multifamily developments include rental garden-style apartment complexes and mobile home parks, found mostly along the southern sections of both the US 1 and CSX corridors.

Commercial development, both out-parcel retail and big-box stores are concentrated at major transportation intersections along US 1 such as the I-540 interchange, South Main Street, NC 98 Bypass and NC 98 (Durham Road). A new retail complex near the NC 98 Bypass includes some national commercial stores such as Home Depot, Lowes and Target. In addition to this recent development, historic main-street storefronts in Youngsville and Wake Forest provide smaller office space and boutique-retail options. Furthermore, older retail development, mainly car dealerships and fast food restaurants are concentrated at the intersection of US 1 and South Main Street. Industrial uses mostly follow the railroad corridor and include major centers such as the Gresham Lake Industrial Park and the South Forest Industrial Park. The northern end of the study area has multiple smaller industrial use parcels close to intersections along both the CSX railroad and US 1 corridors. The largest employer along the US 1 corridor is located at Sunset Drive, the Sprint/Mid-Atlantic Telecom facility.

Institutional uses include churches, educational campuses and government offices. Within the study area, the most prominent institutional facility is the Southeastern Baptist Theological Seminary, occupying over 70 acres in Downtown Wake Forest. Very few office complexes are located along US 1 – the Sprint/Mid-Atlantic Telecom facility being the largest.

Public open spaces and golf courses within the study area are all located in the City of Raleigh and Town of Wake Forest limits. Golf courses include Cheviot Hills, Sharon Farm, Wake Forest and the Paschal's Golf Courses. The Falls Lake State Park, located near the Wakefield mixed-use community, offers active and passive recreation facilities for the local community.

Undeveloped parcels and farm/agricultural uses constitute a large part of the land, and are spread all along both the railroad and US 1 corridors. Many of these parcels are over 20 acres in size with access to major transportation corridors, making them good candidates for future development.

2.8.2 Zoning

Existing zoning within the study area follows conventional patterns with parcels of similar zoning type clustered together and the traditional separation of residential areas from commercial, institutional and industrial properties. As illustrated in Figure 2-8, the zoning categories defined for the purposes of this study generally follow the land use classifications and consolidate specific zoning districts defined by the five jurisdictions within the study area.

A majority of the parcels fronting the US 1 corridor, except in the Town of Wake Forest, are zoned for commercial and industrial uses. Commercial uses are also encouraged in the Wake Forest Central Business District and Wake Forest Historic Central Business District. Residential zoning districts are dominated by categories allowing either attached or detached low-density residential uses such as single family, townhouses or duplexes. The allowable densities for such single and multifamily residential vary significantly, ranging from one to thirty units an acre. The Town of Youngsville has recently rezoned a large number of parcels along the railroad corridor to allow multiple uses through a mixed-use district. Similarly, Franklin County also allows mixed-use development in some areas served by water and sewer facilities. Industrial zoning categories, allowing both heavy and light industrial uses front the railroad corridor in parcels within Wake County. Additionally, Franklin County has zoned some parcels along US 1, just south of NC 96 to allow industrial uses.

Overlaying these conventional zoning districts are special districts created to protect natural and historic resources. Within the City of Raleigh, properties along the Neuse River west of the US 1 Corridor and near the New Falls of Neuse Road area have been designated under the 'Watershed Protection Overlay District' to balance environmental protection and economic growth. The district regulates use, lot size, stream buffers, storm water run-off, and impervious surface coverage. In Wake Forest, most parcels west of US 1 within the study area are also within a watershed protection district. Similarly, Franklin County has instituted watershed protection districts, which allow reduced residential densities (one unit/acre in the WS-II overlay area and two units/acre in the WS-IV overlay area). In addition to environmental protection, historic preservation is an important part of the Town of Wake Forest's Zoning Code. A Historic Preservation Commission makes recommendations for designating new districts and protecting resources.

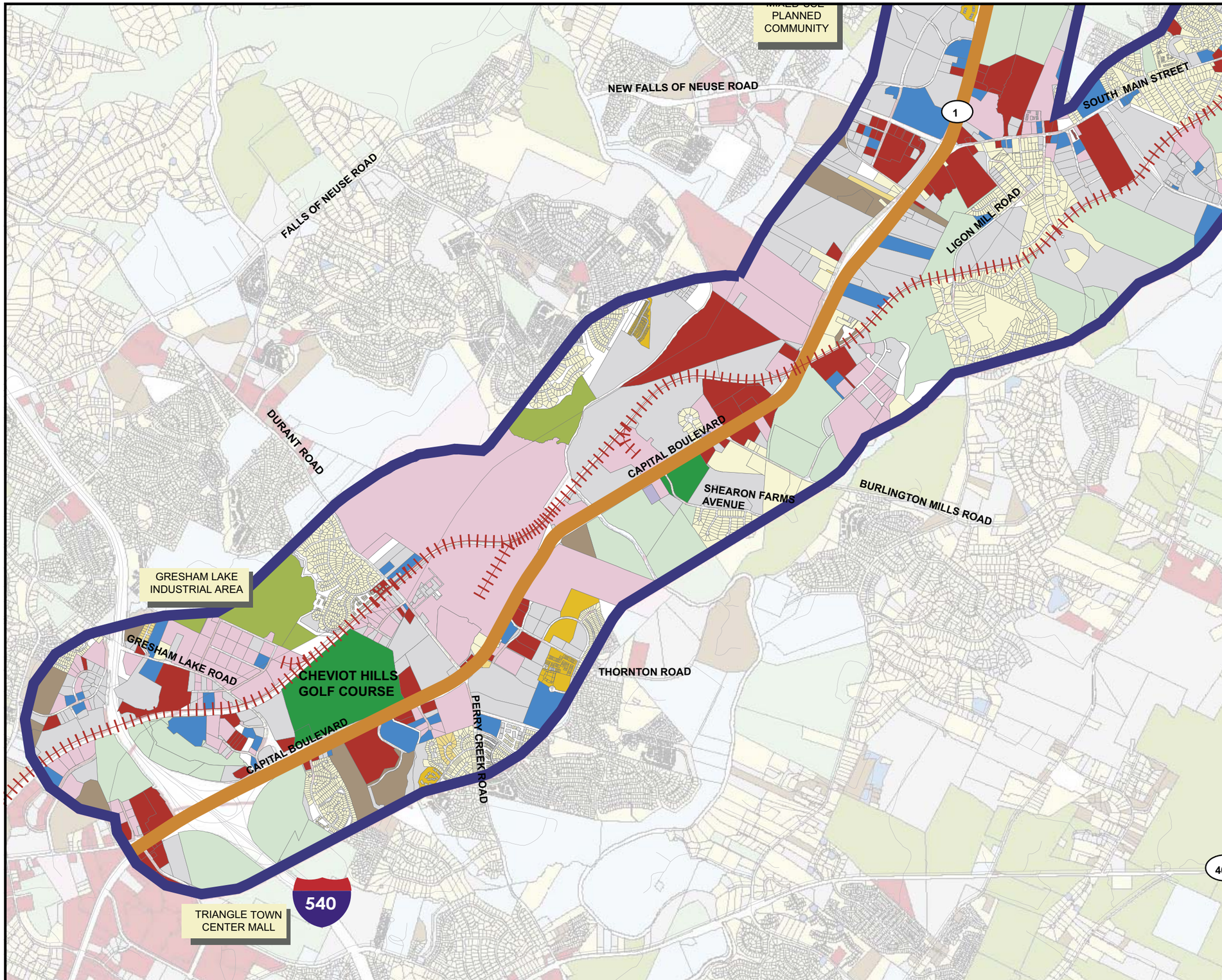
2.9 Cultural and Natural Features

Cultural and natural features that could affect the corridor improvements and in turn could be affected by changes in the corridor transportation and land use decisions include: streams, lakes, ponds and their surrounding flood plains and wetlands; air quality and noise conditions; threatened and endangered species; hazardous materials and contamination sites and farmland (see Figure 2-9).

The following describes the cultural and natural features found in the vicinity of the US 1 Corridor.

2.9.1 Rare Plants and Animals

While there are five rare plant or animal species located in the US 1 corridor study area, only one species is located adjacent to the proposed improvements according to data distributed by the North Carolina Natural Heritage Program, North Carolina's authority on rare elements in the natural environment. The US 1 corridor includes five rare natural elements catalogued by the Natural Heritage Program, including the Four-Toed Salamander, the Glade Milkvine, Michaux's Sumac, the Neuse River Waterdog, and a Wading Bird Rookery (see Table 2-7). The Neuse River Waterdog is located adjacent to US 1 at the Neuse River crossing while the other four species are not adjacent to US 1.



LEGEND

- Single Family Residential
- Duplex Residential
- Townhouse Residential
- Multi-Family Residential/ Mobile Home
- Mixed-Use
- Institutional/ Office
- Industrial
- Commercial
- Vacant
- Golf Course
- Open Space
- Forestry / Agricultural/ Wooded Land

- Railroad
- US-1 Corridor
- US-1 Corridor Study Boundary*

*Land Use study boundaries extend 1/2 mile from corridor center line

0 0.25 0.5 1 Miles

Capital Area Metropolitan Planning Organization

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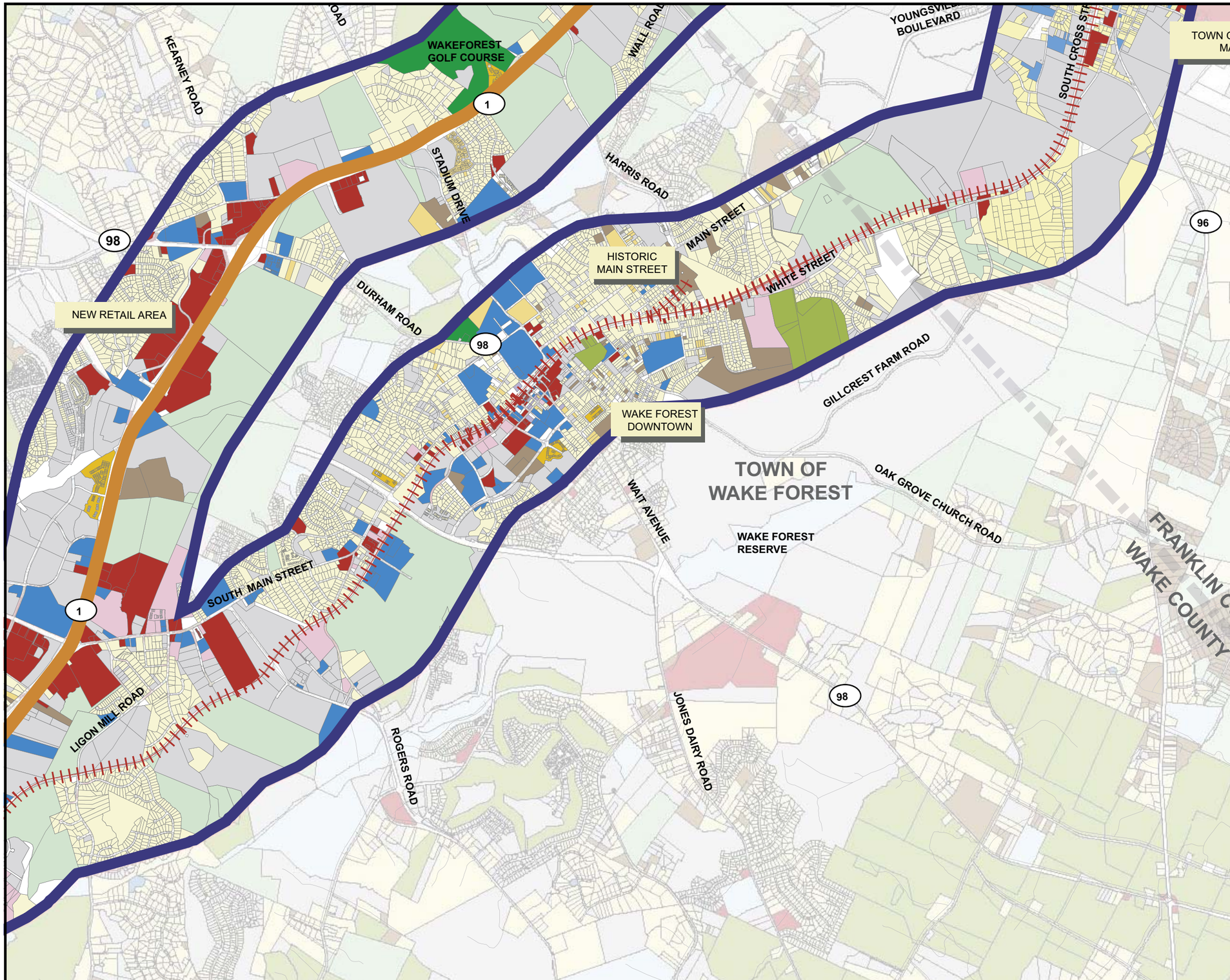
EXISTING CONDITIONS

Existing Land Use

US 1 CORRIDOR STUDY

Figure 2-7
Sheet 1 of 3



LEGEND

- Single Family Residential
- Duplex Residential
- Townhouse Residential
- Multi-Family Residential/ Mobile Home
- Mixed-Use
- Institutional/ Office
- Industrial
- Commercial
- Vacant
- Golf Course
- Open Space
- Forestry / Agricultural/ Wooded Land

- Railroad
- US-1 Corridor
- US-1 Corridor Study Boundary*

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0 0.25 0.5 1 Miles

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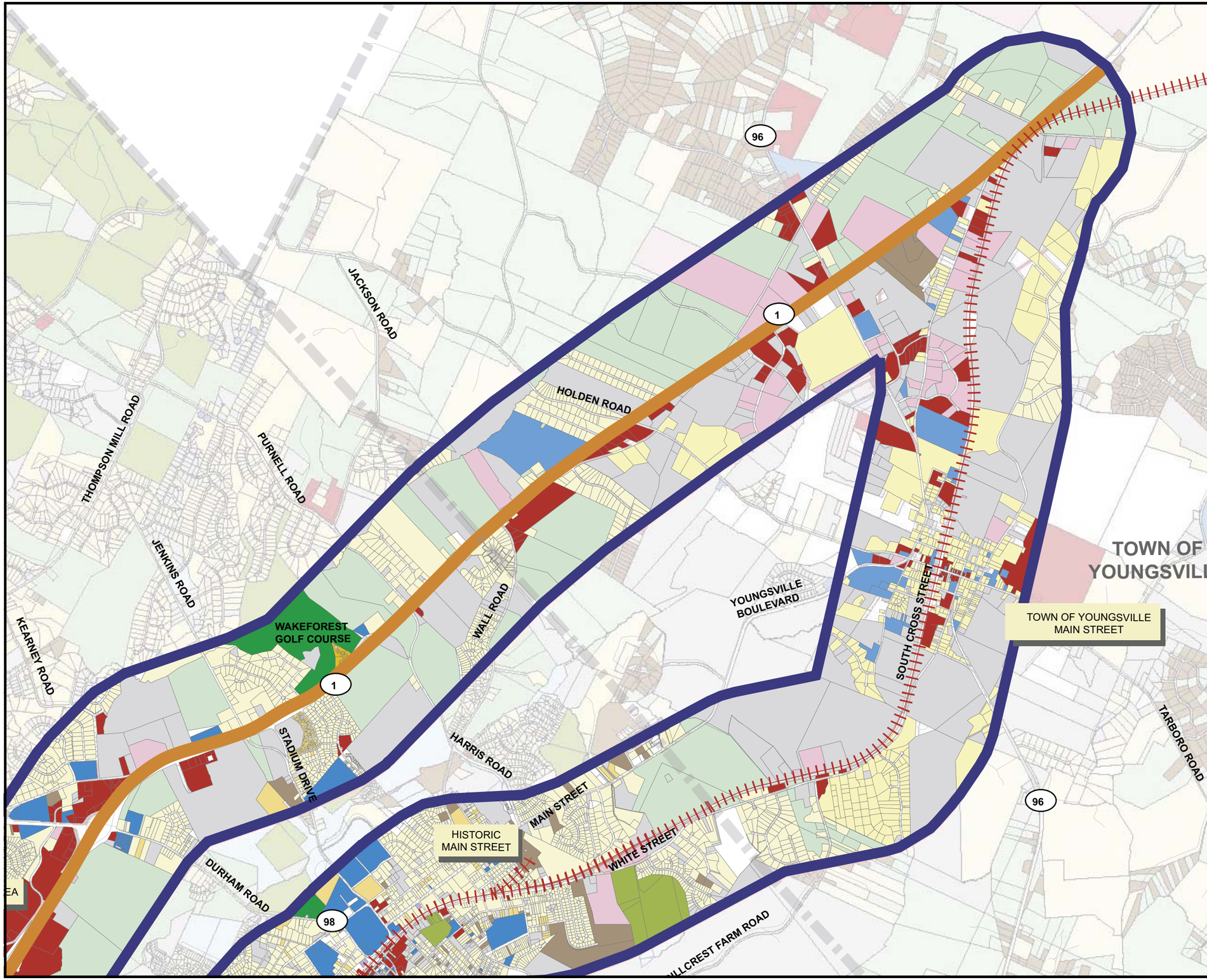
RS&H Architects - Engineers - Planners, Inc. Team

EXISTING CONDITIONS

Existing Land Use

US 1 CORRIDOR STUDY

Figure 2-7
Sheet 2 of 3



LEGEND

- Single Family Residential
- Duplex Residential
- Townhouse Residential
- Multi-Family Residential/ Mobile Home
- Mixed-Use
- Institutional/ Office
- Industrial
- Commercial
- Vacant
- Golf Course
- Open Space
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- Railroad
- US-1 Corridor
- US-1 Corridor Study Boundary*

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0 0.25 0.5 1 Miles

Capital Area Metropolitan Planning Organization

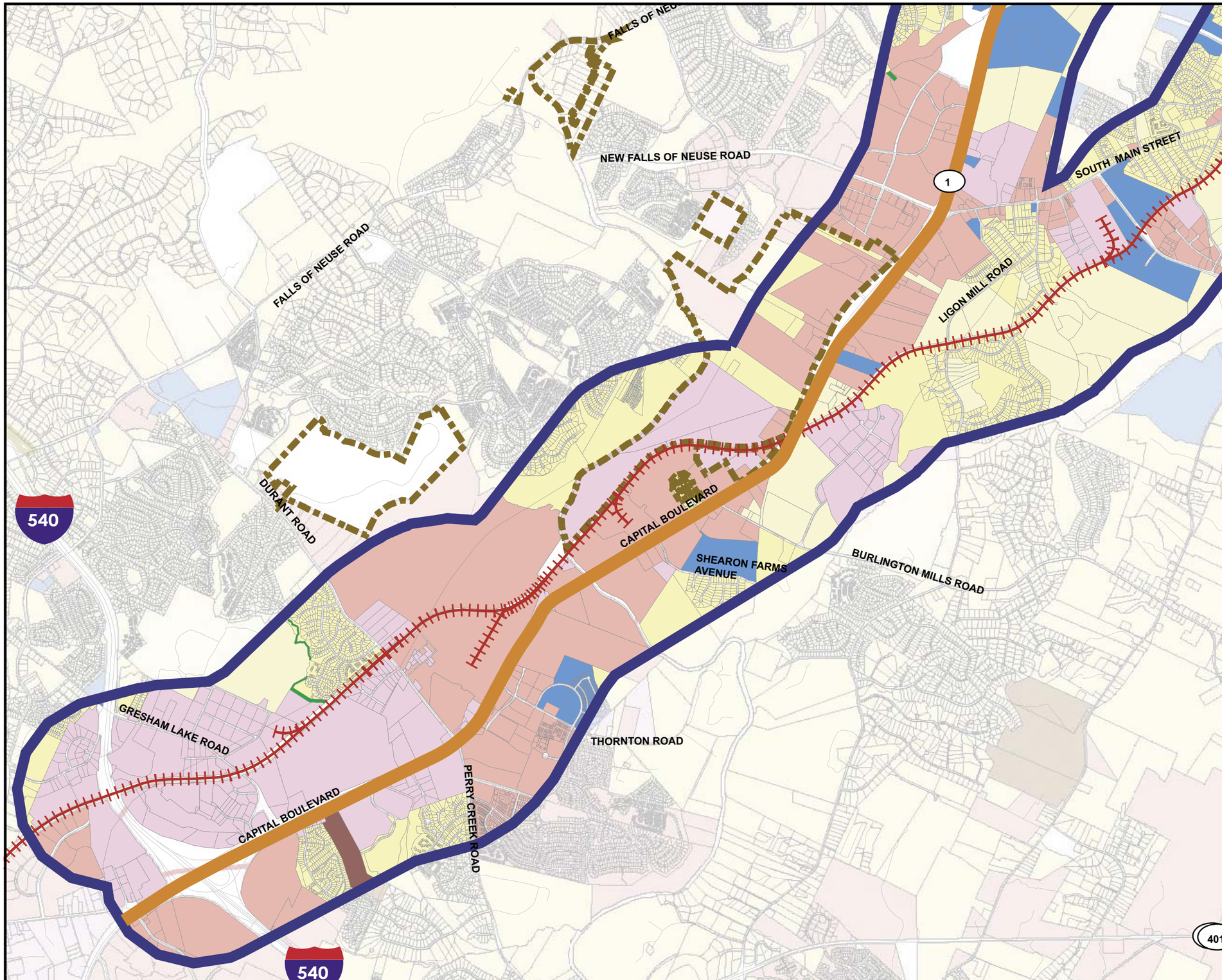
RS&H Architects - Engineers - Planners, Inc. Team

EXISTING CONDITIONS

Existing Land Use

US 1 CORRIDOR STUDY

Figure 2-7
Sheet 3 of 3



LEGEND

- **Wake Forest Central Business District**
- **Wake Forest Historic CBD**
- **Economic Development** (W*-ED)
- **Commercial** (W-HB, W-HD, WF*-NB, R-SC, R*-TD, F-GB, F*-HB,Y-Comm, Y*-Comm/RA, Y-GB, Y-HB, Y-HB)
- **Office / Institutional** (W-O-I, WF-ICD, R- O&I-1, R- O&I-2, F-OI, Y-OI)
- **Industrial** (W- IND1, WF- I, R- I-1, F-HI, F-LI, Y-HI, Y-LI, Y-MI)
- **Mixed Use** (F-MU, Y-MU)
- **Multi-Family Residential** (W-MR1, WF-MF, Y-RSM)
- **Mobile Home** (W-MH, Y-RMH)
- **Residential - (Single family and/or Townhouse)** (W-R10, W-R15, W-R20, W-R30, W-R4, W-R40W, W-R80W, R-R4, R-R5, R-R6, R-R8, WF-R10, WF-R20, F-R1, F-R8, F-R30, F-R40, Y-R1, Y-R30, Y-R40, Y-RH, Y-RS, Y-RSM, Y-RA)
- **Residential Single Family / Rural** (WF-RH, R-RR, Y-RA)
- **Agricultural / Conservation** (R-CM, F-AR, Y-AR, Y-AR/LI)

Overlay Districts

- **Watershed Protection Area Overlay** (Raleigh)
- **Watershed Protection Area** (Wake Forest)
- **Watershed Overlay - II** (Franklin County)
- **Watershed Overlay - IV** (Franklin County)

*** Denotes jusrisdiction name**

F - Franklin County
R - Raleigh
WF - Town of Wake Forest
W - Wake County
Y - Town of Youngsville

- Railroad
- US-1 Corridor
- US-1 Corridor Study Boundary*

*Land Use study boundaries extend 1/2 mile from corridor center line

0 0.5 1 2 Miles

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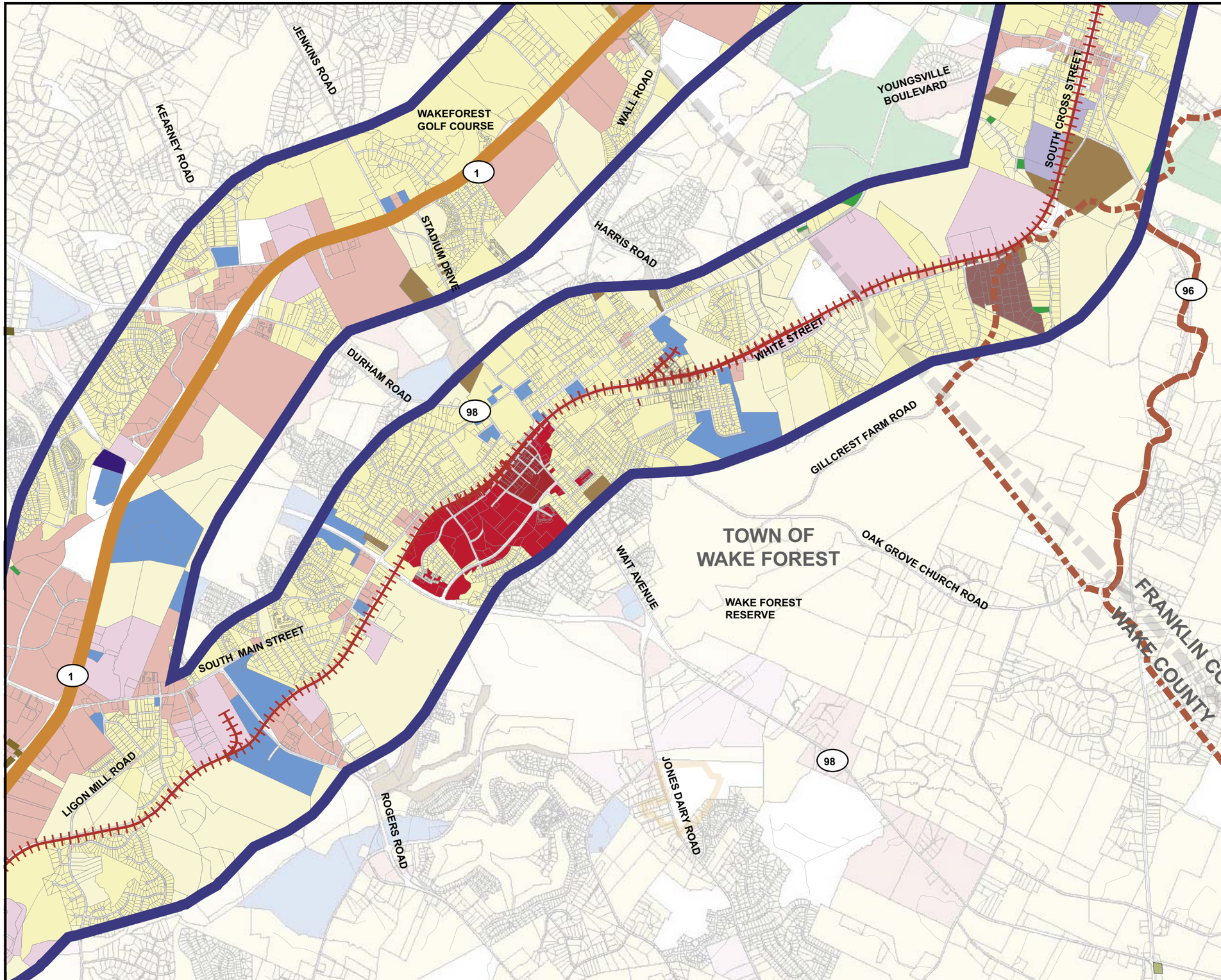
EXISTING CONDITIONS

Existing Zoning

US 1 CORRIDOR STUDY

Figure 2-8
Sheet 1 of 3



LEGEND

- Wake Forest Central Business District
- Wake Forest Historic CBD
- Economic Development (W*-ED)
- Commercial (W-HB, W-HD, WF*-NB, R-SC, R*-TD, F-GB, F*-HB,Y-Comm, Y*-Comm/RA, Y-GB, Y-HB, Y-HB)
- Office / Institutional (W-O-I, WF-ICD, R- O&I-1, R- O&I-2, F-OI, Y-OI)
- Industrial (W- IND1, WF- I, R- I-1, F-HI, F-LI, Y-HI, Y-LI, Y-MI)
- Mixed Use (F-MU, Y-MU)
- Multi-Family Residential (W-MR1, WF-MF, Y-RSM)
- Mobile Home (W-MH, Y-RMH)
- Residential - (Single family and/or Townhouse) (W-R10, W-R15, W-R20, W-R30, W-R4, W-R40W, W-R80W, R-R4, R-R5, R-R6, R-R8, WF-R10, WF-R20, F-R1, F-R8, F-R30, F-R40, Y-R1, Y-R30, Y-R40, Y-RH, Y-RS, Y-RSM, Y-RA)
- Residential Single Family / Rural (WF-RH, R-RR, Y-RA)
- Agricultural / Conservation (R-CM, F-AR, Y-AR, Y-AR/LI)

Overlay Districts

- Watershed Protection Area Overlay (Raleigh)
- Watershed Protection Area (Wake Forest)
- Watershed Overlay - II (Franklin County)
- Watershed Overlay - IV (Franklin County)

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- US-1 Corridor Study Boundary*

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0 0.5 1 2 Miles

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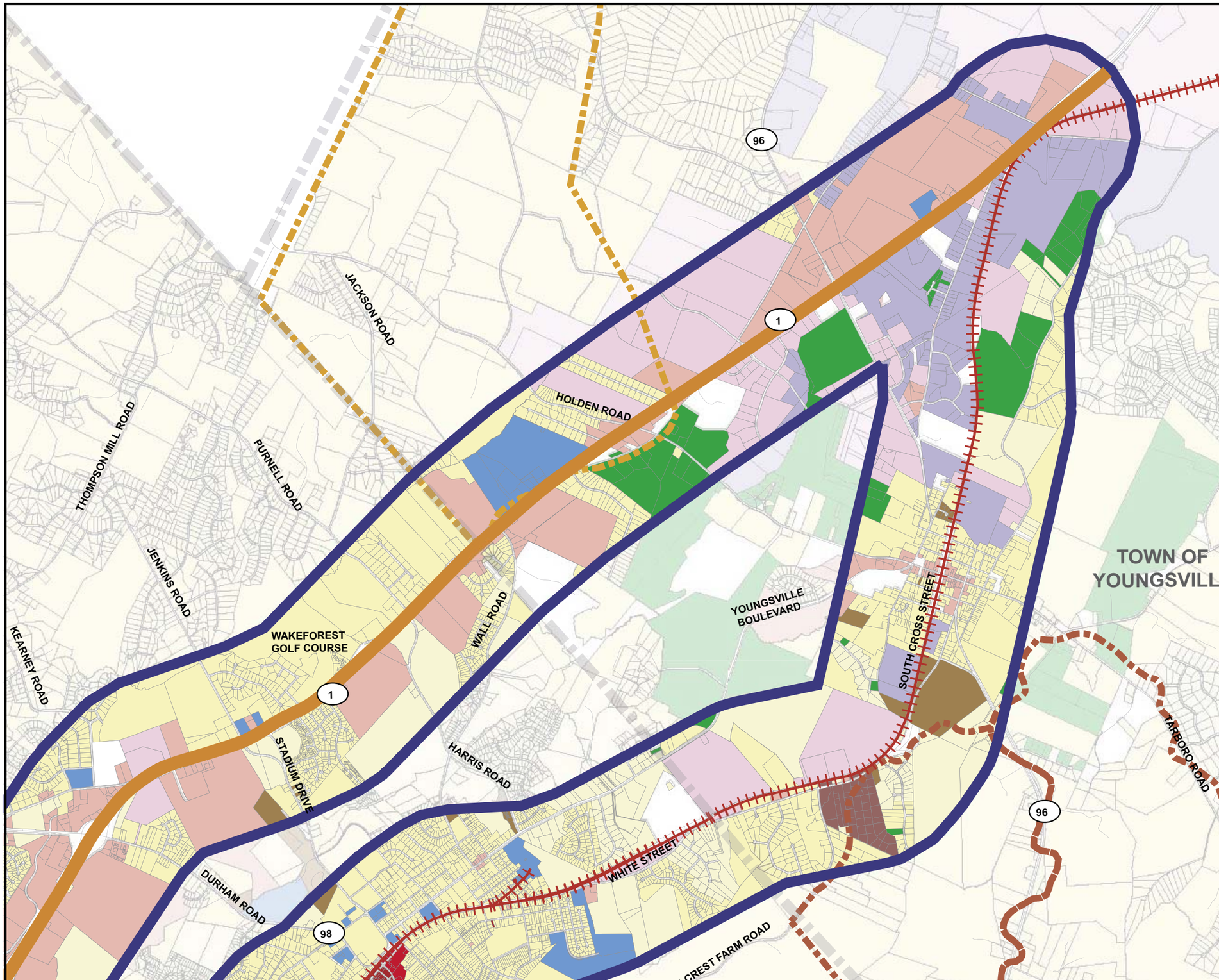
EXISTING CONDITIONS

Existing Zoning

US 1 CORRIDOR STUDY

Figure 2-8
Sheet 2 of 3



LEGEND

- **Wake Forest Central Business District**
- **Wake Forest Historic CBD**
- **Economic Development** (W*-ED)
- **Commercial** (W-HB, W-HD, WF*-NB, R-SC, R*-TD, F-GB, F*-HB,Y-Comm, Y*-Comm/RA, Y-GB, Y-HB, Y-HB)
- **Office / Institutional** (W-O-I, WF-ICD, R- O&I-1, R- O&I-2, F-OI, Y-OI)
- **Industrial** (W- IND1, WF- I, R- I-1, F-HI, F-LI, Y-HI, Y-LI, Y-MI)
- **Mixed Use** (F-MU, Y-MU)
- **Multi-Family Residential** (W-MR1, WF-MF, Y-RSM)
- **Mobile Home** (W-MH, Y-RMH)
- **Residential - (Single family and/or Townhouse)** (W-R10, W-R15, W-R20, W-R30, W-R4, W-R40W, W-R80W, R-R4, R-R5, R-R6, R-R8, WF-R10, WF-R20, F-R1, F-R8, F-R30, F-R40, Y-R1, Y-R30, Y-R40, Y-RH, Y-RS, Y-RSM, Y-RA)
- **Residential Single Family / Rural** (WF-RH, R-RR, Y-RA)
- **Agricultural / Conservation** (R-CM, F-AR, Y-AR, Y-AR/LI)

Overlay Districts

- **Watershed Protection Area Overlay** (Raleigh)
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- Railroad
- US-1 Corridor
- US-1 Corridor Study Boundary*

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0 0.5 1 2 Miles

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EXISTING CONDITIONS

Existing Zoning

US 1 CORRIDOR STUDY

Figure 2-8
Sheet 3 of 3

Table 2-7
Rare Plants and Animals in the US 1 Corridor

Common Name	Major Group	Scientific Name	State Status	Federal Status
Four Toed Salamander	Vertebrate Animal	Hemidactylium scutatum	Special Concern	None
Glade Milkvine	Vascular Plant	Matelea decipiens	Proposed Significantly Rare	None
Michaux's Sumac	Vascular Plant	Rhus michauxii	Endangered-Special Concern	Endangered
Neuse River Waterdog	Vertebrate Animal	Myotis septentrionalis	Special Concern	None
Wading Bird Rookery	Animal Assemblage	None	None	None

Source: North Carolina Natural Heritage Program, April 2006

The North Carolina Natural Heritage Program is responsible for inventorying, cataloging, and conserving the rarest and most outstanding elements of the natural environment of the state. These elements include plants and animals which are so rare as to merit special consideration when land use decisions are made. The above plants and animals include the following designations of the species' need for special consideration:

- *Endangered* (federal definition) - a taxon in danger of extinction throughout all or a portion of its range.
- *Endangered* (state definition) - any species or higher taxon whose continued existence as a viable component of the State's flora or fauna is determined to be in jeopardy.
- *Significantly Rare* (state definition) - species which are very rare in North Carolina, generally with 1-20 populations in the state, generally substantially reduced in numbers by habitat destruction.
- *Special Concern* (state definition for animals) - any species in North Carolina which requires monitoring but which may be collected and sold under regulations adopted under the provisions of Article 25 of Chapter 113 of the General Statutes, 1987.

2.9.2 Streams

There are a large number of streams located in the US 1 study area, most of which are located in the Neuse River Drainage Basin. In addition, a one-mile section of the US 1 Corridor in Franklin County is located within the Tar-Pamlico River Basin. US 1 runs along a natural ridge, therefore, most of the streams flow away from the roadway and do not cross. The three streams that do cross the US 1 corridor are the Neuse River and two more minor streams, Perry Creek and Richland Creek. The Neuse River is a permanent stream which is formed by the confluence of the Flat and Eno rivers northwest of Durham, NC. The Neuse River flows approximately 195 miles and empties into the Pamlico Sound south of New Bern, NC. The Neuse River meanders through the study corridor from west to east and crosses US 1 between Thorton Road and Burlington Mills Road. A greenway path is being planned along the Neuse River as part of the realigned Mountains-to-Sea Trail. Perry Creek crosses US 1 near Gresham Lake Road and flows approximately 5 miles from west of Gresham Lake to it's confluence with the Neuse River. Richland Creek crosses the US 1 corridor south of the NC 98 Bypass interchange and flows approximately 8.5 miles from west of Youngsville to it's confluence with the Neuse River south of New Falls of the Neuse Road.

2.9.3 FEMA Flood Zones

Four areas subject to flooding are located in the study corridor along US 1 (see Figure 2-9). These are associated with the Neuse River, Perry Creek, Richland Creek, and Horse Creek as well as their tributaries. These designations are based on Federal Emergency Management Agency information for Wake and Franklin Counties (2006). The section below reviews the details of the four water bodies and associated wetlands in the US 1 Corridor vicinity.

The Neuse River meanders through the study corridor and crosses beneath US 1 between Thornton Road and Burlington Mills Road. The 100 year floodplain extends along the Neuse River throughout the study corridor. A bridge carries US 1 over the Neuse River at its crossing. In addition to the floodplain, large areas of wetland extend throughout this entire area. Two particularly large areas of wetland and floodplain are located on both sides of US 1 at the bridge crossing over the Neuse River.

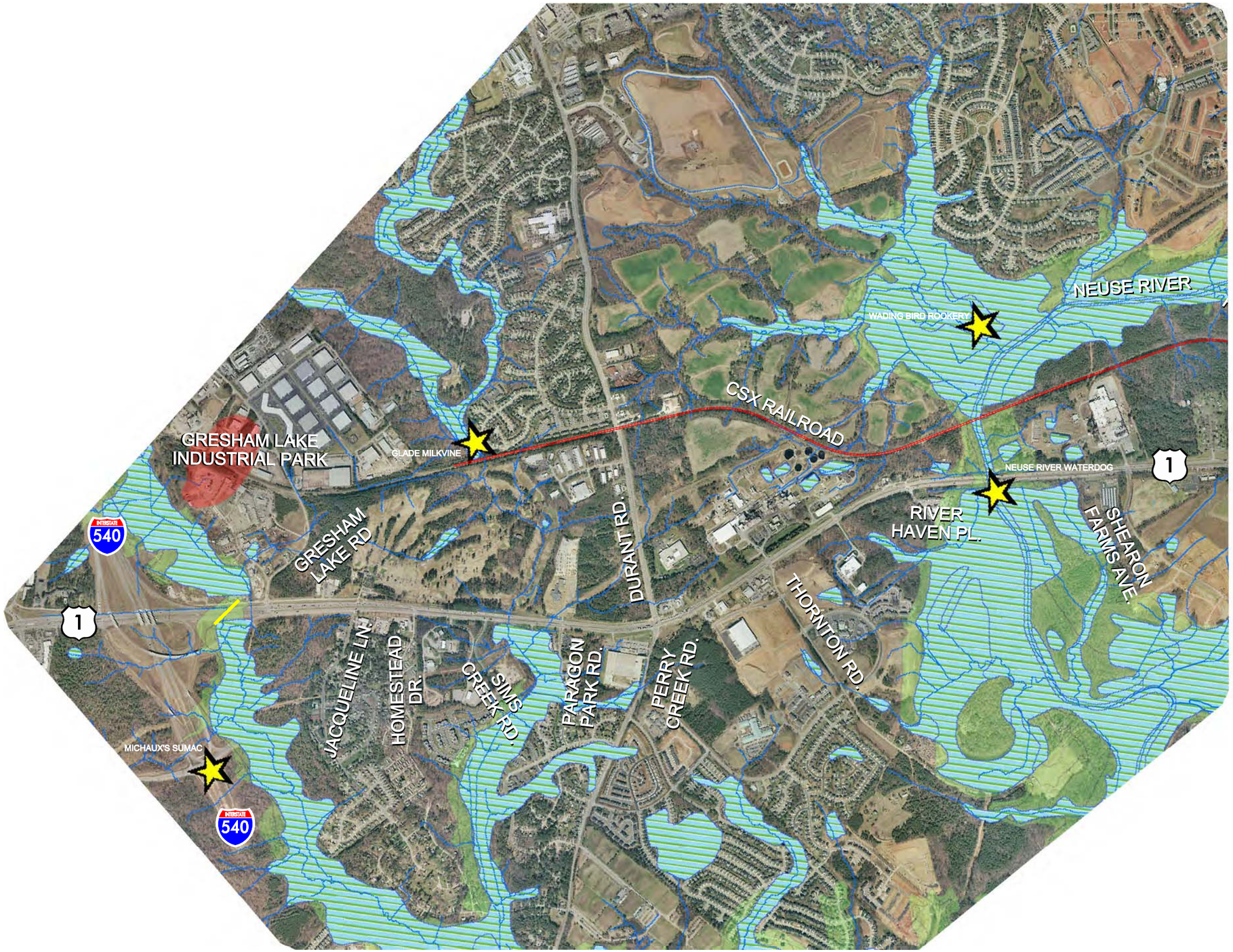
Richland Creek extends from the Neuse River west of Burlington Mills Road to the Wake-Franklin County line east of Wall Road. The 100 year floodplain extends this entire limit and crosses US 1 south of the NC 98 Bypass. Richland Creek is carried by a culvert underneath US 1 at this location. There is a large area of wetlands along Richland Creek from its confluence with the Neuse River northward to Forest Pines Drive. From Forest Pines Drive north, there are small patches of wetlands mainly associated with tributaries of Richland Creek. These wetlands do not intersect US 1 at any point.

Perry Creek crosses US 1 near Gresham Lake Road. The 100 year floodplain extends along Perry Creek and its tributaries as it spans the study area. Perry Creek is carried by a culvert underneath US 1 just north of the I-540 Interchange. Wetlands also parallel Perry Creek and its tributaries throughout the entire study corridor.

Horse Creek parallels the US 1 corridor on the northwest from NC 98 (Durham Road) to Green Road. This area accounts for a floodplain designation that stretches from NC 98 to the Wake-Franklin County line. From the Wake-Franklin County line, wetlands associated with Horse Creek continue along the creek to Green Road. Neither the 100 year floodplain nor the wetlands intersect US 1 at any point.

2.9.4 Historic Properties

The National Register of Historic Places lists districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering and culture. Currently there are seven historic properties located in the US 1 corridor, six of which are on the National Register, and one of which was being studied in December 2005 (see Table 2-8). Of the six properties on the National Register, three properties are adjacent to US 1. These are Wakefields (south of Purnell Road), the Purefoy-Dunn House (north of South Main Street), and the Powell House (north of Burlington Mills Road). Three properties on the National Register are located adjacent or near the CSX Railroad. These are the Forestville Baptist Church (south of the NC 98 Bypass), the Southeastern Baptist Theological Seminary (north of Durham Road), and Oakforest (south of Wake Forest). The remaining structures, under study for National Register eligibility, are located in the US 1 study corridor off of Wall Road and are referred to as the Wall Plantation Outbuildings.



LEGEND

- NATURAL HERITAGE PROGRAM
- SUPERFUND SITE LOCATIONS (1)
- STREAMS
- WETLANDS
- FEMA FLOOD ZONES
- CULVERTS
- HISTORIC PROPERTY
- RAILROAD

0 800 1600 3200
Feet

Capital Area Metropolitan Planning Organization

MULKEY

RS&H Architects - Engineers - Planners, Inc. Team

EXISTING CONDITIONS

CULTURAL, DRAINAGE, AND NATURAL FEATURES

US 1 CORRIDOR STUDY

Figure 2-9
Sheet 1 of 4

LEGEND

- NATURAL HERITAGE PROGRAM
- SUPERFUND SITE LOCATIONS (1)
- STREAMS
- WETLANDS
- FEMA FLOOD ZONES
- CULVERTS
- HISTORIC PROPERTY
- RAILROAD

0 800 1600 3200
Feet

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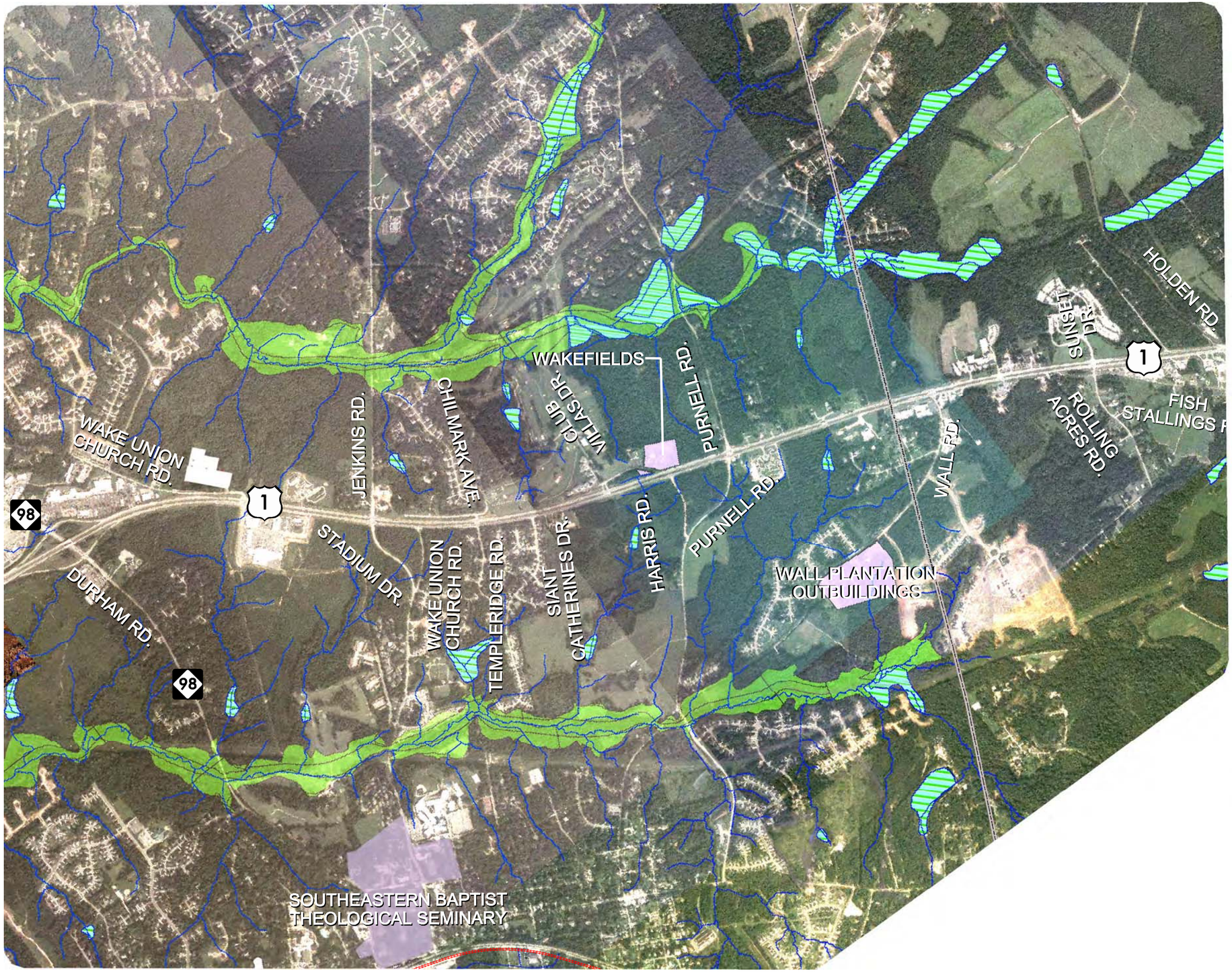
EXISTING CONDITIONS

CULTURAL, DRAINAGE, AND NATURAL FEATURES

US 1 CORRIDOR STUDY

Figure 2-9
Sheet 2 of 4



LEGEND

- NATURAL HERITAGE PROGRAM
- SUPERFUND SITE LOCATIONS (1)
- STREAMS
- WETLANDS
- FEMA FLOOD ZONES
- CULVERTS
- HISTORIC PROPERTY
- RAILROAD

0 800 1600 3200
Feet

Capital Area Metropolitan Planning Organization

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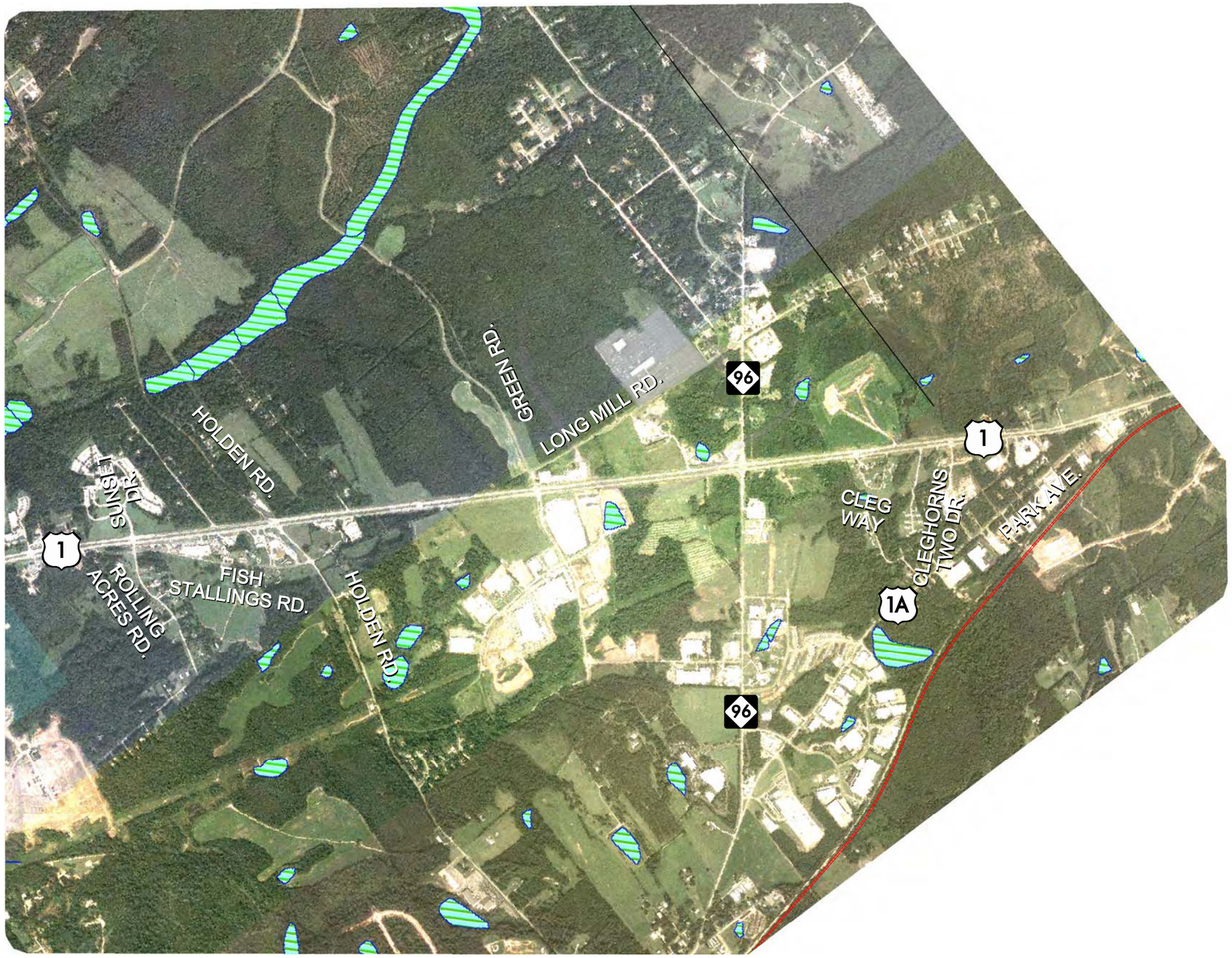
EXISTING CONDITIONS

CULTURAL, DRAINAGE, AND NATURAL FEATURES

US 1 CORRIDOR STUDY

Figure 2-9
Sheet 3 of 4



LEGEND

- NATURAL HERITAGE PROGRAM
- SUPERFUND SITE LOCATIONS (1)
- STREAMS
- WETLANDS
- FEMA FLOOD ZONES
- CULVERTS
- HISTORIC PROPERTY
- RAILROAD

0 800 1600 3200
Feet

Capital Area Metropolitan Planning Organization

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EXISTING CONDITIONS

CULTURAL, DRAINAGE, AND NATURAL FEATURES

US 1 CORRIDOR STUDY

Figure 2-9
Sheet 4 of 4

Table 2-8
National Register Historic Properties in the US 1 Corridor

Location Name	National Register Status	Physical Location	Location Relative to US 1 or CSX corridor
Forestville Baptist Church	National Register	South of the NC 98 Bypass	West of CSX Railroad (non-adjacent)
Oakforest	National Register	North of Ligon Mill Road	East of CSX Railroad (non-adjacent)
Powell House	National Register	North of Burlington Mills Road	East of US 1 (adjacent)
Purefoy-Dunn House	National Register	North of South Main Street	East of US 1 (adjacent)
Southeastern Baptist Theological Seminary	National Register	North of Durham Road	West of the CSX Railroad (adjacent)
Wakefields	National Register	South of Purnell Road	West of US 1 (adjacent)
Wall Plantation Outbuildings	National Register Study List	North of Wall Road	East of US 1 (non-adjacent)

Source: Capital Area Preservation, December 2005

2.9.5 Hazardous Materials and Contaminated Sites

Hazardous waste sites located in the US 1 Corridor vicinity include sites on the superfund list, landfills, junkyards, and major state cleanup sites. At this stage, the sites adjacent to the corridor right-of-way are identified (see Table 2-9). A detailed study of the contaminants and the need for mitigation due to this project will occur during the environmental assessment phase of the project development.

The Rowland Landfill is located approximately 0.6 miles to the west of the US 1 corridor adjacent to the CSX Railroad and I-540. The site is listed with the North Carolina Inactive Hazardous Sites Program and categorized as 'No Further Action'.

Gresham Lake Industrial Park is a designated Superfund site located on the south side of SR 2013, 0.5 miles west of US1. This site is currently designated as "N" (not on the National Priorities List).

Mallinckrodt Inc. is located on the west side of the US 1 corridor across from Thornton Road. This site is currently managed by the NC Treatment Storage Disposal Program.

Burlington Industrial Plant is located on both sides of the US 1 corridor between the Neuse River and Burlington Mills Road. This site is currently listed as an open case by the NC Inactive Hazardous Sites Program.

The Scovill, Schrader-Bellows Division Site is located on the west side of the US 1 corridor between NC 98 (Durham Road) and Jenkins Road. This site is currently managed by the NC Treatment Storage Disposal program.

Table 2-9
Hazardous Materials and Contaminated Sites in the US 1 Corridor

Location Name	Status	Location
Burlington Industrial Plant	North Carolina Inactive Hazardous Sites Program-Open Case	East and West of US 1 (adjacent), near Burlington Mills Road
Gresham Lake Industrial	Superfund Site- Not on the National Priorities List	0.5 miles West of US 1, South of SR 2013
Mallinckrodt, Inc.	NC Treatment Storage Disposal Program	West of US 1 (adjacent), near Thornton Road
Rowland Landfill	North Carolina Inactive Hazardous Sites Program- 'No Further Action'	Adjacent to CSX Railroad, near I-540
Scovill, Schrader-Bellows Division Site	NC Treatment Storage Disposal Program	West of US 1 (adjacent), near Jenkins Road

Source: Environmental Protection Agency CERCLIS Database, December 2005

CHAPTER 3.0
PUBLIC INVOLEMENT PROCESS

3.0 Public Involvement Process

The US 1 facility in the northeastern part of the Raleigh, North Carolina metropolitan area is an important corridor in the north-south movement of people and goods in the region. The North Carolina Department of Transportation (NCDOT) has designated the US 1 corridor as one of its Strategic Highway Corridors. Improvements to the US 1 Corridor should benefit to the maximum extent possible the communities that are affected by the highway and its points of access. Therefore, the involvement of communities and significant stakeholders along this corridor is vital to the overall success of the project. In order to involve community leaders, interested parties, and the general public, the study project team and US 1 Corridor Study Oversight Team established a public involvement process that would keep the public informed and gain input from the public throughout the study.

3.1 Introduction

An important element of the US 1 Corridor Study has been the proactive public involvement program, which provided opportunities for the public and various interest groups, to participate in the investigation of corridor alternatives and ultimately provided guidance in forming the locally preferred alternative. People want to have a say in transportation-decision making for their community. Since the local responsibility of compliance with federal regulations for public involvement lies with the Capital Area Metropolitan Planning Organization (Capital Area MPO), this study was designed to comply the goals of Capital Area MPO's public involvement program. The public involvement process for the Capital Area MPO has been historically cited meeting the minimum requirements for its core duties such as the Long Range Transportation Plan, the Metropolitan Transportation Improvement Plan, and the Unified Planning Work Plan. However, the Capital Area MPO went well beyond those minimum requirements in attempting to solicit public comments during the US 1 Corridor Study. The US 1 Corridor Study public involvement program addressed the need to have an ongoing information exchange form the very beginning of the study throughout its end.

Public Meeting Notice and Alternatives Display at Triangle Town Center Mall

This chapter describes the various public involvement activities and techniques that were used during the development of the US 1 Corridor Study. Major components of the program included the following:

- Developing a detailed website with study updates and electronic comment feedback
- Creating two printed newsletters
- Developing a database list of interested parties and emailing notices and updates
- Conducting two public information workshops in March and July, 2006
- Outreaching through a public display at the Triangle Town Center Mall
- Advertising in the Raleigh News & Observer, the Carolinian, Que Pasa and Wake Weekly newspapers
- Sending press releases via the City of Raleigh Public Affairs Office
- Advertising in Spanish formats
- Advertising at the Triangle Town Center mall and at Living Word Family Church (the host agency for the public information workshops)

One of the highlights of the US 1 Corridor Study involved the direct public outreach to citizens by displaying highway alternatives and a photomontage in one of the vacant storefronts at Triangle Town Center Mall. The mall managers are heavily engaged in public outreach; therefore, they were amenable to Capital Area MPO's request to use their facility for the US 1 public involvement process.

The US 1 Corridor Study was designed to include two public information workshops. The first public information workshop was held on Tuesday, March 14, 2006; and the second workshop was held on Thursday, July 27, 2006. All of the public comments received during the course of the study including at and after the public meetings are documented in Appendix B.

3.2 Public Information

For the plan to be successful, it must reflect the needs and desires of the corridor's communities and residents. The purpose of the public involvement program is to educate the public, elected officials, and other interested parties on the corridor, corridor planning principles, and the issues involved in developing an integrated transportation and land use plan to develop a meaningful dialogue.

3.2.1 Newsletters

US1 Corridor Study

A purpose and a need

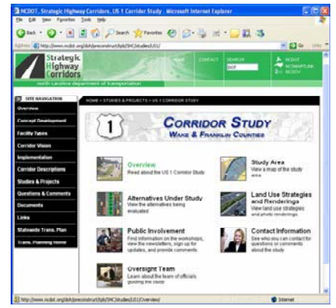
Capital Area MPO considers US 1 options

The project team distributed a total of two newsletters during the project in order to promote educational information as well as to update readers on the study progress and key decision points. The first newsletter was mailed prior to the March 14, 2006, public information workshop. The newsletter was distributed to the North Raleigh and Northeast Raleigh Citizens Advisory Councils (CAC), members of the Capital Area MPO Technical Coordinating Committee and Transportation Advisory Committee, property owners within 1,000 feet of the US 1 Corridor, and interested individuals. The second newsletter was distributed during the week of July 17; ten days prior to the Public information workshop. This newsletter was distributed to the North Raleigh and Northeast Raleigh Citizens Advisory Councils (CAC), property owners within 1,000 feet of the US 1 Corridor, and interested individuals. The second newsletter was also available at the Triangle Town Center Mall's Information Desk during the period that the map display was located in one of the Mall's storefronts. The second newsletter received a greater public response than the first newsletter because of the public's interest in the highway alternative that could be applied to US 1. Approximately 1,300 copies of each newsletter were distributed to the community.

3.2.2 Website

As part of the effort to educate and inform the public about the corridor study, the project team worked with the Transportation Planning Branch of the North Carolina Department of Transportation (NCDOT) to keep an up-to-date and informational project website. Since US 1 is one of NCDOT's Strategic Highway Corridors, the agency hosted the study website and provide webmaster duties throughout the project. The website served as a clearing house for all relevant study information. The uniform resource locator (URL) for the site is http://www.ncdot.org~us1study. The site contains six modules for general public information

that directs the interested party to past presentations; as well as to a "project mailing list and comments" page (US 1 CORRIDOR STUDY > PUBLIC INVOLVEMENT > MAILING LIST & COMMENTS). The "project mailing list and comments" page allows the user to interact with Capital Area MPO staff through email. The Capital Area MPO staff has received numerous emails from citizens who have accessed the website and inquire about additional information.



Because of the increasing pressures of development in this area and the current traffic congestion along portions of US 1, Capital Area MPO, in cooperation with NCDOT, will maintain the US 1 website beyond the study completion to ensure that the public can react and comment about future activities within the study corridor. Comments supplied by citizens at the public information workshops, as well as through email responses suggest that there is a commitment by citizens to remain involved concerning activities along the US 1 corridor.

3.2.3 Email Notification and Updates

The Capital Area MPO staff; in conjunction with staff from the North Carolina Department of Transportation, regularly provided email notifications and updates to individuals that expressed their thought and opinions about the US 1 Corridor. The staff maintained an email listing of persons who have commented on the US 1 Corridor through the NCDOT website. This email listing was kept up to date; and emails have been submitted to these citizens informing them of the latest postings to the website and meeting notifications.

3.2.4 Presentation Materials

At each public meeting, a series of presentation boards, as well as a PowerPoint presentation, was used to provide information about the study and to describe the project. The Oversight Team members provided comments on the maps as presented during their meetings throughout the Study period; whereas the general public was encouraged to write comments on the various maps displayed during the March 14 and the July 27, 2006 public information workshops. The material covered at the July 27 workshop was a compilation of material gathered at the beginning of the study along with information pertaining to the two viable multi-modal transportation alternatives. The maps and photomontages displayed during the public information workshop were the same as those maps and photomontage displayed at the Triangle Town Center Mall.

3.3 Outreach

The outreach exercise that had been achieved in this study utilized three different formats. The initial format included the standard press release as issued through the City of Raleigh; along with legal notices with the local and major newspapers within the region. The second format included broadcasting two newsletters to property owners and residences along the corridor. Furthermore, the second edition of the newsletter was distributed at the Triangle Town Center Mall, where Capital Area MPO displayed maps of two highway alternatives and a photomontage showing the "before" and "after" effects of an improved corridor with complementary land uses. The third format incorporated using a web site, which has been hosted by the NCDOT.

3.3.1 Direct Mail

Oversight Team Meeting

The City of Raleigh sent newsletters through direct mail to property owners and interested parties. The newsletters were prepared and printed by the consulting firm of RS&H in Charlotte. Prior to the final draft being submitted to the printer, staff from those agencies that have made financial contributions to the US 1 Corridor study (City of Raleigh, Town of Wake Forest, TTA, NCDOT, and the Capital Area MPO) reviewed the newsletter copy, and provided comments to Capital Area MPO and RS&H. RS&H incorporated the stakeholders comments and printed the newsletter for distribution. The copies were bulk-mailed to the City of Raleigh's mailroom; and then forwarded to a mail-service provider used by the City to distribute the newsletters to the public.

3.3.2 Public Notices

Notices were sent to the local newspapers, and the City of Raleigh published a press release that was distributed to news agencies throughout Wake and Durham counties. Notices for the public information workshops were sent to all residents within 1000 feet of the study corridor.

3.3.3 Media Coverage

Media coverage for the March 14, 2006 public information workshop included local television stations such as WRAL (Channel 5), WCNC (Channel 17), and local newspapers. The Capital Area MPO staff also contacted the local television stations and other media outlets for the July 27 public information workshop.

3.3.4 Public Meetings

Public information workshop, July 27, 2006

Public Meeting

The first of two public information workshops for the US 1 Corridor Study was held on Tuesday, March 14, 2006, from 3:00 – 7:30 PM at the Living Word Family Church in Wake Forest. This location is centrally located along the US 1 Corridor and had excellent public access. The facility included a multi-media outlet which allowed the public to view a presentation on the US 1 Corridor Study, as well as a US 1 television spot broadcasted by WRAL (TV 5) during the 5 and 6 pm newscast. The public submitted emails through NCDOT's website for the US 1 Corridor Study. The public also expressed their opinions concerning the corridor through questionnaires provided during the meeting and the opportunity to directly mark their comments on the multi-modal alternatives exhibits. The table below addresses the public feedback during the public information workshop concerning multimodal alternatives that had been created during the Oversight Team meetings leading up to the public meeting:

Alternative I – No Build (Alternative under which no improvements would be made to the US 1 Corridor)	11%
Alternative II – Highway (Access-controlled freeway from I-540 to NC 98 with frontage roads, limited control of access north of NC 98 without frontage roads)	25%
Alternative III – Freeway + Transit (Access-controlled freeway with frontage roads throughout the corridor and Special Purpose Lanes from I-540 to NC 98)	45%
Alternative IV – Freeway + Transit (Access-controlled freeway with frontage roads throughout the corridor with two reversible special purpose lanes, barrier separated from I-540 to NC 98)	19%

Public Information Workshop, July 27, 2006

Public Meeting

The second and final public information workshop for the US 1 Corridor Study was held on Thursday, July 27, 2006 from 3:00 – 7:30 PM at the Living Word Family Church in Wake Forest. The Oversight Team had initially planned to conduct the public information workshop at the Triangle Town Center Mall off of I-540 in Raleigh. Concerns about "conflict of interest" directed the Oversight Team to hold the public information workshop at the Living Word Family Church; however, the Oversight Team determined that the Triangle Town Center would serve as an excellent site to advertise for the upcoming public meeting. The Capital Area MPO staff met with the Marketing Director for the Triangle Town Center to discuss using a vacant storefront in the Mall to display maps and information. Triangle Town Center management agreed to allow the Capital Area MPO use of a vacant storefront to display maps and illustrations of the US 1 Corridor Study. Mall management also agreed to announce the public information workshop on the Triangle Town Center's website. The maps and illustration were displayed at the mall from Friday, July 21 through Friday, August 4, 2006. One hundred-fifty copies of the second edition of the US 1 Corridor Study were also placed at the mall's information desk for additional inquiry. The final count of newsletters distributed for additional inquiry totaled 85 percent.

Questionnaires received from citizens during and after the public information workshop revealed that the majority of those citizens prioritized better traffic signal timing, access management, and other low cost improvements as the highest priority items to be initially implemented along the corridor. The citizens were also in support of commuter bus service along US 1 to the destinations of Downtown Raleigh and Research Triangle Park. Also citizens preferred that the future highway cross-section consist of four lanes in each direction (with one lane in each direction reserved as an HOV lane), along with a landscaped median, and two-way frontage/backage roads. The public's comments obtained from the meeting are documented in Appendix B.

3.4 Agency Participation

There has been tremendous agency participation throughout the US 1 Corridor Study process. The Capital Area MPO staff continuously provided material and notices on upcoming meetings pertaining to the US 1 Corridor Study. The agencies contributed to the meetings by providing their perspectives to proposed highway cross-sections and transit implementation. An example of this is when the Wake County Public School System informed the Oversight Team of future school site locations near the US 1 Corridor; or when the North Carolina Trucking Association provided comments addressing the fact that US 1 is their major north-south corridor between Interstate 85 in Durham County and Interstate 95 in eastern North Carolina.

Following the drafting of the preliminary "preferred alternative", the Capital Area MPO Staff, along with the study team and the US 1 corridor study Oversight Team conducted meetings with some in depth discussion concerning the overall cross-section. Members of the Oversight Team, along with the study team met with the chief engineering staff of NCDOT on Friday, June 23, 2006 to discuss the viable alternatives for the US 1 corridor. This technical meeting discussed the advantages and disadvantages of each viable alternative based on design and cost effectiveness. The meeting concluded with NCDOT staff, the Oversight Team, and consultant team agreeing on a corridor cross-section that would be called the "Preliminary Preferred Alternative".

3.4.1 Oversight Team

Technical Oversight Team Meeting

A group of stakeholders, referred to during this study as the Oversight Team was created to provide guidance and oversight throughout the study. Team members included representatives from the Capital Area MPO, City of Raleigh, Town of Wake Forest, TTA, concerned citizens, NC Trucking Association, media personnel, representatives from local chambers of commerce, staff from each of the participating jurisdictions, FHWA and NCDOT staff. The Oversight Team was directed to review the consultant's work, give direction and input, and monitor the project study as it takes place. The oversight study team members attended all of these meetings. The team leader (Chip Russell, Planning Director, Town of Wake Forest) has kept officials of the Capital Area MPO Transportation Advisory Committee apprised of progress throughout the duration of the contract during their TAC meetings. Members of the US 1 Oversight Team are listed in Table 3-1 below:

Table 3-1
US 1 Oversight Team

Name	Company/Agency Representing	Telephone Number	E-Mail Address
Albert Corpening	Town of Youngsville	(919) 556-5639	newton93@earthlink.net
Barbara Weigel	TTA	(919) 485-7509	bweigel@ridetta.org
Battle Whitley	DOT-Division 5	(919) 733-3213	bwhitley@dot.state.nc.us
Bill Andrews	Citizen	(919) 556-3690	bandrews@entrustholdingsinc.com
Chad Lanford	DOT - Congestion Management	(919) 250-4151	clanford@dot.state.nc.us
Cheryl Evans	NCDOT - ITS/Traffic	(919) 733-1735	cevans@dot.state.nc.us
Chip Russell	Town of Wake Forest	(919) 554-6142	crussell@wakeforestnc.gov
David Eatman	Capital Area Transit	(919) 890-4338	david.eatman@ci.raleigh.nc.us
David Wasserman	NCDOT-TPB	(919) 715-5482x380	dswasserman@dot.state.nc.us
Diane Cox	Kerr Area Rural Transit	(252) 438-2573 x26	dcox@kartsnc.com
Diane Wilson	Capital Area MPO	(919) 807-8516	Diane.Wilson@Ci.Raleigh.NC.US
Don Willis	Wake Co Human Services	(919) 250-3829	donwillis@co.wake.nc.us
Ed Johnson	Capital Area MPO	(919) 807-8511	ed.johnson@ci.raleigh.nc.us
Eddie Dancausse	FHWA - NC Division	(919) 856-4330x112	edward.dancausse@fhwa.dot.gov
Eric Lamb	City of Raleigh	(919) 516-2155	eric.lamb@ci.raleigh.nc.us
Fleming A. El-Amin	TTA	(919) 485-7521	felamin@ridetta.org
Gary Faulkner	Citizen	(919) 791-0108	gfaulkfly@earthlink.net
James Speer	NCDOT-RDU	(919) 250-4016	jspeer@dot.state.nc.us
Jody Totten	Citizen	(615) 826-2736	jbtott@aol.com
Joe Huegy	TTA	(919) 485-7416	jhuegy@ridetta.org
John Hodges-Copple	TJCOG	(919) 558-9320	johnhc@tjcog.org
Johnny Whitfield	North Wake Newspaper	(919) 556-3182	johnny@wakeweekly.com
Jon Nance	DOT-Division 5	(919) 560-6851	jnance@dot.state.nc.us
Kaye Yadusky	Town of Youngsville	(919) 570-9385	townyngs@aol.com
Kenneth Withrow	Capital Area MPO	(919) 807-8513	kenneth.withrow@ci.raleigh.nc.us
Maja Vouk	Wake Co Public School System	(919) 516-2658	mvouk@wcpss.net
Michele Hane	City of Raleigh	(919) 516-2664	michele.hane@ci.raleigh.nc.us
Pat Young	Franklin County	(919) 496-2909	pyoung@co.franklin.nc.us
Patrick McDonough	TTA	(919) 485-7455	pmcdonough@ridetta.org
Robert Olason	Citizen	(919) 523-8540	olasonr@yahoo.com
Russell Laing	NC Trucking Assoc	(919) 682-5481	rlaing@coopertrucks.com
Sarah Smith	NCDOT - TPB	(919) 733-4705	sarahsmith@dot.state.nc.us
Shelby Powell	Kerr-Tar RPO	(252) 436-2048	spowell@kerrtarcog.org
Shirley Williams	DOT - Rail Division	(919) 733-7245x273	srwilliams@dot.state.nc.us
Stephen Winstead	NCDOT	(252) 482-0111	steve.winstead@dot.state.nc.us
Tammy Ray	Town of Franklinton	(919) 494-2520	tray@ci.franklinton.nc.us
Tamra Shaw	NCDOT-PTD	(919) 733-4713	tshaw@dot.state.nc.us
Tim Clark	Wake County Planning	(919) 856-6320	tclark@co.wake.nc.us

3.4.2 Technical Oversight Team

The technical Oversight Team (as listed in Table 2) served as a subcommittee to the larger Oversight Team that conducted the more thorough, in-depth analysis of the US 1 Corridor Study in conjunction with the Capital Area MPO staff and the study team. Usually following a general Oversight Team meeting in which there was discussion of the whole project, the technical Oversight Team would meet to discuss details of the project involving such issues as right-of-way, interchange configurations, road widths, y-lines, pedestrian/bicycle routes, corridor aesthetic school site locations and many other detail issues that needed to be addressed. Like the overall Oversight Team, the technical Oversight Team included staff members of various perspectives and backgrounds to ensure that there was a comprehensive review of any issue or opportunity regarding the corridor study.

Table 3-2
US 1 Technical Oversight Team

Name	Company/Agency Representing	Telephone Number	E-Mail Address
David Wasserman	NCDOT	(919) 715-5482x380	dswasserman@dot.state.nc.us
Chad Lanford	DOT - Congestion Management	(919) 250-4151	clanford@dot.state.nc.us
Chip Russell	Town of Wake Forest	(919) 554-6142	crussell@wakeforestnc.gov
Shirley Williams	DOT - Rail Division	(919) 733-7245x273	srwilliams@dot.state.nc.us
Sarah Smith	NCDOT - TPB	(919) 733-4705	sarahsmith@dot.state.nc.us
Patrick McDonough	TTA	(919) 485-7455	pmcdonough@ridetta.org
Fleming A. El-Amin	TTA	(919) 485-7521	felamin@ridetta.org
James Speer	NCDOT-RDU	(919) 250-4016	jspeer@dot.state.nc.us
Pat Young	Franklin County	(919) 496-2909	pyoung@co.franklin.nc.us
Russell Laing	NC Trucking Assoc	(919) 682-5481	rlaing@coopertrucks.com
Michele Hane	City of Raleigh	(919) 516-2664	michele.hane@ci.raleigh.nc.us
Maja Vouk	Wake Co Public School System	(919) 516-2658	mvouk@wcpss.net

Technical Oversight Team Meeting

3.5 Major Meeting Dates

During the US 1 Corridor Study several key meetings occurred to provide information for the stakeholders so that the Oversight Team could formulate decisions and provide direction to the study team. Table 3-3 documents the major meeting dates associated with the study, including the six Oversight Team meetings.

Table 3-3
Oversight Team and Other Major Meeting Dates

Description	Date	Purpose
Kickoff	Wednesday, October 5, 2005	Meeting with study sponsors to outline the project scope and schedule.
Transportation and Transit Modeling Working Lunch Meeting	Thursday, December 9, 2005	Highway and transit modeling parameters, tables in the 2030 regional transportation model and questions dealing with transit options to be modeled and evaluated
Oversight Team No 1	Tuesday, December 13, 2005	Oversight Team Meeting to present project need and purpose
Transit Teleconference	Tuesday, January 10, 2006	Transit Modeling Meeting to discuss transit modeling assumptions
Oversight Team Meeting No 2	Tuesday, January 17, 2006	Oversight Team Meeting to present existing conditions and initial corridor alternatives
Website	Wednesday, February 1, 2006	US 1 Website Teleconference Meeting
Transit Teleconference	Tuesday, February 14, 2006	Transit Model Teleconference to discuss alternative
Oversight Team/Technical Team Meeting No 3	Tuesday, February 14, 2006	Oversight Team Meeting to present four candidate alternatives plus transit components
Media Briefing	Monday, March 6, 2006	Briefing about US 1 with local newspaper staff
Public Information Workshop No 1	Tuesday, March 14, 2006	First Public Information Workshop to inform and gather feedback from the public
Transit Teleconference	Wednesday, March 22, 2006	Transit Modeling Conference Call
Transit Modeling Teleconference	Tuesday, April 4, 2006	Transit Modeling and HOV Lane findings.
NCDOT Conference Call	Wednesday, April 19, 2006	Discussion with Ms. Shirley Williams about SE High-Speed Rail interface with US 1 study
Oversight/Technical Team Meeting No. 4	Tuesday, May 9, 2006	Oversight Team Meeting including field trip along US 1 to discuss the evaluation of the viable alternatives
Technical Oversight Team Meeting No 5	Tuesday, June 6, 2006	Presentation of the two viable alternatives and evaluation matrix
Oversight Team Meeting No 6	Wednesday, June 28, 2006	Presentation and discussion of the “preliminary” preferred alternative
Meeting with NCDOT	Friday, June 30, 2006	Meeting at NCDOT's Century Center to finalize the “preliminary” preferred alternative
Teleconference	Tuesday, July 5, 2006	Teleconference with Urban Collage regarding future land use & photomontages
Public Information Workshop No 2	Thursday, July 27, 2006	Second US 1 Public Information Workshop to present the “preliminary” LPA and to gather input from the public regarding finalizing the LPA
Transit Teleconference	Tuesday, August 1, 2006	Teleconference to confirm transit recommendations
MOU Teleconference	Tuesday, August 29, 2006	Meeting to discuss initial draft of MOU
MOU Teleconference	Tuesday, September 5, 2006	Final discussion concerning the final draft of the US 1 MOU

CHAPTER 4.0
PHASE ONE ANALYSIS

4.0 Phase One Analysis

The size and diversity of the US 1 corridor make it likely that a variety of transportation improvements will be needed for the existing system to meet all of the corridor's future needs. Therefore, this study will examine a variety of transportation modes and improvements that may promise to be part of the long-range transportation solution in the corridor. A process was used that, based on an understanding of the corridor conditions, needs, and goals, moves from general to detailed evaluation and advances from many alternatives to one recommendation.

The US 1 Corridor Study used a three-phase process to screen, evaluate and select viable alternatives. This three-phase screening process, allows assembly of a large array of competing criteria in matrix format for evaluation. The key factor in the screening process is its ability to sort a large array of complex alternatives to obtain several viable comprehensive, long-range land use and transportation alternatives suitable for further analysis.

The purpose of the Phase One evaluation is to identify conceptual alternatives and make a preliminary determination of how well these conceptual corridor alternatives meet future mobility needs through the year 2030. The Phase One process provides a first-cut analysis of the alternatives to screen out the "fatally flawed" concepts so that only viable corridor alternatives are carried forward into the Phase Two analysis.

4.1 Introduction

As a starting point, the following Phase One transportation elements (alternatives) were identified by the US 1 Oversight Team:

- A "null alternative" plan which includes existing plus committed transportation projects;
- The highway-oriented plan based upon CAMPO's Long Range Transportation Plan;
- A transit-oriented plan emphasizing with a transit mode (i.e. busway, light rail, commuter bus or rail);
- A balanced plan which is a modification of the above two alternatives, blending both highway and transit improvements together.

The Phase One analysis began with the consideration of developing as many transportation modes and strategies as possible to improve the corridor. Phase One alternatives included transit, freeway, streets and highways and transportation system management strategies.

The range of transportation improvement alternatives evolved from an evaluation of existing and future (2030) travel demand and system deficiencies. Different sections of the US 1 corridor were evaluated using different improvement alternatives, depending on the extent of current deficiencies and the degree to which improvements could be incorporated into the surrounding environment. The Phase One alternatives were developed by the study team in cooperation with the US 1 Oversight Team.

The results of the Phase One evaluation were reviewed by the US 1 Oversight Team during their meetings in February and March 2006 and by the public through a Public Information Workshop on March 14, 2006. Additional comments pertaining to the Phase One analysis were received through emails, phone calls and the US 1 website's comment card. Phase One comments were valuable and were used to structure both the surviving alternatives and evaluation measures carried forward to the Phase Two analysis.

4.2 Alternatives' Building Blocks Analyzed

This section provides an overview of the transportation components or "building blocks" that are used to develop the alternatives and a brief description of each of the Phase One alternatives. The building blocks for the alternatives are the various types of highway, transit, pedestrian/bicycle and local street improvements that are applicable to the travel and mobility needs in the US 1 study area.

4.2.1 Freeway Components

Before identifying the Phase One alternatives, the study team conducted a review of possible highway system improvements that would allow the US 1 corridor to provide high levels of mobility and a high quality of life. The section below reviews possible highway and freeway improvements.

General Purpose Travel Lanes

General purpose lanes are regular freeway lanes that are open to all types of vehicles. Adding more travel lanes would include adding shoulders and widening the existing mainlines to accommodate future traffic growth. Additional right of way may be needed. These alternatives will reduce congestion, but the added capacity of single occupant vehicles may not help meet air quality goals.

Constructing additional freeway general purpose travel lanes on the US 1 corridor provides additional capacity of approximately 18,000 vehicles per day per lane. The segment of US 1 between I-540 and Durant Road, the most congested portion of the corridor, would need a total of eight (four in each direction) mainline travel lanes in order to meet 2030 travel demand.

Frontage (Service) Roads

Frontage roads are an effective means of providing access from local streets and properties to the freeway mainline. Currently there is significant development adjacent to US 1 that accesses this highway using driveways directly onto US 1. Frontage roads effectively collect and direct local traffic to interchanges where traffic can access the freeway. Continuous frontage roads also provide an excellent opportunity for local trips to travel to their designations without using the freeway, thus lowering the travel demand on the mainline.

Existing Two-Way Backage Road Providing Property Access

Frontage roads are local access roadways that generally parallel the access-controlled freeway. Frontage roads provide additional roadway capacity and separate local traffic (i.e., traffic that needs to slow down and turn into local destinations) from the faster through traffic on the freeway mainlines. The challenge in designing frontage roads, which can be either one-way or two-way, is that they must separate slowing and turning local traffic from the through traffic on the freeway. If there is not enough storage room on ramps for traffic exiting and entering the freeway, then backups and crashes on both the freeway and the frontage road become more likely.

Backage Roads

Similar to frontage roads, backage roads are also designed to provide access from local streets and properties adjacent to the freeway. While backage roads also run parallel to the freeway, they are not adjacent to the mainline. Backage roads are usually set back approximately 1,000 to 1,500 feet from the

freeway mainline. However in the case of backage roads, development is located immediately adjacent to the freeway and is accessed by the backage roads located on the side of the development opposite to the freeway. Similarly to frontage roads, backage roads also direct the local traffic to grade-separated interchanges where traffic can access the freeway.

Retail Drive - Example of Two-Way Frontage/Backage Road Supporting Development

Interchanges

In order for US 1 to be upgraded to a freeway, access to and from the freeway will only be permitted at grade-separated interchanges with overpasses and/or underpasses. These interchanges provide means of accessing the freeway while allowing unimpeded travel along the freeway mainlines. Usually interchanges are spaced no closer than one mile apart in urban conditions and between two and three miles apart in rural conditions.

Grade-Separations

Grade-separating local roads over the freeway allows high levels of service along the freeway mainline and enables secondary roadway system connections for local trips within and between communities. Not every roadway crossing the freeway can be designated as an interchange due to freeway (interchange) design spacing criteria. Grade-separated roadways do not impede mainline traffic and provide local connections that may otherwise need to use the US 1 mainline for local trips. Pedestrian and bicycle traffic should be directed towards the grade-separated crossings of US 1 because of the lower volume of motorized traffic associated at these locations. Grade separate roadways are generally spaced between interchanges to increase the connectivity of communities on each side of the freeway.

Special Purpose High Occupancy Vehicle (HOV) Lanes

High Occupancy Vehicle (HOV) lanes are designed to increase the capacity of the roadway by providing positive incentives for drivers to carpool. Depending on the location, HOV lanes are usually reserved for motorcycles or cars carrying at least two passengers.

4.2.2 Transit Components

An initial assessment was undertaken to identify the applicability of different transit modes for the US 1 study corridor based on current and projected land development densities and based on a review of past research. The insights were used in screening the alternate transit modes for the corridor, as well as how transit should be modeled in the corridor during the Phase One alternatives analysis. The sections below describe the transit elements considered in the Phase One analysis.

Regional Rail

The Triangle Transit Authority (TTA) is planning a new regional commuter rail system, pending federal funding approval. The majority of the line would serve the I-40 corridor, connecting downtown Raleigh to Cary, the Research Triangle Park (RTP), and Durham. The regional rail line would also continue north from downtown Raleigh, toward the US 1 study area, but terminating south of I-540, at Spring Forest Road. TTA has also shown a potential extension of the line north of Spring Forest Road to Durant Road north of I-540.

As the railroad tracks continue north into the study area, an extension of the rail system is one option for providing a public transit alternative for commute trips originating in or passing through the study area.

Traditional locomotive-hauled commuter rail is found only in the largest metropolitan areas in the United States, being present in eight of the ten largest metropolitan areas. San Diego is the smallest region (17th-ranked in population) to have commuter rail; in comparison, the Raleigh-Durham-Chapel Hill region is the 40th-largest region in the U.S. The population density required to support commuter rail varies depending on the size of the urban core served by the line; a downtown area with 25,000,000 million square feet of office space can support commuter rail within a corridor that has densities as low as 2.0 households per net acre (1.5 households per gross acre)[1].

Nearly the entire US 1 study corridor currently has a household density below 1.5 households per gross acre, with the exception of portions the Town of Wake Forest and a small area northwest of the I-540/US 1 interchange. Estimates of population growth prepared by CAMPO for the year 2030 suggest that household densities within the study corridor will continue to be very low (fewer than 1.5 households per gross acre) well into the future. Further, downtown Raleigh has only 3.5 million square feet of private office space, although the Raleigh-Durham corridor in total has more than 21 million square feet of private office space.[2] Public office space, particularly associated with state government buildings, increase these totals, but not sufficiently to currently support traditional commuter rail.

A more recent development is the comeback of diesel multiple-unit (DMU) vehicles, which are self-propelled rail vehicles that require neither the locomotive needed for traditional commuter rail, nor the overhead electrical infrastructure of light rail. Unlike LRT vehicles, DMUs meet Federal Railroad Administration (FRA) criteria for operation in mixed freight-passenger train environments. Although operating experience is limited, DMUs are claimed to have lower operating costs than traditional commuter rail, which would be a great benefit to smaller passenger markets. The proposed TTA system would use DMUs.

The DMU-based systems currently in operation—Dallas-Ft. Worth, Texas; Trenton-Camden, New Jersey; Ottawa, Ontario—differ from traditional commuter rail systems in that they have strong anchors at both ends of the route. TTA's proposed Raleigh-Durham line would be similar, as would be most of the other DMU lines currently proposed. In comparison, an extended TTA rail line into the study corridor would have no northern anchor or any substantial population base within the corridor to draw from. Consequently, regional rail does not appear to be a feasible option for the study corridor in the short-term.

Local/Limited-Stop Bus

Fixed-route bus service that relies on walk access for most of its ridership (i.e., traditional local bus service) requires higher densities than rail to be feasible. This is because rail may draw riders from an area within 5 miles of a station (using private vehicles to get to the station) while a local bus typically draws riders from an area within ¼ mile of a stop. There are many more potential passengers within the rail catchment area, despite its lower density. A density of 4 households per net acre (3 households per gross acre) is generally

[1] Pushkarev, Boris S. and Jeffrey M. Zupan, *Public Transportation and Land Use Policy,* Indiana University Press, Bloomington, Indiana, 1977. Net acres consider only the land developed for housing, while gross acres consider the total land area, including streets, parks, etc. Gross acres are generally easier to work with using GIS software.

[2] Grubb & Ellis/Thomas Linderman Graham, *Office Market Snapshot, Raleigh-Durham, Third Quarter 2005.*

the lower limit of the density that could support hourly transit service. Because this density exists virtually nowhere within the study corridor, fixed-route local bus service does not appear to be a feasible option in the short-term.

Commuter Bus

Commuter bus routes typically collect their passengers at park-and-ride lots and deliver them non-stop to a compact set of destinations (e.g., several stops within a downtown area). Because there are no intermediate stops, in-vehicle travel times tend to be very competitive with the automobile, particularly if uncongested HOV lanes are provided on roadways with congested general-purpose lanes. Since fewer passengers are needed to fill a bus, compared to a train, commuter buses can operate successfully in regions with lower-density suburbs and smaller city centers. The flexibility to alter routes to increase ridership is a huge benefit to this mode of transit. However, the number of trips operated is often limited to a few peak-direction trips during peak periods, as insufficient demand exists to support all-day service and roadways are less congested during off-peak times. The buses used are typically over-the-road coaches, which can operate at higher sustained speeds and provide a more comfortable seating environment, compared to standard transit buses.

4.2.3 Refined Transit Alternatives

From this initial assessment, it was determined that commuter bus would be an appropriate initial premium transit service for the US 1 study corridor, complementing added fixed-route local bus service implemented to the area by Capital Area Transit (CAT) and TTA as sufficient development occurs. In the longer-term, beyond year 2030, an extension of the Regional Rail system north of Spring Forest Road (if the initial phase is previously developed between Durham and Raleigh) could be appropriate if development density is sufficient in the US 1 study corridor and further development occurs in downtown Raleigh and other destinations along the Regional Rail corridor.

Commuter Bus

The refined transit alternative from the Phase One conceptual analysis is the commuter bus option. Two commuter bus routes from downtown Wake Forest to downtown Raleigh and the Research Triangle Park have been identified. Each route would operate only during the weekday a.m. and p.m. peak periods, at a 20-30 minute frequency, with limited off-peak runs potentially. Each route would run from downtown Wake Forest (stop location to be determined) west on NC 98 to US 1, then south on US 1 to I-540. Intermediate stops along this segment have been identified at NC 98/US 1, US 1/New Falls of the Neuse Road, Burlington Mills Road, US 1/Durant Road, and US 1/I-540. At I-540, the downtown Raleigh route would continue south on US 1 and Capital Blvd. into downtown, with a potential intermediate stop at the Spring Forest Road Regional Rail station. The RTP route would head west on I-540, terminating at the RTP Transit Center.

Commuter Bus

Along US 1, commuter bus service would operate either in general purpose travel lanes or special use (diamond HOV) lanes, depending on the particular highway alternative developed. Bus operation on the freeway shoulders is another possibility.

Southeast High-Speed Rail

North Carolina and Virginia have been working since the 1990's to assess the development of the Southeast High-Speed Rail (SEHSR) corridor, a new intercity passenger rail line that would connect Richmond with Charlotte. The preferred corridor would use the CSX rail corridor through the US 1 study corridor. Since 2003, the two states have been developing a Tier II EIS for the Petersburg, VA to Raleigh section of the corridor. The schedule is to have a Final EIS developed and approved by the end of 2008.

Generally the SEHSR corridor will be 150 feet wide on new alignment where possible; however, where existing CSX right-of-way width is narrower than this, such as through downtown Wake Forest where only an 80-foot right of way exists, the new line will be developed within existing rail right of way. The proposed track section through the US 1 study corridor includes one track to be shared by both SEHSR and CSX freight traffic, with 5-mile long passing sidings approximately 10 miles apart.

TTA has coordinated to date with the SEHSR project to integrate a potential future Regional Rail line into the CSX corridor with high-speed rail north to Durant Road. The Regional Rail line would be double track on the east side of the combined SEHSR/freight track. Given the right-of-way constraints through the central Wake Forest area, any further extension of Regional Rail north of Durant Road would need to terminate on the south side of Wake Forest.

Limited CSX Railroad Right of Way in Downtown Wake Forest

Locations where the CSX rail corridor and SEHSR service could potentially impact improvements along US 1 include the following:

- Gresham Lake Road. The existing CSX alignment plans to remain. Gresham Lake Road plans to be relocated to the south of the existing at-grade CSX crossing and then reconnect to US 1 approximately 200 feet north of US 1. Gresham Lake Road will be grade-separated with both the CSX rail corridor and US 1. Gresham Lake Road will continue east across US 1 and connect to Town Center Boulevard.
- North of Thornton Road. The existing CSX alignment is close to US 1 at this point; however, SEHSR plans to flatten out an existing curve at this location which will move the rail alignment to the west. The tracks will be approximately 600 feet from US 1; therefore, no impact is anticipated.
- Between Park Avenue (US 1A) and Bert Winston Road. The existing CSX tracks are very close to US 1 in this area (approximately 200 feet). SEHSR plans to be grade separated at Bert Winston Road, and if so, it most likely will be a continuous structure as it passes over the CSX tracks due to the proximity of US 1, depending on the rail alternative chosen at that location. Bert Winston Road however, is outside the US 1 Corridor Study limits.

4.2.4 Potential Development Opportunities

Figure 4-1 provides the Phase One vision of development opportunities in the US 1 corridor by building upon the existing conditions analysis and corridor survey conducted by the Team. The map illustrates parcels or areas susceptible to land use change based on their existing use, age, location and regulatory requirements and also creates the basis for understanding future growth in the corridor (assuming conducive market conditions).

The study area has tremendous potential for attracting growth and development based on its location and land availability. While the 2030 Regional Plan anticipates mostly commercial development along US 1, recent trends show a large number of single-family, duplex and townhouse communities currently underway. Based on the Team's analysis, future growth is anticipated to be both infill redevelopment projects and the development of vacant land. Prominent infill areas within the corridor are located at the Gresham Lake Industrial Park, which could support higher-density uses, and the Towns of Youngsville and Wake Forest. Infill development should be sensitive to the historic fabric and compatible with the existing scale and architecture of the Towns. Additionally, as illustrated in Figure 4-1 there are numerous opportunities for redeveloping older retail uses or apartment complexes, many such properties located with direct access to US 1.

Opportunities for developing vacant land can be found all through the study area, but are more significant in the northern sections within Franklin County. While the study area has over 3,500 acres of vacant land and 2,900 acres of agricultural or forested land, new development should aim to preserve environmental resources and be focused at strategic locations with adequate infrastructure. The interchange at I-540 and the south side of the NC 98 Bypass are such locations appropriate for higher intensity uses.

4.3 Phase One Alternatives

The Phase One alternatives include freeway alignment alternative improvements and multi-modal alternative improvements that could be implemented to address future travel and mobility needs in the corridor. A base scenario, derived from the adopted CAMPO Long Range Transportation Plan was defined as the "null" alternative. As a result, the null alternative is used as the yardstick against which the performances of the other alternatives considered in the US 1 Corridor Study are measured.

Through using the highway and transit alternative building blocks reviewed above, the study team identified four Phase One alternatives that should be considered. The section below describes the four Phase One Alternatives considered for the US 1 corridor.

The Phase One alternative plans were developed for two different segments of the corridor. Because the unique needs of each section often dictated that different parts of the corridor receive individualized solutions, the corridor was divided into the following two sections:

- Section One: I-540 to NC 98 (Durham Road)
- Section Two: NC 98 to Park Avenue (US 1A North) in Franklin County

Section 1 from I-540 to NC 98 already has denser adjacent highway development and Year 2030 traffic projections indicate a range between 132,000 and 70,500 average daily traffic (ADT). This section of the corridor is transitioning to a higher density suburban land use and corresponding traffic conditions. In section two the corridor is transitioning to more suburban conditions between NC 98 and Park Avenue in Franklin County, where adjacent developments are not as dense. Future 2030 traffic projections vary between 66,000 to 38,500 ADT in this section. These differences in adjacent land use trends and future traffic projections were taken into consideration when identifying mobility solutions throughout the corridor study.

4.3.1 Alternative I: Null Alternative

The Null Alternative applies to all segments and assumes that no improvements would be made as part of the US 1 Corridor Study, establishing a benchmark from which the other alternatives can be measured. The Null Alternative includes all existing facilities plus committed projects as identified in the Long Range Transportation Plan (LRTP) and local plans. The Null Alternative contains roadway improvements in local plans that have not yet been built. All of these projects will be funded by anticipated revenue from federal, state, or local sources. The following lists some of the major projects that affect the US 1 corridor:

- I-540 extension between US 1 and the US 64 Bypass
- US 401 improvements between Ligon Mill Road and NC 39
- Perry Creek Road widening
- New Falls of the Neuse River extension
- US 1A/South Main Street widening
- NC 98 Bypass construction around Wake Forest

US 1 is designated as six lanes between I-540 and NC 98 and will be four lanes between NC 98 and Park Avenue (US 1A North). Major cross streets would continue to be signalized, while bicycle lanes or sidewalks would not be possible along US 1. Figure 4-2 depicts the typical cross section of Alternative I, the Null Alternative.

4.3.2 Alternative II: Highway Alternative

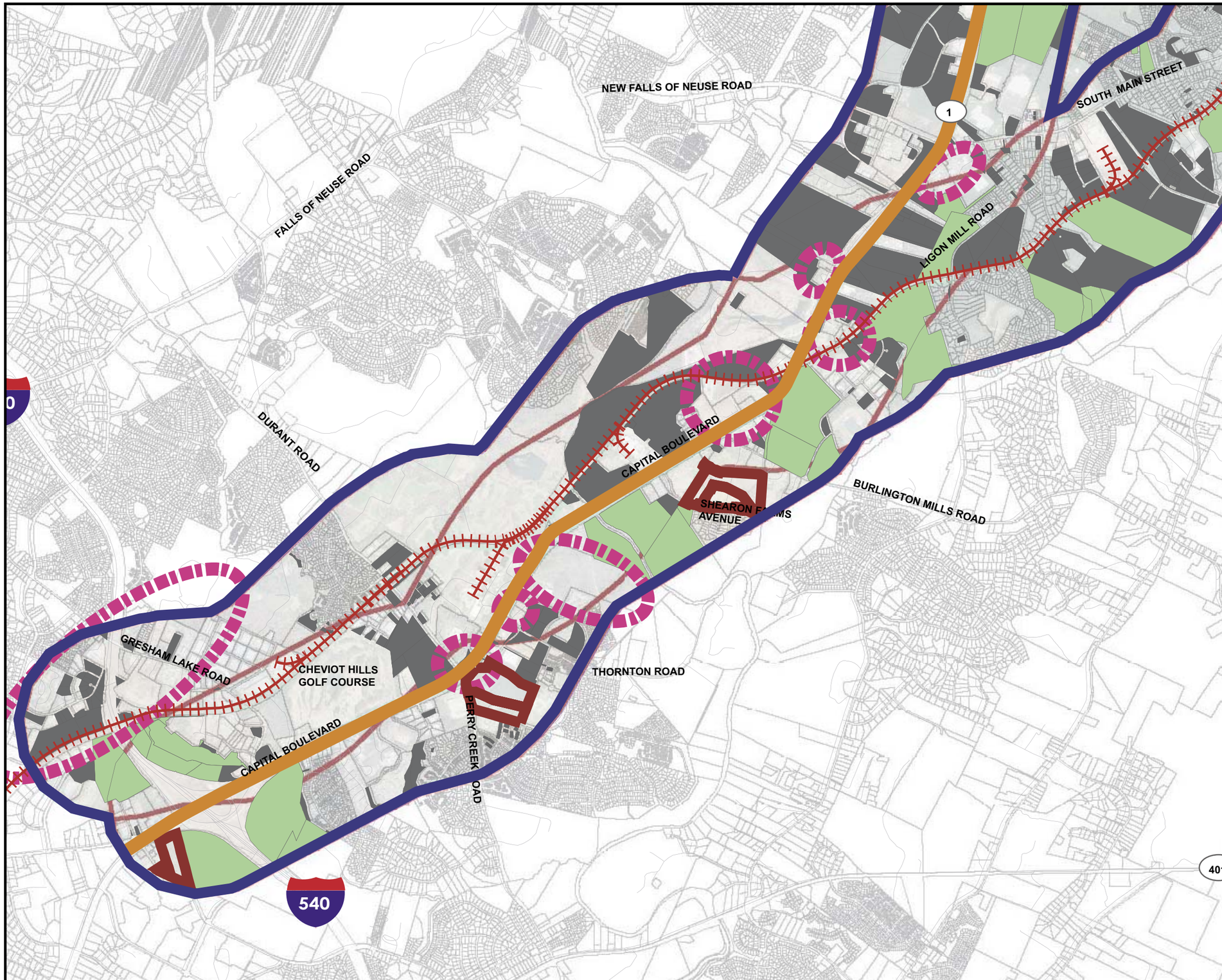
Alternative II, the Highway Alternative, includes six general purpose lanes from I-540 to US 1A North, Franklin County with a median barrier and no at-grade cross access points. Interchanges would be constructed at major cross streets and other cross streets would be grade-separated to provide east-west connectivity. Either two-lane frontage roads (either one-way or two-way) paralleling US 1 or two-lane backage roads set behind adjacent properties would be constructed. Where practical, freeway standards with full access control would be implemented, while other locations would have expressway standards with partial access control (only right-in and right-out access allowed at selected locations). Bicycle lanes and sidewalks would be constructed along frontage roads and cross streets. Park and ride lots and transit stops would be located along frontage or backage roads. Figure 4-3 depicts the typical cross section of Alternative II, the Highway Alternative.

4.3.3 Alternative III: Highway plus Transit Alternative

Alternative III, the Highway plus Transit Alternative, includes six general purpose lanes from I-540 to US 1A North, Franklin County, and two special use high-occupancy vehicle (HOV) lanes (one in each direction from I-540 to NC 98. Interchanges would be constructed at major cross streets and other cross streets would be grade-separated to provide east-west connectivity. This alternative would include two-lane frontage roads (either one-way or two-way) paralleling US 1 or backage roads set behind adjacent properties to provide access. Bicycle lanes and sidewalks would be constructed along frontage roads and cross streets. Park and ride lots and transit stops would be located along frontage or backage roads. Figure 4-4 depicts the typical cross section of Alternative III, the Highway plus Transit Alternative.

4.3.4 Alternative IV: Highway plus Transit Alternative with Two Reversible Special Use Lanes

Alternative IV, the Highway plus Transit Alternative with Reversible Special Use Lanes, includes six general purpose lanes from I-540 to US 1A North, Franklin County. Two reversible special use/high occupancy vehicle (HOV) lanes would be constructed between I-540 and NC 98 to accommodate the potential high directional volumes during the peak hours. Interchanges would be constructed at major



LEGEND

Parcel Susceptible to Change:

- Vacant Land
- Agricultural/ Forested Land
- Opportunities for Residential and Commercial Infill Development
- Development - Planned/ Under Construction
- Railroad
- US-1 Corridor
- US-1 Corridor Study Boundary*

*Land Use study boundaries extend 1/2 mile from corridor center line

0 0.5 1 2 Miles

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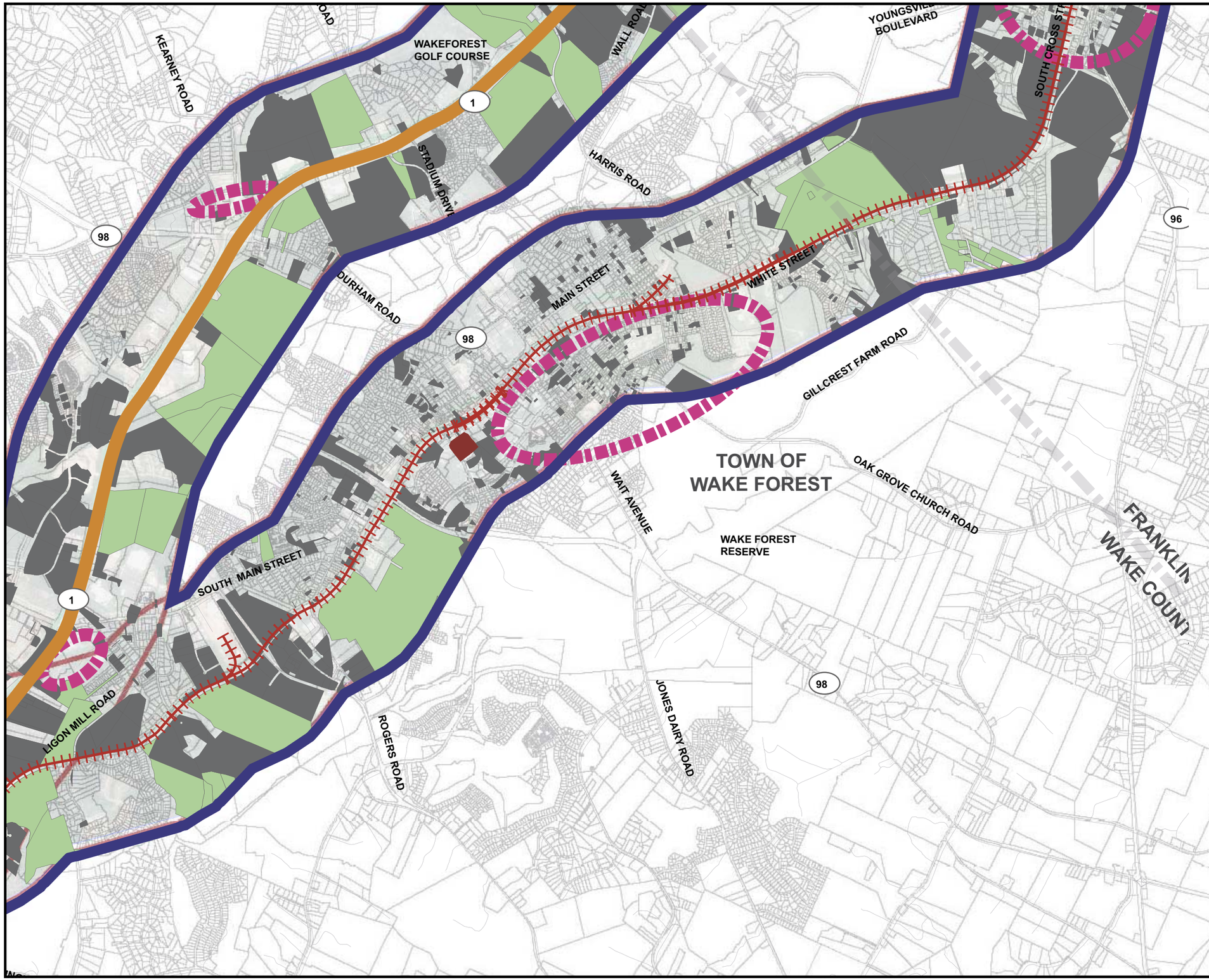
PHASE 1 ANALYSIS

Potential Development Opportunities

US 1 CORRIDOR STUDY

Figure 4-1
Sheet 1 of 3



LEGEND

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- Development - Planned/ Under Construction
- Railroad
- US-1 Corridor
- US-1 Corridor Study Boundary*

*Land Use study boundaries extend 1/2 mile from corridor center line

0 0.5 1 2 Miles

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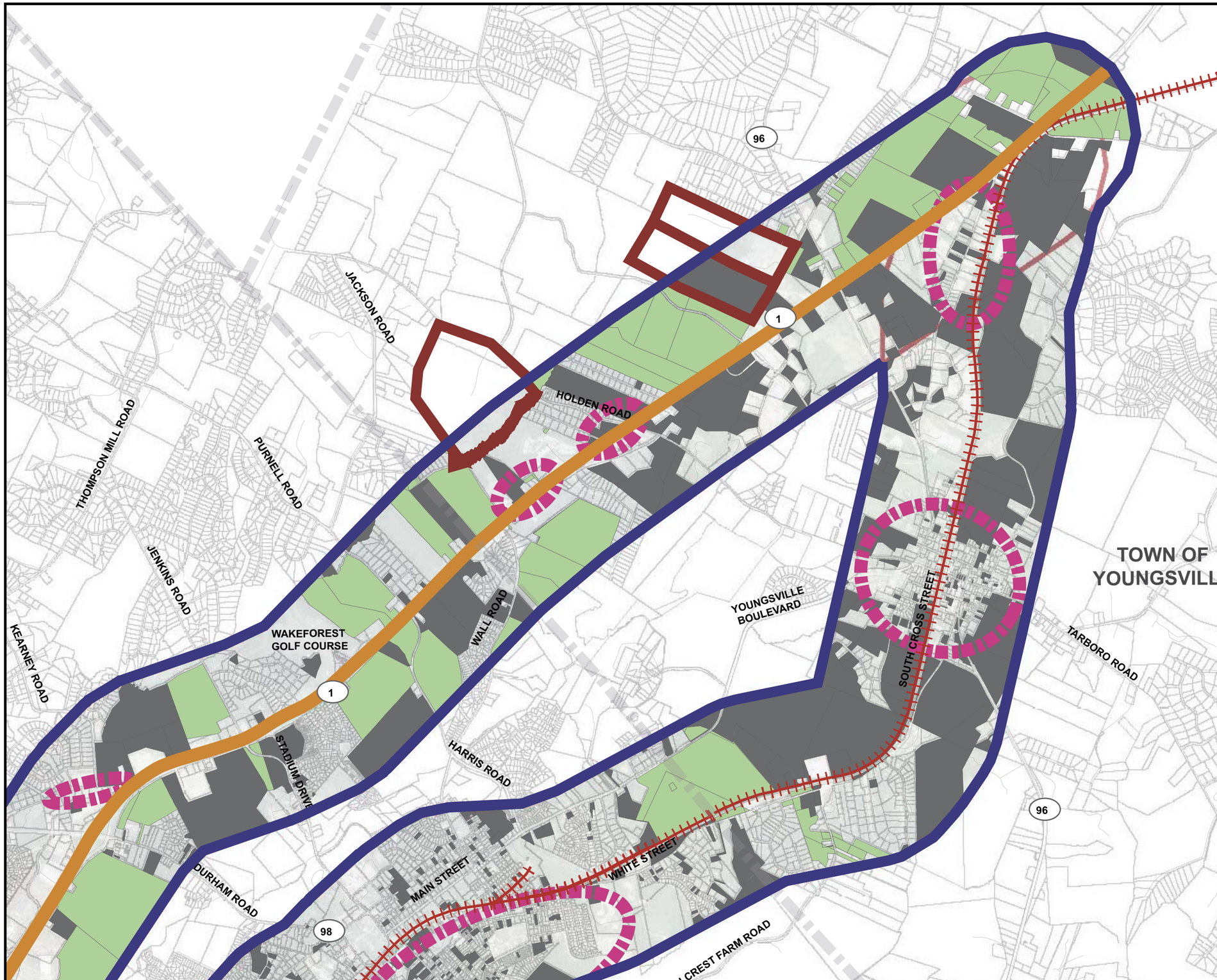
PHASE 1 ANALYSIS

Potential Development Opportunities

US 1 CORRIDOR STUDY

Figure 4-1
Sheet 2 of 3



LEGEND

Parcel Susceptible to Change:

- Vacant Land
- Agricultural/ Forested Land
- Opportunities for Residential and Commercial Infill Development
- Development - Planned/ Under Construction
- Railroad
- US-1 Corridor
- US-1 Corridor Study Boundary*

*Land Use study boundaries extend 1/2 mile from corridor center line

0 0.5 1 2 Miles

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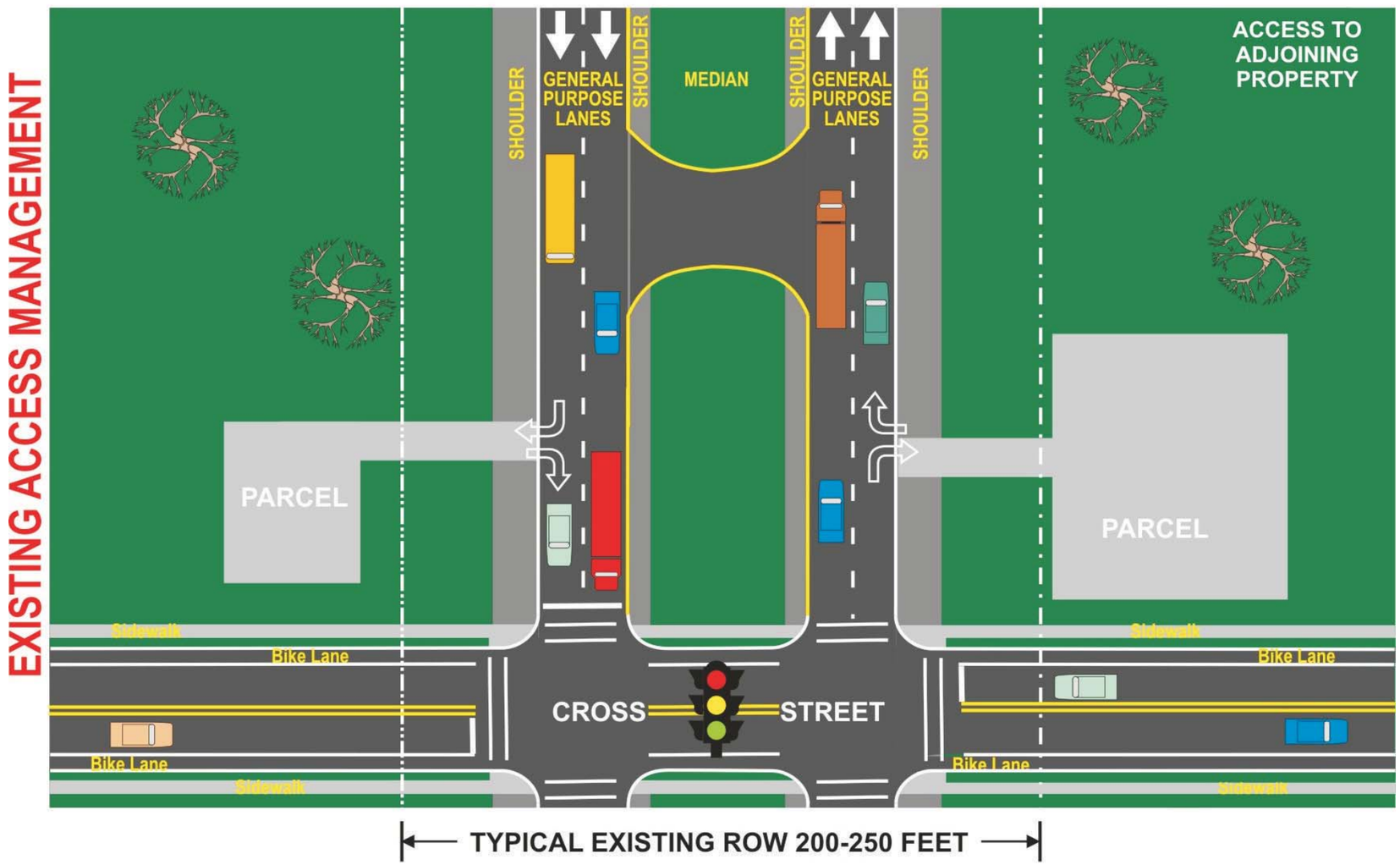
PHASE 1 ANALYSIS

Potential Development Opportunities

US 1 CORRIDOR STUDY

Figure 4-1
Sheet 3 of 3

Alternative I: Null Alternative



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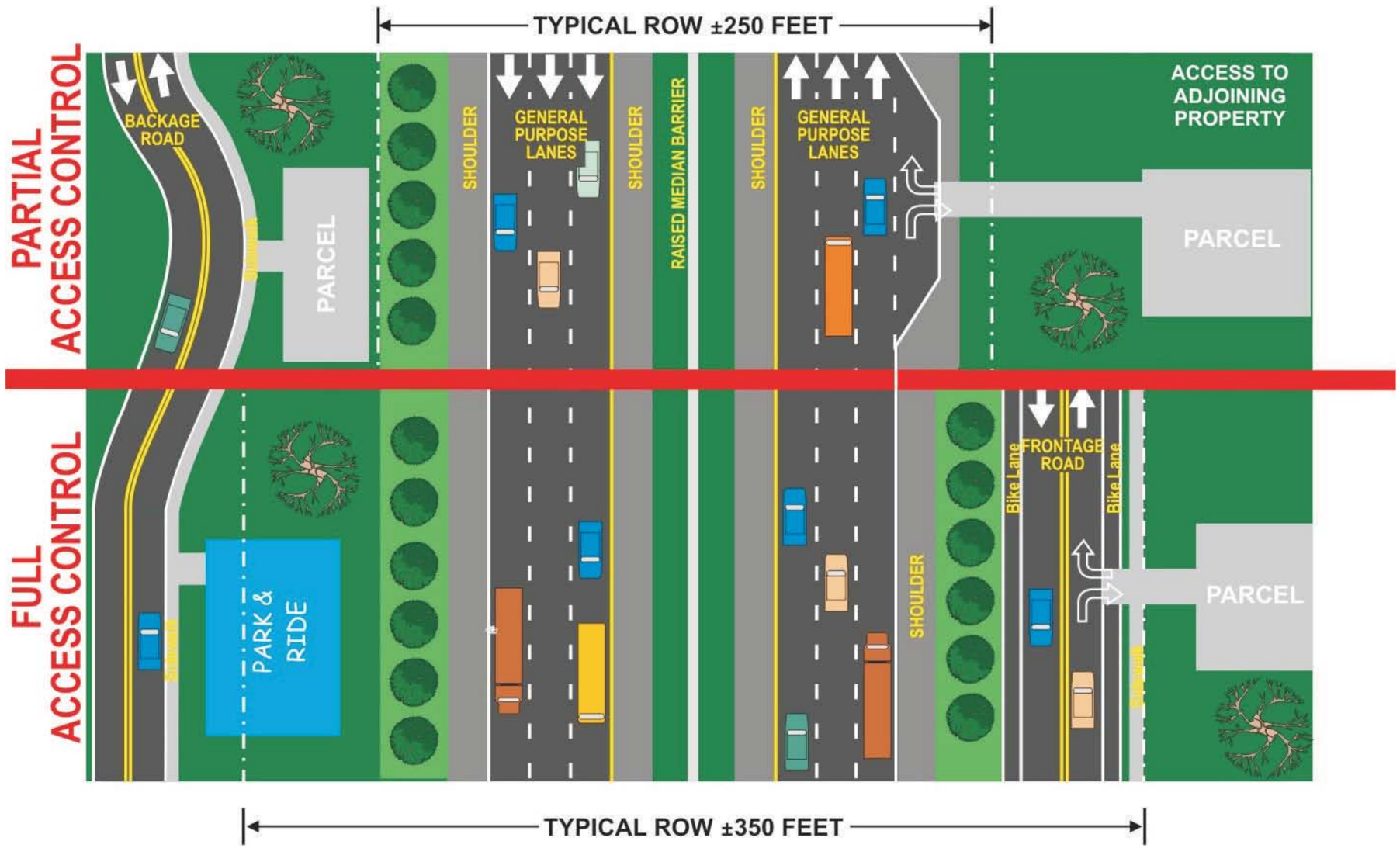
PHASE 1 ANALYSIS

Alternative I: Null Alternative

US 1 CORRIDOR STUDY

Figure 4-2

Alternative II: Highway Alternative



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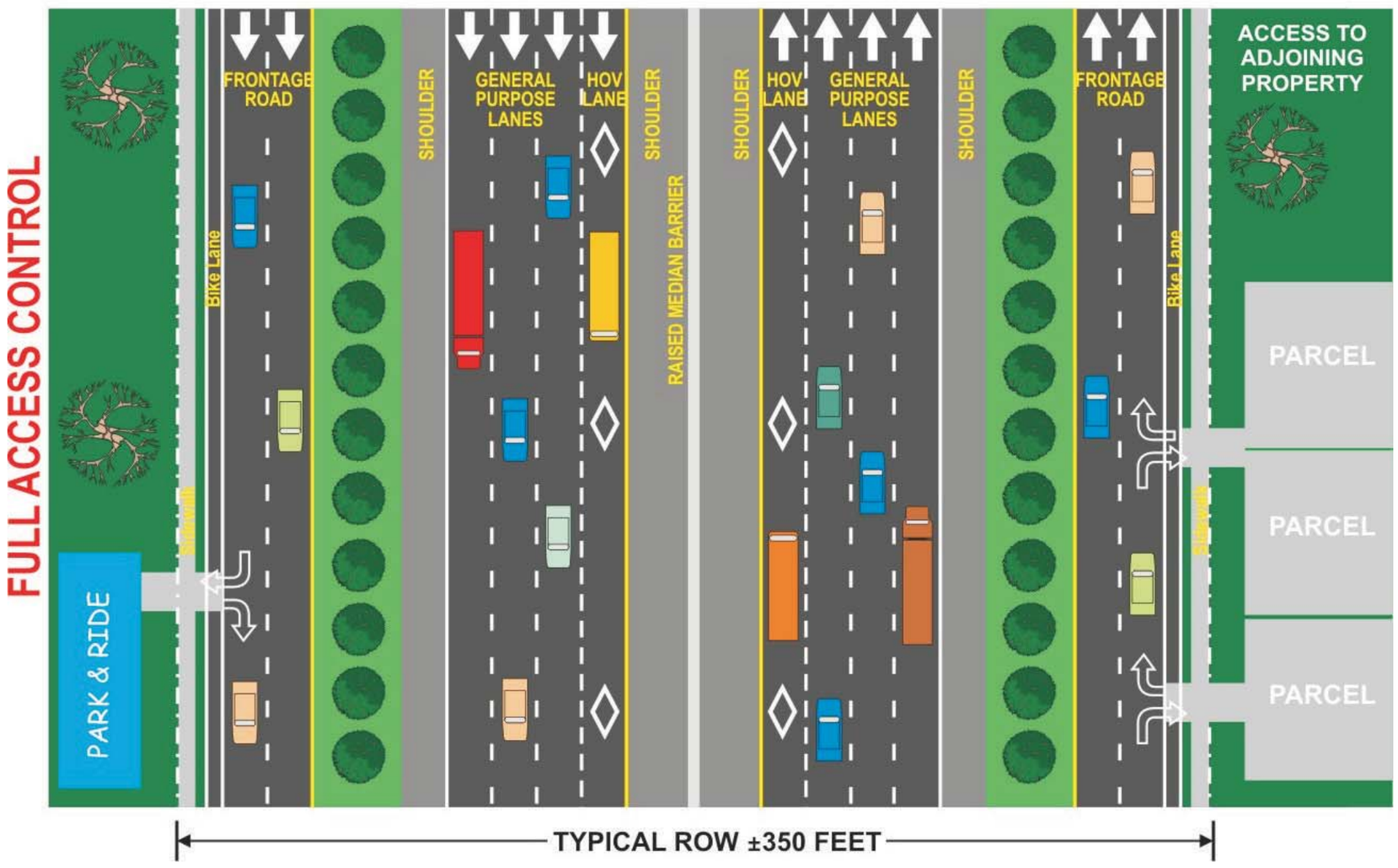
PHASE 1 ANALYSIS

Alternative II:
Highway Alternative

US 1 CORRIDOR STUDY

Figure 4-3

Alternative III: Highway plus Transit Alternative



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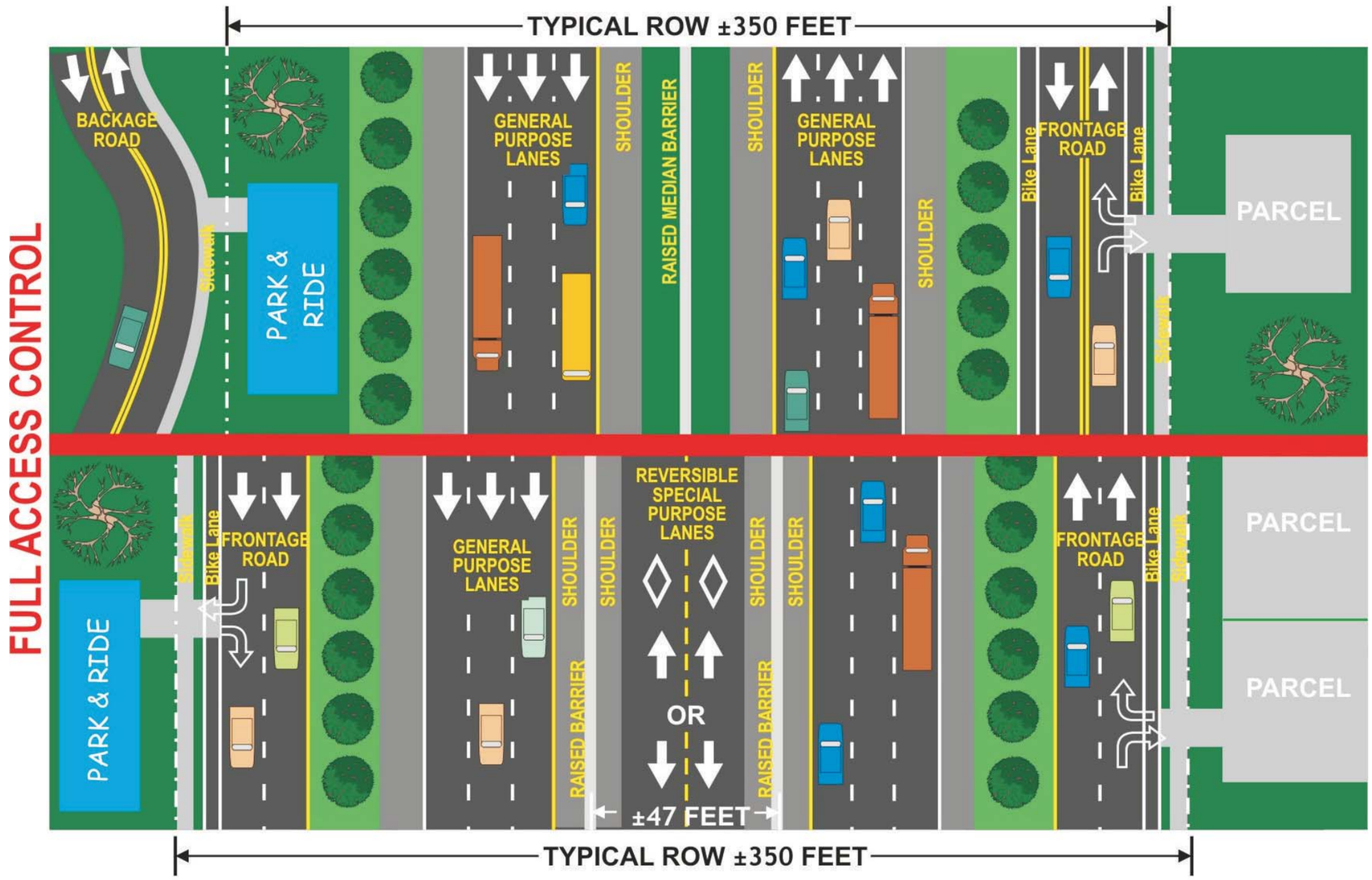
PHASE 1 ANALYSIS

Alternative III:
Highway plus Transit
Alternative

US 1 CORRIDOR STUDY

Figure 4-4

Alternative IV: Highway plus Transit Alternative with Reversible Special Use Lanes



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PHASE 1 ANALYSIS

Alternative IV:
Highway plus Transit with
Reversible Special Use Lanes

US 1 CORRIDOR STUDY

Figure 4-5

cross streets and other cross streets would be grade-separated to provide east-west connectivity. This alternative would include two-lane frontage roads paralleling US 1 (either one-way or two-way) or backage roads set behind adjacent properties to provide access. Bicycle lanes and sidewalks would be constructed along frontage roads and cross streets. Park and ride lots and transit stops would be located along frontage or backage roads. Figure 4-5 depicts the typical planning view cross section of Alternative IV, the Highway plus Transit Alternative with Reversible Special Use Lanes.

4.4 Year 2030 Traffic Demand Analysis

The travel analysis evaluates the ability of the transportation alternative plans to meet future travel demand along the US 1 corridor. In the Phase One analysis of the US 1 Corridor Study the four alternative plans identified above were analyzed. The travel analysis forecasted future travel for the corridor using the Triangle Regional Model's data and evaluated the ability of the alternative transportation plans to meet future demand.

4.4.1 Travel Demand Projections

The US 1 Corridor Study future travel demand modeling documentation and results are included in Appendix C – Travel Demand Modeling. These projections were necessary in determining a need for the 2030 roadway and transit improvements along the US 1 corridor.

4.4.2 Mainline Capacity Analysis

The purpose of this analysis is to identify the design requirements and capacity needed for the US 1 corridor in order to the meet future traffic demand. The travel demand projections for the US 1 corridor included the frontage/backage roads traffic volumes, and the US 1 corridor mainline general purpose and HOV lane traffic volumes.

To determine the number of lanes required for US 1 corridor mainline traffic, the 24-hour mainline general purpose traffic volumes for the US 1 corridor were estimated from the travel demand projections in a two step process.

- In the first step, the US 1 corridor mainline traffic volumes are estimated by diverting 15% of the model projections onto the parallel frontage/backage roads wherever they exist. The 15% traffic diversion onto the frontage/backage road system is based on the study team's travel demand modeling experience.
- In the second step, US 1 corridor mainline general purpose lanes traffic volumes were calculated by subtracting the HOV lanes traffic volumes.

The capacity analysis for the mainline general purpose lanes is performed using the Level of Service thresholds defined by the North Carolina Level of Service Software Tool (see Table 2-4).

Under the Alternative I, the US 1 corridor has six general purpose lanes with no access control between I-540 and NC 98 and four general purpose lanes with no access control north of NC 98. This alternative does not include any frontage/backage roads or HOV lanes for US 1 corridor. The capacity analysis indicates that the travel demand through 90% of the study corridor (Old Wake Forest Road to NC 96) would exceed the roadway capacity (Level of Service F). For the remainder of the corridor, traffic would flow at Level of Service D or better, an acceptable rate of traffic flow.

Under the Alternative II, the US 1 corridor has six general purpose lanes with full access control between I-540 and NC 98 and six general purpose lanes with no access control north of NC 98. This alternative includes frontage/backage roads parallel to US 1 between I-540 and NC 98 but does not include any HOV lanes. The capacity analysis indicates that the travel demand through approximately 30% of the study corridor (I-540 to Burlington Mills Road and NC 98 to Jenkins Road) would either approach or exceed the roadway capacity (Level of Service E or F). For the remainder of the corridor, traffic would flow at Level of Service D or better, an acceptable rate of traffic flow.

Under the Alternative III, the US 1 corridor has six general purpose lanes with full access control throughout the study area. This alternative includes frontage/backage roads parallel to US 1 between I-540 and US 1A North and two concurrent flow HOV lanes (one in each direction) between I-540 and NC 98. The capacity analysis indicates that the traffic demand on approximately 50% of the US 1 corridor (I-540 to NC 98 Bypass) would flow at Level of Service D, an acceptable rate of traffic flow. For the remainder of the corridor, traffic would flow at Level of Service C or better, a good rate of traffic flow.

Under the Alternative IV, the US 1 corridor has six general purpose lanes with full access control throughout the study area. This alternative includes frontage/backage roads parallel to US 1 between Gresham Lake Road and US 1A North and two reversible HOV lanes, between I-540 and NC 98. The capacity analysis indicates that the traffic demand on approximately 30% of US 1 corridor (I-540 to Burlington Mills Road) would flow at Level of Service D, an acceptable rate of traffic flow. For the remainder of the corridor, traffic would flow at Level of Service C or better, a good rate of traffic flow.

Table 4-1 shows the US 1 corridor traffic volumes and the Level of Service for each of the Phase One alternatives.

4.5 Refined Phase One Alternatives

The Oversight Team after reviewing the future mobility needs and directional travel distribution along the corridor, eliminated Alternatives I and IV. Alternative II (highway) and Alternative III (highway plus transit) were deemed worthy of further study by the Oversight Team. Roll maps were created for these two conceptual alternatives so that the project Oversight Teams and the public could review alternatives II and III in more detail. The conceptual plan design and transportation features on the refined Phase One alternatives drawing are shown on Figures 4-6 and 4-7, Alternative II and Alternative III, respectfully.

The refined Phase One drawings used year 2005 aerials received from Wake County and the City of Raleigh as their base. The major transportation features shown on Figures 4-6 and 4-7 include:

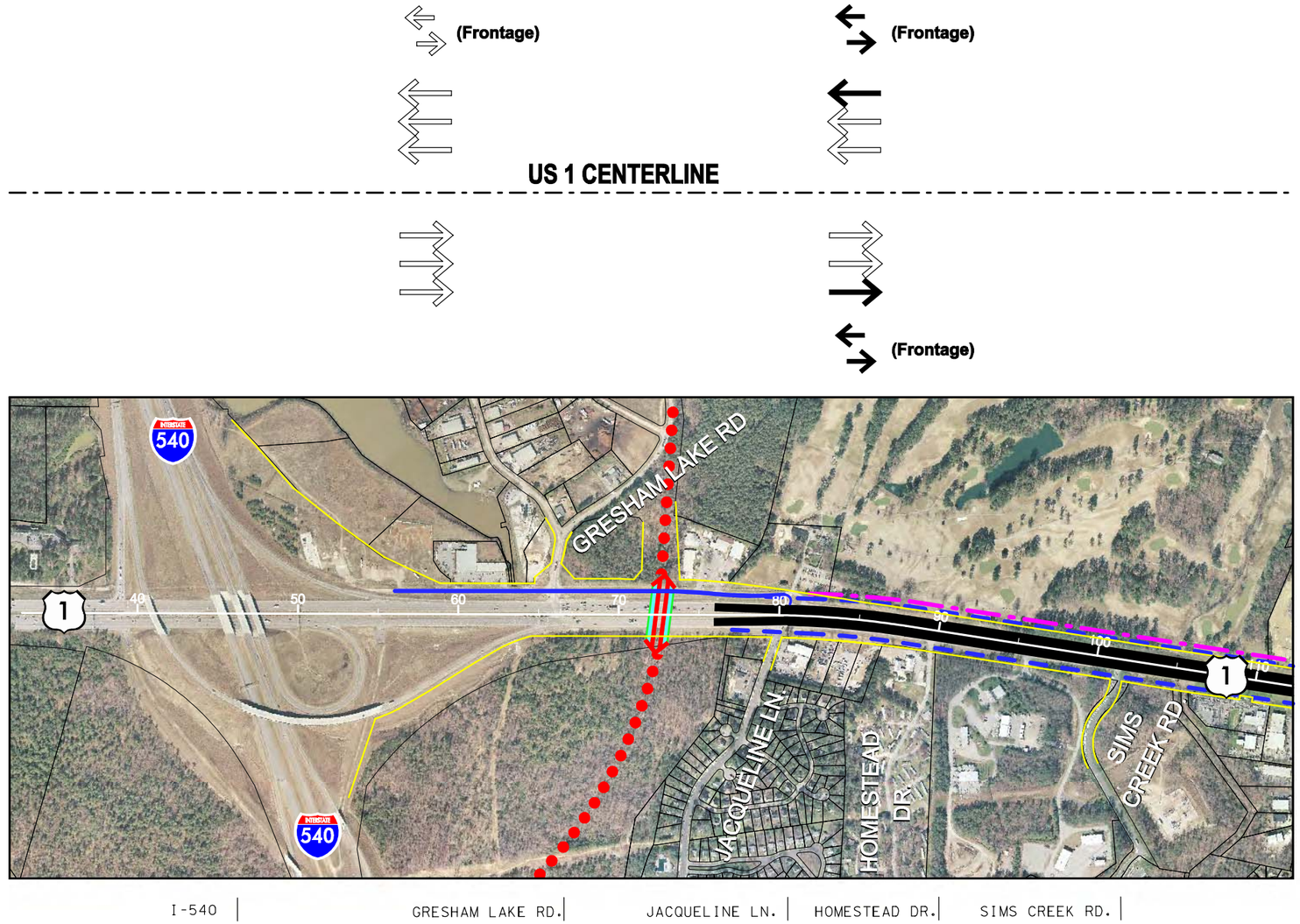
- existing and proposed right of way
- existing and proposed two-way frontage/backage roads
- proposed local streets
- proposed interchange locations
- proposed grade-separation crossings
- existing and proposed general purpose travel lanes
- proposed HOV lane

The refined Phase One alternative drawings were posted on the US 1 website, for the community to review and comment. Also larger scaled drawings of Alternatives II and III were produced and presented for the community to review and comment at the first public workshop. Written comments were documented by the public and posted directly on the refined Phase One drawings at the public meeting (see Appendix B).

Table 4-1
2030 Traffic Projections vs. Capacity

US 1 Section	Alternative I				Alternative II					Alternative III						Alternative IV					
	General Purpose Lane ADT	No. of Lanes[1]	Capacity[2]	LOS[3]	Frontage Road ADT	General Purpose Lane ADT	No. of Lanes[1]	Capacity[2]	LOS[3]	Frontage Road ADT	HOV Lane ADT	General Purpose Lane ADT	No. of Lanes[1]	Capacity[2]	LOS[3]	Frontage Road ADT	HOV Lane ADT	General Purpose Lane ADT	No. of Lanes[1]	Capacity[2]	LOS[3]
Old Wake Forest Rd - I-540 EB Ramps	108,100	6	68,100	**F**	0	112,900	6	112,700	**F**	0	0	99,400	6	112,700	D	0	0	99,900	6	112,700	D
I-540 EB Ramps - Gresham Lake Rd	131,500	6	68,100	**F**	21,015	107,285	6	112,700	**E**	18,495	6,400	98,405	6	112,700	D	19,095	11,800	96,405	6	112,700	D
Gresham Lake Rd - Durant Rd	131,800	6	68,100	**F**	22,500	113,400	6	112,700	**F**	18,720	10,100	95,980	6	112,700	D	18,810	14,100	92,490	6	112,700	D
Durant Rd - Burlington Mills Rd	126,500	6	68,100	**F**	21,465	107,835	6	112,700	**E**	17,970	10,400	91,430	6	112,700	D	18,210	13,800	89,390	6	112,700	D
Burlington Mills Rd - US 1A South	110,800	6	68,100	**F**	19,110	94,890	6	112,700	D	15,825	7,300	82,375	6	112,700	D	16,035	13,400	77,465	6	112,700	C
US 1A South – NC 98 Bypass	106,800	6	68,100	**F**	17,610	87,290	6	112,700	D	15,270	5,800	80,730	6	112,700	D	15,450	12,500	75,050	6	112,700	C
NC 98 Bypass – NC 98	70,500	6	68,100	**F**	12,180	56,320	6	112,700	C	10,695	4,100	56,505	6	112,700	C	11,595	12,700	53,005	6	112,700	B
NC 98 – Jenkins Rd	63,700	4	45,400	**F**	11,565	65,535	6	68,100	**E**	10,425	0	59,075	6	112,700	C	11,385	0	64,515	6	112,700	C
Jenkins Rd – Harris Rd	57,200	4	45,400	**F**	10,440	59,160	6	68,100	D	9,405	0	53,295	6	112,700	B	9,765	0	55,335	6	112,700	B
Harris Rd – Holden Rd	58,400	4	45,400	**F**	10,650	60,350	6	68,100	D	9,600	0	54,400	6	112,700	B	9,855	0	55,845	6	112,700	C
Holden Rd – NC 96	52,900	4	45,400	**F**	9,540	54,060	6	68,100	D	8,580	0	48,620	6	112,700	B	8,565	0	48,535	6	112,700	B
NC 96 – US 1A North	38,500	4	45,400	D	6,600	37,400	6	68,100	C	5,940	0	33,660	6	112,700	A	6,225	0	35,275	6	112,700	B

[1] Number of General Purpose Lanes on US 1 Mainline
[2] Capacity is equal to Level of Service E
[3] Level of Service
[4] Frontage Road ADT is estimated as 15% of US 1 Mainline ADT



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- PROPOSED HOV LANE
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0 400 800 1600
Feet

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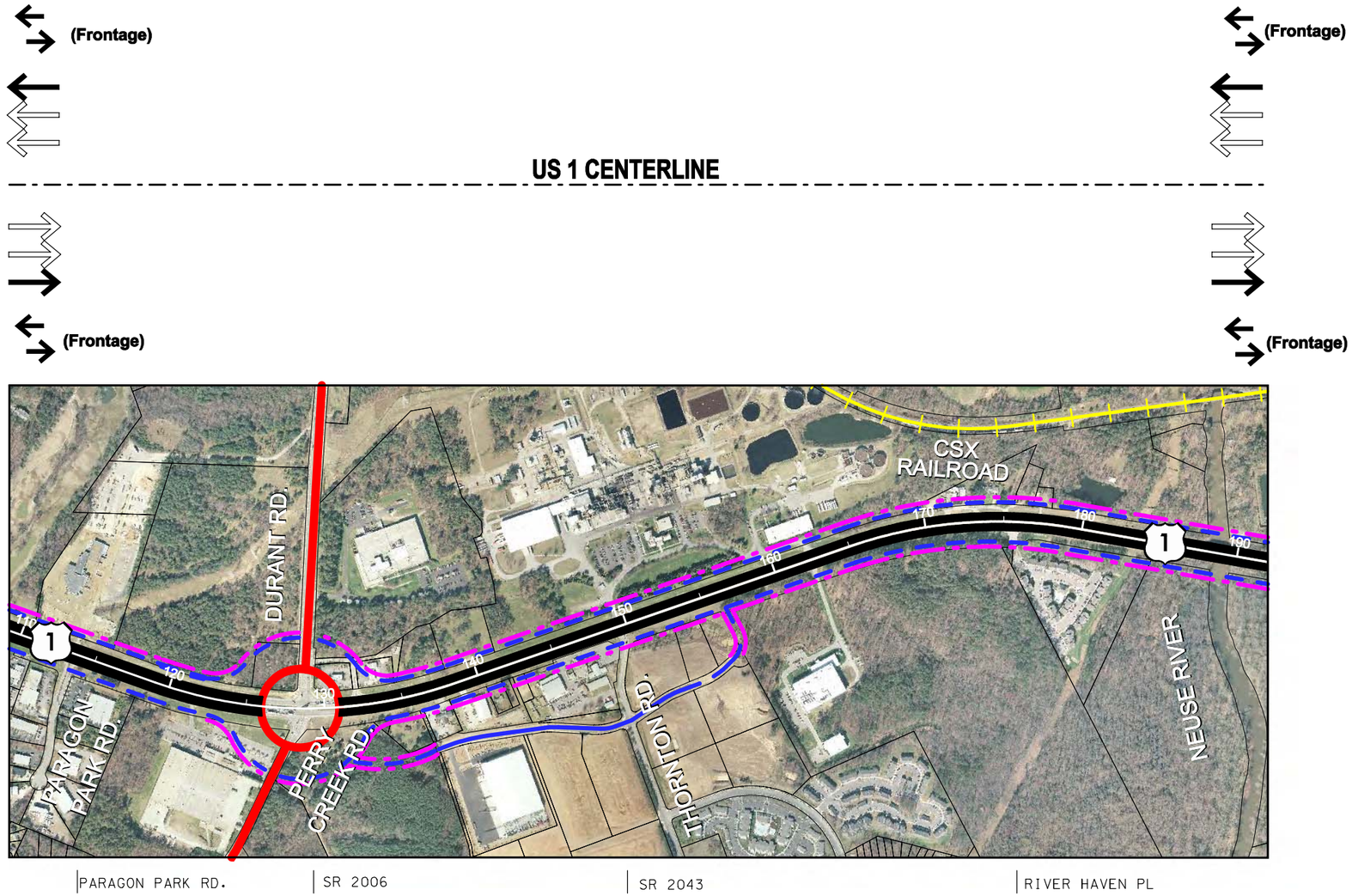
PHASE 1 ANALYSIS

ALTERNATIVE II HIGHWAY

US 1 CORRIDOR STUDY

Figure 4-6
Sheet 1 of 10



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ALTERNATIVE II HIGHWAY

US 1 CORRIDOR STUDY

Figure 4-6
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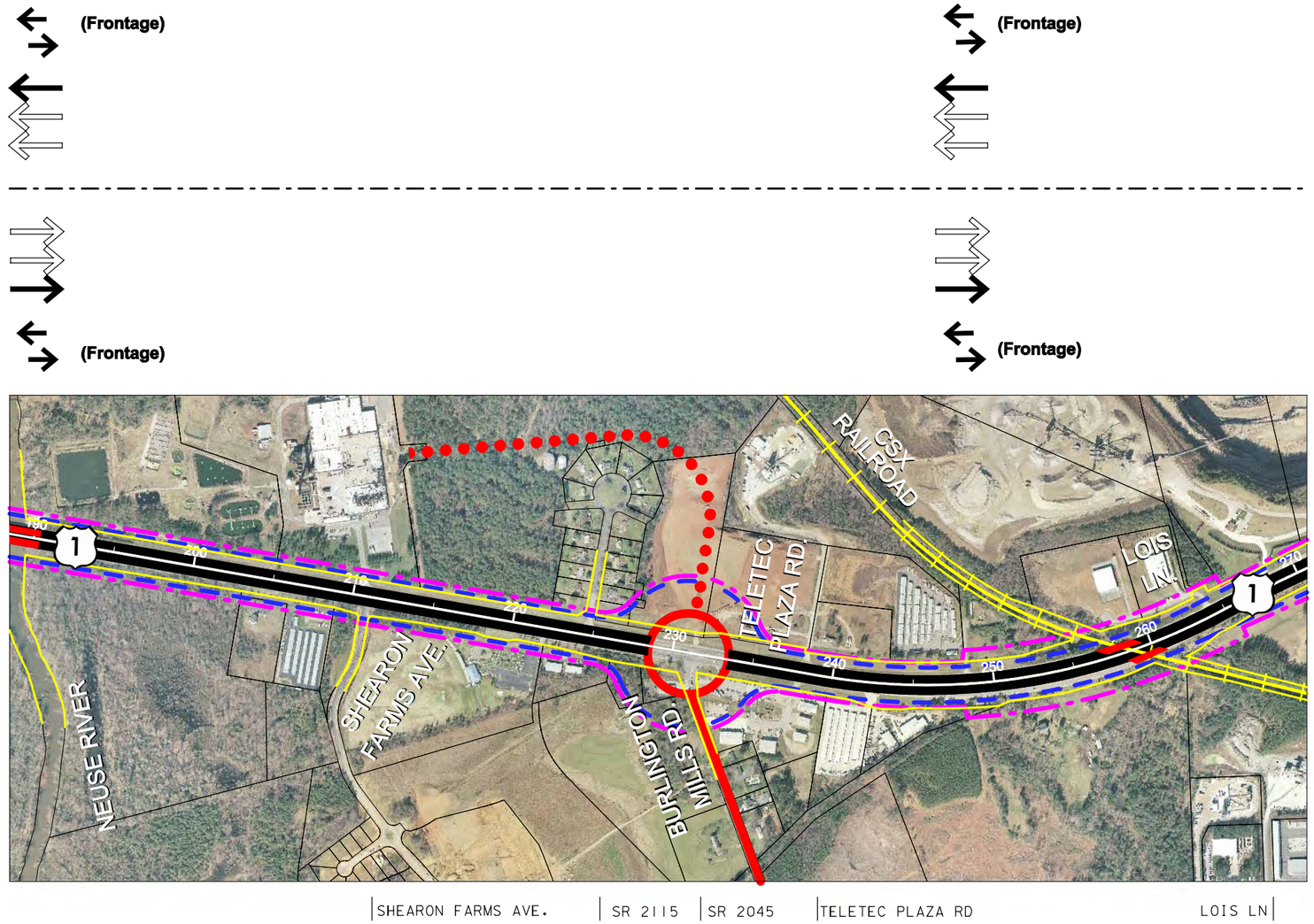

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ALTERNATIVE II HIGHWAY

US 1 CORRIDOR STUDY

Figure 4-6
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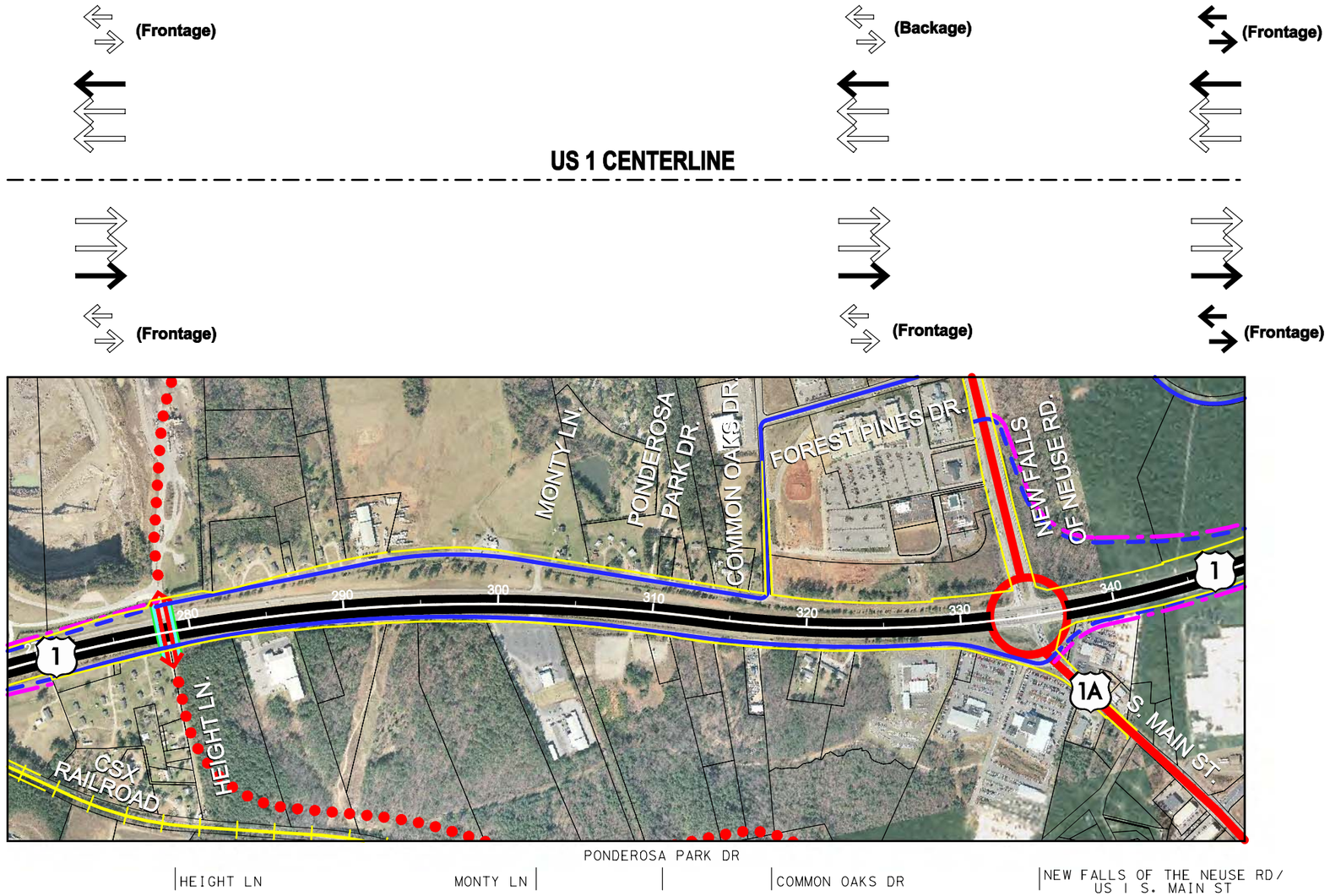

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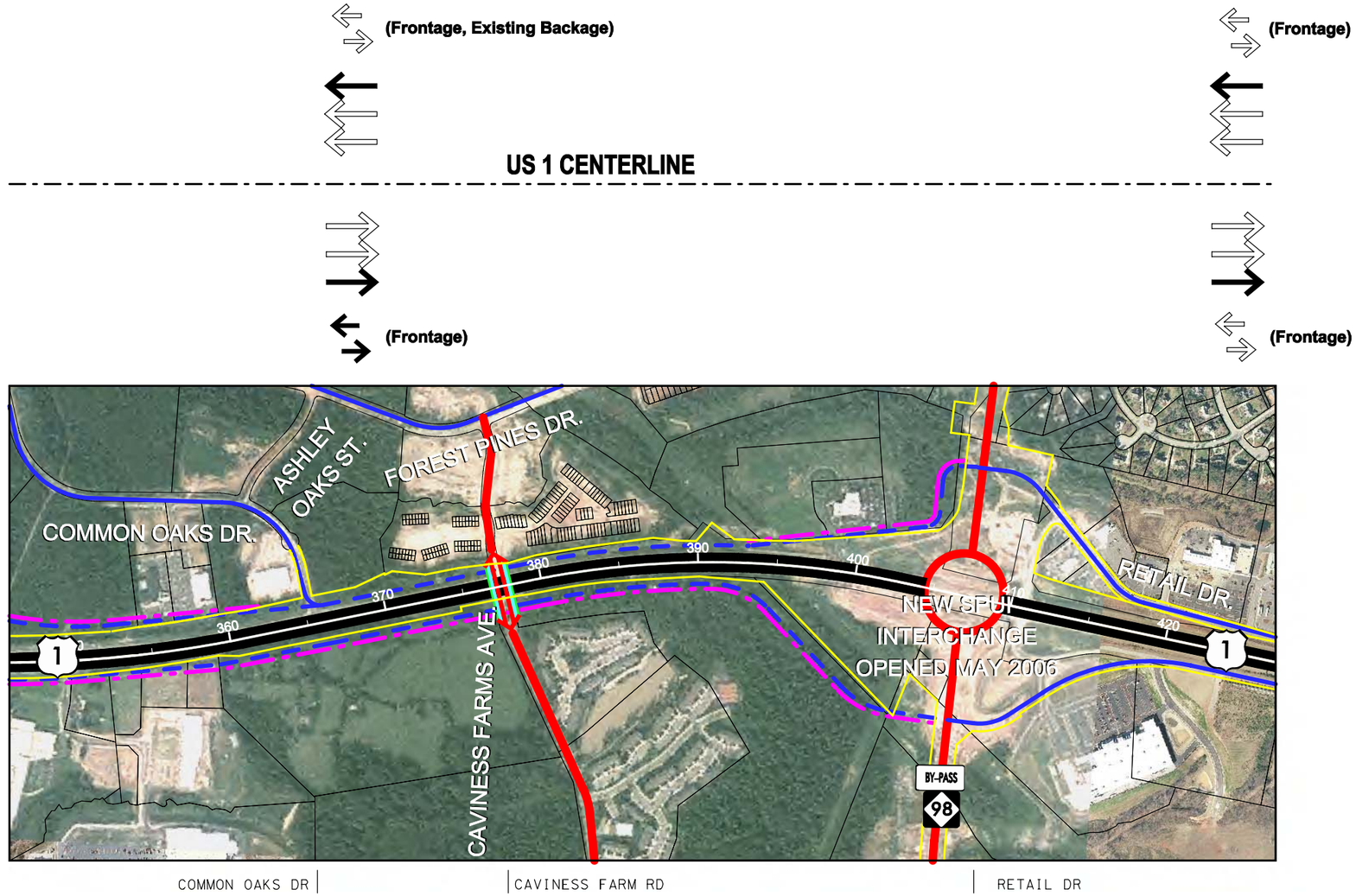

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Figure 4-6
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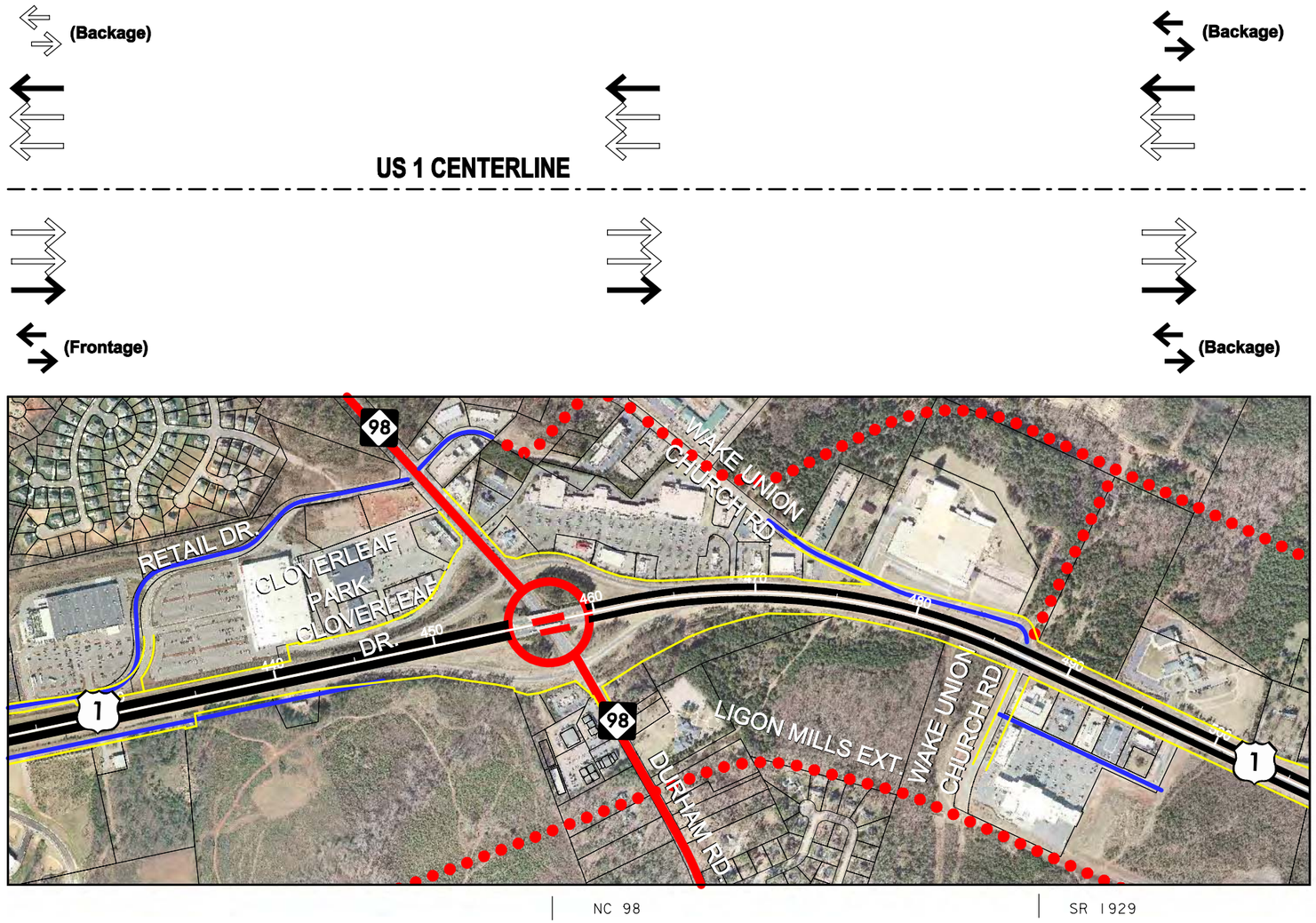

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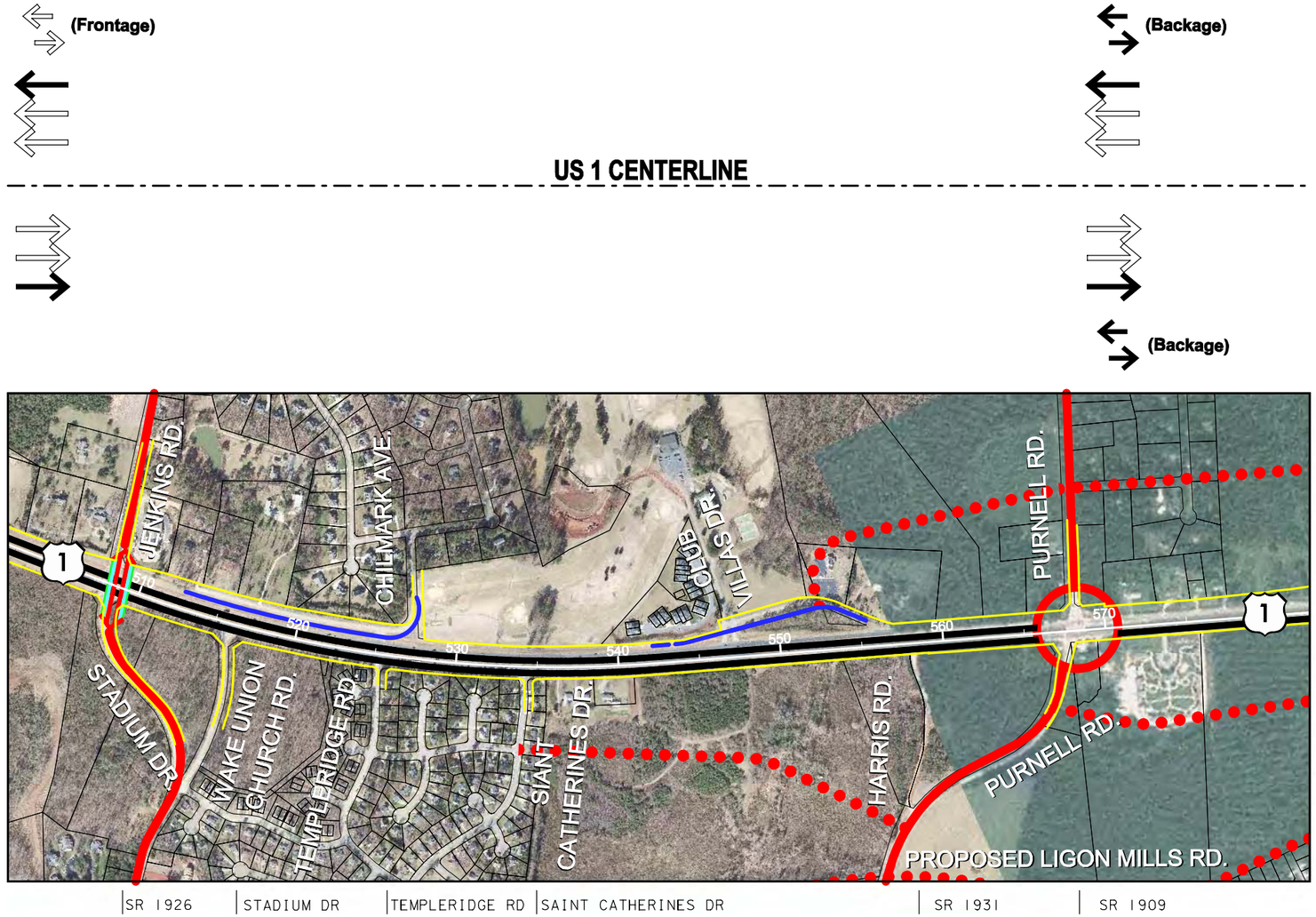

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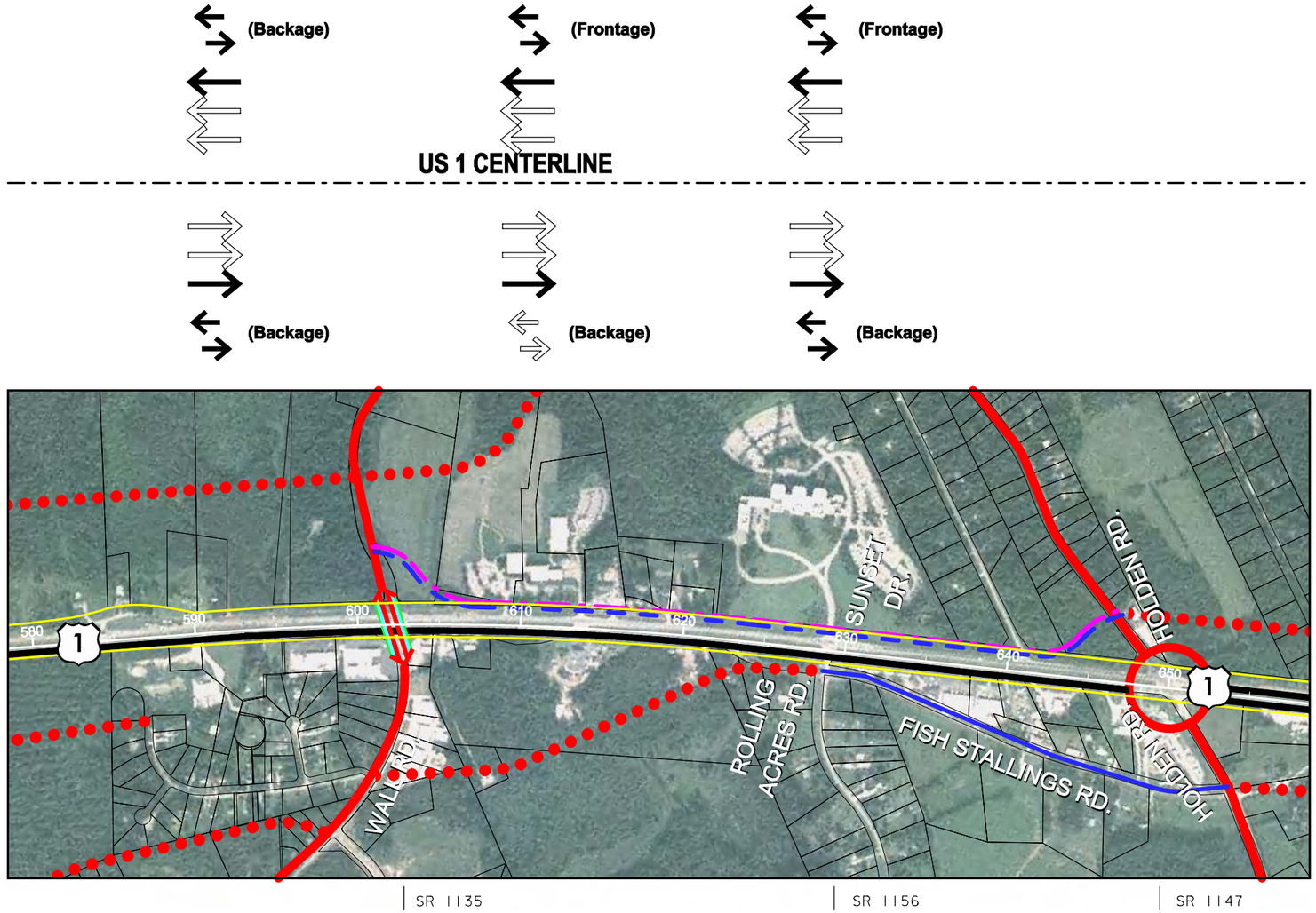

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ALTERNATIVE II HIGHWAY

US 1 CORRIDOR STUDY

Figure 4-6
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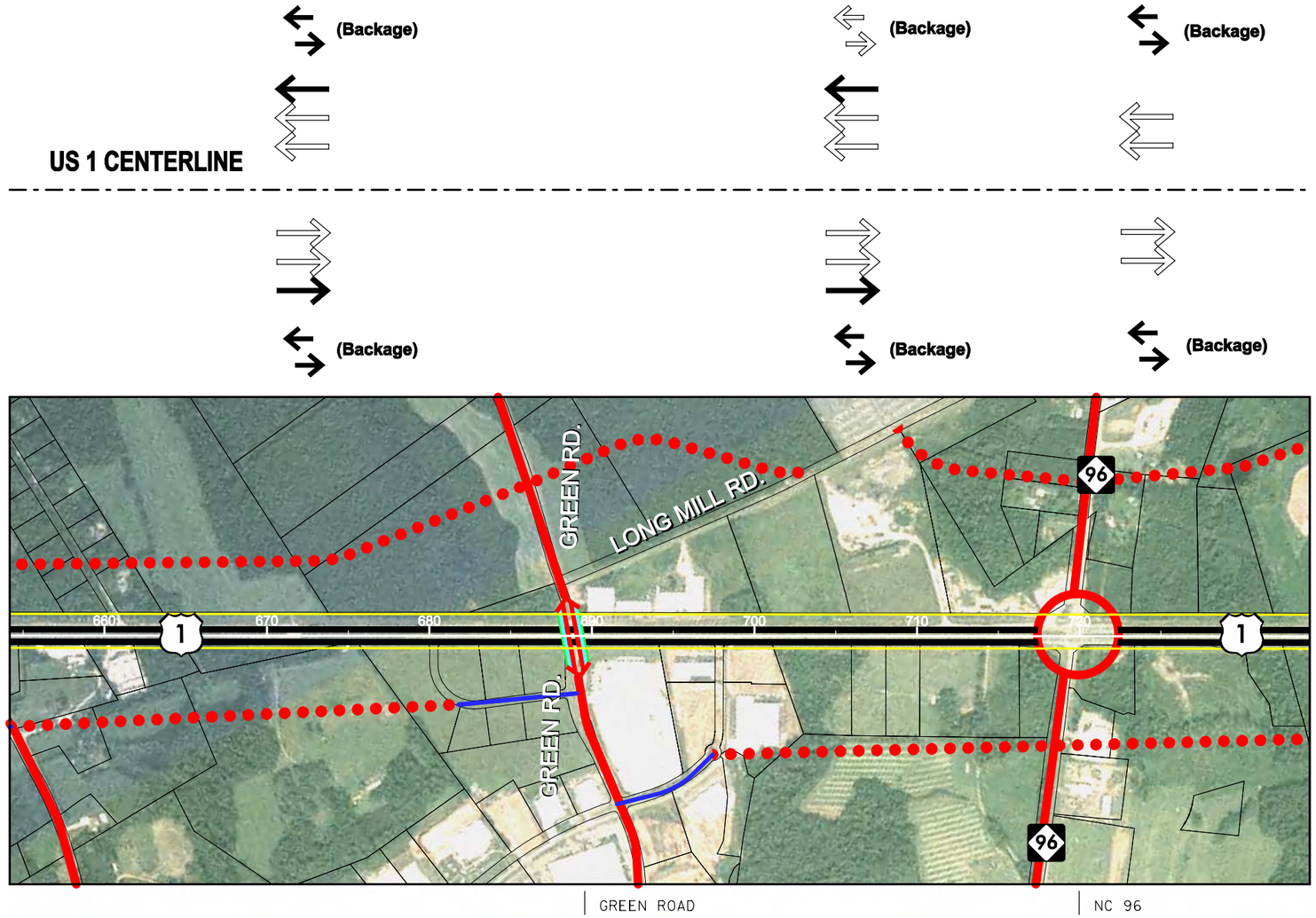

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ALTERNATIVE II HIGHWAY

US 1 CORRIDOR STUDY

Figure 4-6
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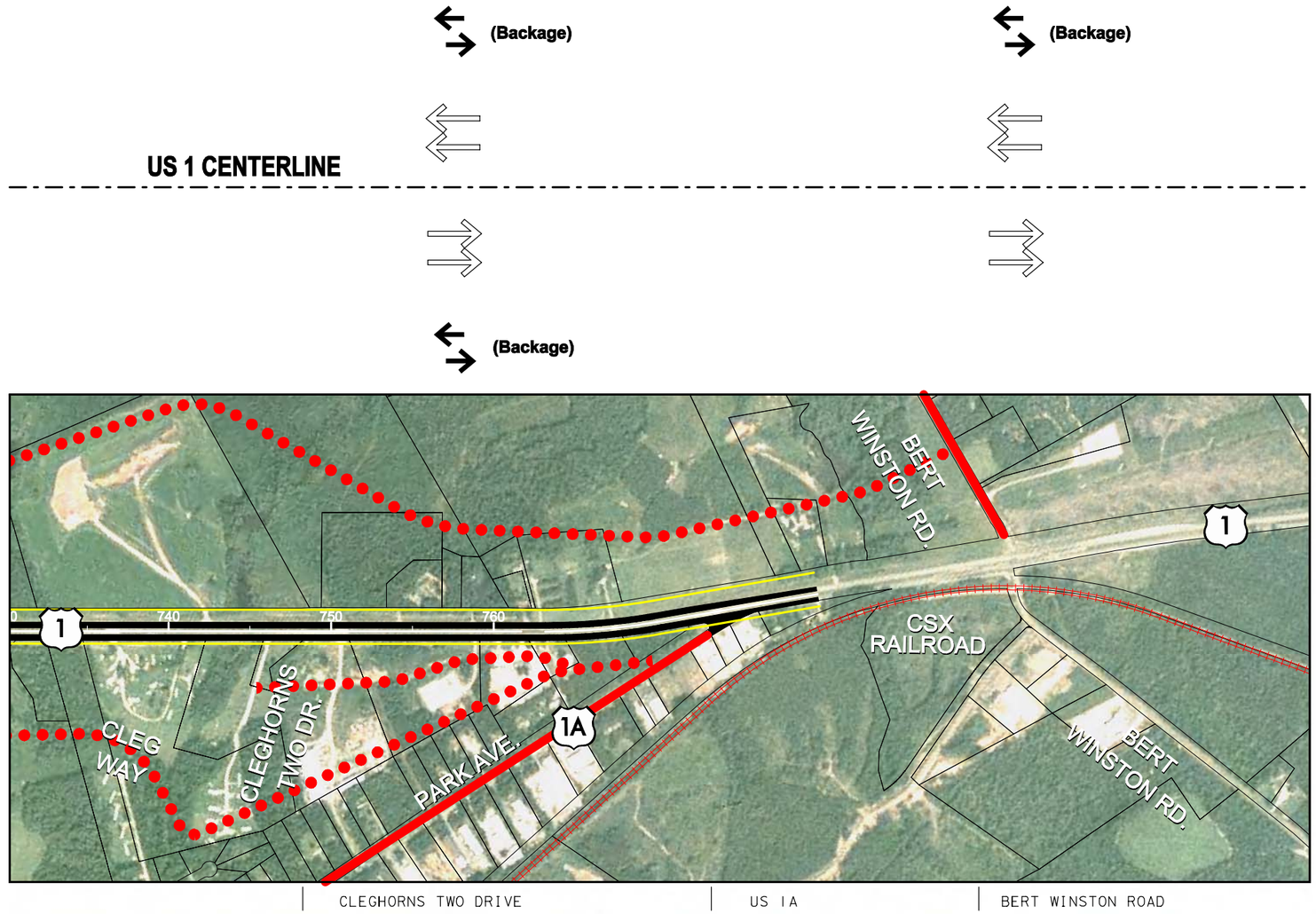

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Figure 4-6
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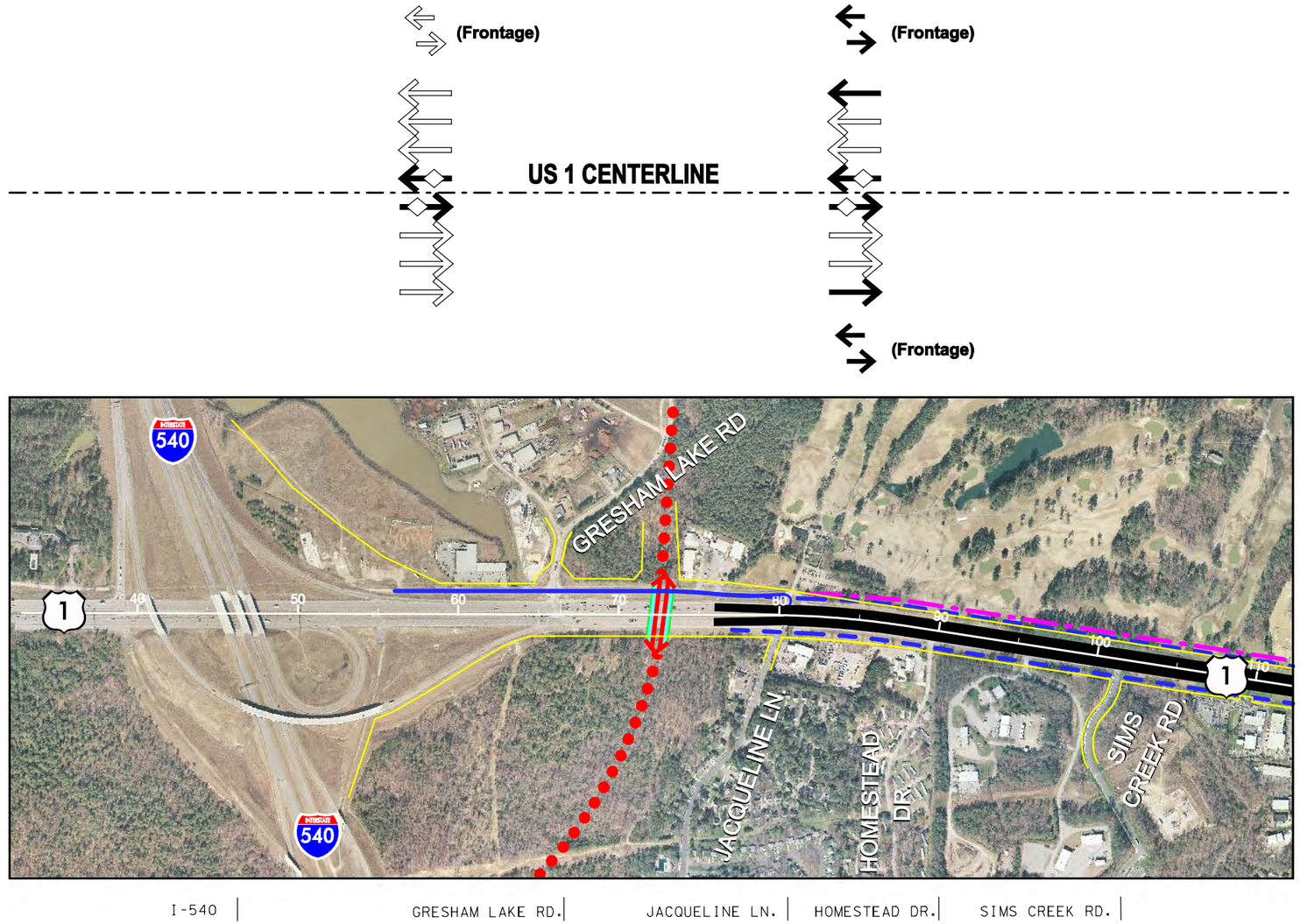

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ALTERNATIVE III
HIGHWAY AND TRANSIT

US 1 CORRIDOR STUDY

Figure 4-7
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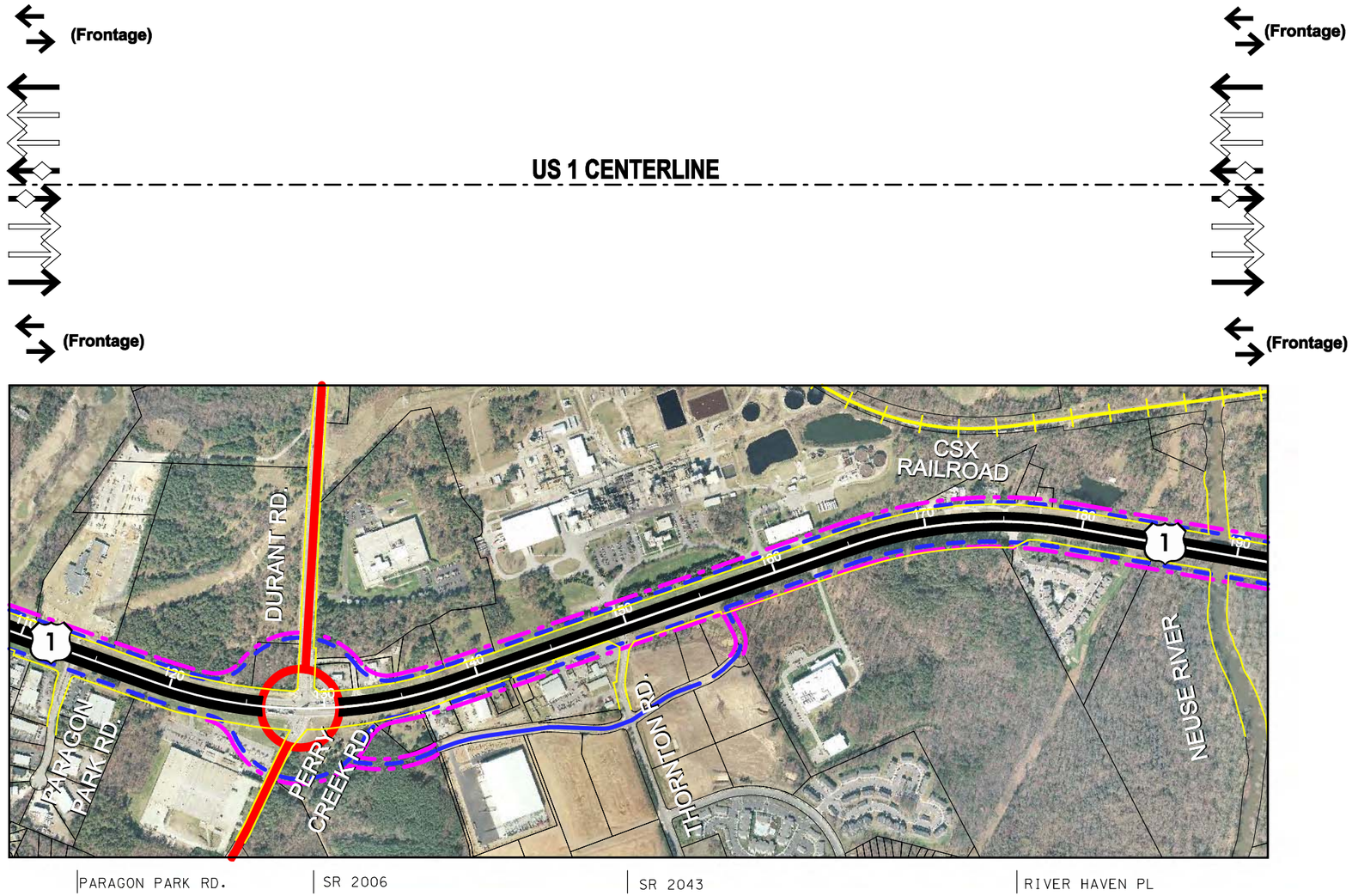

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ALTERNATIVE III
HIGHWAY AND TRANSIT

US 1 CORRIDOR STUDY

Figure 4-7
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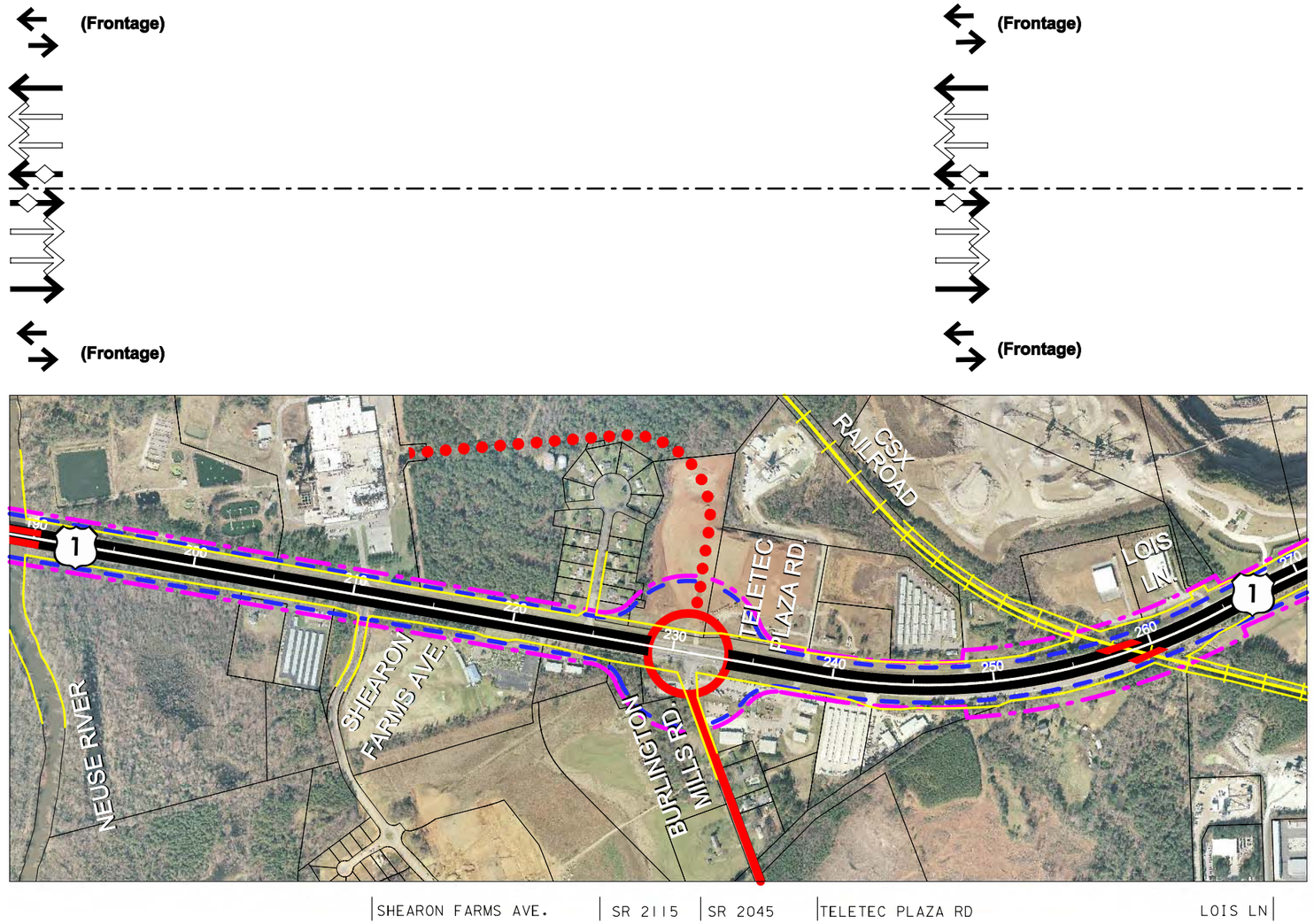

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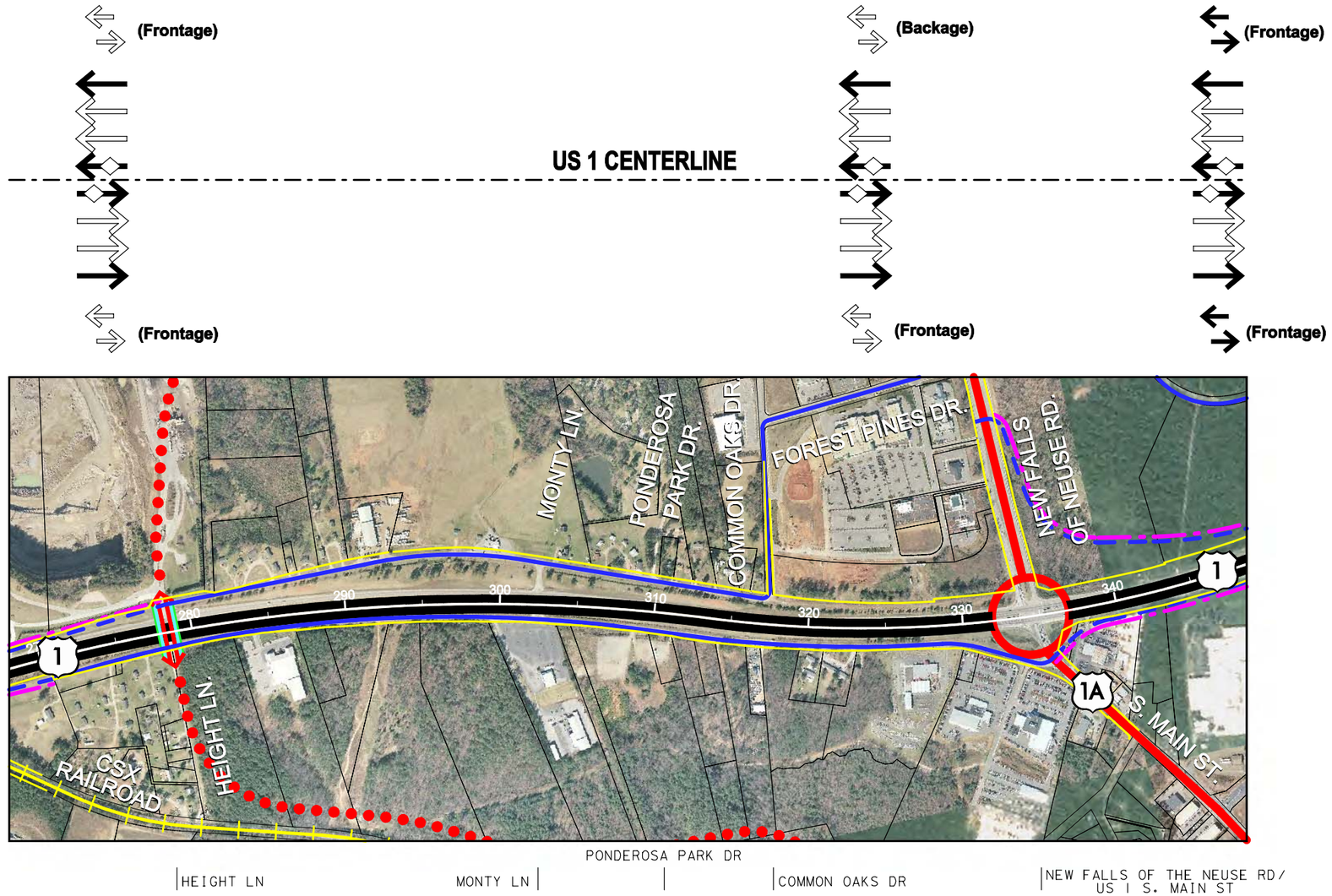

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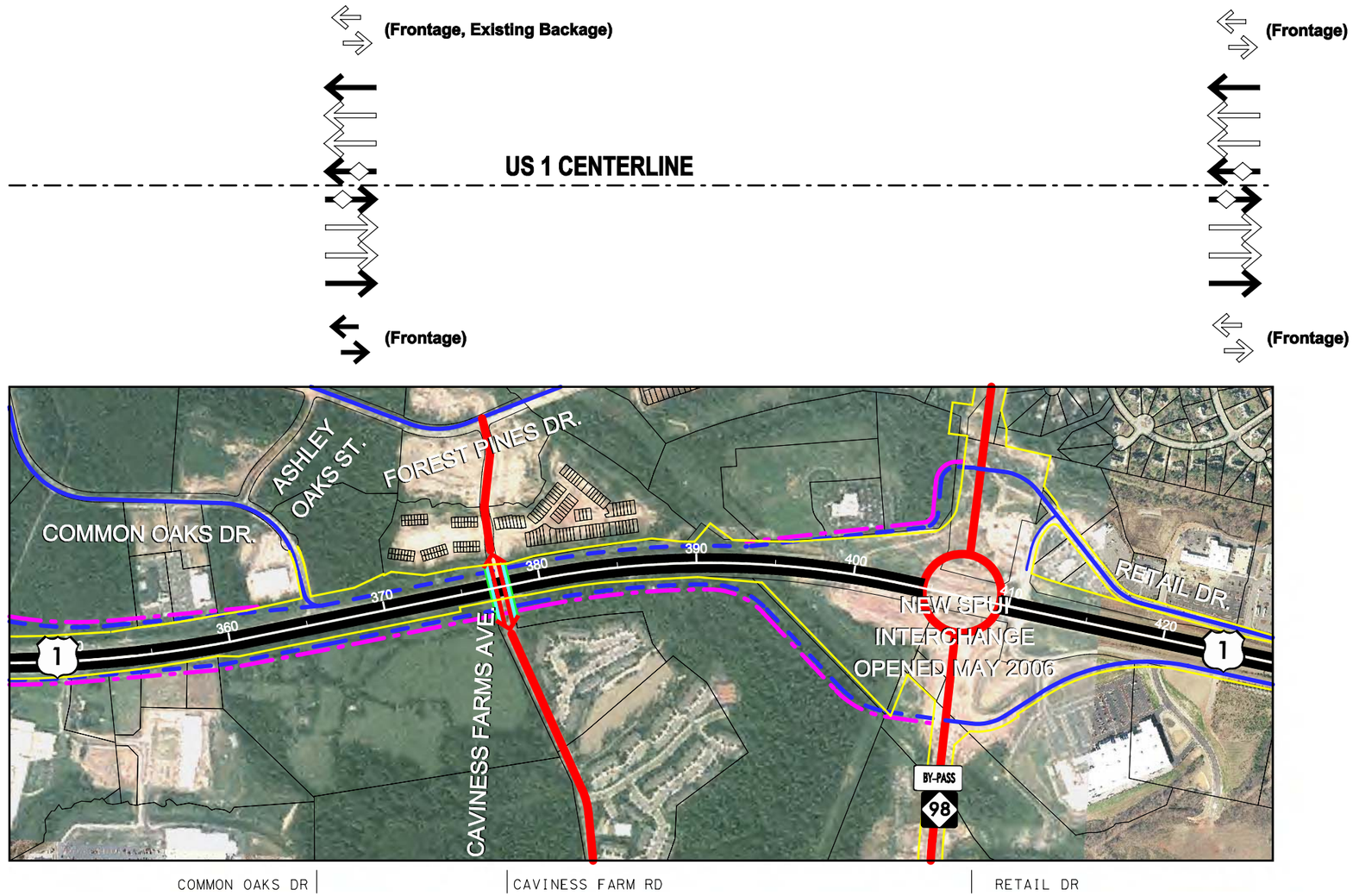

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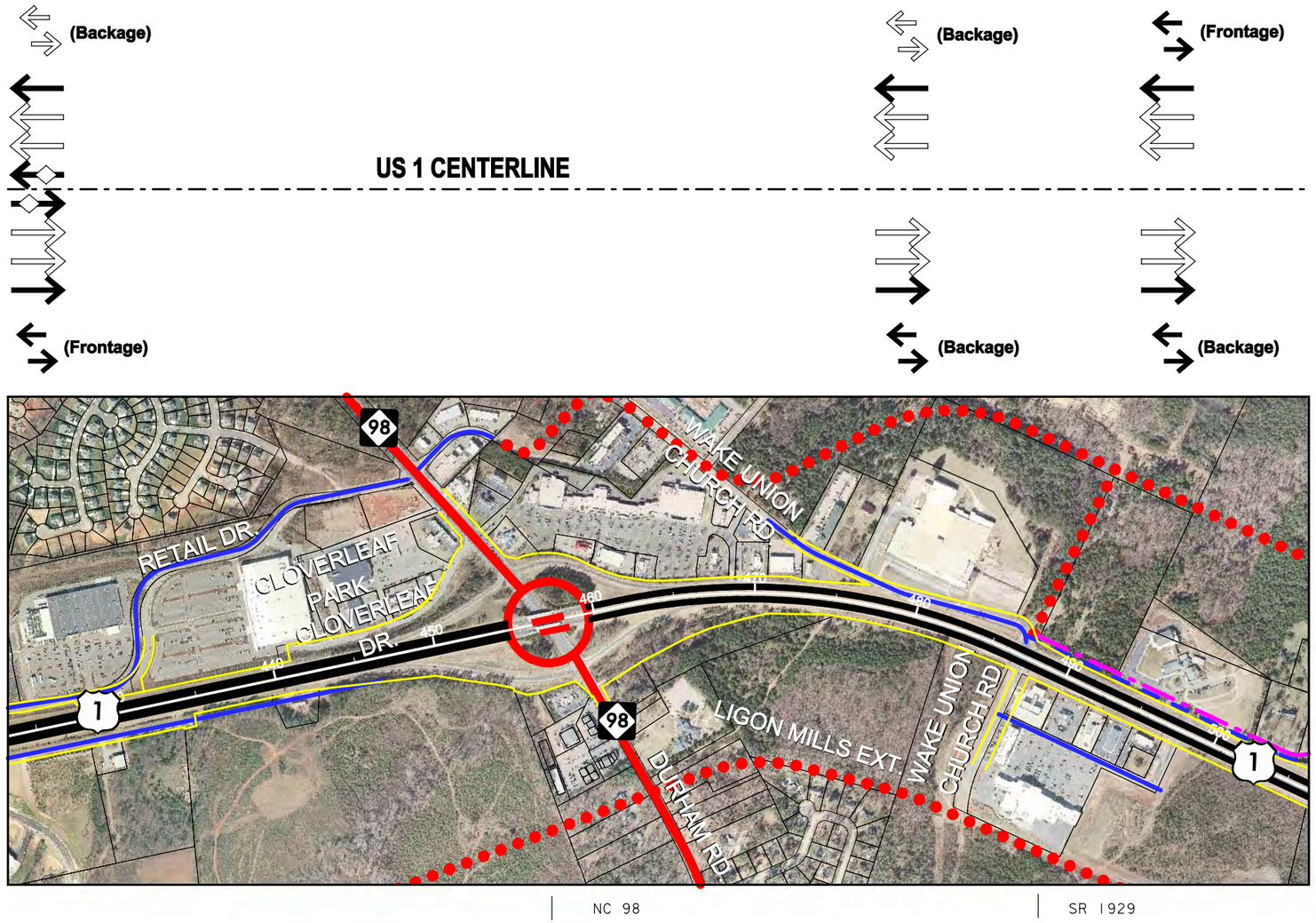

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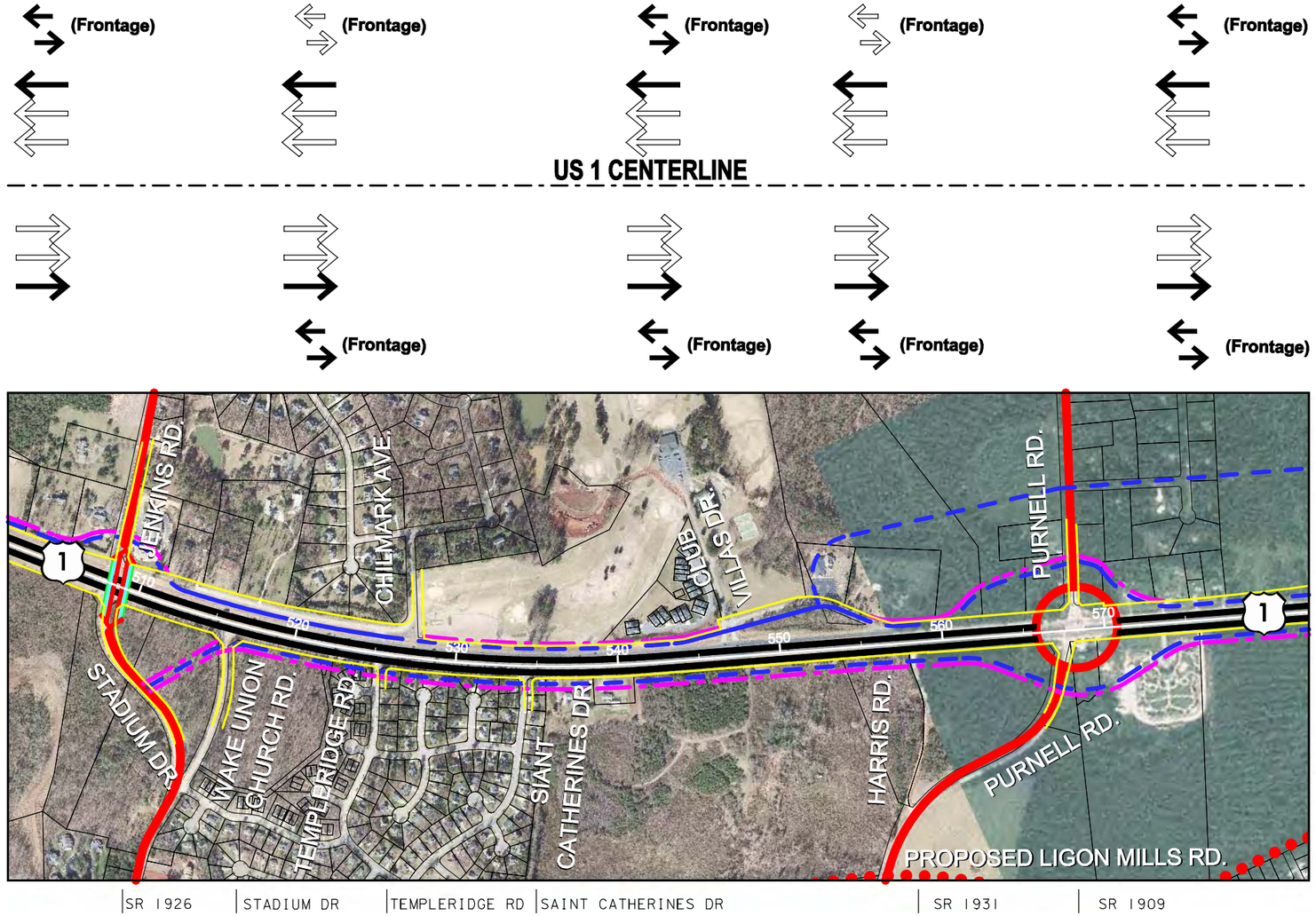

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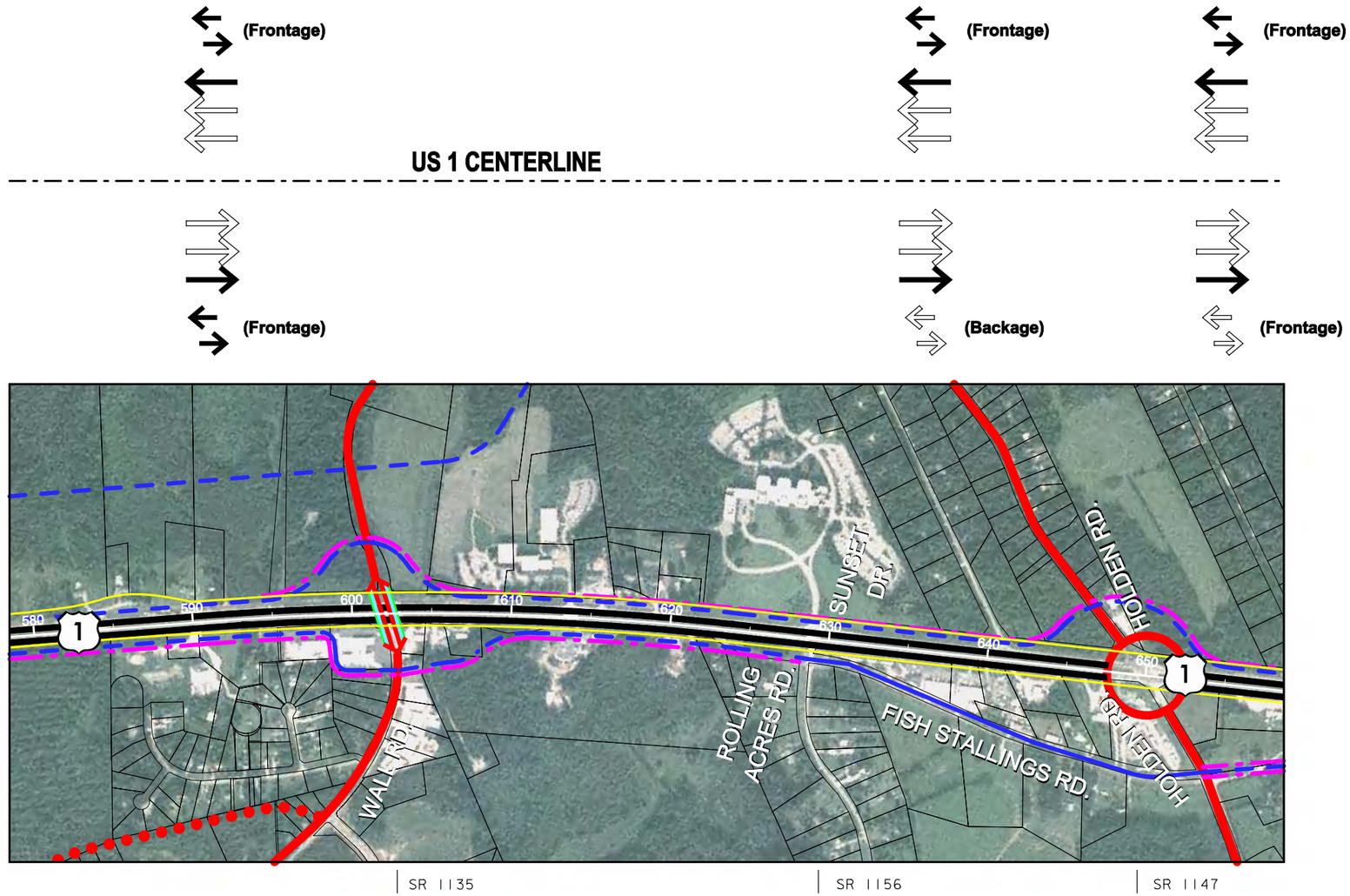

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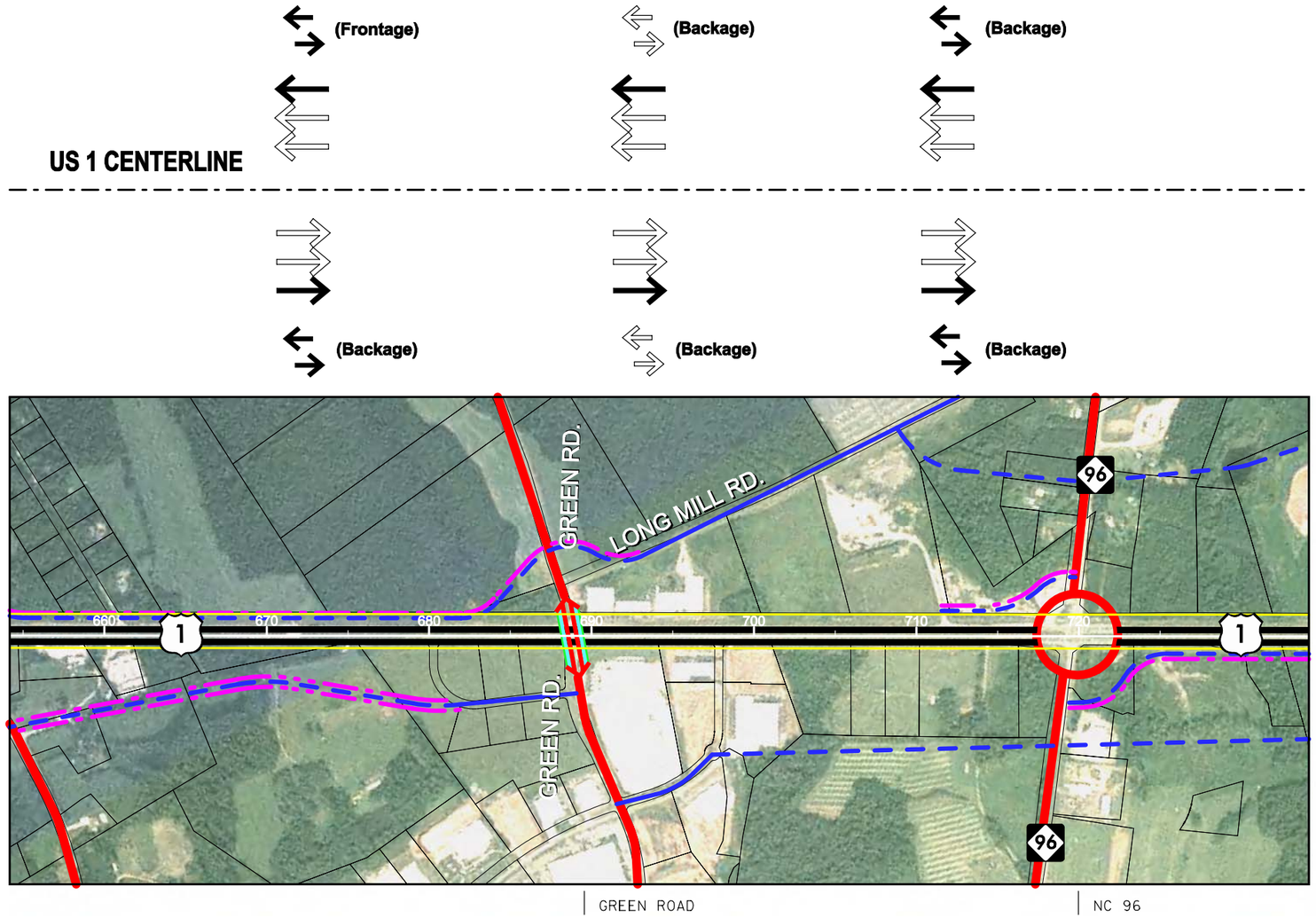

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- EXISTING FRONTAGE ROAD
- PROPOSED FRONTAGE ROAD

0 400 800 1600
Feet

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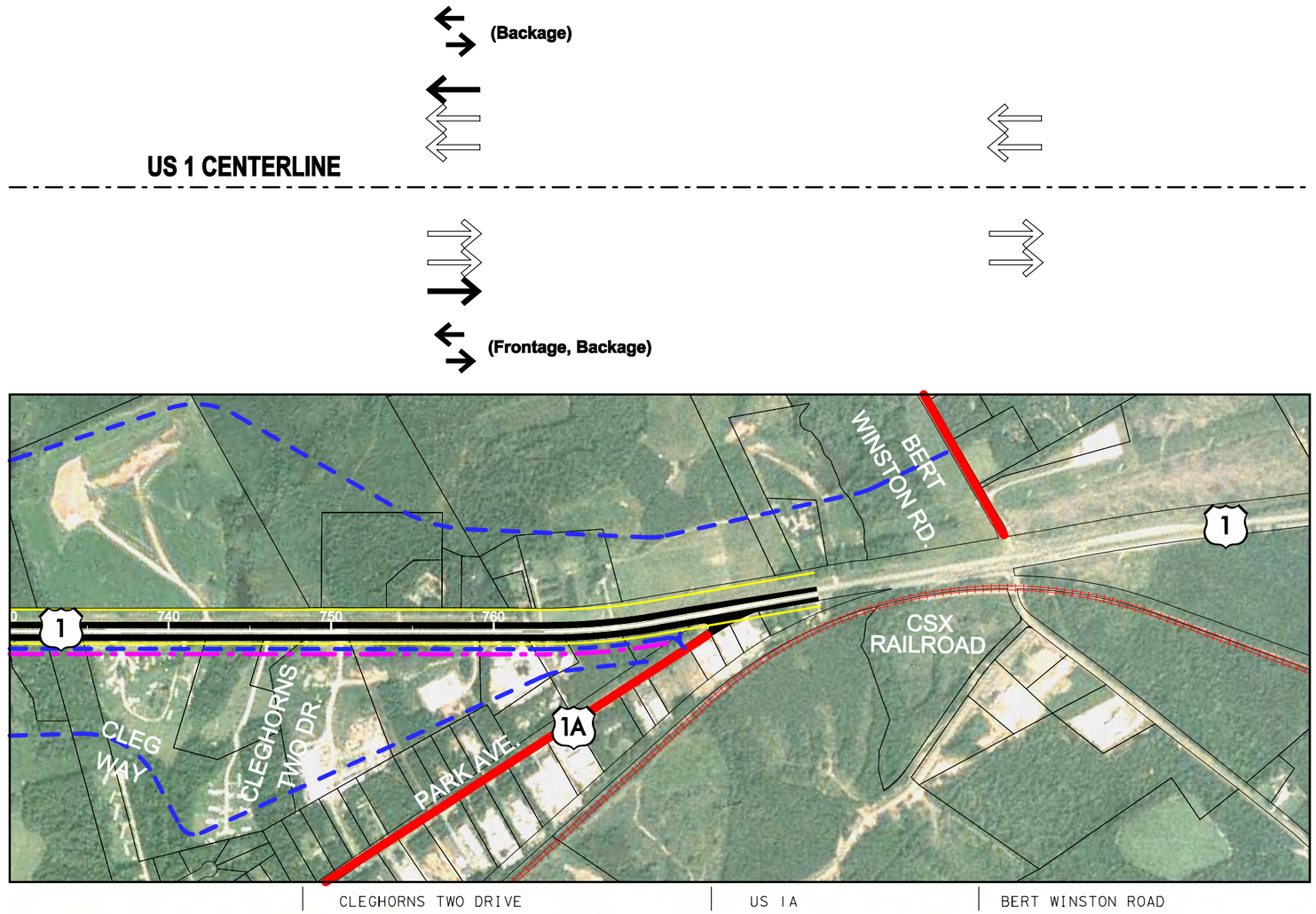
PHASE 1 ANALYSIS

ALTERNATIVE III
HIGHWAY AND TRANSIT

US 1 CORRIDOR STUDY

Figure 4-7
Sheet 9 of 10



LEGEND

- EXISTING ROW
- PROPOSED ROW
- MAJOR LOCAL ROAD
- MAIN LINE IMPROVEMENTS
- EXISTING FRONTAGE/ BACKAGE ROADS
- PROPOSED FRONTAGE/ BACKAGE ROADS
- PROPOSED LOCAL ROAD
- PROPOSED INTERCHANGE
- PROPOSED GRADE SEPARATION
  - ROADWAY
  - BIKE
  - PEDESTRIAN
- CSX RAILROAD
- EXISTING LANE
- PROPOSED LANE
- PROPOSED HOV LANE
- EXISTING FRONTAGE ROAD
- PROPOSED FRONTAGE ROAD

0 400 800 1600
Feet

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PHASE 1 ANALYSIS

ALTERNATIVE III
HIGHWAY AND TRANSIT

US 1 CORRIDOR STUDY

Figure 4-7
Sheet 10 of 10

4.6 Phase One Evaluation Matrix

The study team along with the technical Oversight Team compared and ranked the Phase One transportation alternatives base on the evaluation criteria identified below. At the Phase One analysis stage of evaluation many of the criteria is qualitative. An important quantitative performance measure during the Phase One analysis was improving the corridor's mobility. The 2030 travel demand analysis clearly indicated Alternative III – highway plus transit provides the best overall corridor mobility improvements (See Table 4-1). As discussed earlier, Alternative IV did not have the required traffic directional distribution to be feasible, therefore this was a fatal flaw associated with this alternative. A summary of the Phase One evaluation matrix is shown in Table 4-2.

The detailed measures of effectiveness and other respective levels of investment used to evaluate each of the corridor segments through the US 1 Corridor Study include:

Improve Public Safety
- Consistency with Design Standards
- Accident Locations Eliminated

Improve Mobility
- General Purpose Lanes Congested
- Person Capacity
- Transit Station Accessibility
- Local Street Connectivity and Extensions
- Access to Existing Fronting Properties
- Multimodal Enhancements

Increase Transit Opportunities
- Transit Ridership
- CAMPO / TTA / CAT / SEHSR Plan Consistency

Avoid or Minimize Environmental Effects
- Wetlands
- Contamination Sites
- Flood Plains

Avoid or Minimize Cultural Impacts
- Historical Sites
- Community Facilities
- New and Re-Development Opportunities

Right of Way Acquisitions
- Buildings Taken
- Parcels Affected
- Total Acreage Required

Cost Analysis
- Construction Costs
- Right-of Way Costs
- Special Purpose Lanes Operating Costs

4.7 Selection of Phase Two Alternative

After reviewing the year 2030 capacity analysis, the Phase One evaluation matrix and comments received from the first public information workshop, the Oversight Team decided to discontinue the study of Alternatives I, II, and IV. It was determined the mobility needs within the corridor would be best achieved by the further study of the following two alternatives, variations of the original Alternative III – highway plus transit Phase One transportation alternative, which were carried forward in the Phase Two analysis.

The two variations of the highway plus transit alternative to be carried forward in the Phase Two analysis are as follows:

- Alternative III-A: highway plus transit alternative with two-way frontage or backage roads
- Alternative III-B: highway plus transit alternative with one-way frontage roads

Table 4-2
Phase I Alternatives Evaluation Matrix

EVALUATION CRITERIA	Alternatives			
	I	II	III	IV
	Null Alternative	Highway Alternative	Highway+Transit Alternative	Highway+Transit Alternative w/ 2 Reversible HOV Lanes
Improve Public Safety				
Consistency with Design Standards	1	4	5	5
Accident Locations Eliminated	0	2	4	4
Improve Mobility				
General Purpose Lanes Congestion	0	2	4	4
Person Capacity	0	3	4	4
Transit Station Accessibility	0	1	4	1
Local Street Connectivity and Extensions	1	4	4	4
Access to Existing Fronting Properties	2	3	4	4
Multimodal Enhancements	0	2	3	3
Increase Transit Opportunities				
Transit Ridership	1	1	4	4
CAMPO/TTA/CAT/SEHSR Consistency	0	1	3	3
Avoid or Minimize Environmental Effects				
Wetlands	5	4	3	3
Contamination Sites	5	4	4	4
Flood Plains	5	4	3	3
Avoid or Minimize Cultural Impacts				
Historical Sites	5	4	3	3
Community Facilities	5	4	4	4
New and Re-Development Opportunities	1	3	5	4
Right of Way Acquisitions				
Buildings Taken	5	4	3	1
Parcels Affected	5	4	3	1
Total Acreage Required	5	4	3	1
Costs				
US 1 Highway Improvements	5	4	3	1
Right of Way*	5	4	3	1
Special Purpose Lanes Operating Costs	5	5	4	1
OVERALL	**61**	**71**	**80**	**63**

*** Does not include relocation costs.**

Legend

5 4 3 2 1 0

Best → Worst

CHAPTER 5.0
PHASE TWO ANALYSIS

5.0 Phase Two Analysis

The phase 2 evaluation developed workable land use and transportation solutions for the US 1 corridor from the alternatives found suitable for further development in the phase 1 evaluation.

The phase 2 analysis focused on further refining the selected roadway alignment, incorporating interchanges into the design and evaluating the proposed plans including planning level construction and right of way cost estimates. Conceptual site development diagrams were also developed and used to evaluate the impacts of the proposed roadway and access alternatives. As in phase 1, a matrix evaluation defines the impacts in greater detail, reflecting the further refinement of the planning alternatives.

The phase 2 alternatives were developed in conjunction with the oversight team. The following two Alternative plans are included in the phase 2 evaluation process:

- Alternative III-A: Highway plus Transit Alternative with Two-way Frontage or Backage Roads
- Alternative III-B: Highway plus Transit Alternative with One-way Frontage Roads south of the NC 98 Bypass and Two-way Frontage or Backage Roads north of the NC 98 Bypass

The final deliverable of the phase 2 analysis process was the selection of a locally preferred alternative to be further refined in the phase 3 analysis.

5.1 Alternative III-A: Highway plus Transit Alternative with Two-way Frontage or Backage Roads

Alternative III, the highway plus transit alternative, includes both highway and transit improvements along the length of the study area. The entire US 1 corridor would be widened to six general purpose lanes between I-540 and Park Avenue (US 1A North) in Franklin County. In addition, there would be two supplemental lanes (one in each direction) that could function as either general purpose or special use/high occupancy vehicle (HOV) lanes between I-540 and the NC 98.

The identifying feature of Alternative III-A is that the access to adjacent properties would be allowed by constructing either two-lane, two-way frontage roads parallel to US 1 or two-lane, two-way backage roads set behind adjacent properties. While two-lane, two-way frontage roads would provide access to properties adjacent to US 1 on some sections of the corridor, other sections of the corridor may prefer to have backage roads providing access to properties opposite the side that faces the freeway. The frontage roads would provide access to US 1 via nearby interchanges.

Interchanges are proposed at major cross streets, while other cross streets would be grade-separated to provide east-west connectivity. Wider outside travel lanes are recommended to accommodate bikes and sidewalks would be constructed along the frontage roads, backage roads and cross streets. Pedestrians and bicyclists would be encouraged and oriented towards the grade-separated US 1 crossovers versus the heavier traffic volume interchange crossings. Park and ride lots and transit stops are proposed along frontage or backage road to support the possible commuter bus service.

Figure 5-1 shows the freeway design of Alternative III-A, including the proposed freeway, right-of-way needs, parcels, frontage roads, local roads and structures. The planning view typical cross section is illustrated in Figure 5-2.

5.2 Alternative III-B: Highway plus Transit Alternative with One-way Frontage Roads south of the NC 98 Bypass and Two-way Frontage or Backage Roads north of the NC 98 Bypass

Alternative III, the highway plus transit alternative, includes both highway and transit improvements along the length of the study area. The entire US 1 corridor would have six general purpose lanes between I-540 and Park Avenue (US 1A North) in Franklin County. In addition, there would be two special use or high occupancy vehicle (HOV) lanes (one in each direction), between I-540 and NC 98.

The identifying feature of Alternative III-B is that the access to properties would be allowed by constructing either two-lane, one-way frontage roads parallel to US 1 or two-lane, two-way backage roads set behind adjacent properties. One-way frontage roads are most practical south of the NC 98 Bypass. In this section the development is built-up and available right-of-way is limited. Two-way backage roads are a logical improvement north of NC 98 Bypass. The opportunity to develop backage roads is easier in less populated areas. The underdeveloped northern section of this corridor currently provides this opportunity.

Accessibility to US 1 would be allowed through proposed interchanges constructed at major cross streets, while other cross streets would be grade-separated to provide east-west connectivity. Wider outside travel lanes are recommended to accommodate bikes and sidewalks would be constructed along frontage roads and cross streets. Park and ride lots and transit stops would be located along frontage or backage roads.

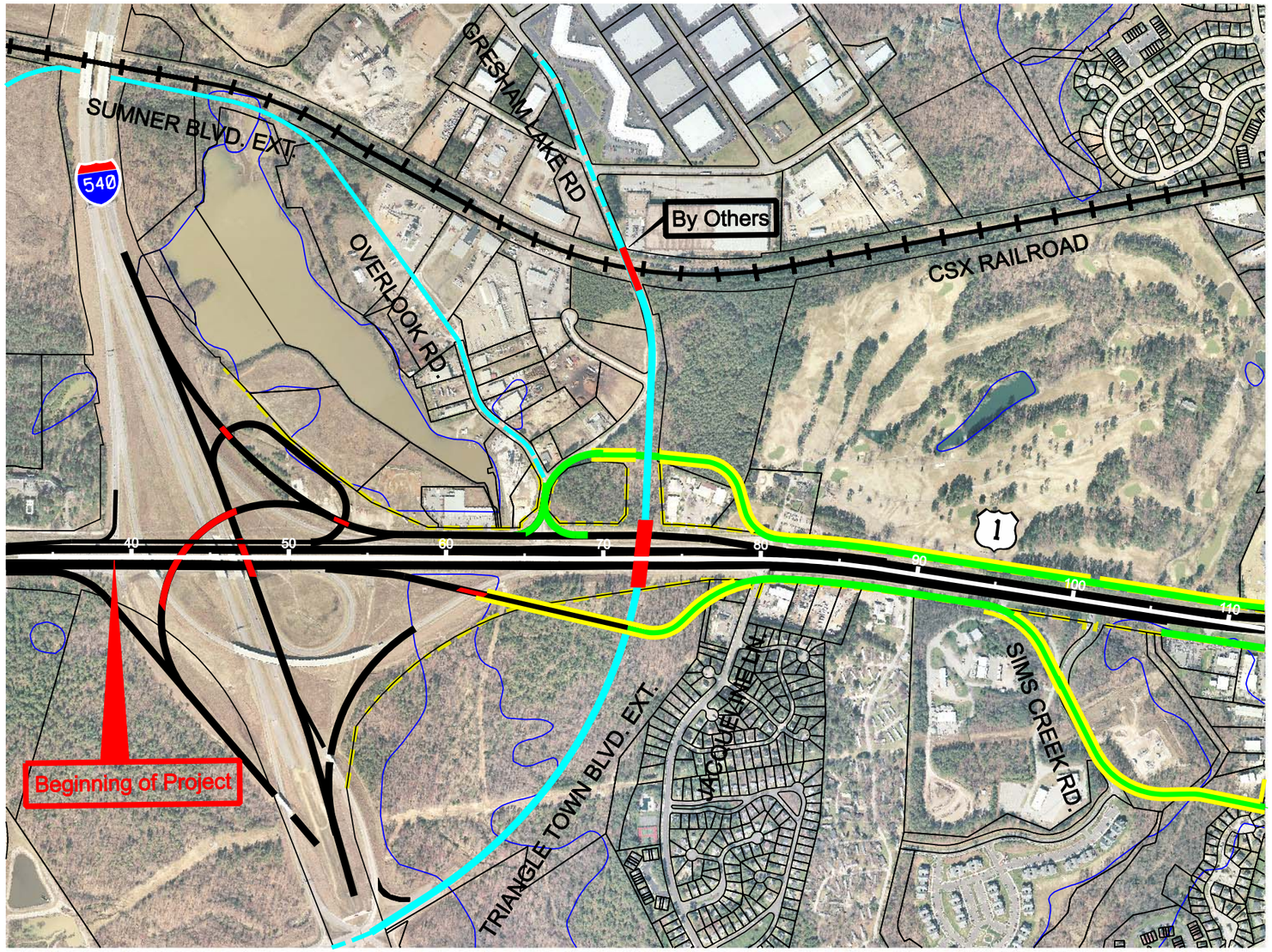
Figure 5-3 shows the freeway design of Alternative III-B, including the proposed freeway alignment, right-of-way needs, parcel, frontage roads, local roads, new and existing interchange configurations and structure Alternative III-B also highlights the ramp locations that access the one-way frontage road system. The typical cross section is illustrated in Figure 5-4.

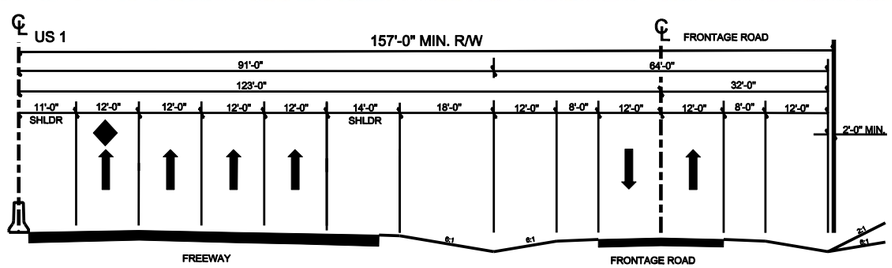
5.3 Frontage Road Evaluation

Since the critical difference between Alternative III-A and Alternative III-B is the inclusion of one-way or two-way frontage roads, the study team evaluated one-way and two-way frontage roads in more detail. The following synopsis summarizes the purpose and operation of frontage roads in order to provide a framework for decision-making in the phase 2 analysis of the US 1 Corridor Study.

5.3.1 Purpose of Frontage Roads

A critical component of freeway design is providing appropriate access to local streets and properties. This is the case for the US 1 Corridor Study, especially the section from I-540 to NC 98 (Durham Road). While the US 1 corridor between I-540 and NC 98 currently has suburban characteristics, this section of the corridor is urbanizing rapidly with many properties and businesses adjacent to US 1 with direct access to the highway. Limited control of access exists today in a few sections of the corridor. Access management techniques are starting to be deployed by the North Carolina Department of Transportation (NCDOT) to help control and manage access to the highway. How and where traffic enters or leaves a freeway has a significant impact on safety, traffic flow and roadway capacity along the corridor's mainlines as well as its frontage road system.





HALF TYPICAL SECTION BETWEEN I-540 AND NC 98

WITH 3 GENERAL PURPOSE LANES AND 1 SPECIAL PURPOSE LANE WITH TWO-WAY FRONTAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES

LEGEND

- EXISTING R/W
- PROPOSED R/W
- CSX RR
- STREAMS, RIVER, WETLANDS
- PARCEL BOUNDARY
- PROPOSED FREEWAY IMPROVEMENTS
- PROPOSED TWO -WAY FRONTAGE ROADS
- EXISTING TWO -WAY FRONTAGE ROADS
- EXISTING LOCAL ROADS
- PROPOSED LOCAL ROADS
- PROPOSED STRUCTURES

0 400 800 1600
Feet

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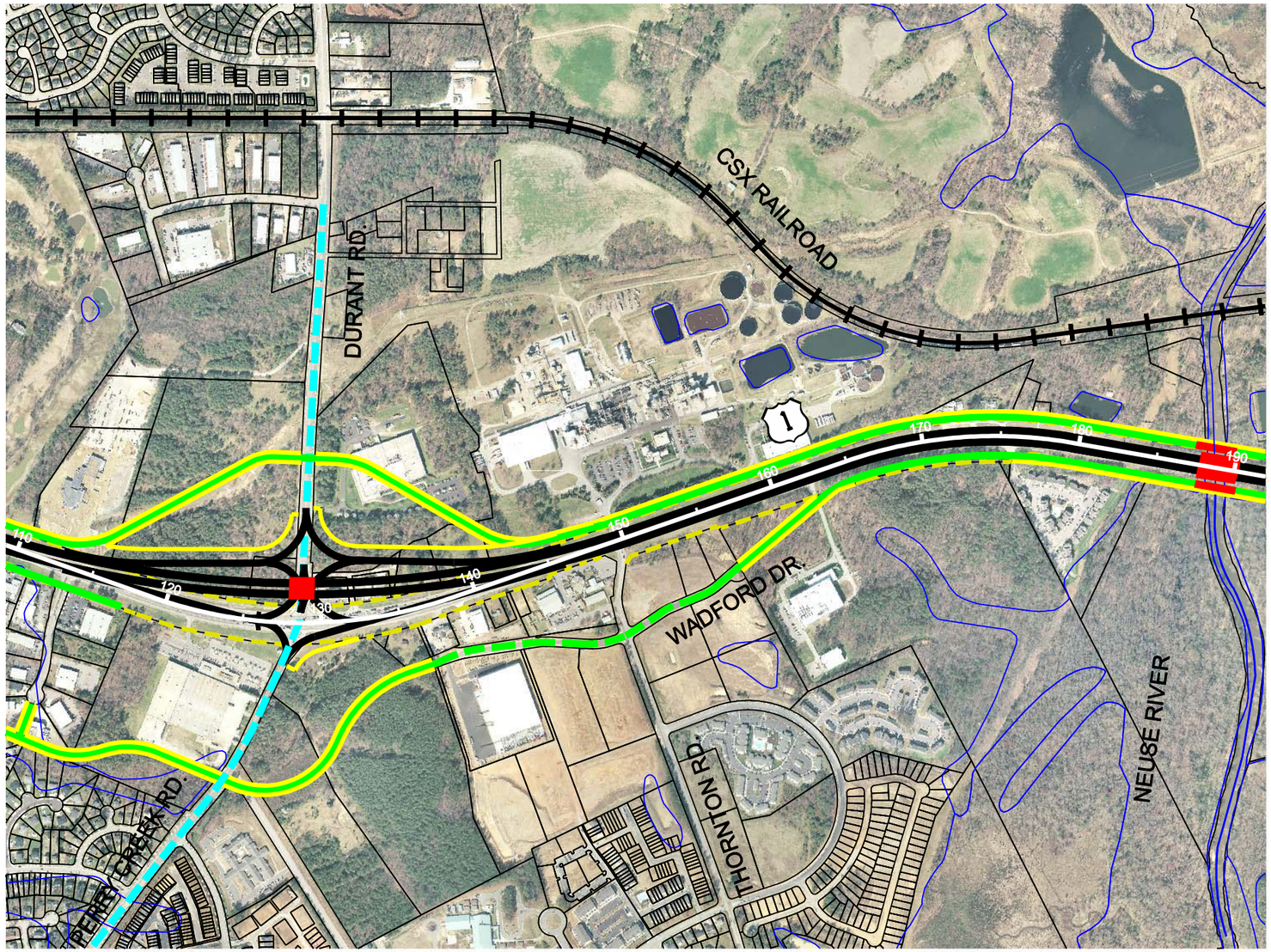
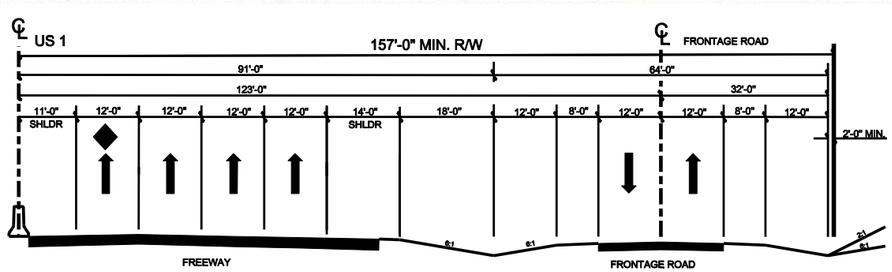
PHASE 2 ANALYSIS

Alternative III-A
Two-Way Frontage Roads

US 1 CORRIDOR STUDY

Figure 5-1
Sheet 1 of 10





HALF TYPICAL SECTION BETWEEN I-540 AND NC 98

WITH 3 GENERAL PURPOSE LANES AND 1 SPECIAL PURPOSE LANE WITH TWO-WAY FRONTAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES

LEGEND

- EXISTING R/W
- PROPOSED R/W
- CSX RR
- STREAMS, RIVER, WETLANDS
- PARCEL BOUNDARY
- PROPOSED FREEWAY IMPROVEMENTS
- PROPOSED TWO -WAY FRONTAGE ROADS
- EXISTING TWO -WAY FRONTAGE ROADS
- EXISTING LOCAL ROADS
- PROPOSED LOCAL ROADS
- PROPOSED STRUCTURES

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Feet

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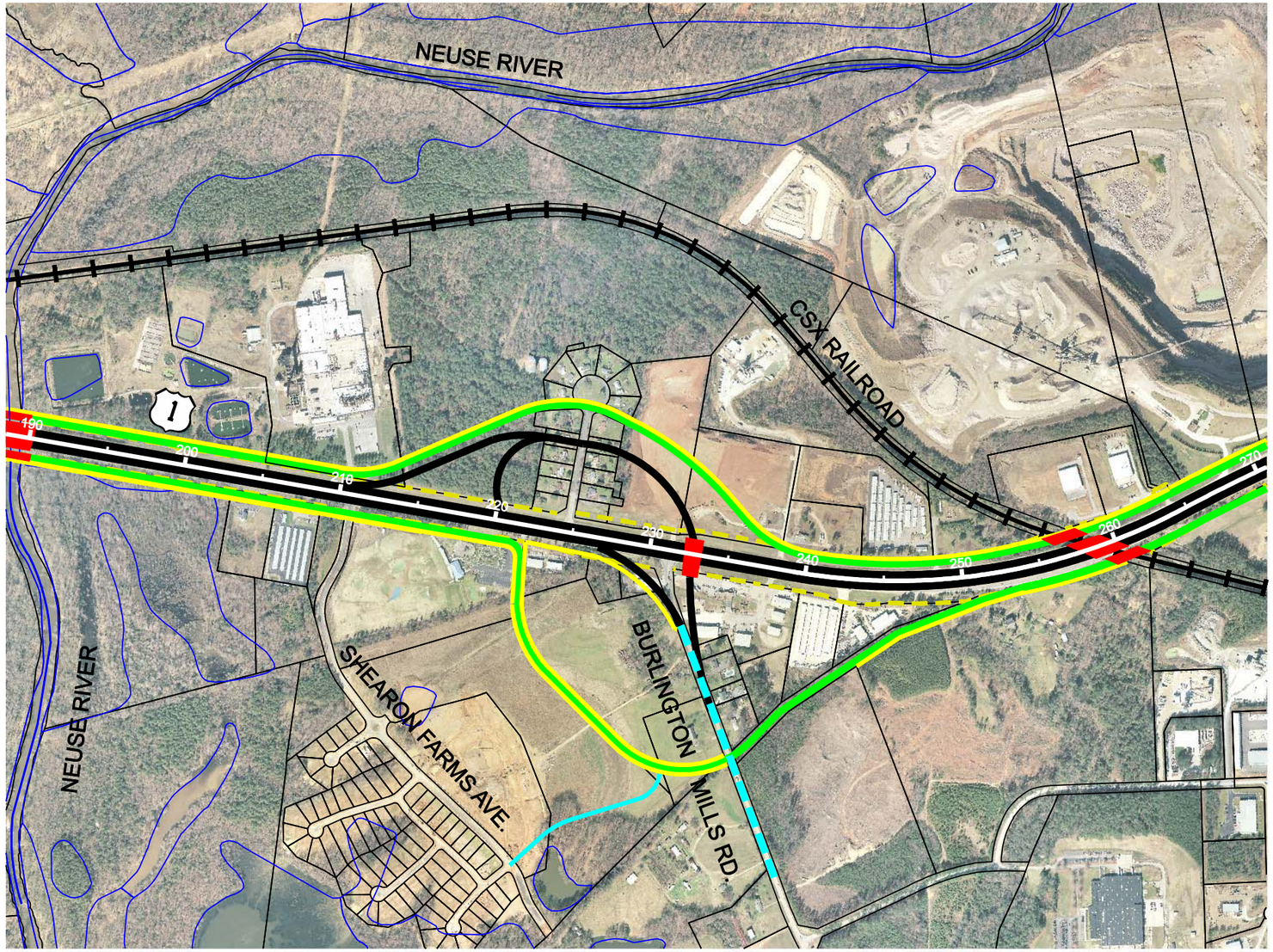
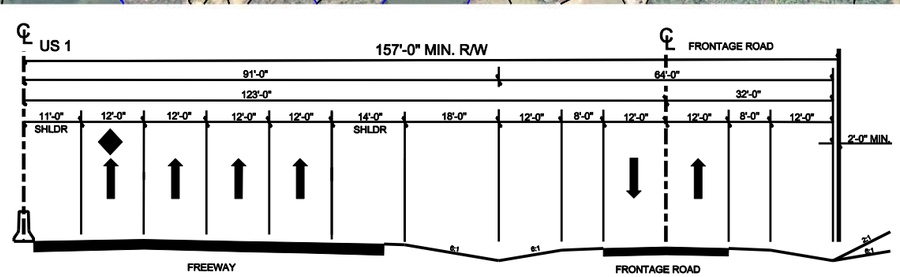
PHASE 2 ANALYSIS

Alternative III-A
Two-Way Frontage Roads

US 1 CORRIDOR STUDY

Figure 5-1
Sheet 2 of 10





HALF TYPICAL SECTION BETWEEN I-540 AND NC 98

WITH 3 GENERAL PURPOSE LANES AND 1 SPECIAL PURPOSE LANE WITH TWO-WAY FRONTAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES

LEGEND

- EXISTING R/W
- PROPOSED R/W
- CSX RR
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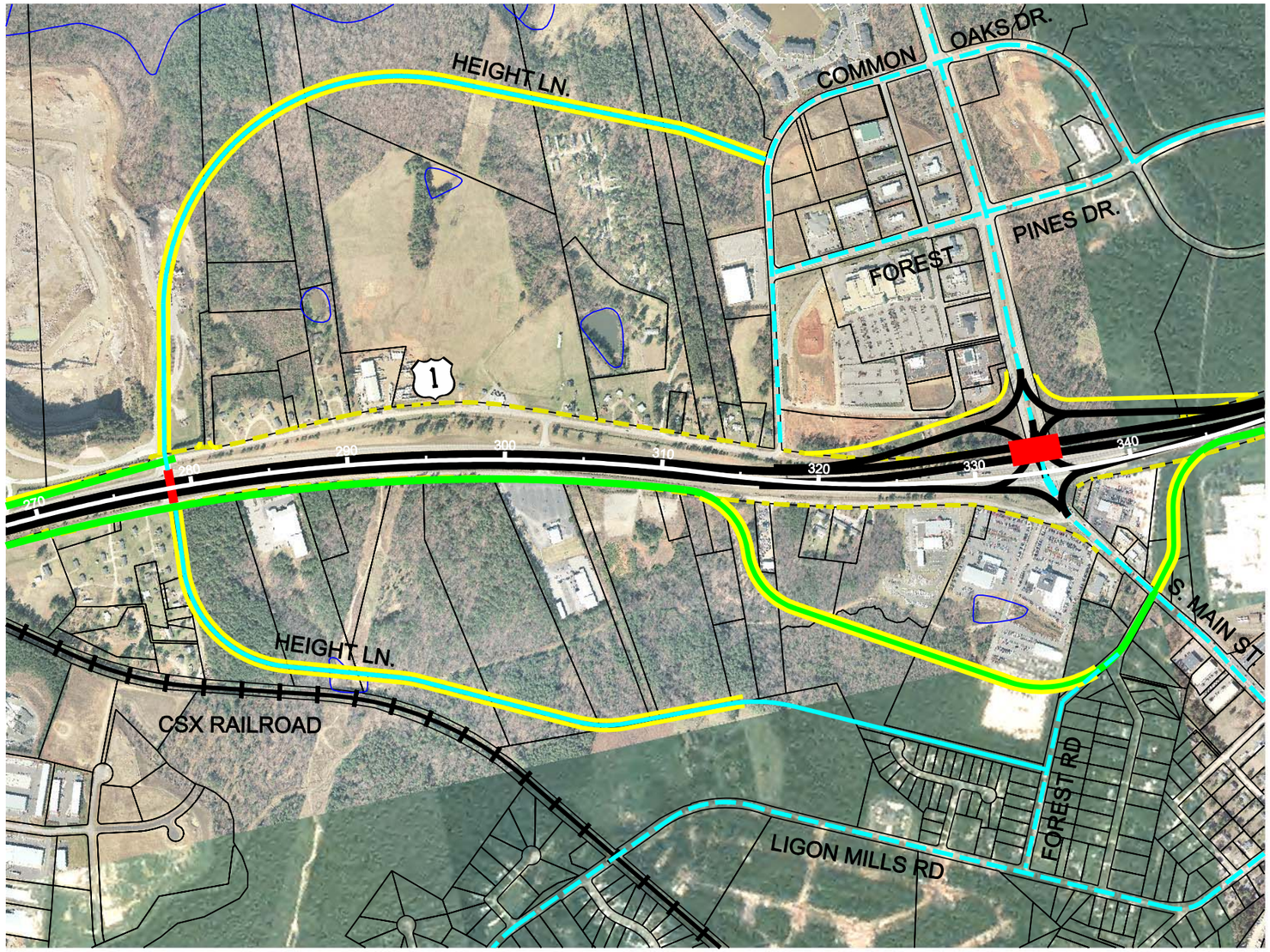
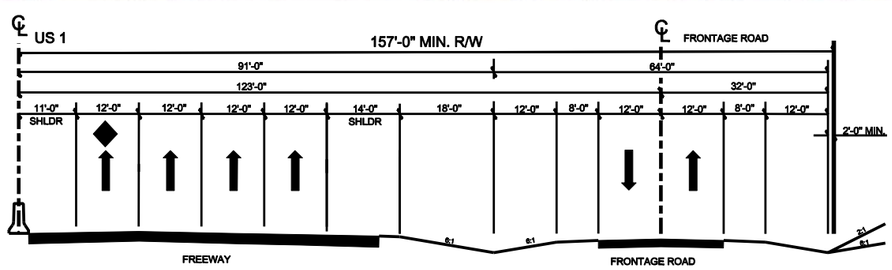
PHASE 2 ANALYSIS

Alternative III-A
Two-Way Frontage Roads

US 1 CORRIDOR STUDY

Figure 5-1
Sheet 3 of 10





HALF TYPICAL SECTION BETWEEN I-540 AND NC 98

WITH 3 GENERAL PURPOSE LANES AND 1 SPECIAL PURPOSE LANE WITH TWO-WAY FRONTAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES

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- EXISTING R/W
- PROPOSED R/W
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- PROPOSED LOCAL ROADS
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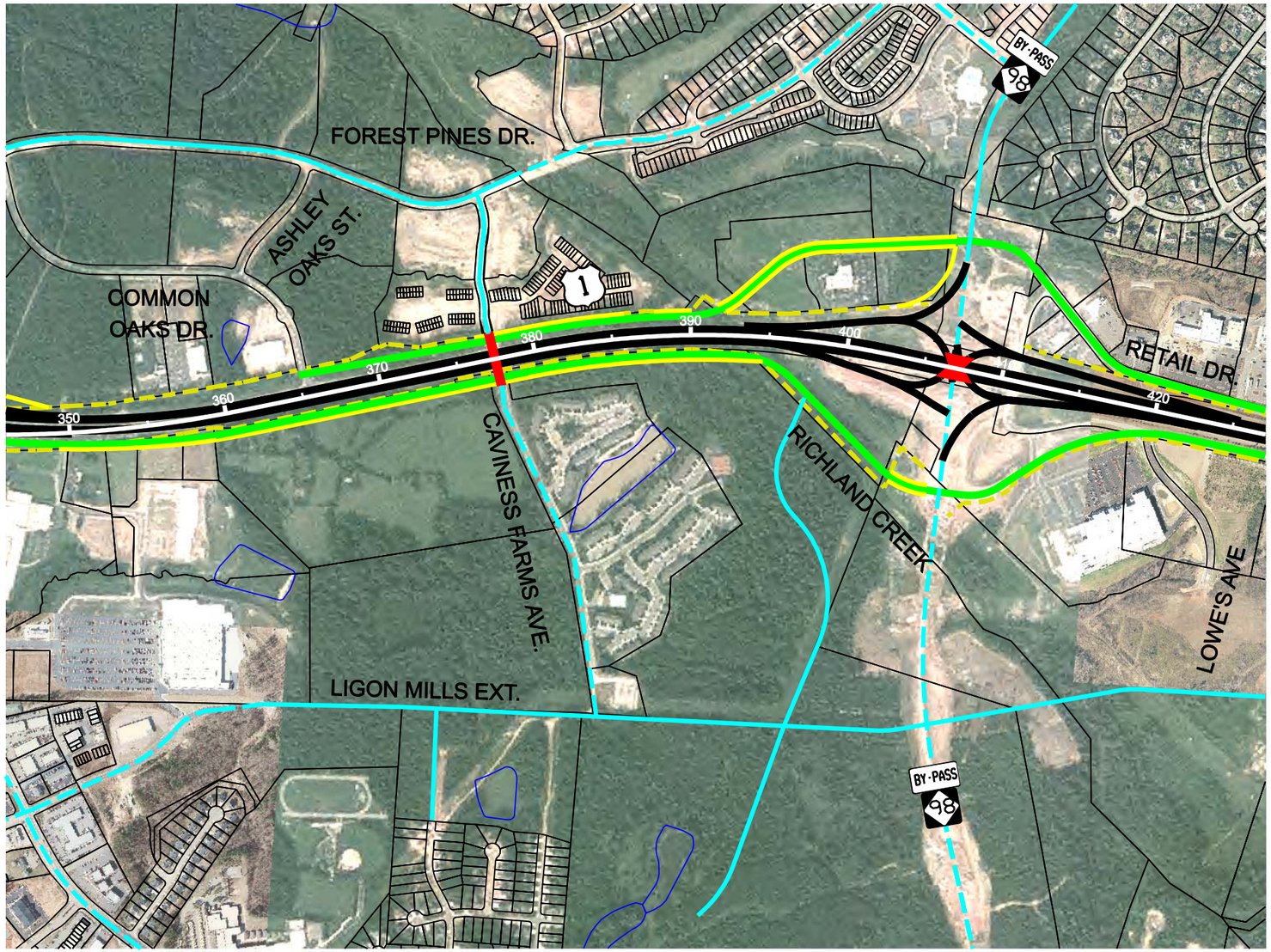
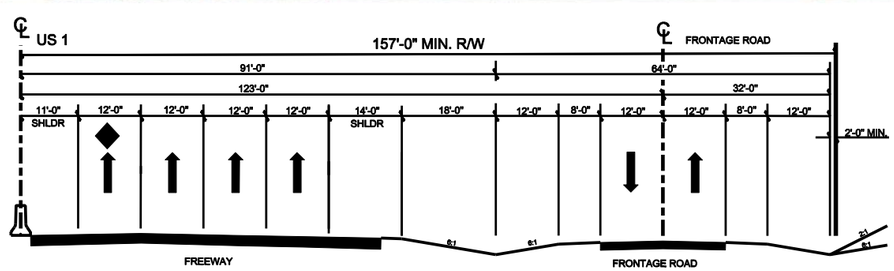
PHASE 2 ANALYSIS

Alternative III-A
Two-Way Frontage Roads

US 1 CORRIDOR STUDY

Figure 5-1
Sheet 4 of 10





HALF TYPICAL SECTION BETWEEN I-540 AND NC 98

WITH 3 GENERAL PURPOSE LANES AND 1 SPECIAL PURPOSE LANE WITH TWO-WAY FRONTAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES

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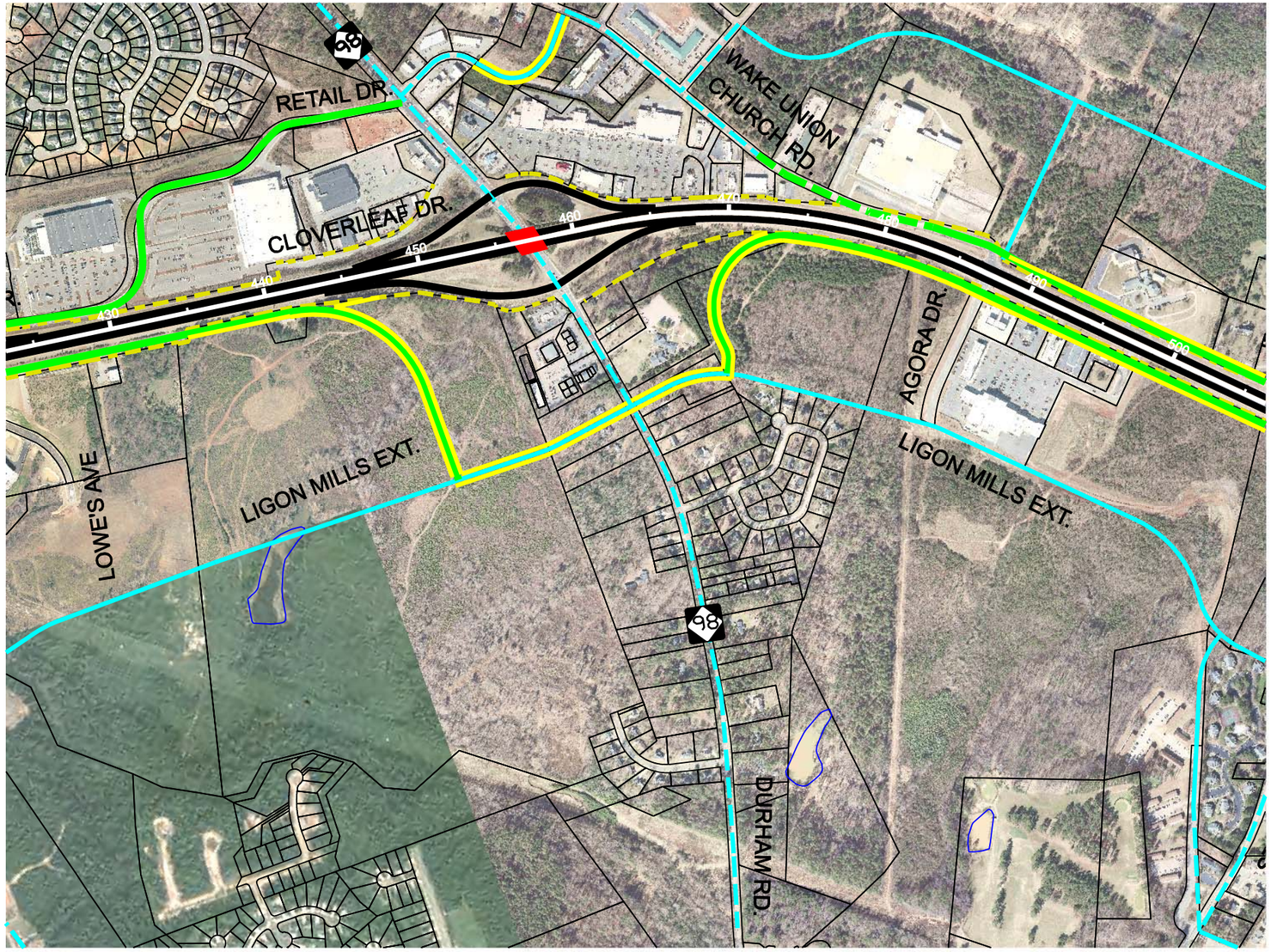
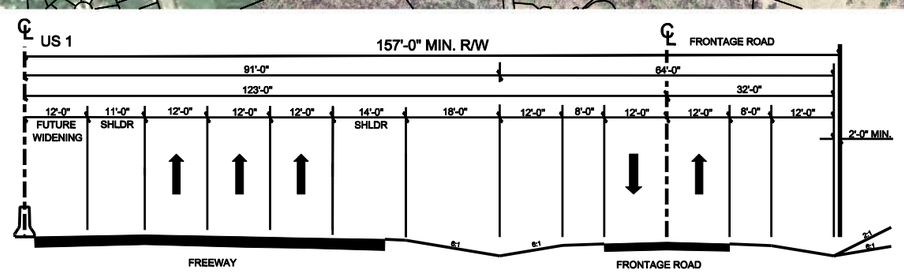
PHASE 2 ANALYSIS

Alternative III-A
Two-Way Frontage Roads

US 1 CORRIDOR STUDY

Figure 5-1
Sheet 5 of 10





HALF TYPICAL SECTION BETWEEN NC 98 AND US1A, NORTH (PARK AVE.)

WITH 3 GENERAL PURPOSE LANES WITH TWO-WAY FRONTAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES

LEGEND

- EXISTING R/W
- PROPOSED R/W
- CSX RR
- STREAMS, RIVER, WETLANDS
- PARCEL BOUNDARY
- PROPOSED FREEWAY IMPROVEMENTS
- PROPOSED TWO -WAY FRONTAGE ROADS
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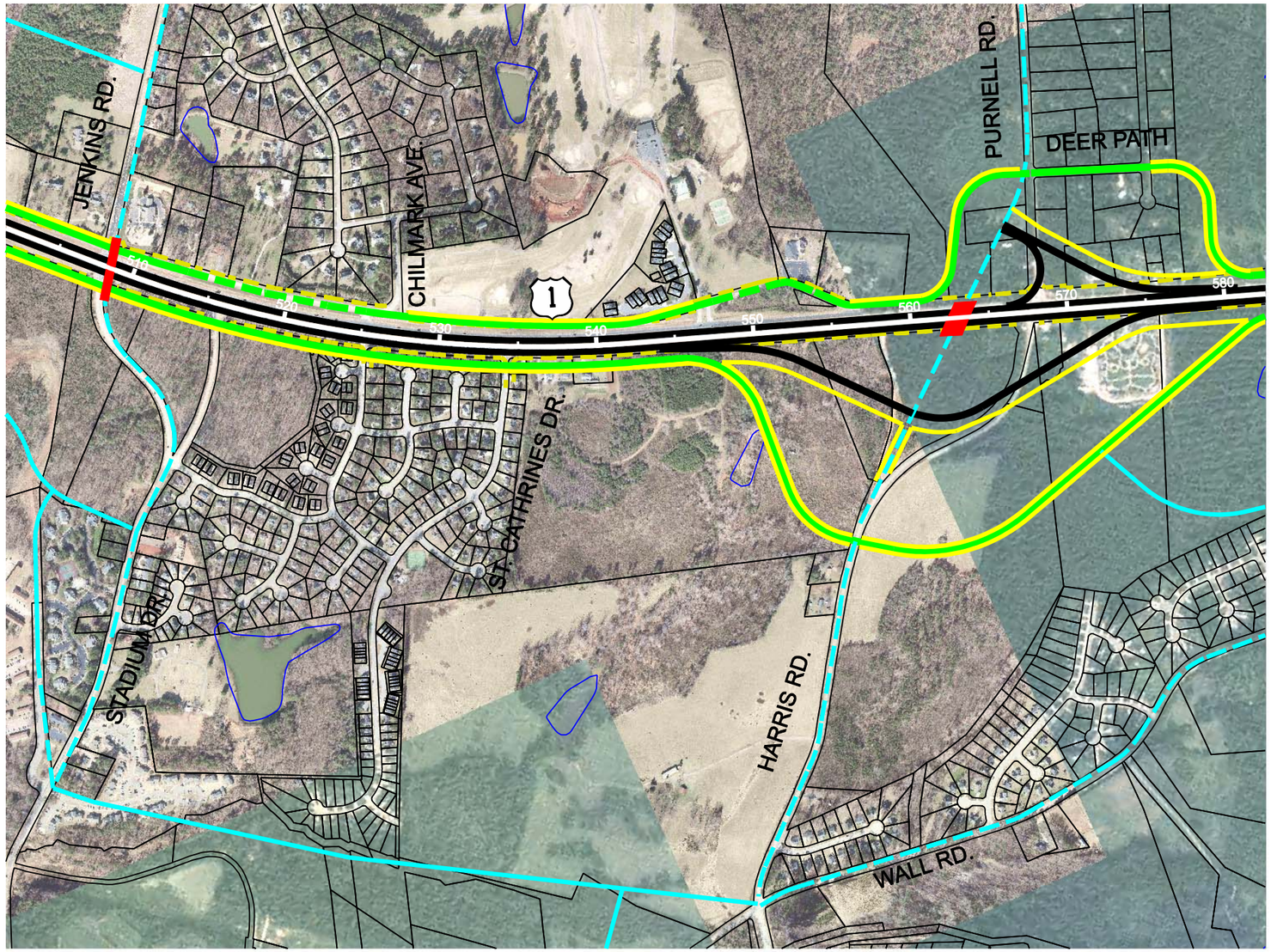
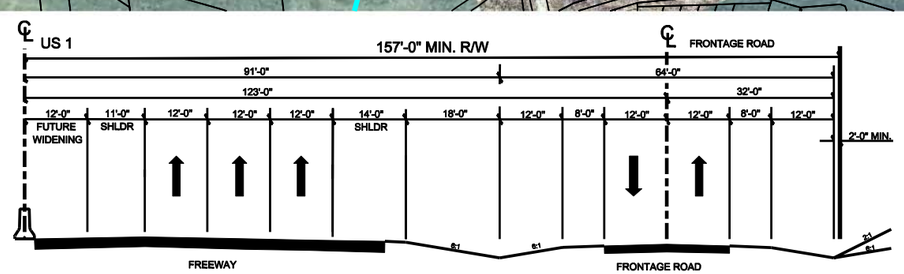
PHASE 2 ANALYSIS

Alternative III-A
Two-Way Frontage Roads

US 1 CORRIDOR STUDY

Figure 5-1
Sheet 6 of 10





HALF TYPICAL SECTION BETWEEN NC 98 AND US1A, NORTH (PARK AVE.)

WITH 3 GENERAL PURPOSE LANES WITH TWO-WAY FRONTAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES

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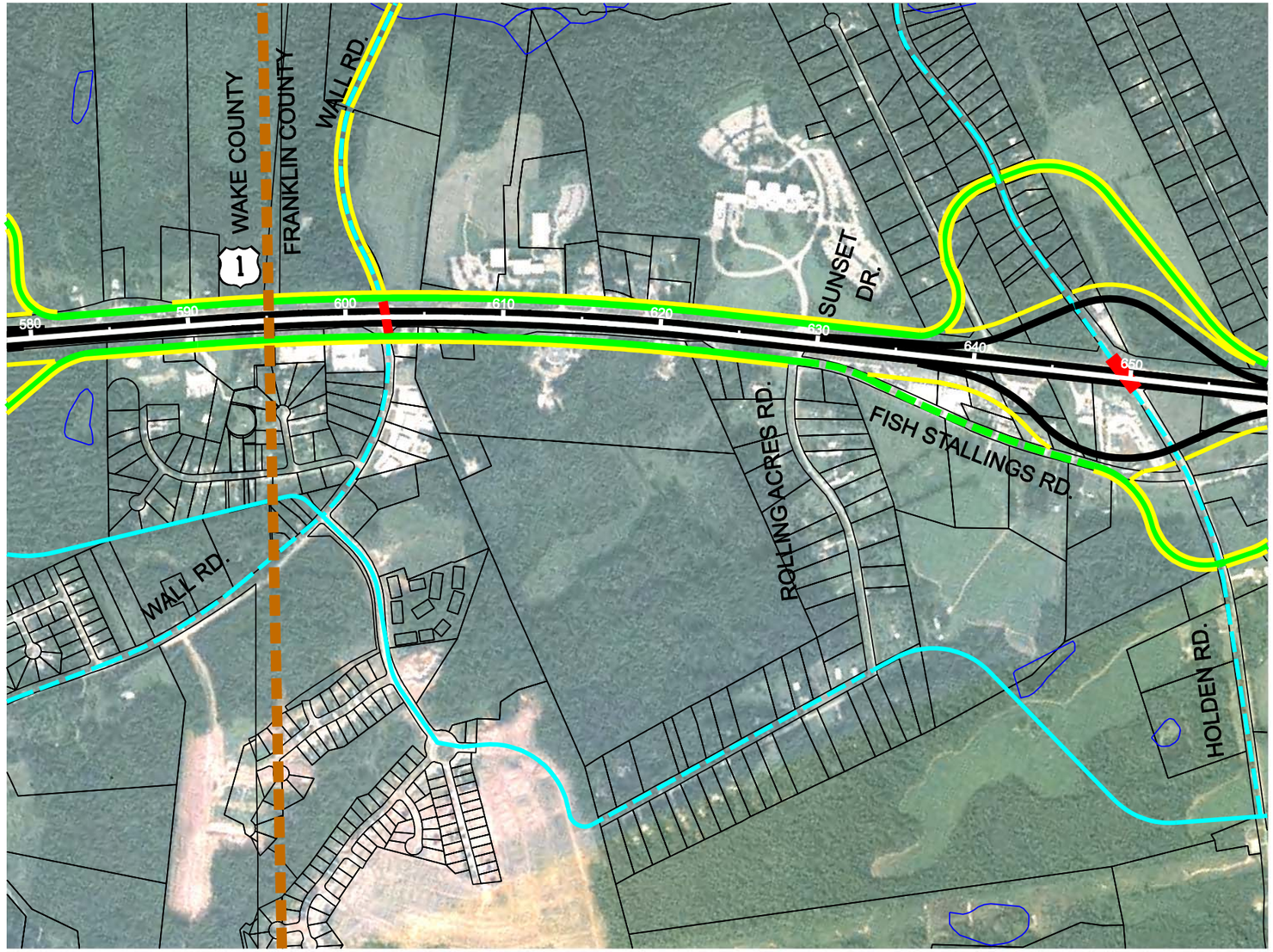
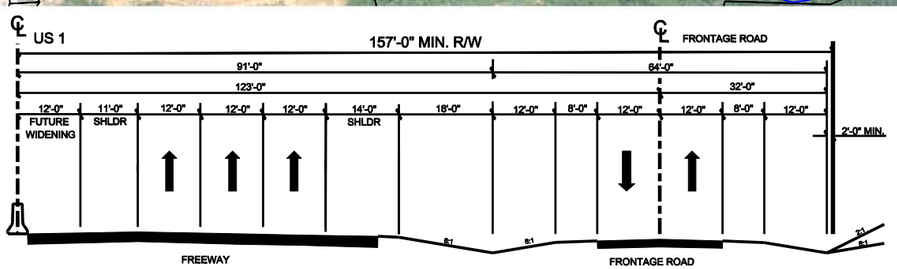
PHASE 2 ANALYSIS

Alternative III-A
Two-Way Frontage Roads

US 1 CORRIDOR STUDY

Figure 5-1
Sheet 7 of 10





HALF TYPICAL SECTION BETWEEN NC 98 AND US1A, NORTH (PARK AVE.)

WITH 3 GENERAL PURPOSE LANES WITH TWO-WAY FRONTAGE ROADS

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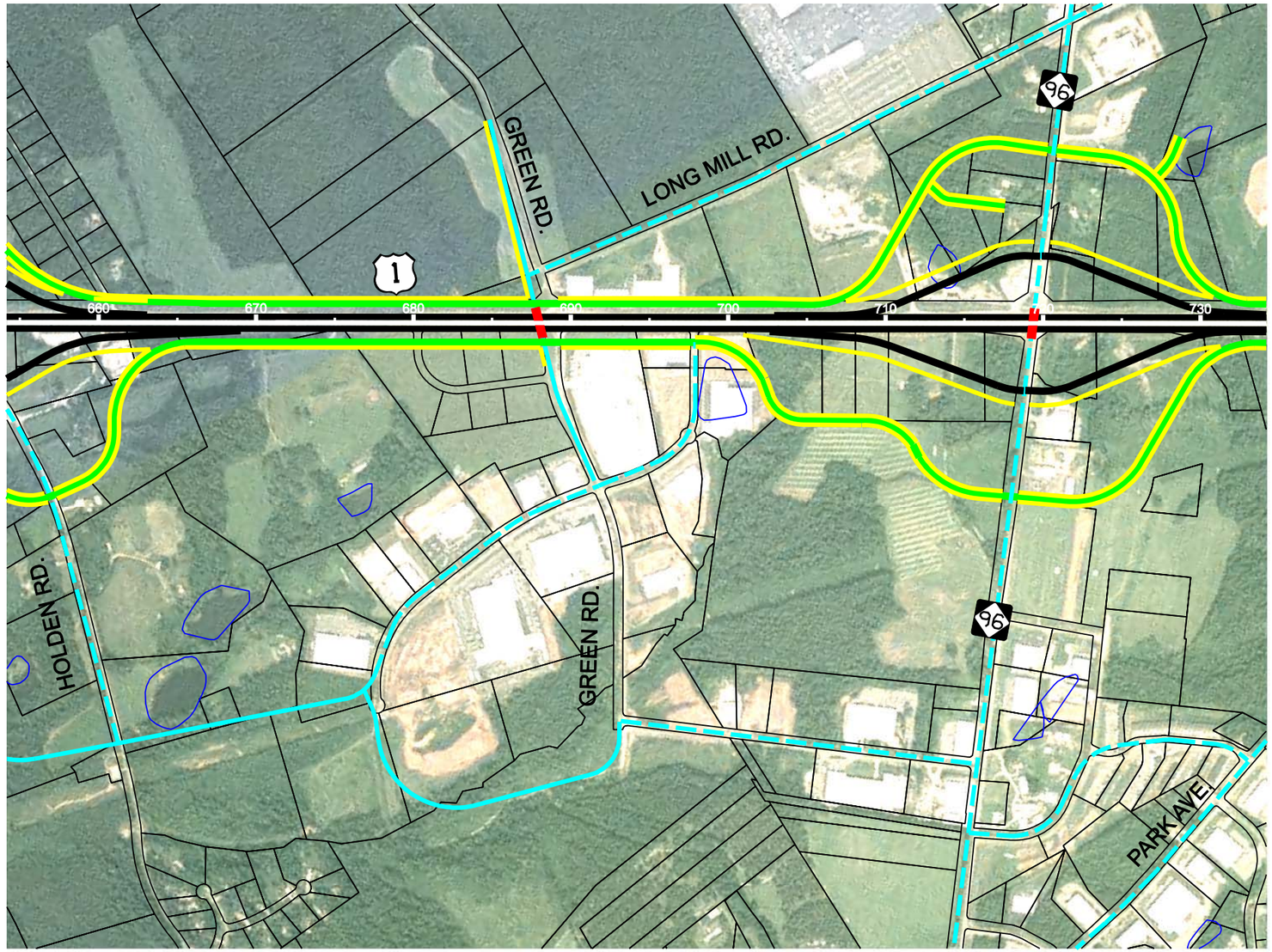
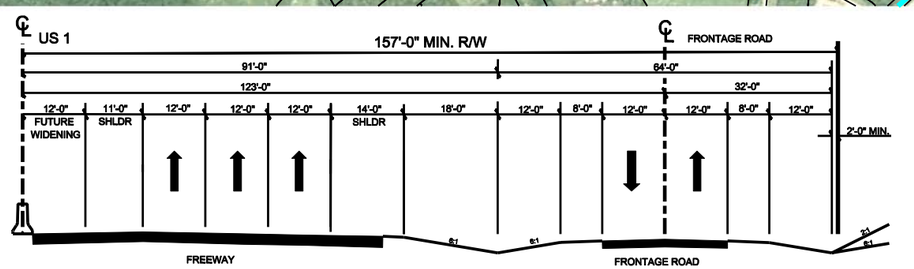
PHASE 2 ANALYSIS

Alternative III-A
Two-Way Frontage Roads

US 1 CORRIDOR STUDY

Figure 5-1
Sheet 8 of 10





HALF TYPICAL SECTION BETWEEN NC 98 AND US1A, NORTH (PARK AVE.)

WITH 3 GENERAL PURPOSE LANES WITH TWO-WAY FRONTAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES

LEGEND

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0 400 800 1600
Feet

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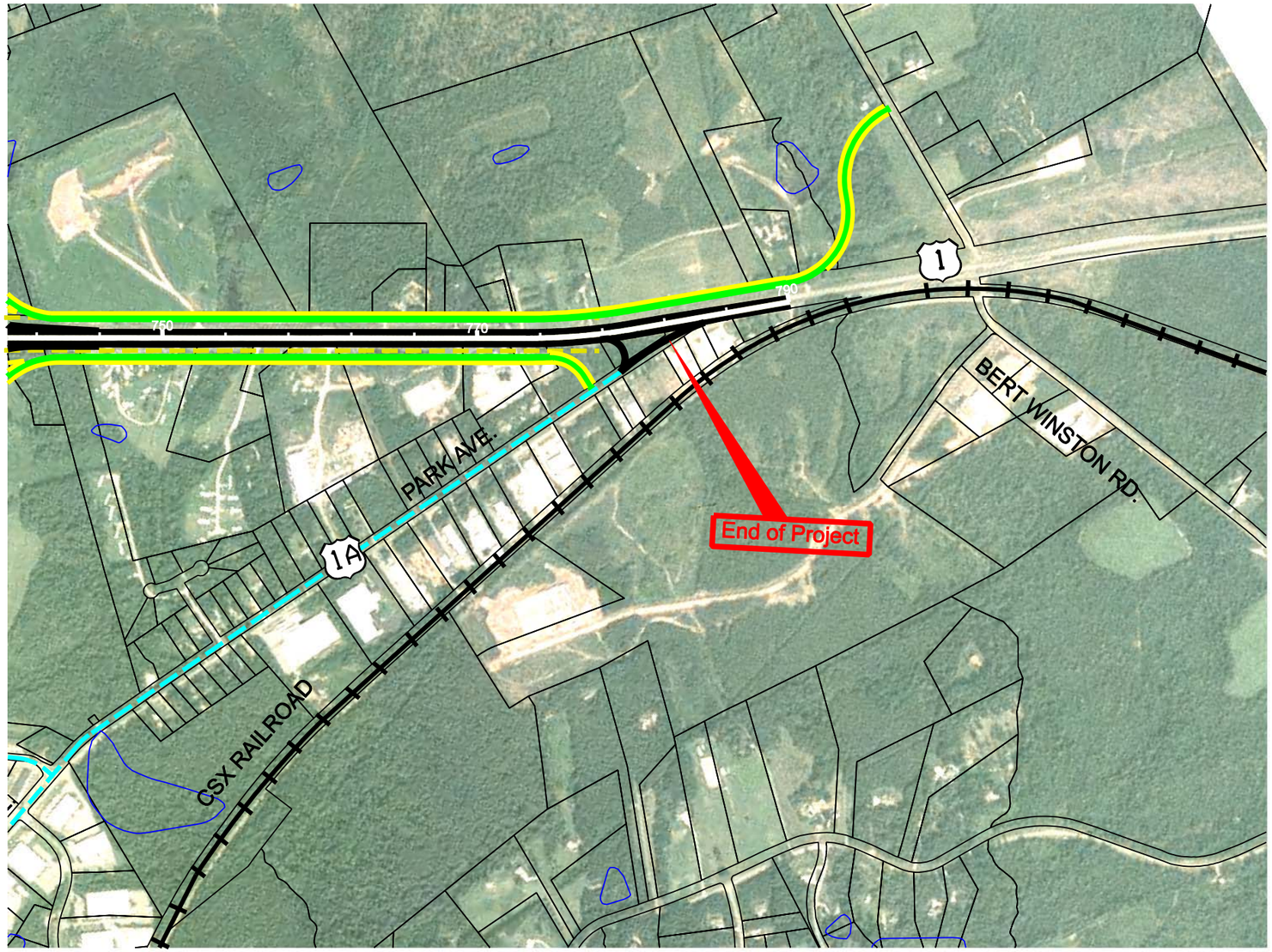
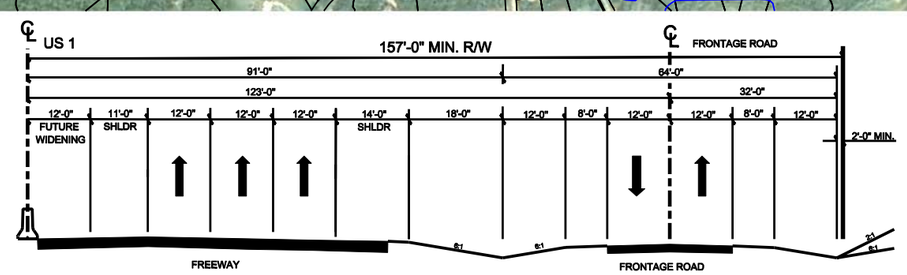
PHASE 2 ANALYSIS

Alternative III-A
Two-Way Frontage Roads

US 1 CORRIDOR STUDY

Figure 5-1
Sheet 9 of 10





HALF TYPICAL SECTION BETWEEN NC 98 AND US1A, NORTH (PARK AVE.)

WITH 3 GENERAL PURPOSE LANES WITH TWO-WAY FRONTAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES

LEGEND

- EXISTING R/W
- PROPOSED R/W
- CSX RR
- STREAMS, RIVER, WETLANDS
- PARCEL BOUNDARY
- PROPOSED FREEWAY IMPROVEMENTS
- PROPOSED TWO -WAY FRONTAGE ROADS
- EXISTING TWO -WAY FRONTAGE ROADS
- EXISTING LOCAL ROADS
- PROPOSED LOCAL ROADS
- PROPOSED STRUCTURES

0 400 800 1600
Feet

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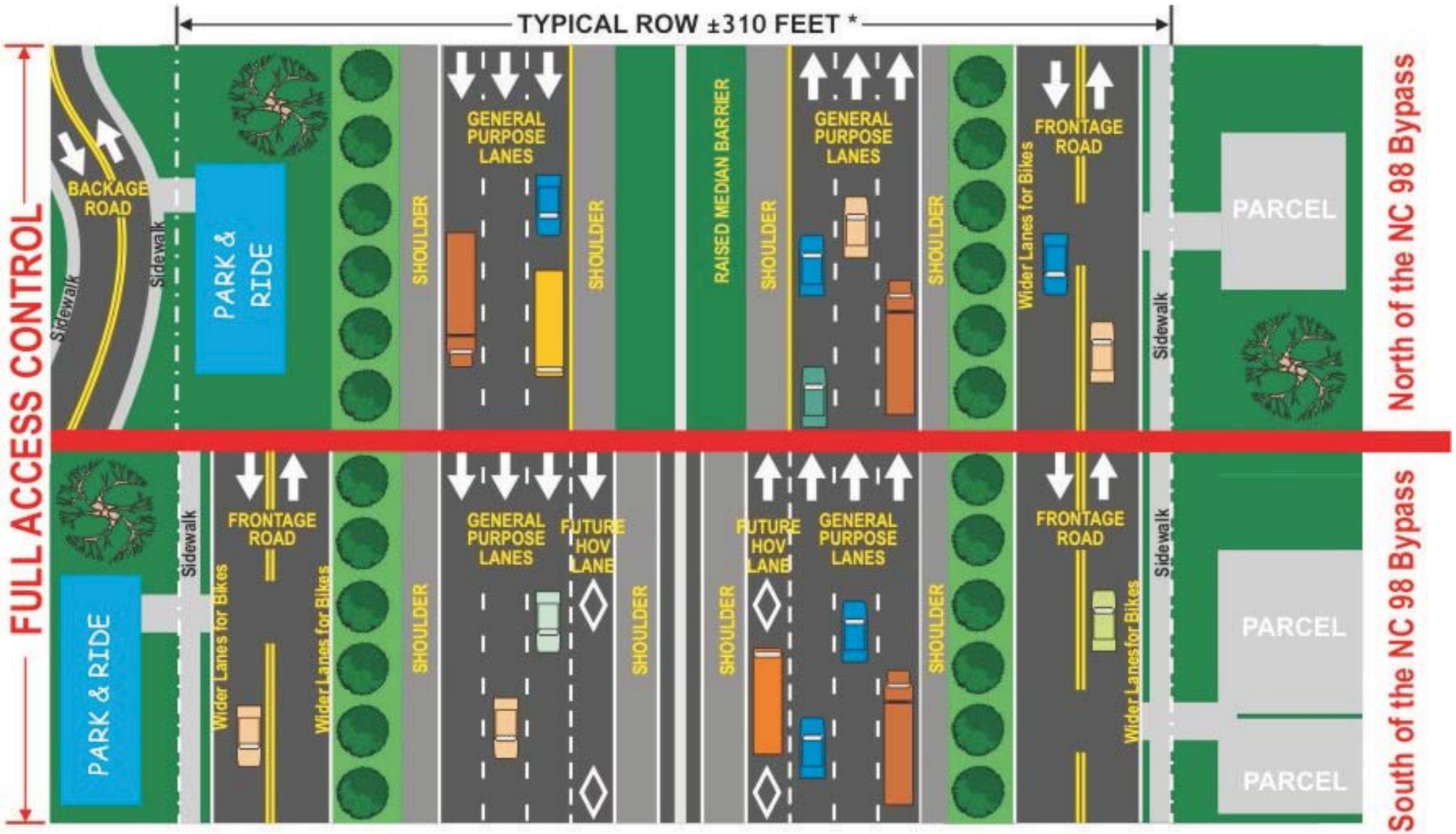
PHASE 2 ANALYSIS

Alternative III-A
Two-Way Frontage Roads

US 1 CORRIDOR STUDY

Figure 5-1
Sheet 10 of 10

Alternative III-A: Highway plus Transit Alternative with Two-way Frontage or Backage Roads



* ROW will increase at interchanges

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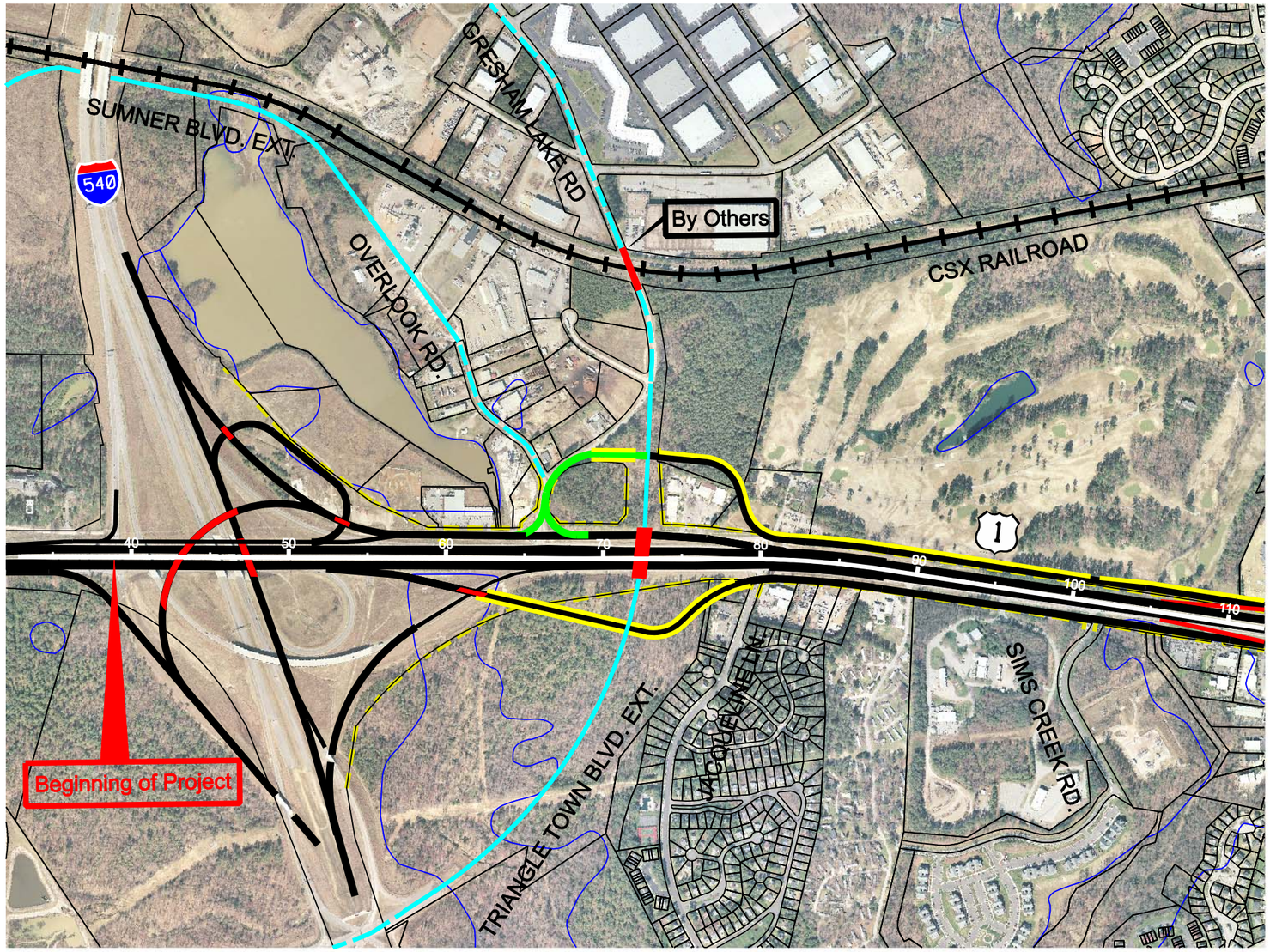
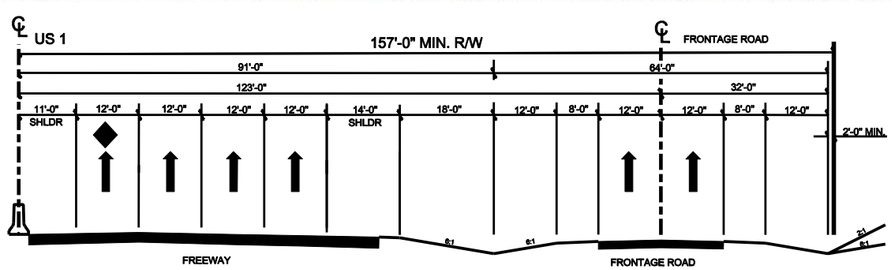
Alternative III-A:
Highway plus Transit Alternative
(Two-Way Frontage Roads)

US 1 CORRIDOR STUDY

Figure 5-2





HALF TYPICAL SECTION BETWEEN I-540 AND NC 98

WITH 3 GENERAL PURPOSE LANES AND 1 SPECIAL PURPOSE LANE WITH ONE-WAY FRONTAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES

LEGEND

- EXISTING R/W
- PROPOSED R/W
- CSX RR
- STREAMS, RIVER, WETLANDS
- PARCEL BOUNDARY
- PROPOSED FREEWAY IMPROVEMENTS
- PROPOSED ONE -WAY FRONTAGE ROADS WITH SLIP RAMPS
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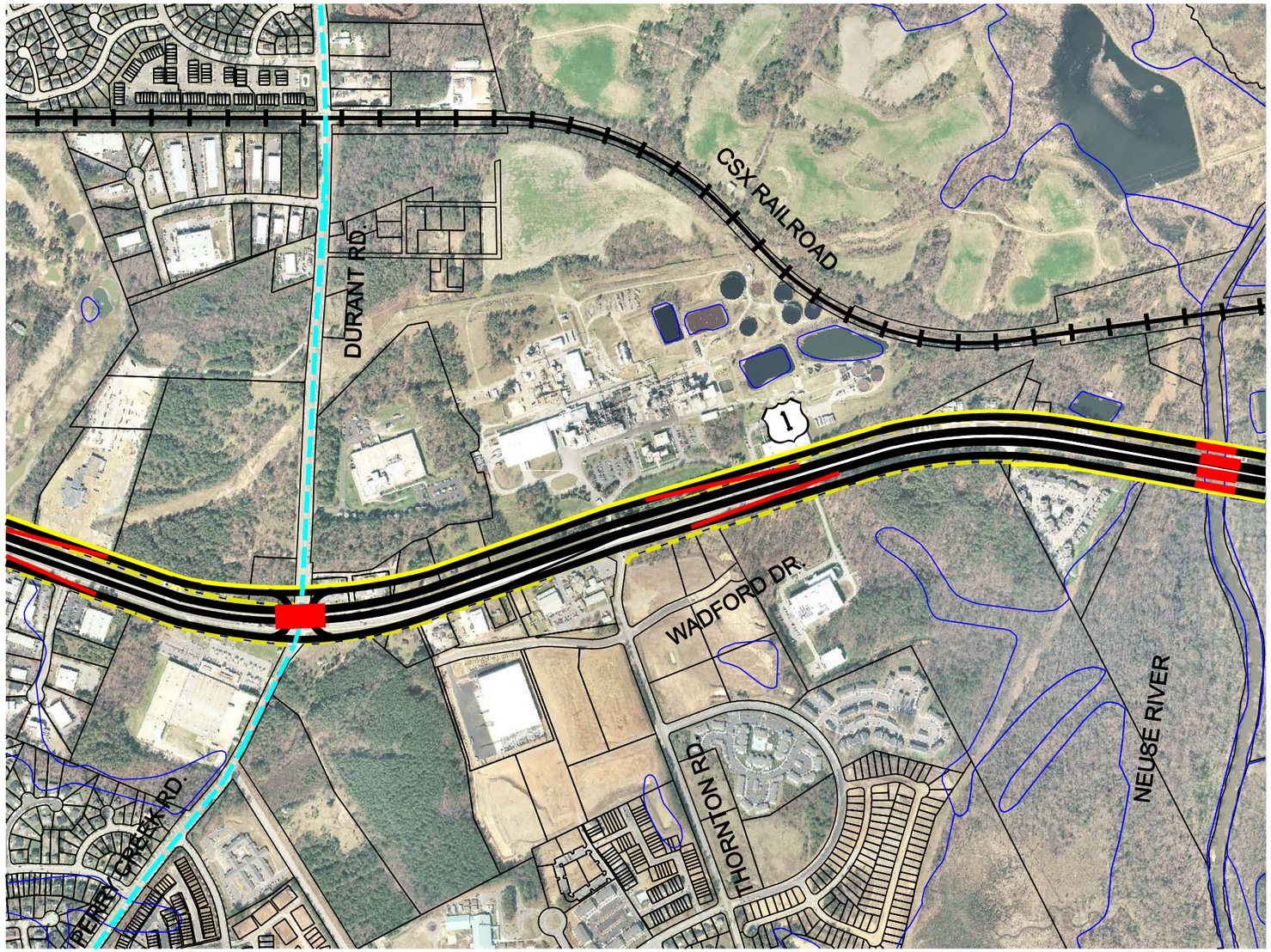
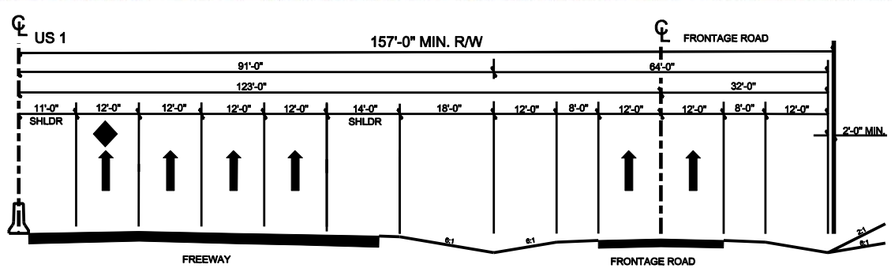
Alternative III-B
One-Way Frontage Roads

US 1 CORRIDOR STUDY

Figure 5-3
Sheet 1 of 10





HALF TYPICAL SECTION BETWEEN I-540 AND NC 98

WITH 3 GENERAL PURPOSE LANES AND 1 SPECIAL PURPOSE LANE WITH ONE-WAY FRONTAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES

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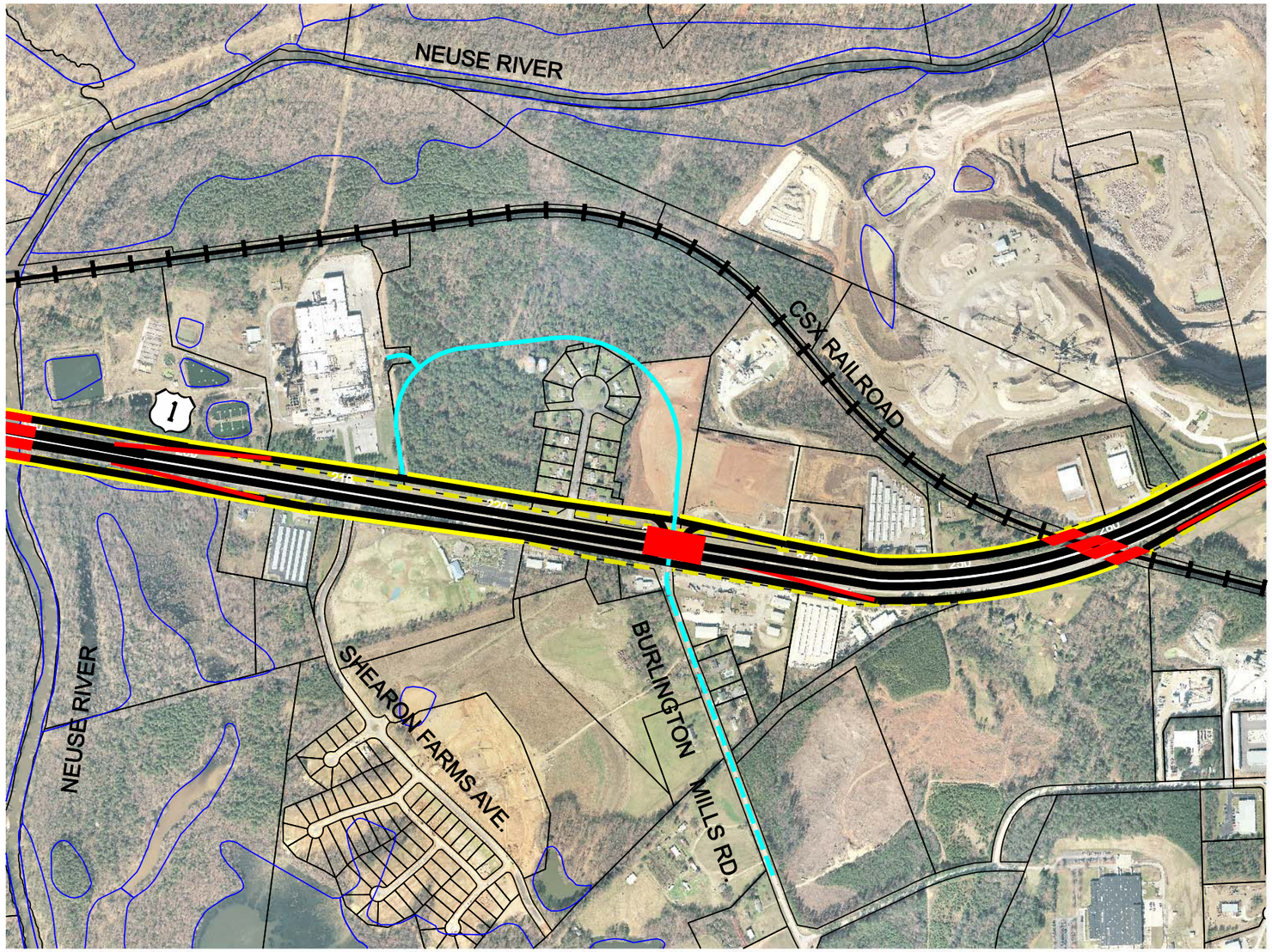
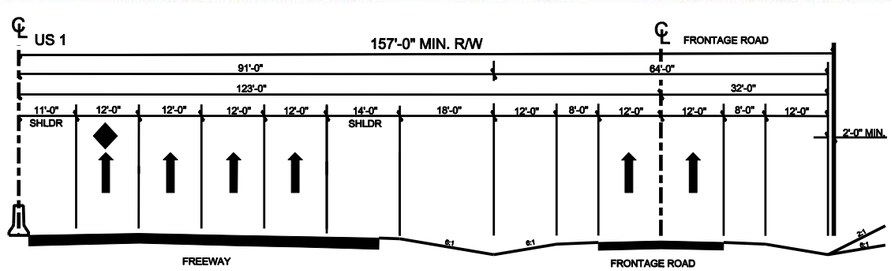
Alternative III-B
One-Way Frontage Roads

US 1 CORRIDOR STUDY

Figure 5-3
Sheet 2 of 10





HALF TYPICAL SECTION BETWEEN I-540 AND NC 98

WITH 3 GENERAL PURPOSE LANES AND 1 SPECIAL PURPOSE LANE WITH ONE-WAY FRONTAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES

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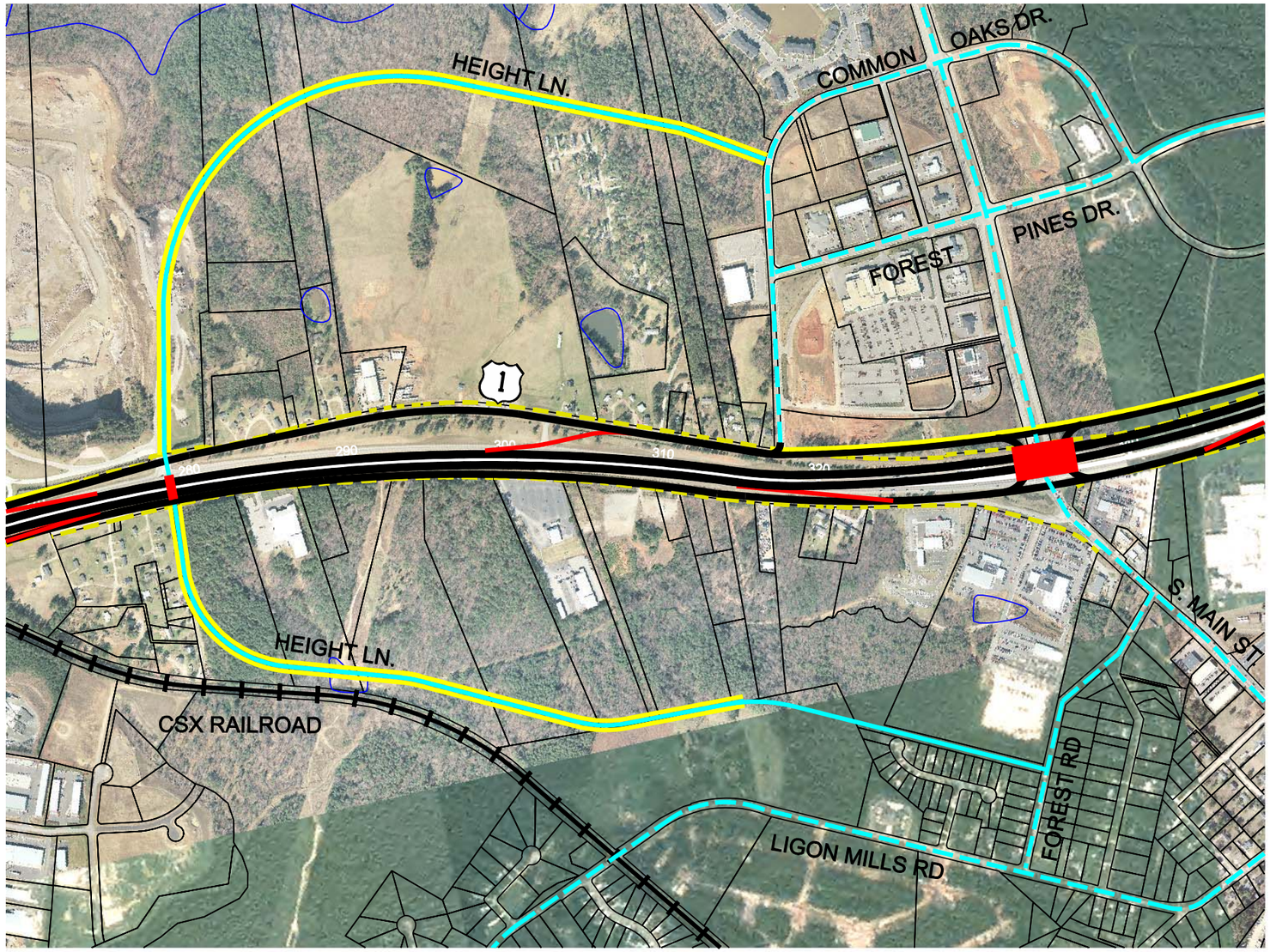
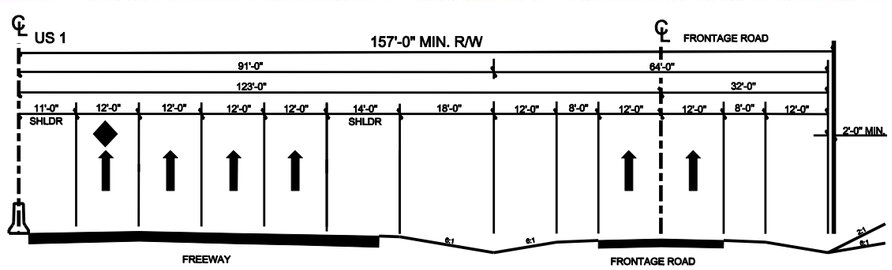
PHASE 2 ANALYSIS

Alternative III-B
One-Way Frontage Roads

US 1 CORRIDOR STUDY

Figure 5-3
Sheet 3 of 10





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WITH 3 GENERAL PURPOSE LANES AND 1 SPECIAL PURPOSE LANE WITH ONE-WAY FRONTAGE ROADS

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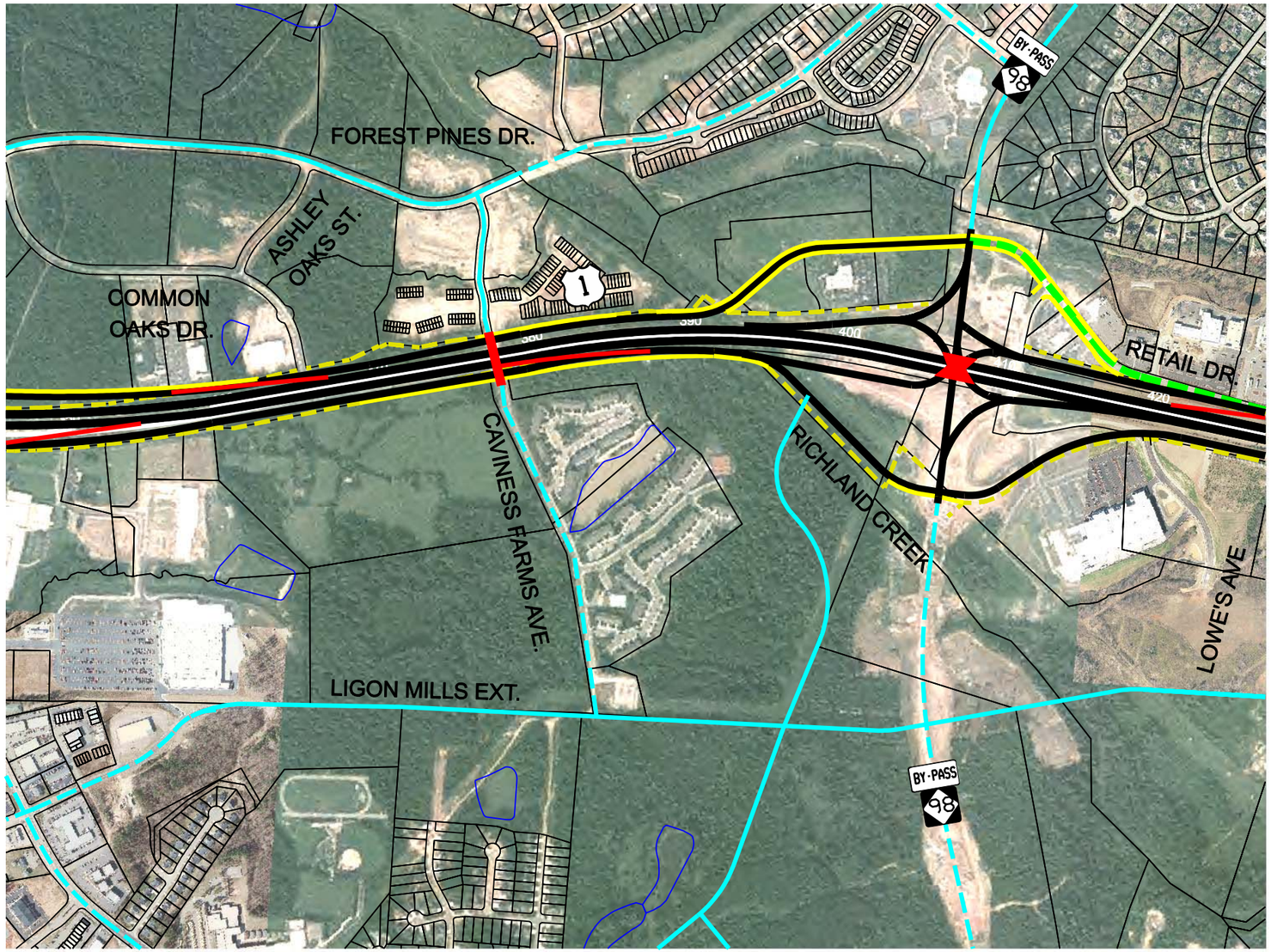
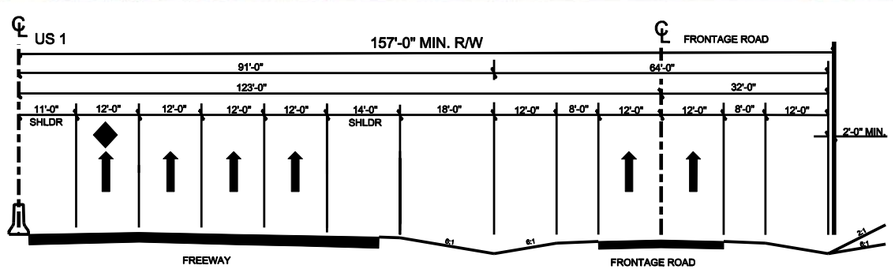
Alternative III-B
One-Way Frontage Roads

US 1 CORRIDOR STUDY

Figure 5-3
Sheet 4 of 10





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WITH 3 GENERAL PURPOSE LANES AND 1 SPECIAL PURPOSE LANE WITH ONE-WAY FRONTAGE ROADS

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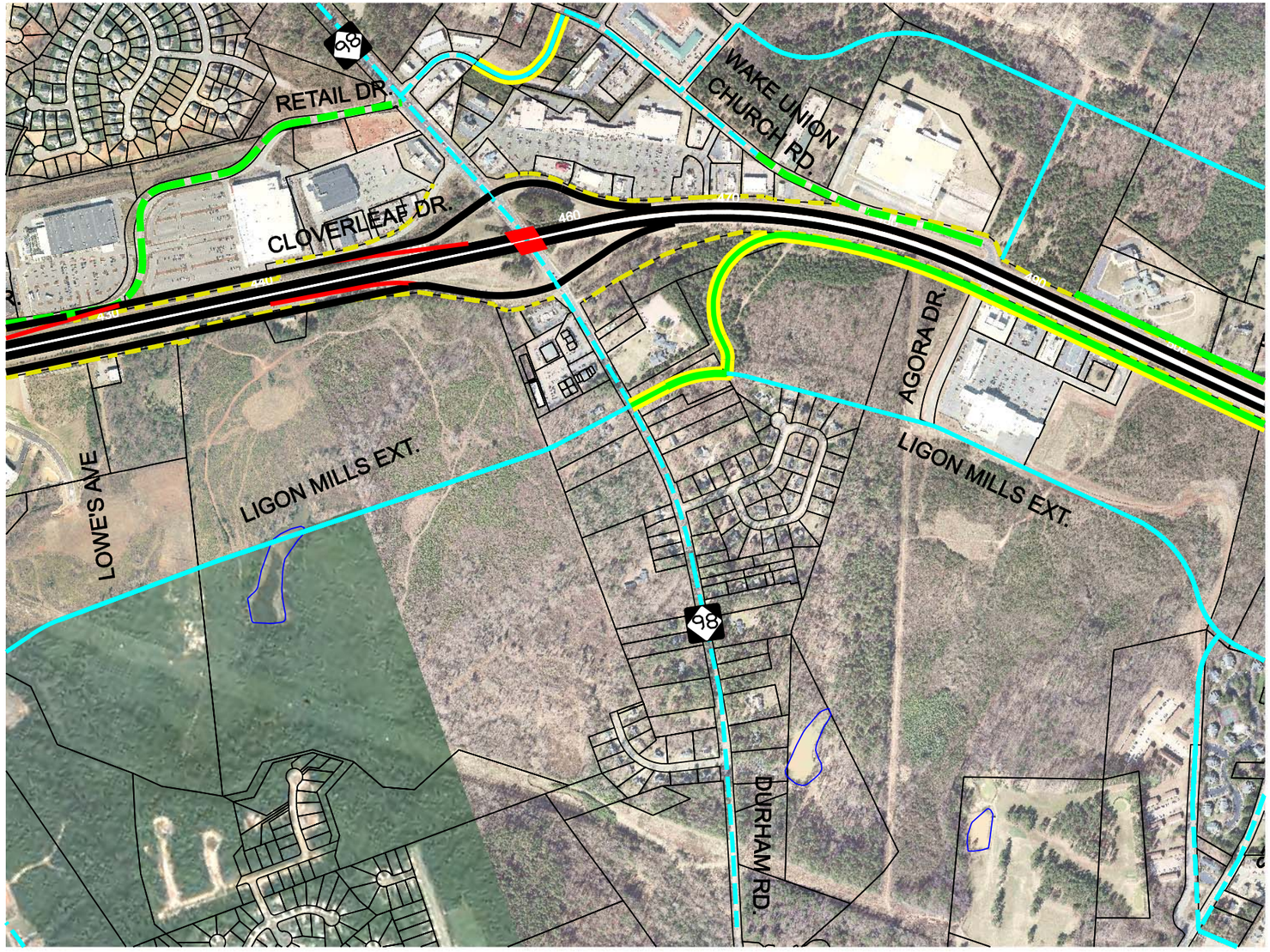
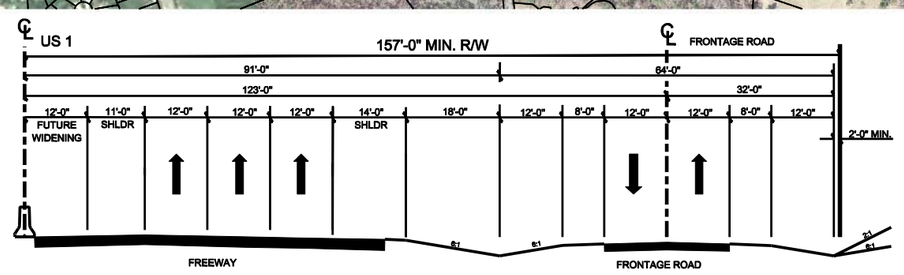
Alternative III-B
One-Way Frontage Roads

US 1 CORRIDOR STUDY

Figure 5-3
Sheet 5 of 10





HALF TYPICAL SECTION BETWEEN NC 98 BYPASS AND US1A, NORTH (PARK AVE.)

WITH 3 GENERAL PURPOSE LANES WITH TWO-WAY FRONTAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES

LEGEND

- EXISTING R/W
- PROPOSED R/W
- CSX RR
- STREAMS, RIVER, WETLANDS
- PARCEL BOUNDARY
- PROPOSED FREEWAY IMPROVEMENTS
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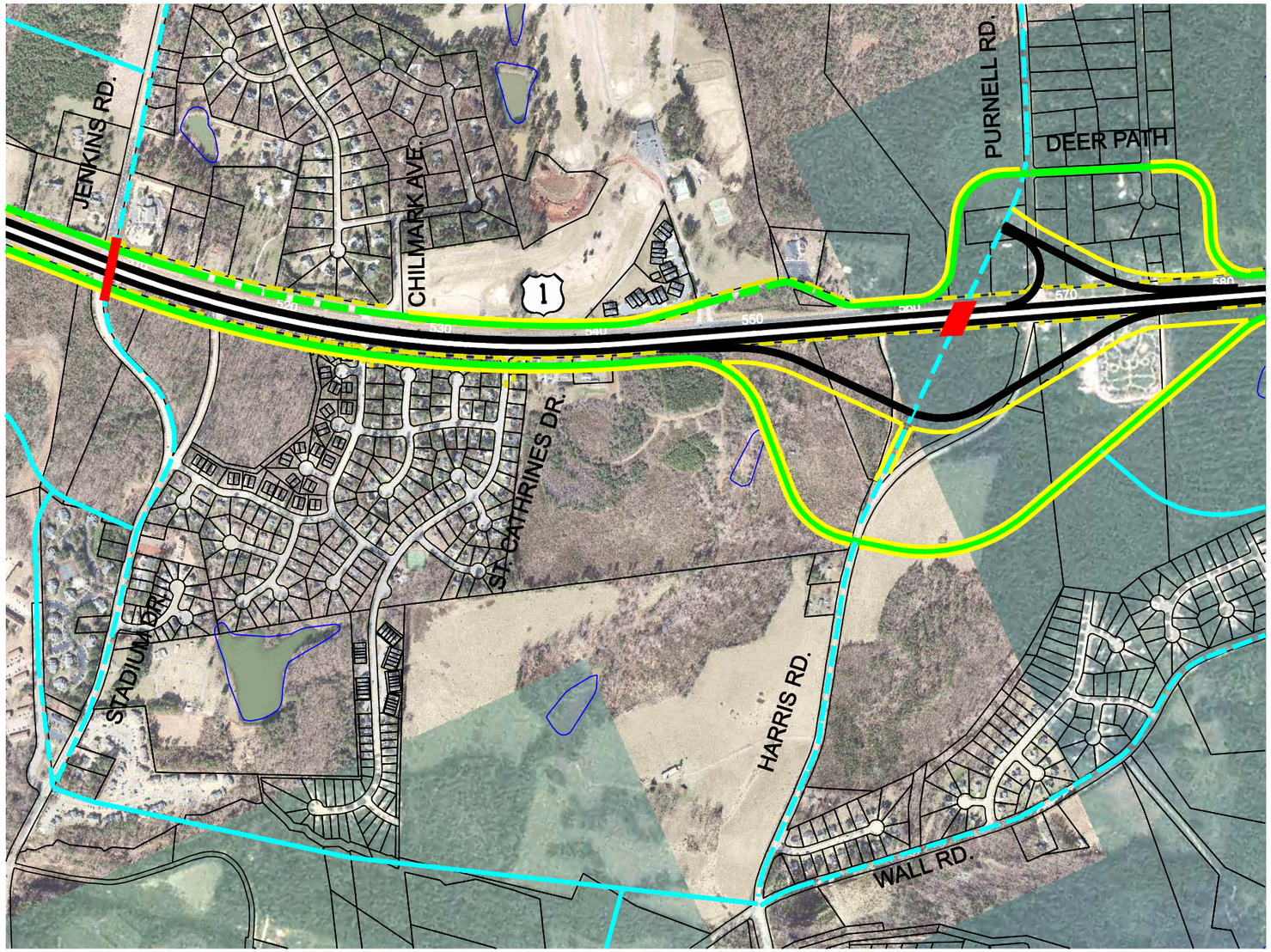
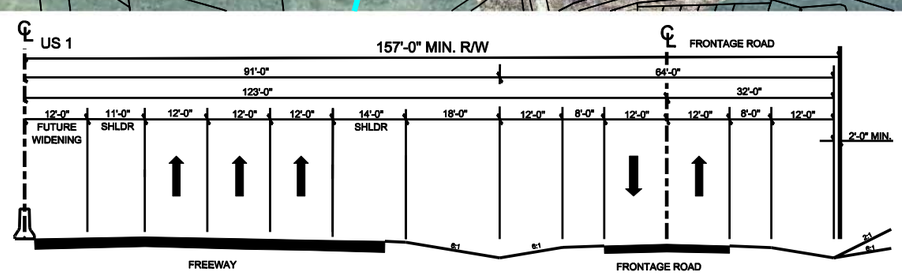
PHASE 2 ANALYSIS

Alternative III-B
One-Way Frontage Roads

US 1 CORRIDOR STUDY

Figure 5-3
Sheet 6 of 10





HALF TYPICAL SECTION BETWEEN NC 98 BYPASS AND US1A, NORTH (PARK AVE.)

WITH 3 GENERAL PURPOSE LANES WITH TWO-WAY FRONTAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES

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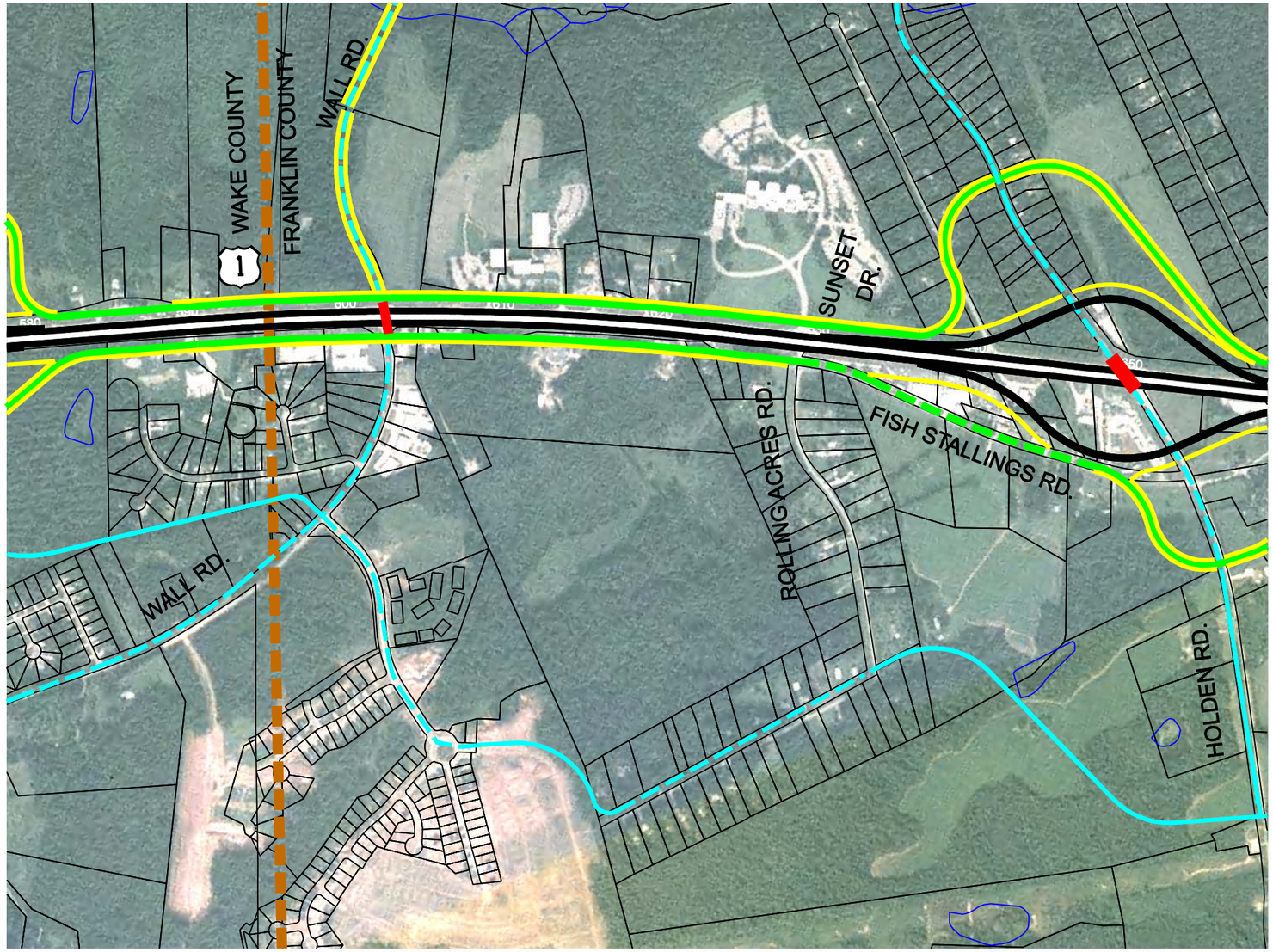
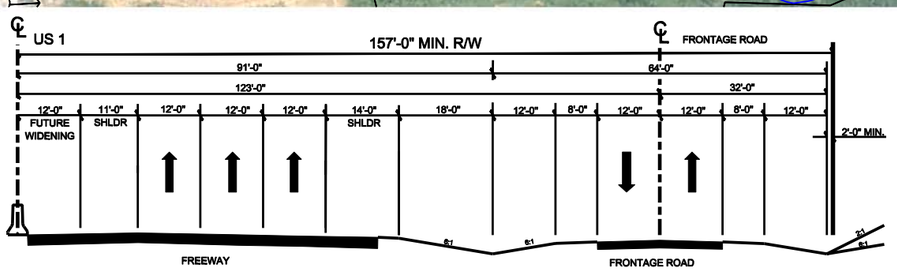
PHASE 2 ANALYSIS

Alternative III-B
One-Way Frontage Roads

US 1 CORRIDOR STUDY

Figure 5-3
Sheet 7 of 10





HALF TYPICAL SECTION BETWEEN NC 98 BYPASS AND US1A, NORTH (PARK AVE.)

WITH 3 GENERAL PURPOSE LANES WITH TWO-WAY FRONTAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES

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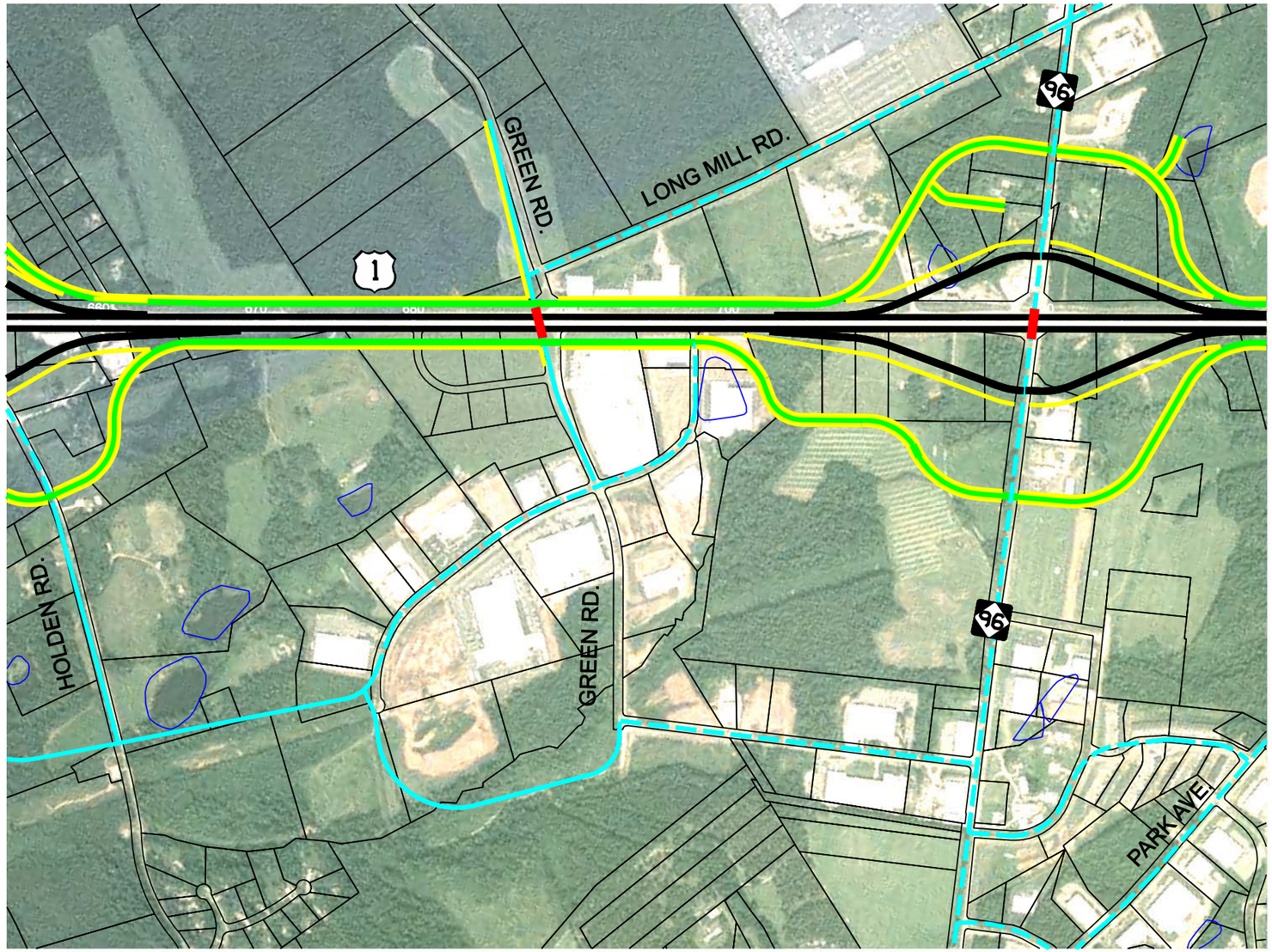
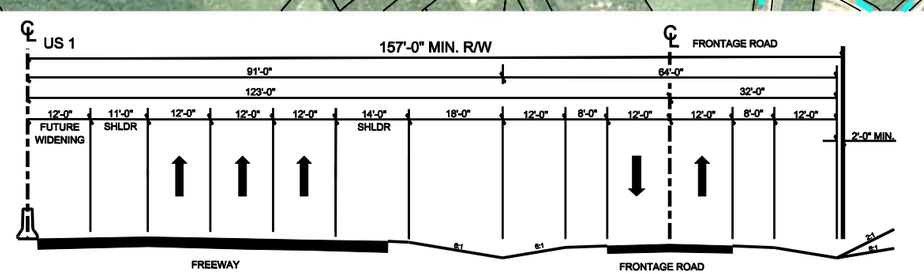
Alternative III-B
One-Way Frontage Roads

US 1 CORRIDOR STUDY

Figure 5-3
Sheet 8 of 10





HALF TYPICAL SECTION BETWEEN NC 98 BYPASS AND US1A, NORTH (PARK AVE.)

WITH 3 GENERAL PURPOSE LANES WITH TWO-WAY FRONTAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES

LEGEND

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Feet

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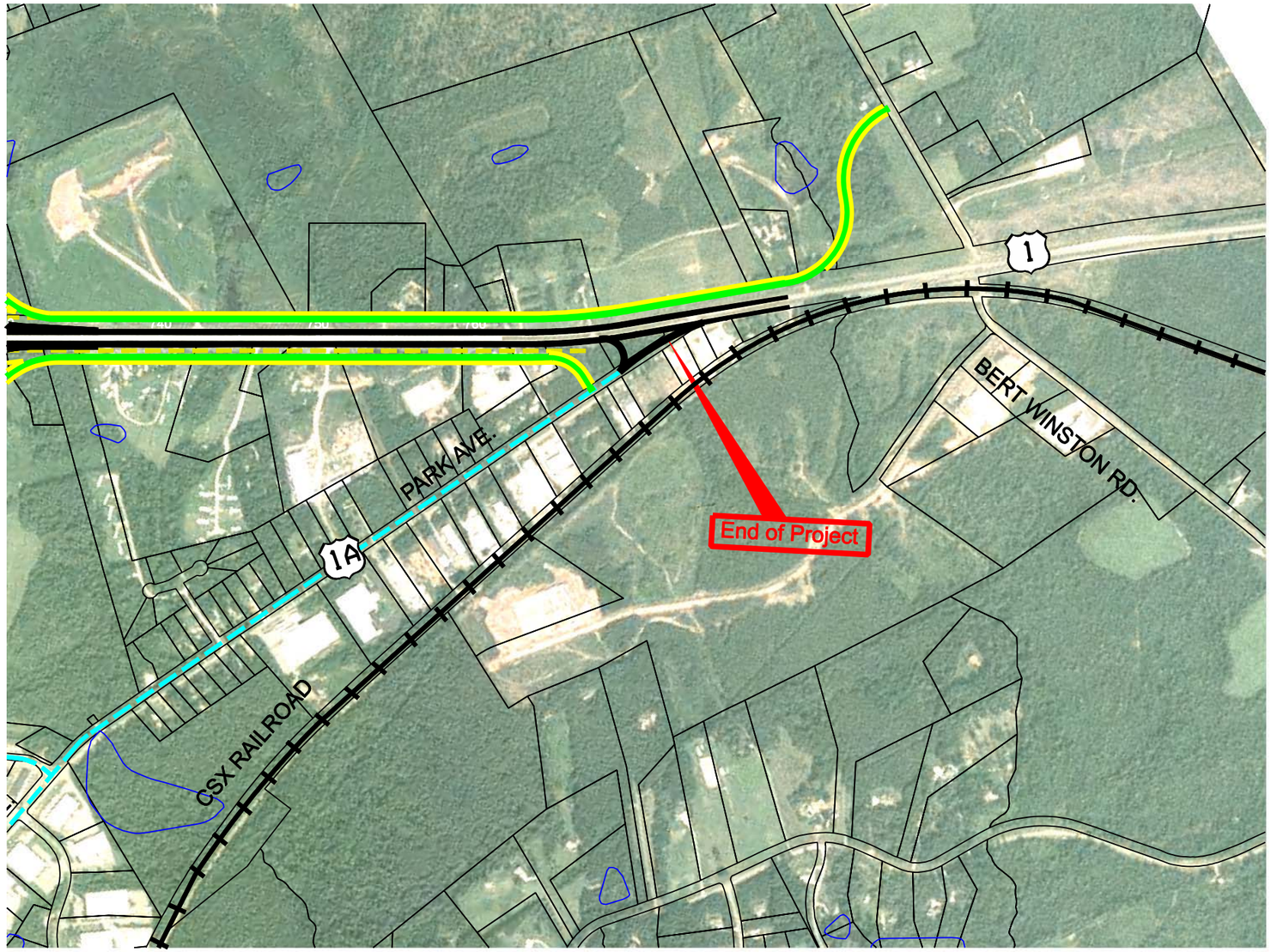
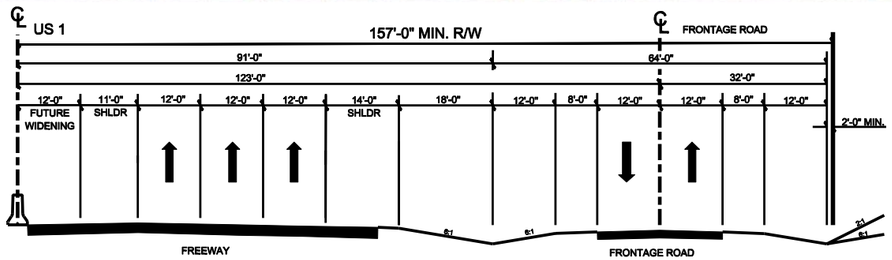
Alternative III-B
One-Way Frontage Roads

US 1 CORRIDOR STUDY

Figure 5-3
Sheet 9 of 10





HALF TYPICAL SECTION BETWEEN NC 98 BYPASS AND US1A, NORTH (PARK AVE.)

WITH 3 GENERAL PURPOSE LANES WITH TWO-WAY FRONTAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES

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Feet

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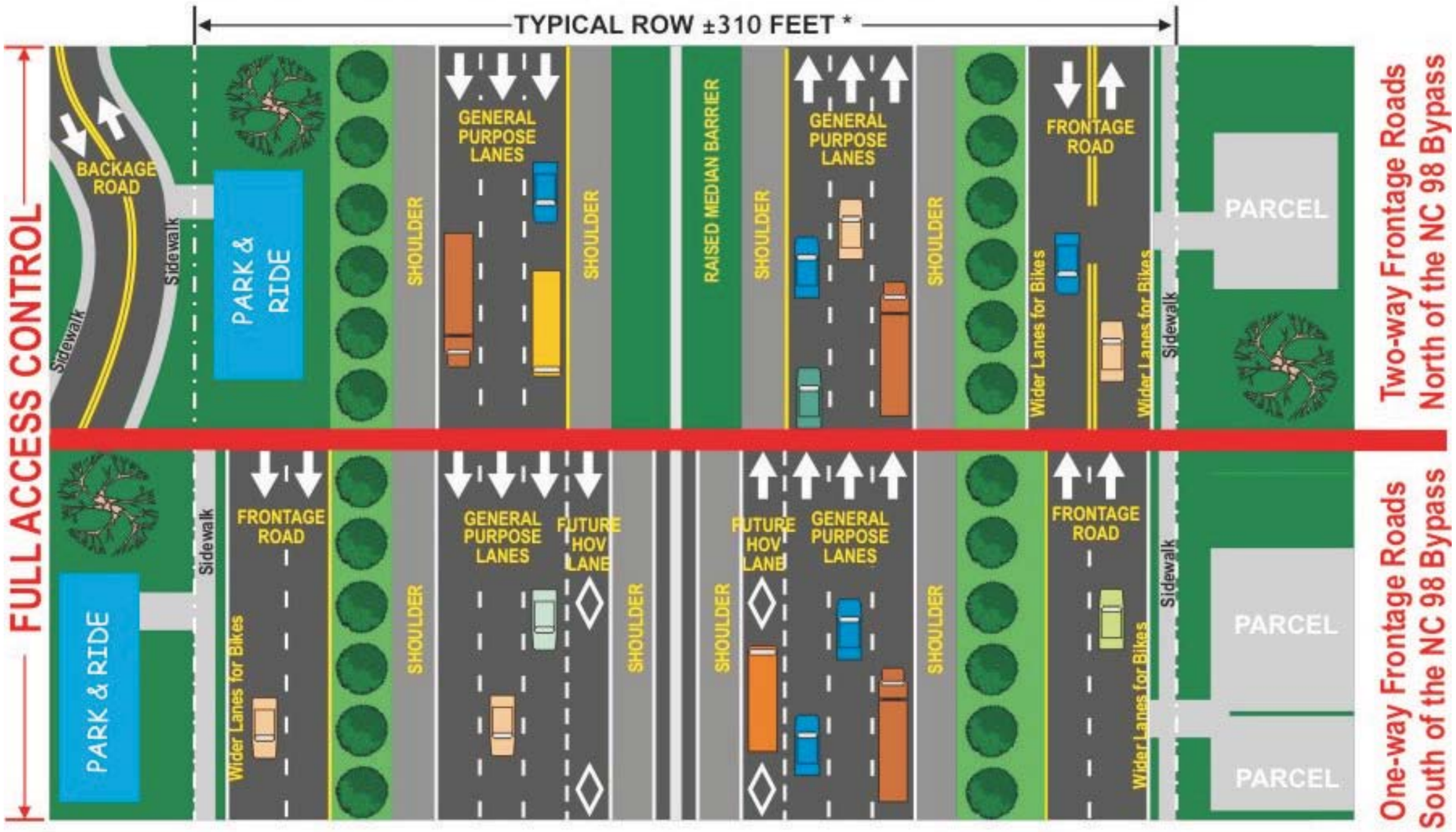
Alternative III-B
One-Way Frontage Roads

US 1 CORRIDOR STUDY

Figure 5-3
Sheet 10 of 10

Alternative III-B: Highway plus Transit Alternative
with One-way Frontage Roads south of the NC 98 Bypass
and Two-way Frontage or Backage Roads north of the NC 98 Bypass



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PHASE 2 ANALYSIS

Alternative III-A:
Highway plus Transit Alternative
(One-Way Frontage Roads)

US 1 CORRIDOR STUDY

Figure 5-4

5.3.2 Frontage Roads in the US 1 Corridor Study

The US 1 Corridor Study has determined additional highway and transit capacity is needed to provide an acceptable level of service and enhanced safety along this corridor in the future. Two viable multimodal alternatives have been developed between I-540 and US 1A North (Park Avenue). Both of these alternatives have similar cross-sections and the total number of traffic lanes is identical. Both alternatives consist of a full control of access freeway cross-section and frontage roads. Additional freeway auxiliary lanes may be needed and pedestrian/bicycle improvements will also be recommended to provide multimodal capability to the community and transit facilities.

Most freeways in North Carolina have full control of access to and from the facility. In other words, access to and from the freeway is only permitted at grade-separated interchanges with overpasses or underpasses. In many other states, freeway interchanges can also link travelers to one-way frontage roads with "slip ramps" thus linking the freeway and frontage roads together.

Frontage roads are local-access roads that parallel the access-controlled freeway. AASHTO's Green Book characterizes frontage roads as "the ultimate in access control" (1995, page 528). A policy of building frontage roads avoids the purchase of access rights when upgrading existing highways to freeway standards, and generally supplements local street networks. Frontage road systems may also impact corridor operations, land values, and development patterns.

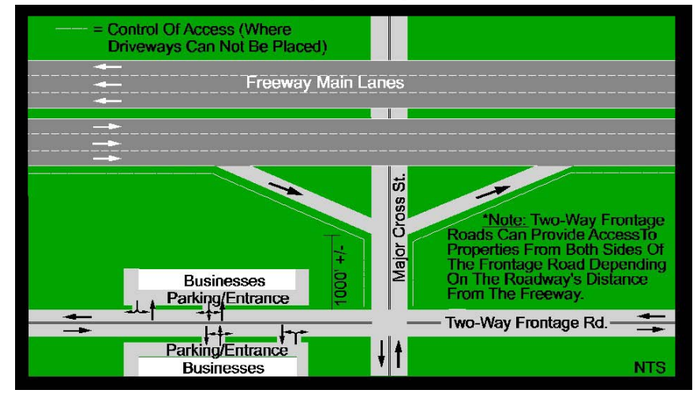
Frontage roads separate local traffic, (i.e., traffic that needs to slow down and turn into local destinations), from the faster through traffic on an access controlled freeway. The challenge in designing frontage roads, which can be either one-way or two-way, is that they separate slowing and turning local traffic from the through traffic on the freeway. If there is not enough storage room on ramps for traffic exiting and entering the freeway, then backups and crashes on both the freeway and the frontage road become more likely.

5.3.3 Two-way Frontage Roads

North Carolina has many examples of roads that provide access to properties via a two-way frontage road facility connecting to the cross street (see Figure 5-5). Since there are numerous two-way frontage roads within the State, drivers are familiar with their operations and, therefore, driver expectancy is high. The travel distance and time between destinations along two-way frontage roads is usually less than that for one-way frontage roads. Two-way frontage roads require much more space than one-way frontage roads in order to prevent backups at intersections and interchange ramps. Current guidelines that help ensure the safe operation of two-way frontage roads in North Carolina include:

- A minimum of 1,000 feet between the interchange ramps and the frontage road/cross-street intersections. This separation distance is required to ensure efficient traffic operations and requires additional right-of way acquisitions at interchanges as compared to one-way frontage roads.
- No direct (slip) ramps from the highway to and from the two-way frontage road.

Figure 5-5
Two-Way Frontage Road



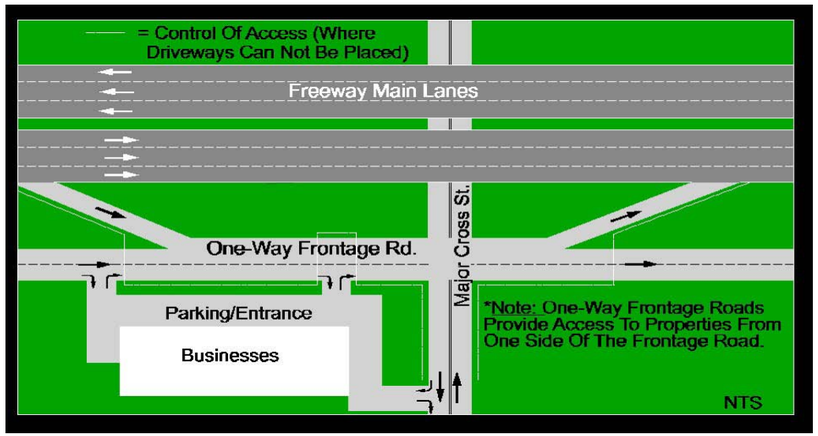
5.3.4 One-way Frontage Roads

One-way frontage roads generally have fewer conflict points at driveways along the frontage road (only right-in and right-out turns are allowed) and at intersections with cross-streets (see Figure 5-6). Motorists that have experience using one-way frontage roads tend to appreciate the convenient and safer access to properties that front the freeway. Slip ramps that connect directly from the freeway to the frontage road provide a convenient system that links travelers to these fronting properties. North Carolina drivers are not familiar with one-way frontage road systems; therefore, drivers expectancy may cause confusion to the motoring public. A disadvantage of one-way frontage roads is that the motorist has farther to travel when they miss a turn. Agencies designing one-way frontage roads have developed the following guidelines to improve safety and traffic operations:

- Detailed standards that define the control of the access line (where driveways/intersections cannot be permitted) which provides adequate distance between ramp intersection with the frontage road and the nearest driveway and/or cross-street intersection. These standards prohibit the placement of frontage road property driveways from aligning either directly across or too close to the slip ramps which would cause safety issues.
- A feature that helps move traffic along one-way frontage roads and provides quick access to the opposite side frontage road is the "Texas U-turn" (see turnaround in Figure 5-7). Essentially a Texas U-turn carries frontage road traffic heading in one direction to the frontage going in the opposite direction. In this way, traffic along this turnaround maneuver is continuous and does not have to pass through traffic signals or stop signs located at the cross street. The Texas U-turn movement is always placed at the same grade as the cross street and frontage road system.

Figure 5-7 shows the operational differences between two-way and one-way frontage road systems.

Figure 5-6
One-Way Frontage Road



5.4 Land Use and Economic Development Opportunities

In addition to planning for the long-term transportation needs along the US 1 corridor, the study incorporates land use and economic development strategies to promote the vitality and livability of the corridor. Preserving environmentally sensitive areas and accommodating for future growth is essential to maintaining the quality of life in this area. Some key strategies include - encouraging mixed use development, concentrating higher density growth at major intersections and improving accessibility with a network of multimodal transportation options.

Figure 5-8 illustrates some of the transportation enhancements and land use strategies summarized below:

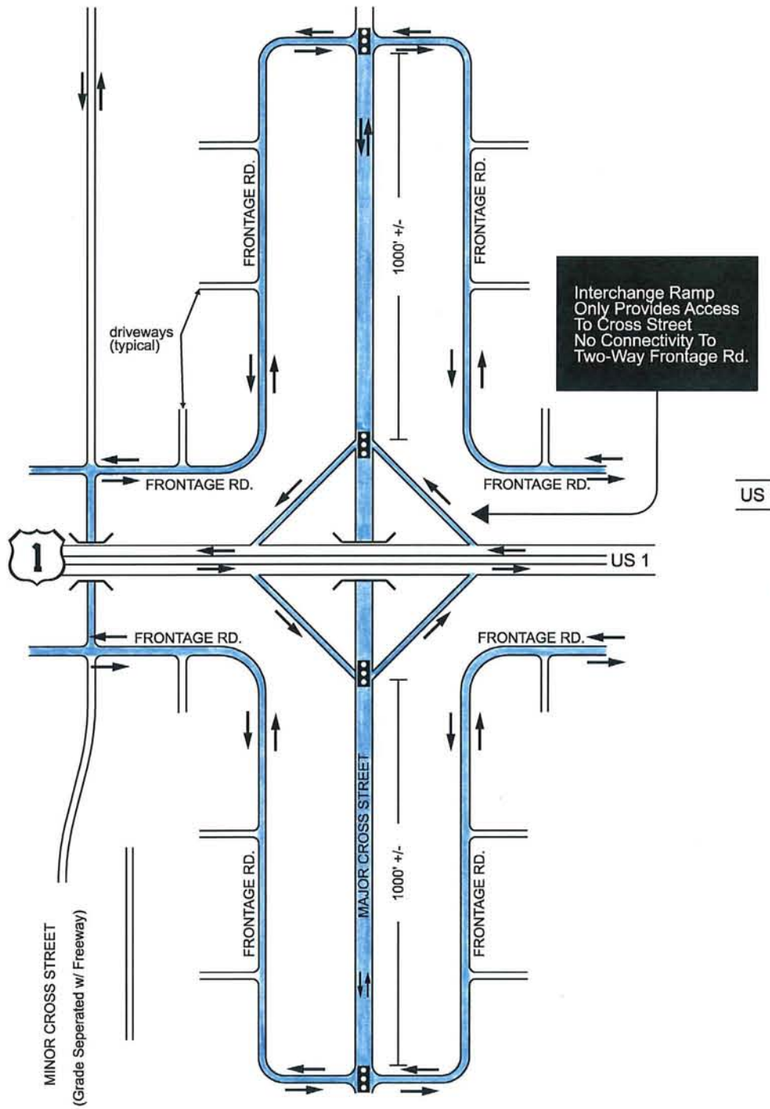
- Provide interchanges at major cross-streets and additional grade-separated crossings at minor streets. All of these US 1 crossings will be pedestrian and bicycle friendly. These crossings will ensure and promote multimodal connectivity across US 1. Park and ride lots would be encouraged along the frontage roads with easy access to US 1 and the secondary roadway system.
- Provide frontage and/or backage roads along the corridor to accommodate local trips and to increase the accessibility to properties and encourage economic development. This secondary roadway system is very important to the corridor. In fact, the US 1 corridor transportation improvements proposed will not be sufficient if this secondary roadway system is not implemented.

5.5 Phase Two Analysis Evaluation Matrix

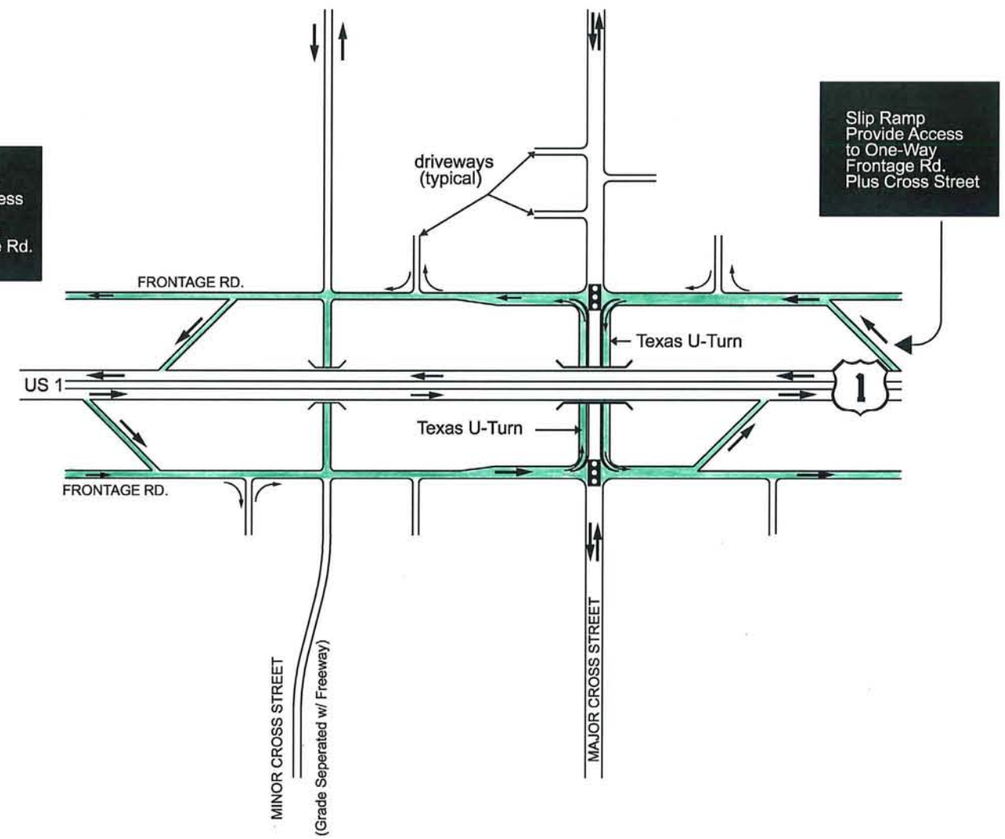
The evaluation criteria developed in the phase 1 analysis was refined to provide additional quantitative data such as estimated construction and right of way costs associated with each of the phase 2 transportation alternatives. Also a better understanding of the safety and the North Carolina driver expecting associated with the two-way frontage system is factored into the phase 2 evaluation. A summary of the phase 2 evaluation matrix, including estimated construction and right of way costs, is depicted in Table 5-1.

The factor that clearly differentiates one alternative from the other is right-of-way both its costs and impacts on the community.

The overall score between Alternatives III-A and III-B is fairly close and one could complete. During the phase 2 analysis the construction costs are within 3%, therefore construction cost may not be a deciding factor. Anticipated right-of-way cost during the phase 2 plan development was approximately 22% higher for Alternative III-A. The higher right of way costs are due to the fact the two-way frontage roads require additional right of way at the proposed interchanges to provide for separation between interchange ramp intersections and frontage road intersections. With Alternative III-B, one way frontage roads can be located closer to the mainline and approximately 350 to 450 feet apart from each other, however access will still need to be controlled on the cross street.



Alternative III A
Highway + Transit Alternative
with Two-Way Frontage Roads



Alternative III B
Highway + Transit Alternative
with One-Way Frontage Roads and Slip Ramps

Legend

Two-Way Frontage Road Interchange Ramp Systems

One-Way Frontage Road and Slip Ramp System

NTS

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PHASE 2 ANALYSIS

Two-Way Vs. One-Way Frontage Road Operations

US 1 CORRIDOR STUDY

Figure 5-7
Sheet 1 of 1

Table 5-1
Phase II Alternatives Evaluation Matrix

Evaluation Criteria	Alternative III Highway + Transit	
	III-A 2-Way Frontage Roads Preliminary Preferred Alternative	III-B 1-Way Frontage Roads South of NC 98 Bypass
Improve Public Safety		
Consistency with Design Standards	5	4
Accident Locations Eliminated	4	4
Improve Mobility		
General Purpose Lanes Congestion	4	5
Person Capacity	4	5
Transit Station Accessibility	4	4
Local Street Connectivity and Extensions	4	4
Access to Existing Fronting Properties	4	4
Multimodal Enhancements	4	4
Increase Transit Opportunities		
Transit Ridership	4	4
CAMPO/TTA/CAT/SEHSR Consistency	3	3
Avoid or Minimize Environmental Effects		
Wetlands	3	3
Contamination Sites	4	4
Flood Plains	3	3
Avoid or Minimize Cultural Impacts		
Historical Sites	3	3
Community Facilities	4	4
New and Re-Development Opportunities	5	4
Right of Way Acquisitions		
Buildings Taken	3	4
Parcels Affected	3	4
Total Acreage Required	3	4
Costs		
US 1 Highway Improvements	$397.3 M	$386.3 M
Right of Way*	$103.7 M	$79.7 M
Special Purpose Lanes Operating Costs	4	4

*** Does not include relocation costs.**

Legend

5 4 3 2 1 0

Best → Worst

5.6 Planning Cost Estimates

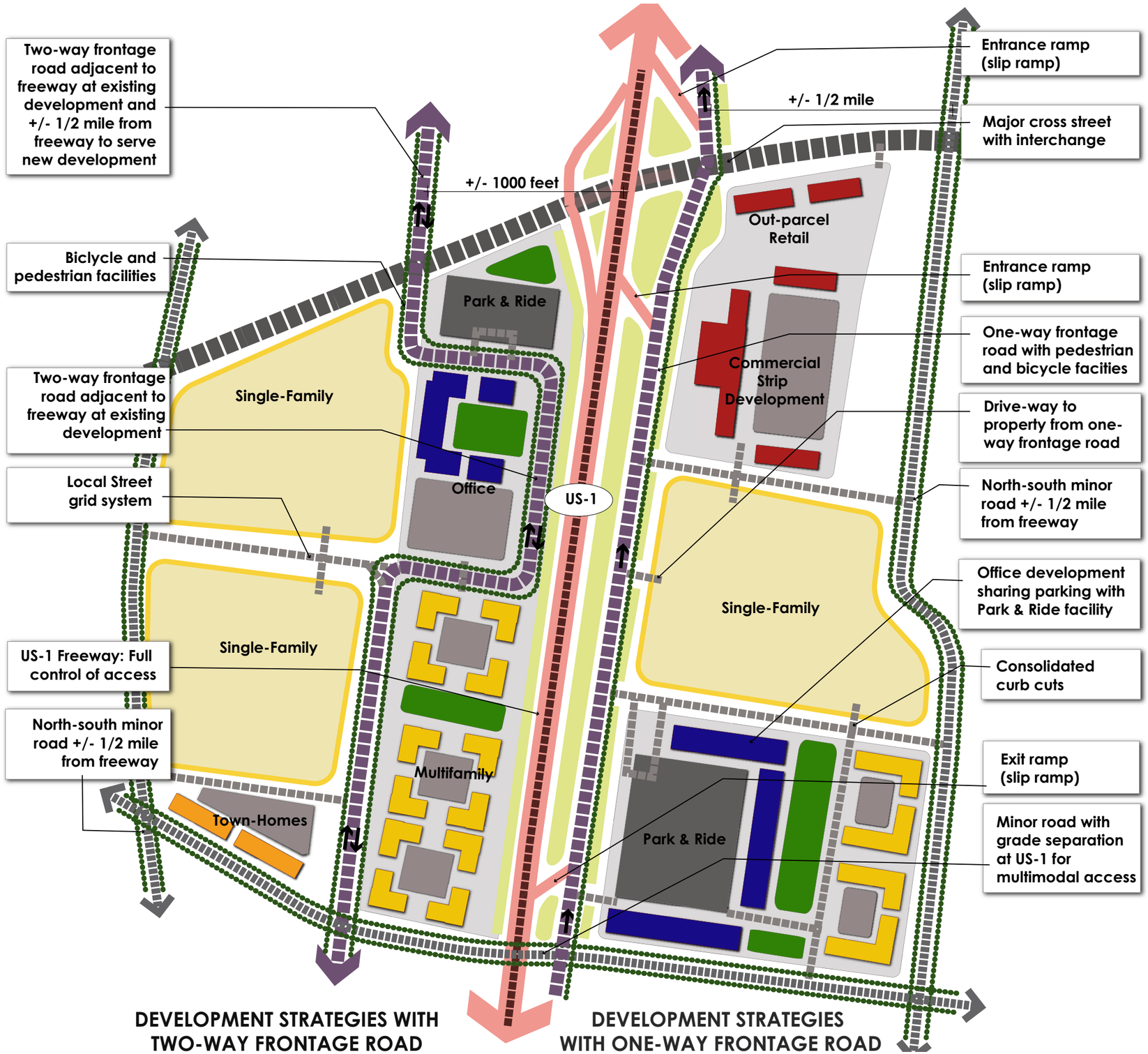
Appendix E contains the final planning-level construction and right-of-way estimates developed for the three viable alternatives studied in the US 1 Corridor Study (Alternative III-A, Alternative III-B and the Locally Preferred Alternative). The term planning-level is used to describe the cost estimates for the alternatives because there can be many interpretations what is meant by (and what items are included in) cost estimates for capital projects. The study team worked with NCDOT's Project Services Unit to develop these cost estimates to be consistent to NCDOT's long-range planning analyses. These estimates include the adjustments to cost estimates for the final corridor alternatives (such as interchange configurations and corresponding right-of-way revisions) as modified in the phase 3 analysis.

5.7 Selection of Locally Preferred Alternative

The phase 2 analysis included a detailed conceptual design review, planning level cost estimates, evaluation matrix, reviewing public comments, oversight team meetings, and a meeting with NCDOT chief engineering staff and to determine the "preliminary" locally preferred alternative. Once the "preliminary" locally preferred alternative was identified by the study and oversight teams, the second US 1 Newsletter was mailed to the community and the second Public Information Workshop was scheduled. The study and oversight teams reviewed the comments received from the July 27, 2006 Public Information Workshop and selected Alternative III-A as the locally preferred alternative. Alternative III-A: highway plus transit alternative with two-way frontage/backage roads was advanced to the phase 3 analysis to further refine and evaluate the LPA. At the conclusion of the phase 2 analysis and after reviewing community comments received at the public meeting, the oversight team requested the study team to consider the following refinements to the LPA during the phase 3 analyses of the US 1 Corridor Study:

1. Review the interchange configurations at four intersections to reduce right of way impacts.
2. Confirm the transit elements in the LPA with TTA / CAT / SEHSR / CAMPO.
3. Develop a memorandum of understanding to protect and preserve the long-range transportation and land use needs along the corridor.
4. Incorporate the greenway and bikeway plans in CAMPO's "Draft" Comprehensive Transportation Plan (dated August 2006).
5. Add three sets of raised landscaped planting beds each 15 feet wide along the corridor

Widen the proposed frontage/backage roads to provide for three travel lanes with a wide outside lane to accommodate bikes.



LEGEND

- Single Family Residential
- Multifamily Residential
- Townhouse Residential
- Commercial
- Office
- Open Space
- Park & Ride Facility
- Parking Lot
- US-1 Freeway
- HOV Lane
- Major Road
- Frontage Road
- Minor Road
- Local Road
- Bicycle & Pedestrian Facilities
- Landscape Buffer

0 250 500 1000 Feet

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Collage

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PHASE 2 ANALYSIS

Conceptual Strategies Integrating Land Use with Multimodal Transportation Alternatives

US 1 CORRIDOR STUDY

Figure 5-8
Sheet 1 of 1

CHAPTER 6.0
PHASE THREE ANALYSIS-LOCALLY PREFERRED ALTERNATIVE

6.0 Phase Three Analysis– Locally Preferred Alternative

After thorough reviews of the results discussed in the Phase I and Phase II analyses, discussions with the oversight teams, coordination with NCDOT, and the evaluations of opinions and concerns expressed at the public meetings, the following locally preferred alternative (LPA) is recommended.

The Phase Three process presents a description of the multi-modal land use and transportation alternative selected in the Phase 2 analyses for final development as the LPA. The US 1 corridor oversight teams determined the inclusion or elimination of specific transportation and land use elements to produce a single comprehensive, long-range multi-modal transportation plan for the US 1 Corridor that takes into account cost, constructability, environmental impacts and construction staging. The analysis of the alternatives led to the conclusion that all of the major components evaluated in this corridor study (general purpose lanes, special purpose lanes, transit and a compatible land use) are necessary elements of the LPA. The LPA provides congestion relief by having an acceptable Level of Service throughout the corridor. The new controlled access freeway design presents a great opportunity to improve public safety in the corridor. Furthermore, it coordinates well with TTA's and CAT's plans for transit in the corridor; and promotes economic development along the corridor with implementation of an improved local roadway system. The Capitol Area MPO's Transportation Advisory Committee is the policy board ultimately responsible for adopting the LPA. The transportation improvements, land use and economic development opportunities, and the planning cost estimate for the LPA for the US 1 Corridor are described in the following sections.

6.1 Overview of the Locally Preferred Alternative

Alternative III-A including highway plus transit alternatives was selected as the locally preferred alternative whose elements are listed below. Exact alignments and interchange/grade separation locations, will be decided during the future design phases.

- Three general-purpose lanes in each direction from I-540 to US 1A North, Franklin County (Park Avenue), plus auxiliary lanes where appropriate
- Either one special use (high-occupancy) lane or one additional general purpose lane in each direction from I-540 to NC 98 (Durham Road).
- Two-way, three lane frontage roads paralleling US 1 or backage roads in each direction (located 1,000 to 1,500 feet away from US 1) to provide access to adjacent properties
- Sufficient right-of-way to accommodate an ultimate eight-lane freeway facility, three-lane frontage roads and raised landscaped planting beds
- Ten interchanges (three existing) at major cross-streets
- Nine grade separations (two existing) to provide east-west multimodal connectivity
- Wide outside traffic lanes for shared motorized vehicles and cyclist use
- Sidewalks along the frontage or backage roads
- Park and ride lots and transit stops along the frontage or backage roads

Figure 6-1 depicts the planning view cross-section and Figure 6-2 illustrates the multi-modal transportation improvements layout of the locally preferred alternative.

Proposed interchanges and grade separations for the Locally Preferred Alternative include three existing interchanges, seven proposed interchanges, two existing grade-separations and seven proposed grade-separated crossings. Table 6-1 lists the existing and proposed interchanges and grade-separated crossings in the US 1 corridor between I-540 and Park Avenue (US 1A) in Franklin County. Interchanges would exist at major cross-streets, including I-540, Gresham Lake Road, Burlington Mills Road, South Main Street (US 1A) / New Falls of the Neuse Road, the NC 98 Bypass, NC 98 (Durham Road), Harris Road / Purnell Road, Holden Road and NC 96. Additional cross-streets would be grade-separated to provide multimodal east-west connectivity across the US 1 Corridor. Grade-separated crossings include the propose Perry Creek Greenway, the Neuse River / proposed Mountains to Sea Trail, the CSX Railroad, Height Lane, Common Oaks Drive, Richland Creek / Richland Creek Greenway, Stadium Drive / Jenkins Road, Wall Road and Green Road.

Table 6-1:
Locally Preferred Alternative Interchanges and Grade Separated Crossings

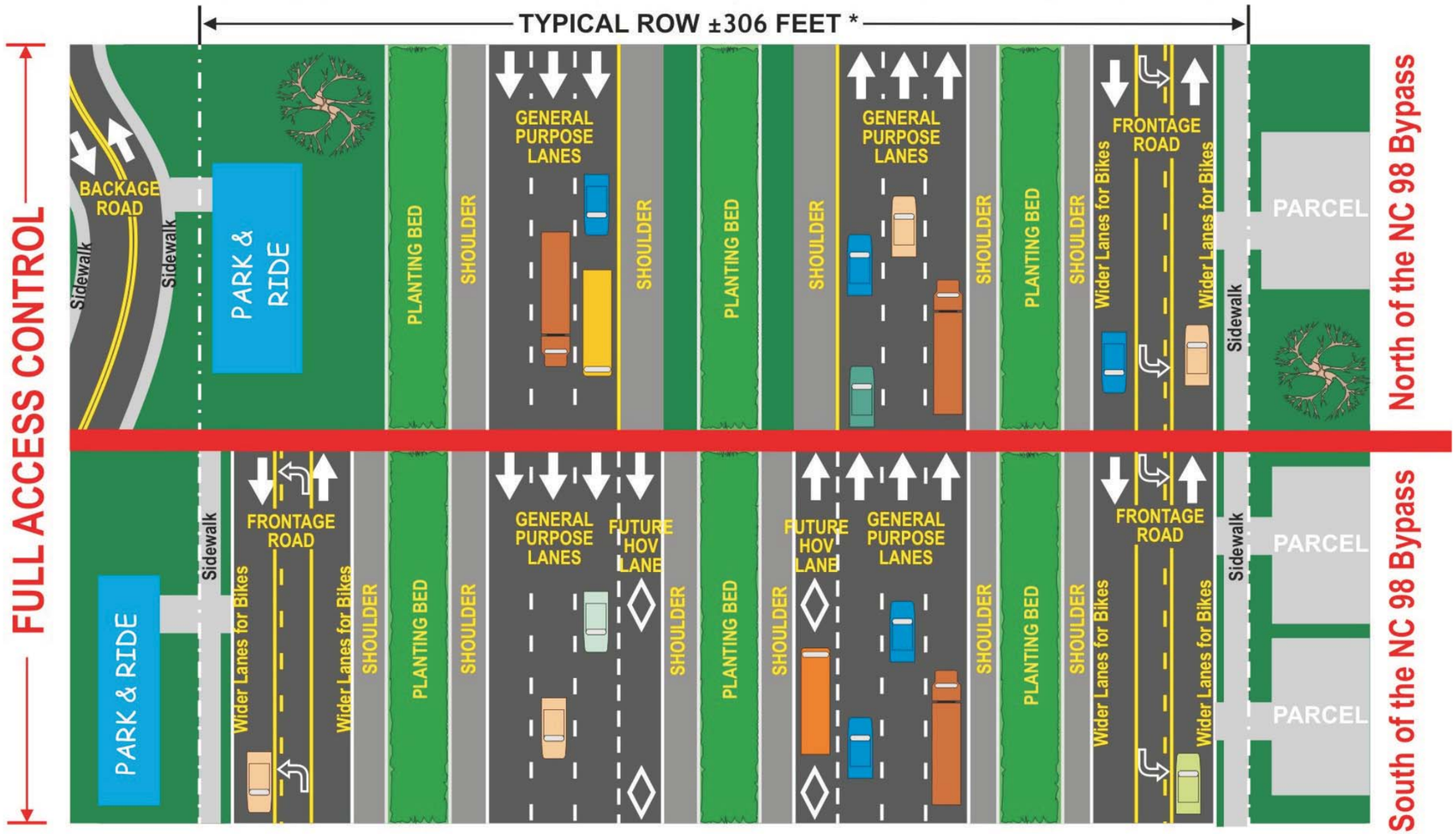
Facility Type	Facility Status	Cross-Street Location
Directional Interchange	Existing[1]	I-540
Diamond Interchange	Proposed	Gresham Lake Road
Grade Separated Crossing	Proposed	Perry Creek Greenway
Urban Diamond Interchange	Proposed	Perry Creek Road
Grade Separated Crossing	Existing	Neuse River Mountains to Sea Trail
Urban Diamond Interchange	Proposed	Burlington Mills Road
Grade Separated Crossing	Existing	CSX Railroad
Grade Separated Crossing	Proposed	Height Lane
Urban SPUI Interchange	Proposed	(US 1A)/New Falls of the Neuse Road
Grade Separated Crossing	Proposed	Common Oaks Drive
Grade Separated Crossing	Proposed	Richland Creek Greenway
SPUI Interchange	Existing	NC 98 Bypass
Rural Diamond Interchange	Existing	NC 98 (Durham Road)
Grade Separated Crossing	Proposed	Stadium Drive / Jenkins Road
Partial Parclo / Interchange	Proposed	Harris Road / Purnell Road
Grade Separated Crossing	Proposed	Wall Road
Urban Diamond Interchange	Proposed	Holden Road
Grade Separated Crossing	Proposed	Green Road
Rural Diamond Interchange	Proposed	NC 96

[1] Recommended US I-540 Interchange to be reconstructed to provide for a full-directional interchange.

The Locally Preferred Alternative strives to encourage multimodal travel and would include sidewalks and widened lanes for bicycles on frontage roads and cross-streets. Park and ride lots and transit stops for Commuter Bus transit would be available at key locations along the US 1 frontage roads, backage roads and cross-streets system. The following text provides a short narrative of the locally preferred alternative starting at I-540 and proceeding to the study's north project limit.

The reconfiguration of the existing directional interchange at I-540 was not included in the scope of services; however for this interchange to connect and function with the proposed interchange at Gresham Lake Road it was necessary to provide a conceptual design at I-540. It is our understanding the ultimate interchange at I-540 will include two at-grade signalized intersections, once I-540 is completed east of US 1.

Alternative III-A: Highway plus Transit Alternative with Two-way Frontage or Backage Roads



* ROW will increase at interchanges

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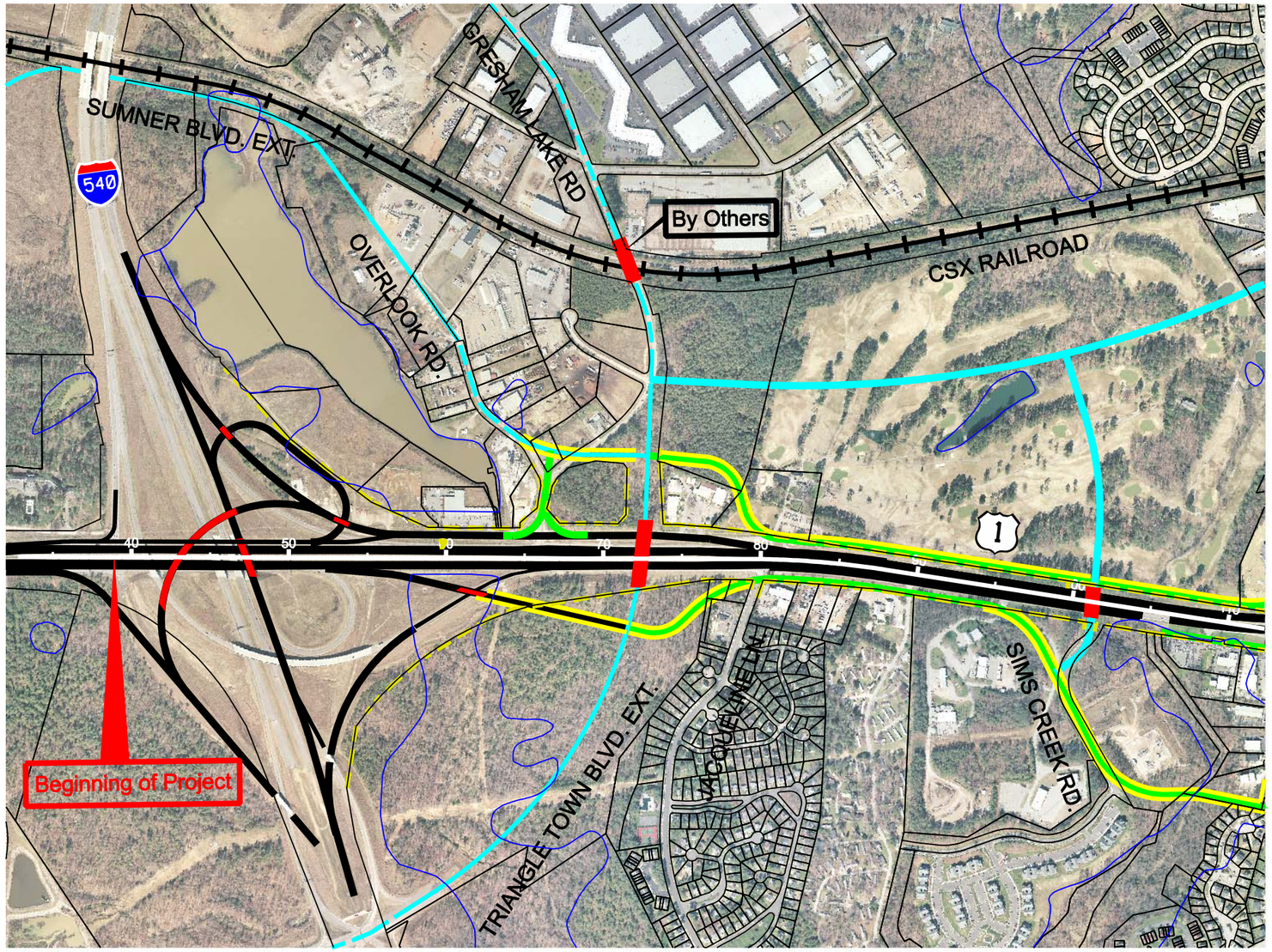
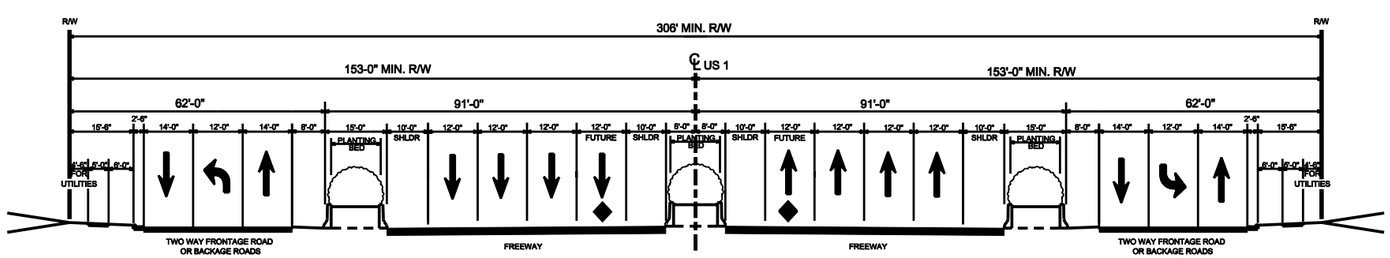
PHASE 3 ANALYSIS

Alternative III-A:
Planning View Cross Section
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-1





TYPICAL SECTION - Between Gresham Lake Road and NC 98 (Durham Rd)

3 GENERAL PURPOSE LANES AND 1 SPECIAL PURPOSE LANE IN EACH DIRECTION, WITH TWO-WAY FRONTAGE OR BACKAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES AND OUTSIDE PLANTING BEDS WILL NOT BE CONTINUOUS

LEGEND

- EXISTING R/W
- PROPOSED R/W
- CSX RR
- STREAMS, RIVER, WETLANDS
- PARCEL BOUNDARY
- PROPOSED FREEWAY IMPROVEMENTS
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- PROPOSED STRUCTURES

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Feet

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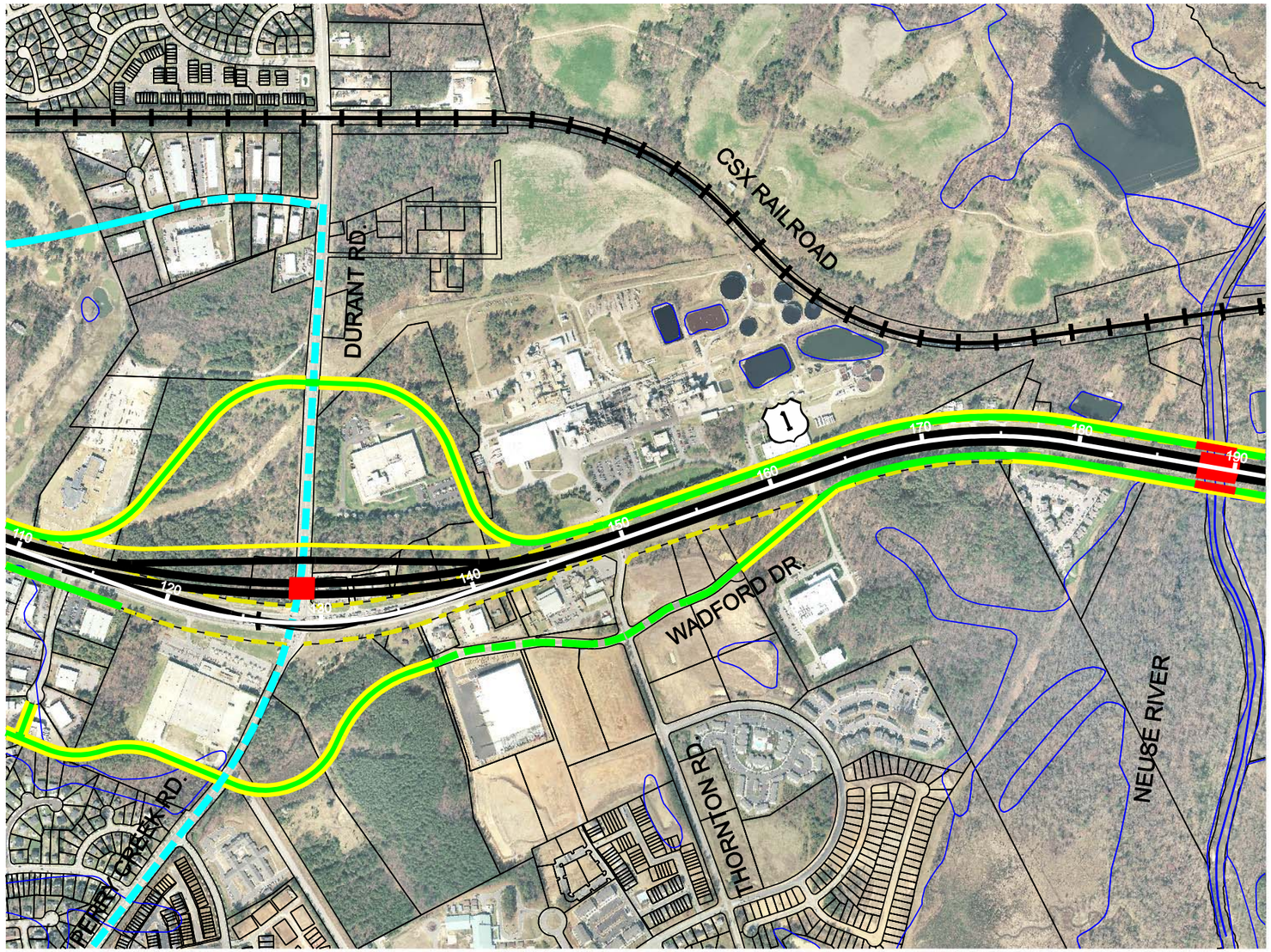
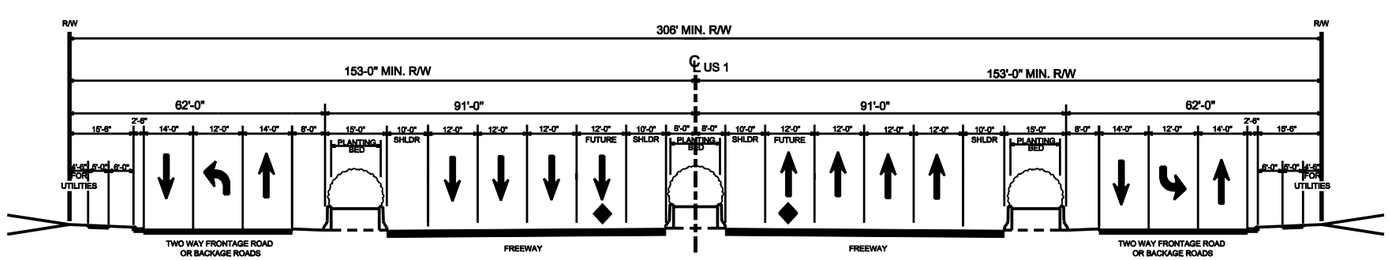
Alternative III-A
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-2
Sheet 1 of 10





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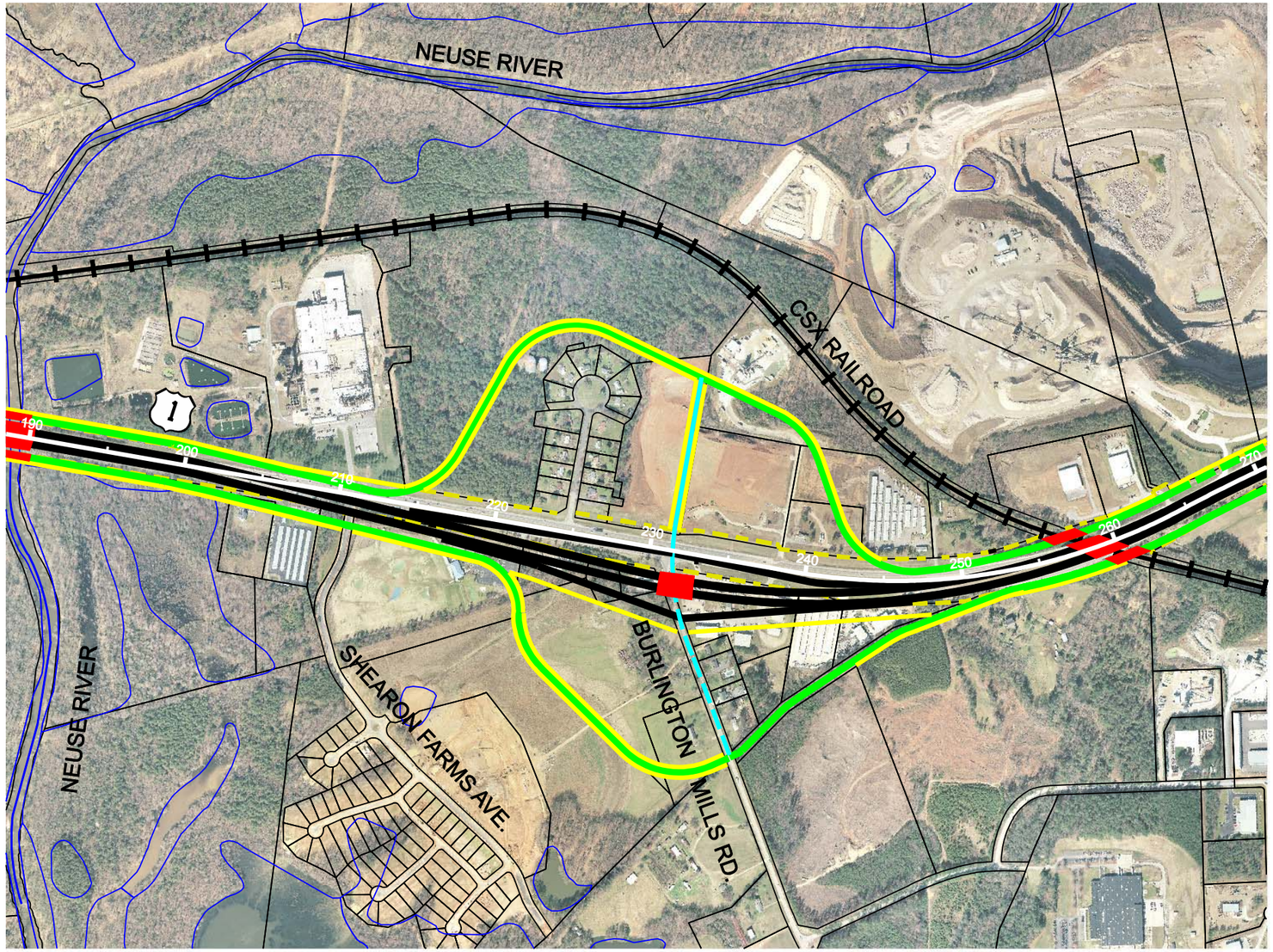
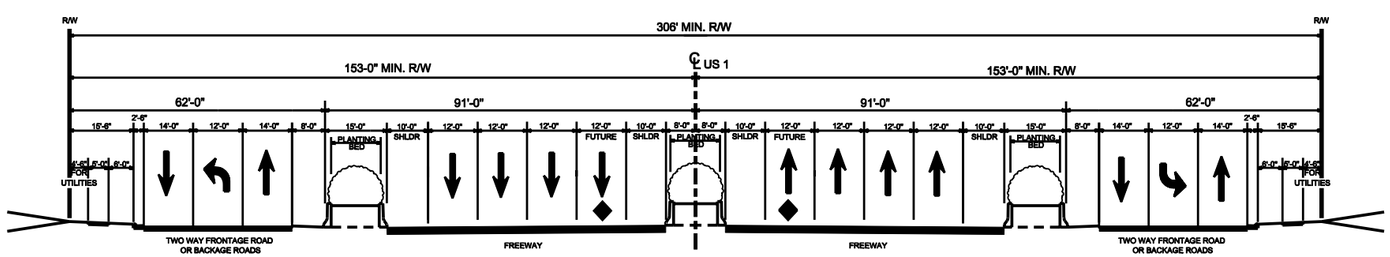
Alternative III-A
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-2
Sheet 2 of 10





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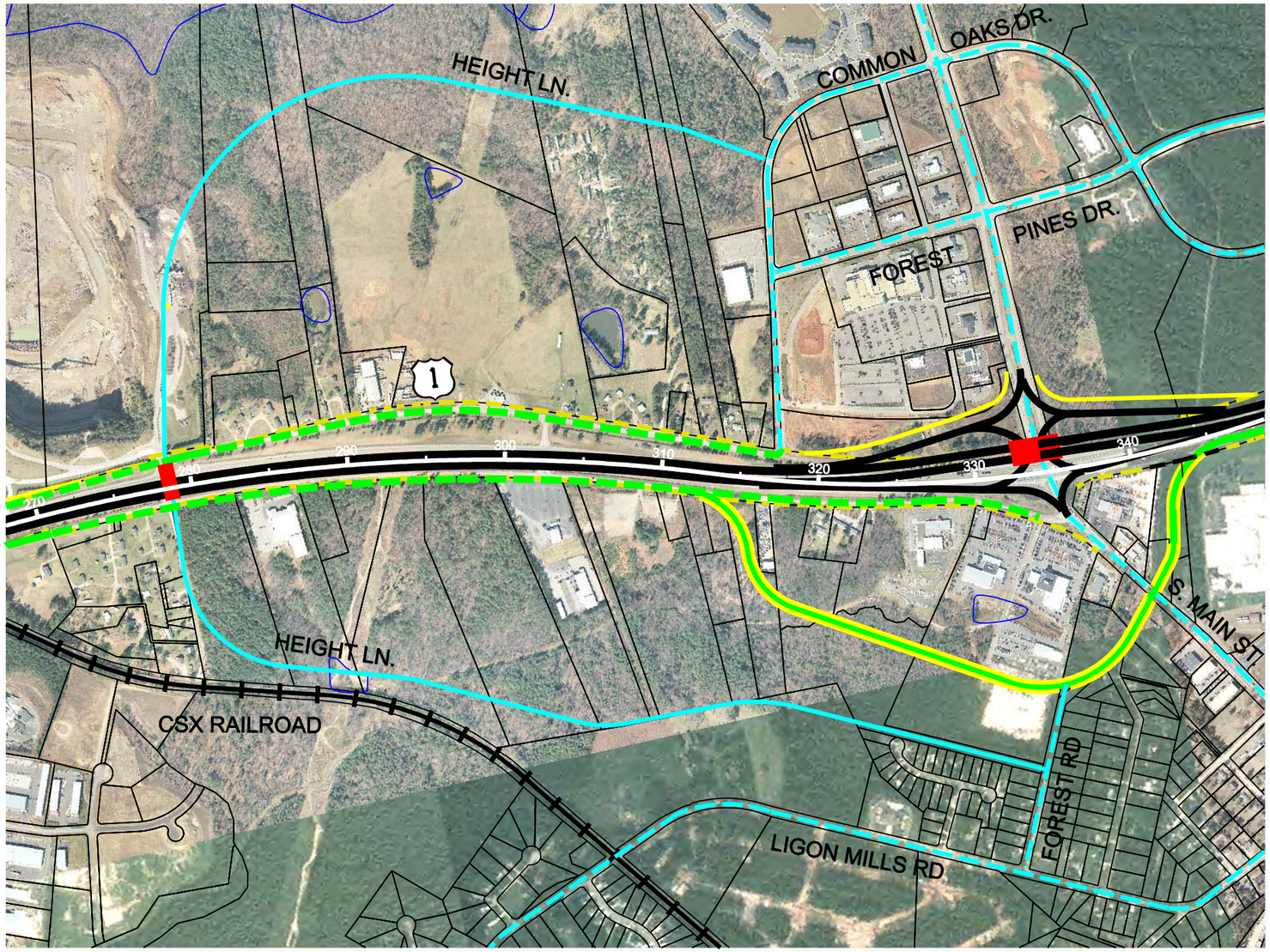
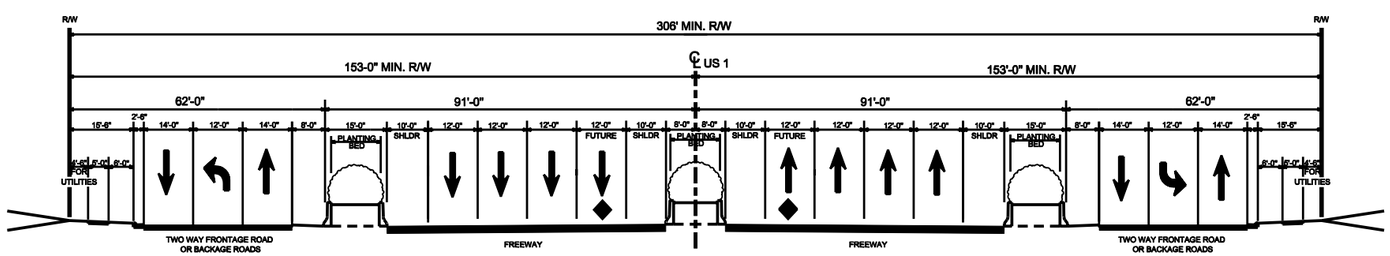
Alternative III-A
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-2
Sheet 3 of 10





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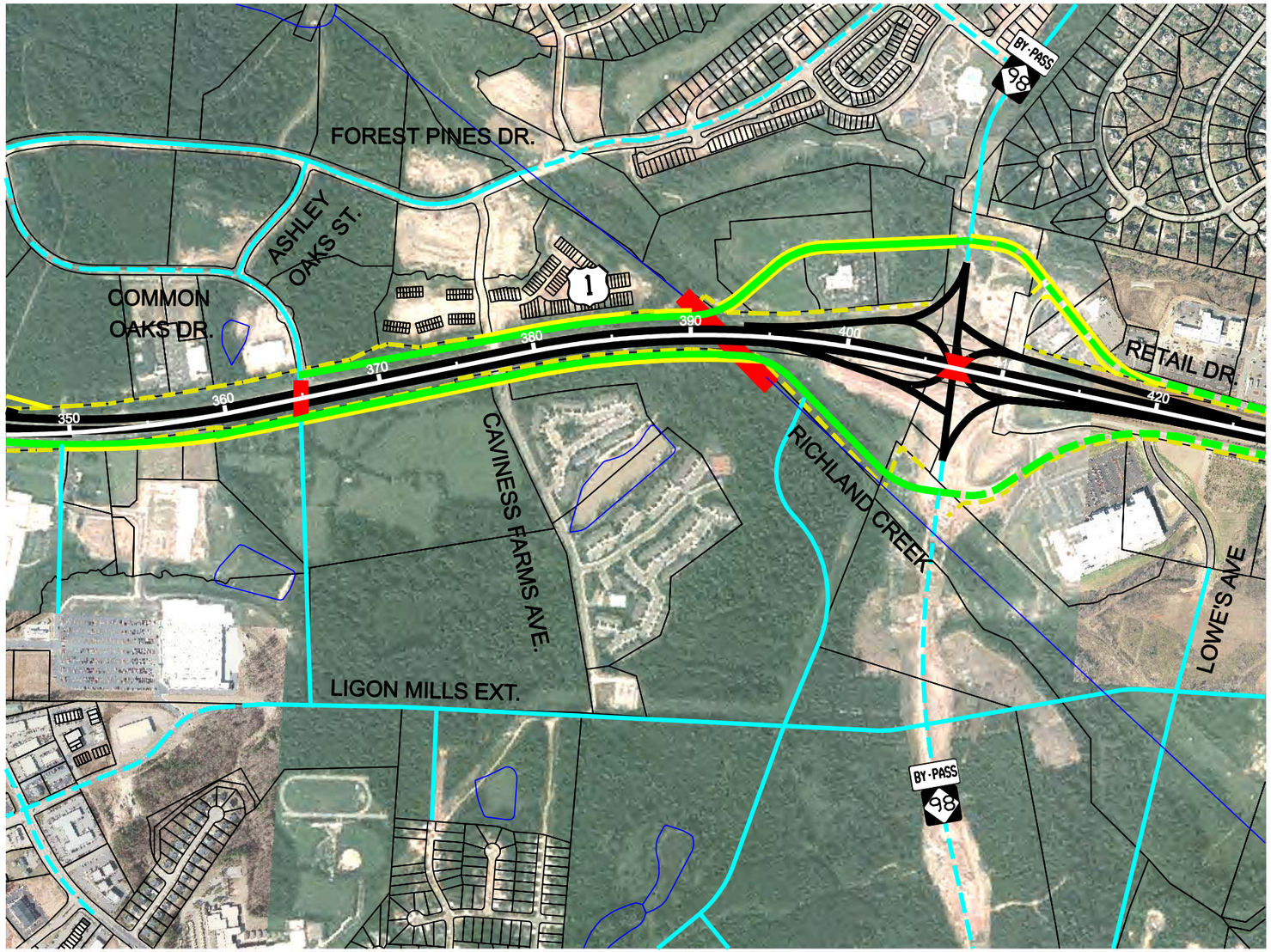
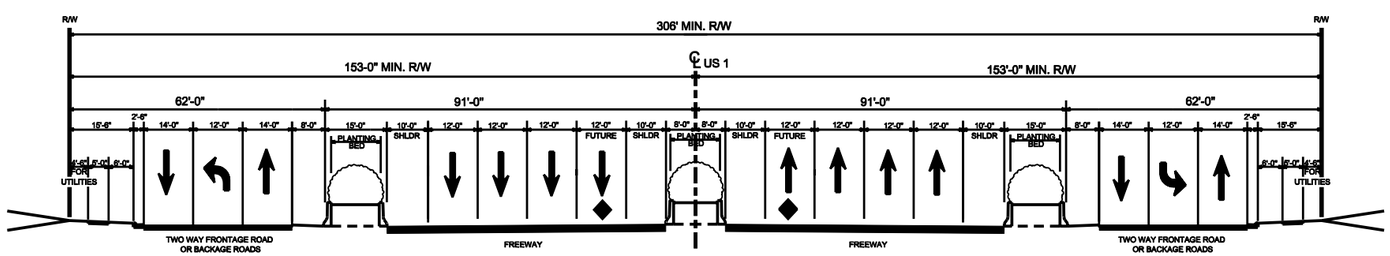
PHASE 3 ANALYSIS

Alternative III-A
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-2
Sheet 4 of 10





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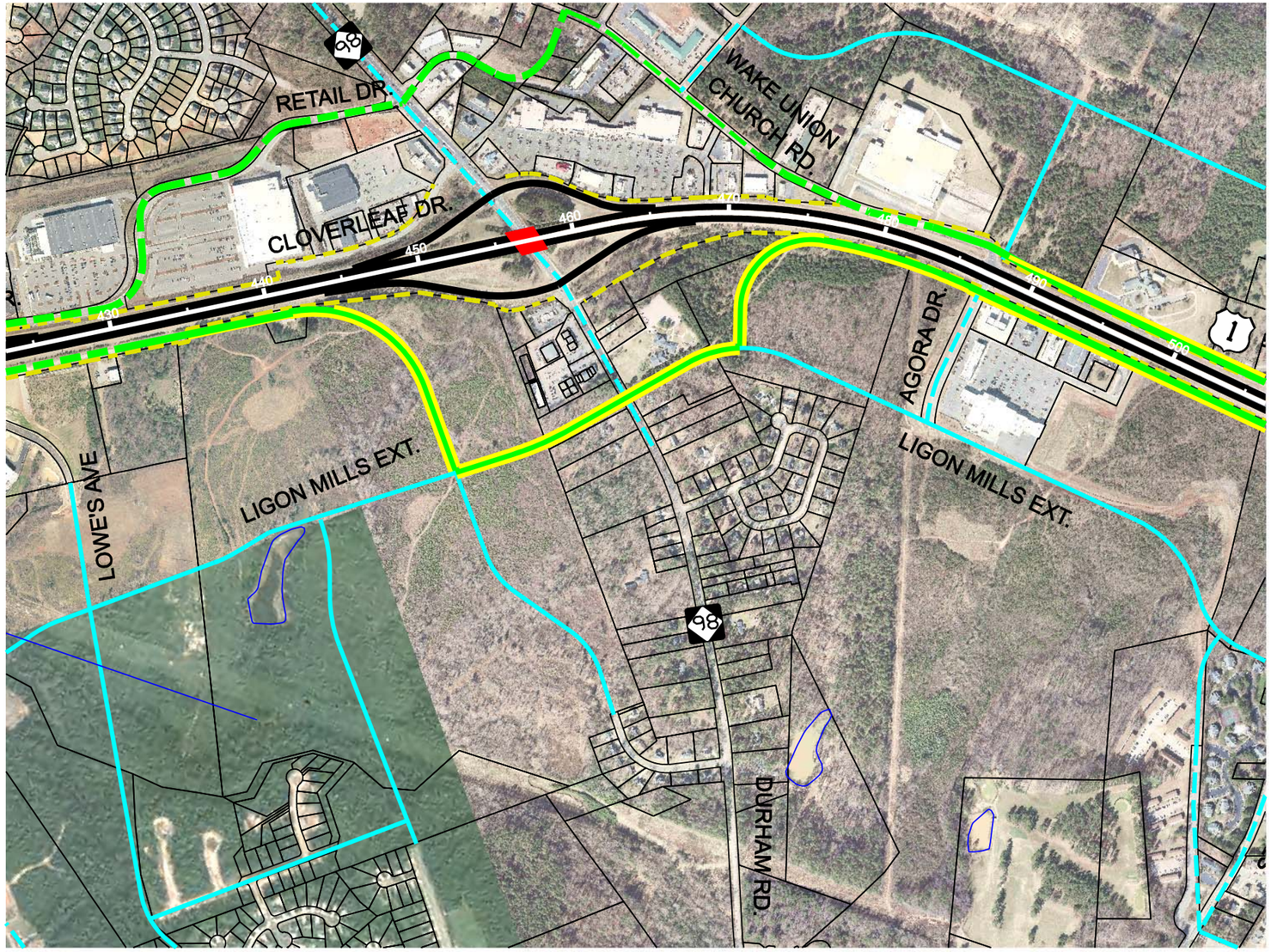
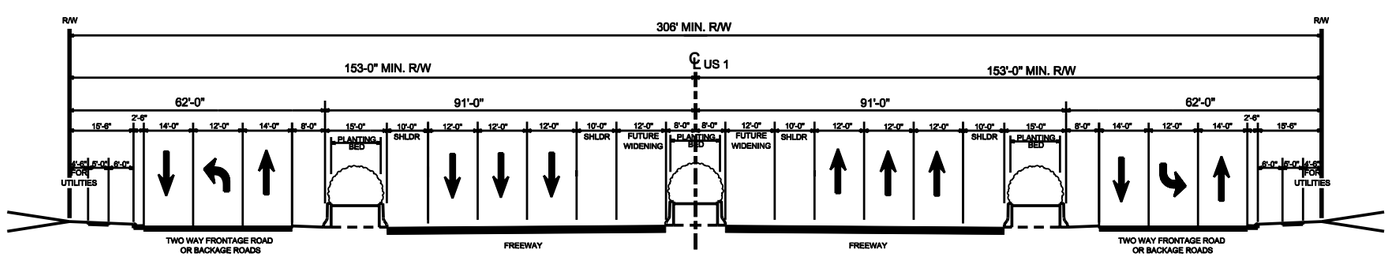
Alternative III-A
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-2
Sheet 5 of 10





TYPICAL SECTION - Between NC 98 (Durham Rd) and US 1A, North (Park Ave.)

3 GENERAL PURPOSE LANES WITH TWO-WAY FRONTAGE OR BACKAGE ROADS

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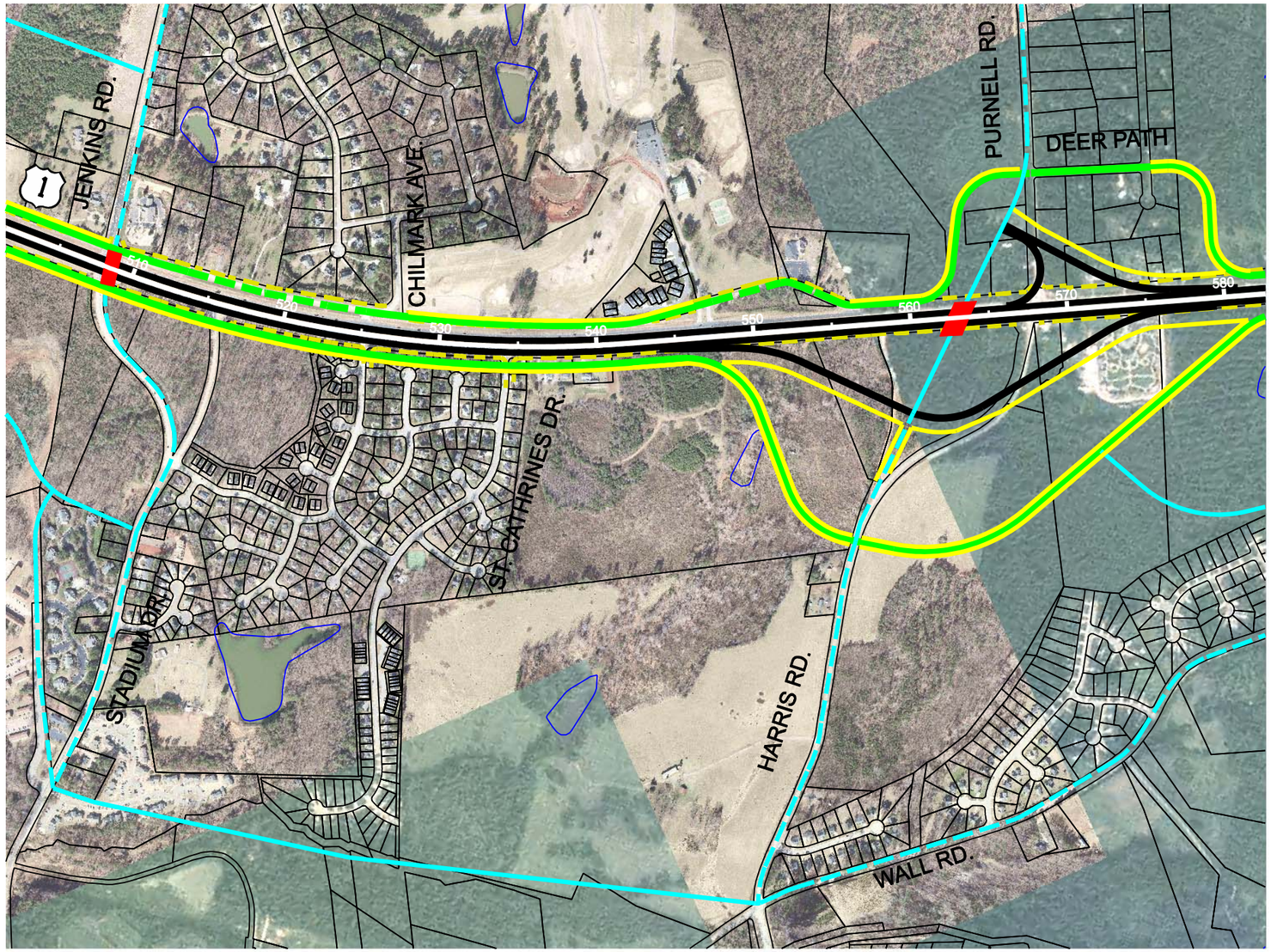
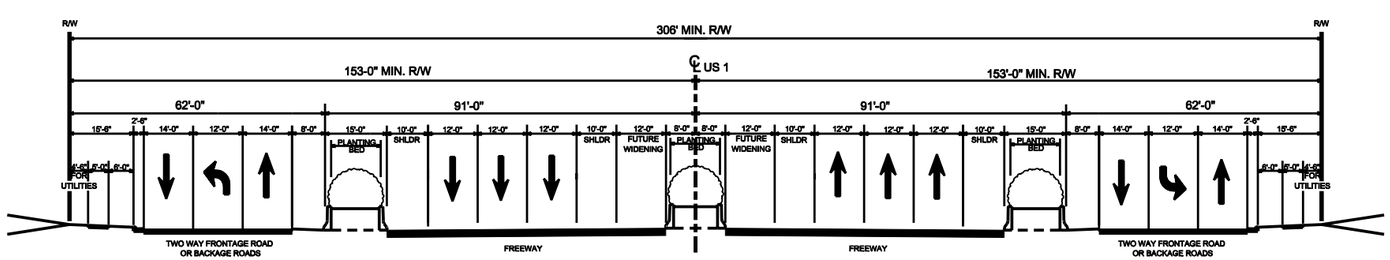
PHASE 3 ANALYSIS

Alternative III-A
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-2
Sheet 6 of 10





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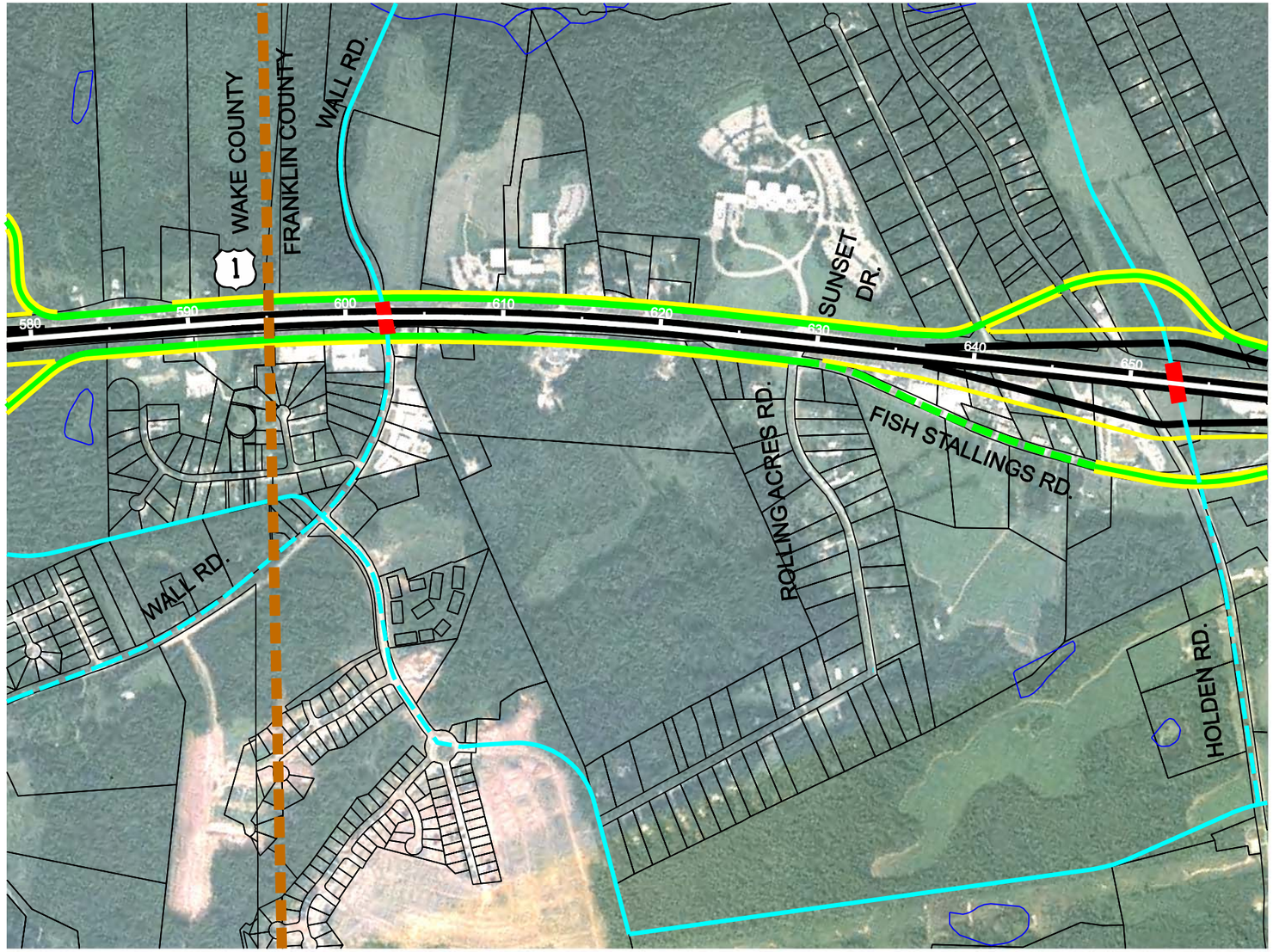
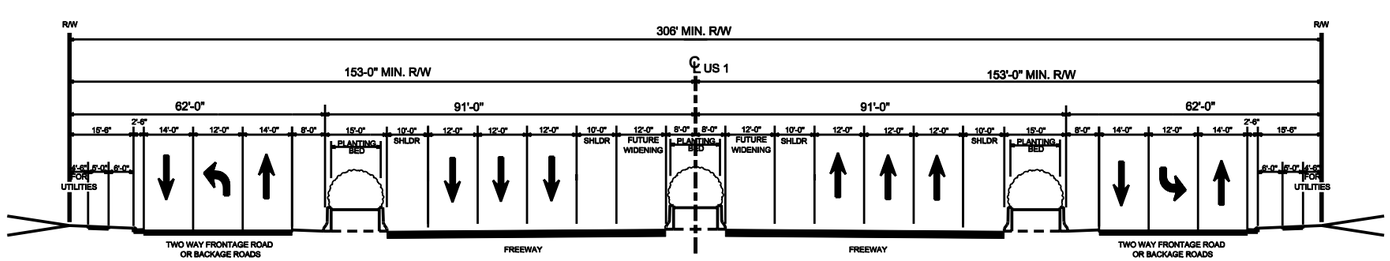
PHASE 3 ANALYSIS

Alternative III-A
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-2
Sheet 7 of 10





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Feet

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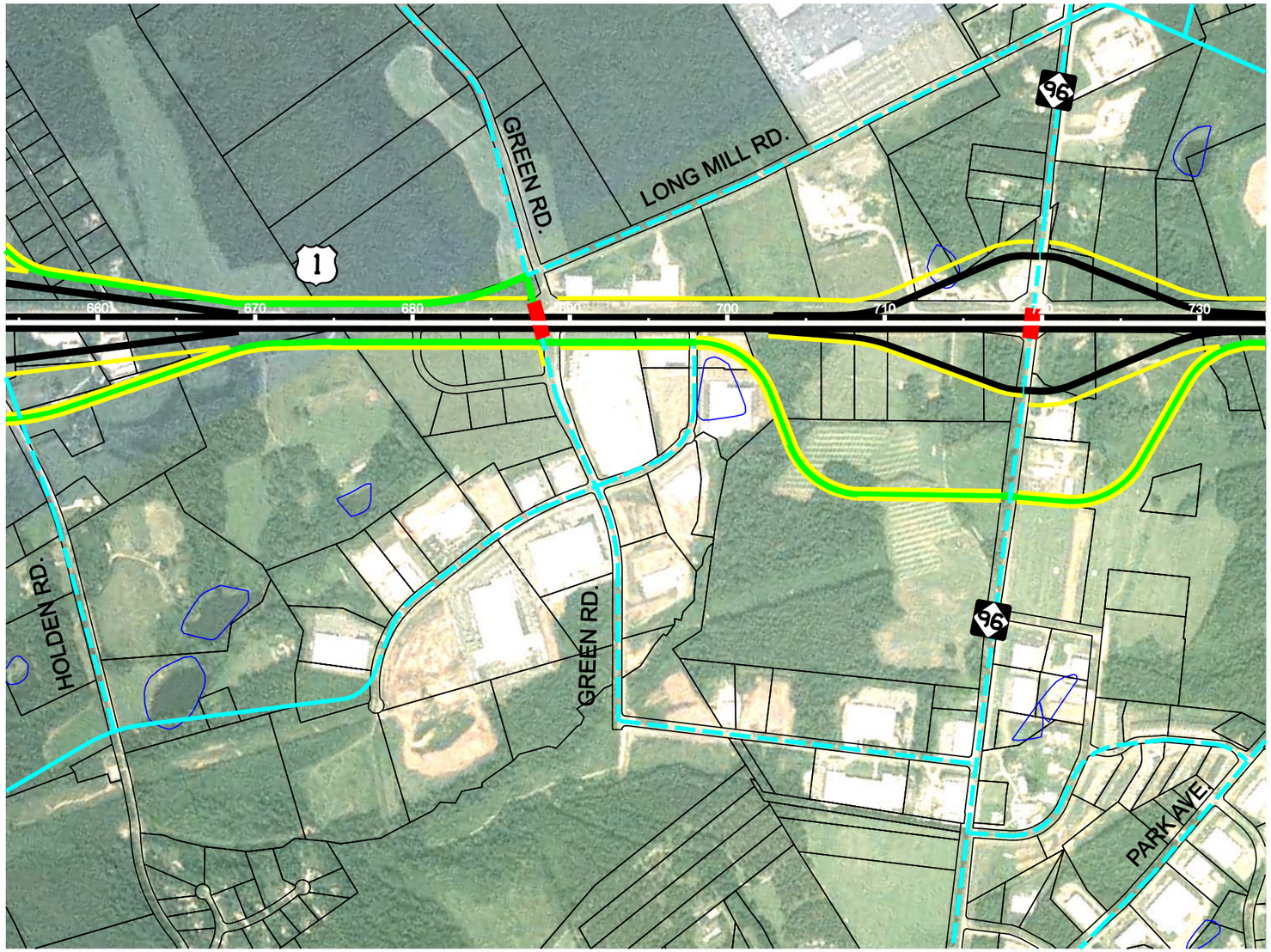
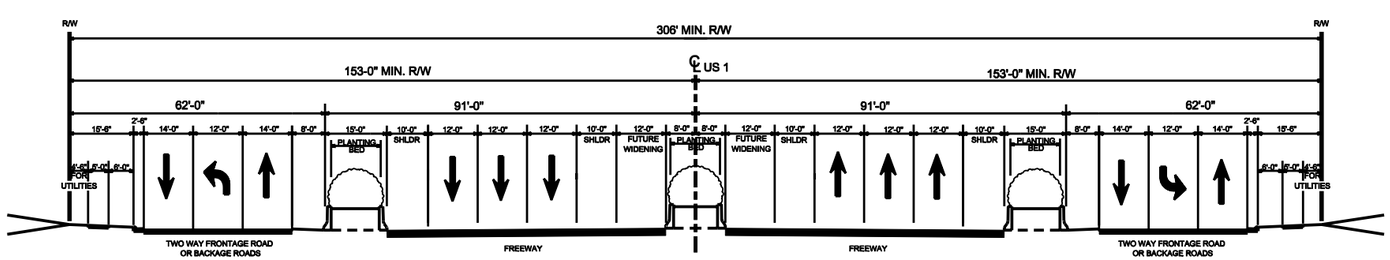
PHASE 3 ANALYSIS

Alternative III-A
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-2
Sheet 8 of 10





TYPICAL SECTION - Between NC 98 (Durham Rd) and US 1A, North (Park Ave.)

3 GENERAL PURPOSE LANES WITH TWO-WAY FRONTAGE OR BACKAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES AND OUTSIDE PLANTING BEDS WILL NOT BE CONTINUOUS

LEGEND

- EXISTING R/W
- PROPOSED R/W
- CSX RR
- STREAMS, RIVER, WETLANDS
- PARCEL BOUNDARY
- PROPOSED FREEWAY IMPROVEMENTS
- PROPOSED TWO -WAY FRONTAGE ROADS
- EXISTING TWO -WAY FRONTAGE ROADS
- EXISTING LOCAL ROADS
- PROPOSED LOCAL ROADS
- PROPOSED STRUCTURES

0 400 800 1600
Feet

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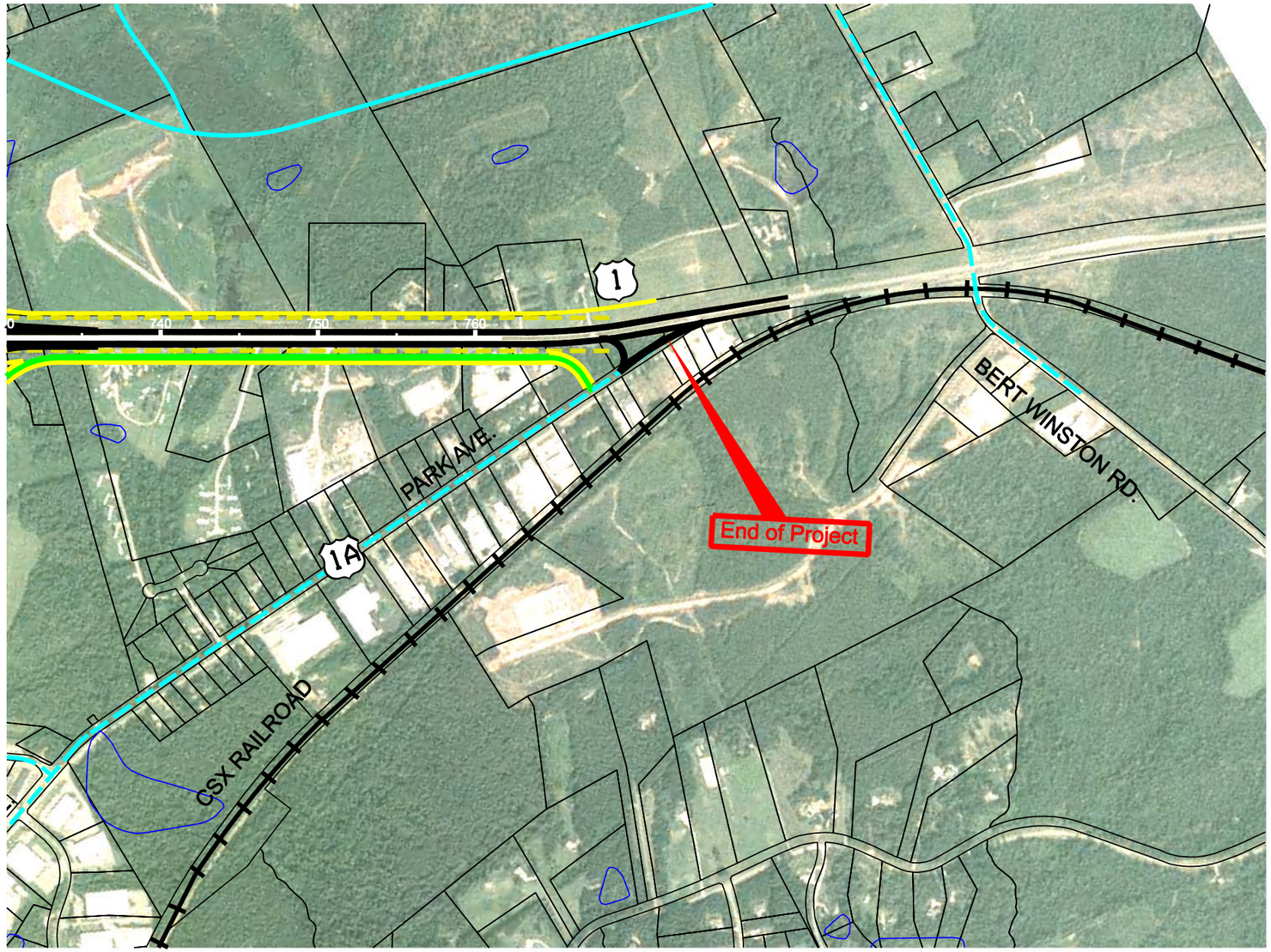
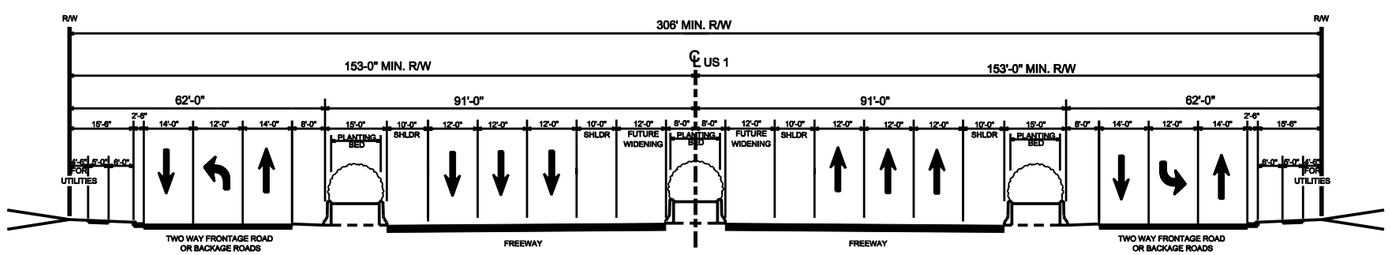
PHASE 3 ANALYSIS

Alternative III-A
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-2
Sheet 9 of 10





TYPICAL SECTION - Between NC 98 (Durham Rd) and US 1A, North (Park Ave.)

3 GENERAL PURPOSE LANES WITH TWO-WAY FRONTAGE OR BACKAGE ROADS

NOTE: R/W WILL INCREASE AT INTERCHANGES AND OUTSIDE PLANTING BEDS WILL NOT BE CONTINUOUS

LEGEND

- EXISTING R/W
- PROPOSED R/W
- CSX RR
- STREAMS, RIVER, WETLANDS
- PARCEL BOUNDARY
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0 400 800 1600
Feet

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PHASE 3 ANALYSIS

Alternative III-A
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-2
Sheet 10 of 10

One intersection is designed for southbound to eastbound US 1 traffic (existing signal location). The second at-grade signalized intersection will be implemented to accommodate the future eastbound I-540 traffic to either turn left or right onto US 1. The conceptual design as shown in Figure 6-2 eliminates these two at-grade signalized intersections and therefore provides for a full directional interchange. The close proximity of the proposed Gresham Lake interchange will require a southbound collector-distributor (C-D) road to be added north of Gresham Lake Road to south of I-540. Southbound US 1 traffic desiring to access Gresham Lake Road and I-540 would exit together in advance of Gresham Lake Road. Gresham Lake Road traffic wanting to access I-540 and US 1 southbound would also use this C-D road. The C-D would be place approximately in the same location of the existing two-way frontage road, west of US 1. To eliminate the at-grade signalized movement for I-540 eastbound to southbound (at US 1 main lanes); another C-D is planned. A westbound I-540 C-D road will be needed to provide for this movement. The C-D road will begin as the exit ramp for westbound I-540 wanting to access US 1, continues across US 1 (on the existing northern structure at US 1) and ties back into westbound main lane traffic before the CSX railroad crossing. Should this conceptual design be implemented the I-540 / US 1 location will become a three-level full directional interchange.

The next proposed interchange is at Gresham Lake Road. The oversight team requested a full access interchange at this location. The distance between I-540 and Gresham Lake Road is approximately 2,400 feet. A full access interchange at Gresham Lake Road coupled with the close proximity of I-540 required that these two interchanges be linked together using C-D roads. Gresham Lake Road is planned to be relocated approximately 600 feet to the north of its existing intersection with US 1. Existing right-of-way has been secured for the Gresham Lake Road relocation and extended to the east and connected to Triangle Town Boulevard. Both Gresham Lake Road and Triangle Town Boulevard are planned as minor east-west thoroughfares in Raleigh's Thoroughfare Plan. Also shown in the City of Raleigh's Comprehensive Plan (Northeast Regional Center Plan, dated March 2006) is the Sumner Boulevard extension under I-540 and connecting to Overlook Road and Gresham Lake Road. Once these local roads are constructed in the northern quadrants of the I-540 interchange a local loop roadway system will exist, providing important access to parcels surrounding the US 1/I-540 interchange. The proposed US 1 improvements and local street system make this area a prime target for higher density and possible transit-oriented development.

During the study period the Cheviot Hills Golf Course wite was sold and the developer is currently developing a master plan for the site. The LPA indicates maintaining the existing right of way on the east side of US 1 due to the existing development along US 1; therefore the US 1 alignment is proposed to shift to the west along the Cheviot Hills Golf Course site. Both two-way frontage and backage (collector) roads are proposed through the golf course site. The oversight team recommended a new east-west greenway crossing over US 1 (new grade-separation), which is proposed to connect to Sims Creek Road. This new crossing is referred to as the Perry Creek Greenway which is included on Raleigh's Proposed Bikeways and Greenways Plan.

At the Durant Road interchange intersection a tight urban diamond is recommended, due to the Mallinckrodt development complex located in the northwest quadrant. The US 1 alignment is shifted to the west to maintain the existing right of way line on the east side and to facilitate construction of the new interchange while maintaining traffic on the existing roadway. Two-way frontage roads extending from Gresham Lake Road to Durant Road on the west and Perry Creek Road on the east side of US 1. The frontage roads cross Durant and Perry Creek Roads approximately 1,500 feet from the proposed centerline of US 1. The frontage road to the east of US 1 takes the form of a backage road using Sims Creek Road and Wadford Drive. Both the main lanes and frontage roads cross the Neuse River on new wider structures which also provide for the Mountains-to-Sea Trail to cross below.

At Burlington Mills Road several interchange configurations where considered. A tight urban diamond was ultimately selected to conserve right-of-way at this location. The US 1 alignment at Burlington Mills Road was re-aligned to the east to hold the existing right of way line on the west side. This shift in alignment provides the opportunity to construct the new US 1 overpass while maintaining traffic on existing alignment. A transit station located on the west side of US 1 is also proposed. Burlington Mills Road would provide excellent access to an initial commuter bus and future rail transit station; the close proximity of both US 1 and the CSX railroad make it a logical location for a transit park-and-ride facility. This area, known as the Riderplace Commerce Center, also provides an opportunity for transit-oriented development. The US 1 main lanes and frontage roads would cross over the CSX Railroad on new structures.

At Height Lane a grade-separated crossing over US 1 is proposed. The new frontage roads would be constructed along the same alignment as the existing frontage roads in this area.

At South Main Street/New Falls of the Neuse Road the proposed single point interchange is recommended to be one of the first interchanges constructed along the corridor due to the high traffic volumes and corresponding traffic congestion associated with both of these roadways. The US 1 alignment is proposed to shift to the west due the existing development adjacent to the existing eastern right-of-way line. US 1 is recommended to go over New Falls of the Neuse due to the existing grades at this location.

A new grade-separation is proposed at Common Oaks Drive to cross over US 1 and provide east-west connectivity to the community. A large school campus (containing two schools) is currently being constructed along Forest Pines Drive near this proposed crossing. It is also recommended Common Oaks Drive be extended east to connect to the future Ligon Mills extension planned by the Town of Wake Forest; however an existing stream and wetlands will need to be crossed.

At US 1 and NC 98 Bypass a new single point urban interchange was completed in May 2006. The western extension of the NC 98 Bypass, connecting to NC 98 (Durham Road) is planned to be completed by 2012. This new interchange eliminated an at-grade signalized intersection and provided improved access to the surrounding developing area between the Bypass and Durham Road. Retail Drive is an excellent example of an existing frontage/backage road serving a highly developed land use on the west side of US 1. More roadways of this type will be needed in the future as the corridor's land-use develops. Local jurisdictions and NCDOT need to work together as the frontage/backage road system is planned and implemented along the corridor.

At the Stadium Drive/Jenkins Road a new grade-separated overpass is proposed intersection. Again it is proposed the two-way frontage roads intersect at the same grade as the overpass to provide east west connectivity. All the new grade separations along the corridor should be designed to emphasize the movement of pedestrians and bicycles across US 1.

A partial clover leaf interchange is recommended at US 1 and Harris Road/Purnell Road. To minimize right of way impacts to existing development a partial cloverleaf was selected as well as realigning Harris Road/Purnell Road to the south. The realignment of this cross street will benefit the constructability of the proposed interchange allowing motorists to use the existing signalized intersection while the new interchange is being constructed.

At Wall Road in Franklin County, a new grade separated overpass is proposed. In their long-range plan Franklin Country has included an extension of Wall Road to connect with Sid Mitchell Road. The frontage roads are recommended to intersect at the same grade as the overpass to provide east-west connectivity across US 1.

At the US 1 and Holden Road intersection to reduce the impacts of existing development, an urban diamond interchange is recommended. The alignment of Holden Road is proposed to shift to the north to

lessen the impacts to existing residential development on the west side of US 1. This will also aid in the constructability of this new interchange. The two-way frontage road on the eastern side of US 1 would align with Fish Stallings Road.

At Green Road a new grade separation roadway going over US 1 is recommended. This location is approximately half way between Holden Road and NC 96. This crossing would provide for multi-modal access across US 1 by intersection the frontage roads at the same grade as the overpass.

NC 96 is a primary highway on NCDOT's and Franklin County's Roadway Plans. The area around this intersection is rapidly changing to a higher density land use. To support the potential higher density development the access to US 1 is recommended to be upgraded to include a rural diamond interchange and frontage/backage road system. One concept studied is to convert the existing Long Mills Road to a backage road to sever and provide access to the existing developments facing US 1. A new backage road is proposed between NC 96 and Bert Wilson Road to provide access to parcels on the west side of US 1 between these two east-west roads.

The northern project limit is where US 1 intersects with Park Avenue (US 1A North). Improvements identified at this intersection include closing the median opening and providing right-in and right-out traffic movements for the northbound lanes of US 1. Due to the short distance between Bert Wilson Road and Park Avenue intersections, this segment of US 1 will need to be studied in further detail.

6.2 Transit LPA Elements

The locally preferred alternative for transit in the US 1 corridor focuses on the initial development of limited premium bus service (in the form of commuter bus service) to downtown Raleigh and the Research Triangle Park. As development density increases in the US 1 corridor over time, the commuter bus service could be transformed into more of a bus rapid transit (BRT) operation, still with limited stops given the conversion of US 1 to a freeway facility south of NC 98, but with improved service frequency and hours of operation. Also over time added fixed-route bus service on cross streets in the US 1 corridor would be provided as development density increases and the street network develops. Continued paratransit service will be provided to serve lower density areas and to serve the elderly and handicapped who can't use regular fixed-route service. The plan calls for the development of key transit stations along the US 1 corridor south of NC 98, with smaller park-and-ride facilities developed initially to support the commuter bus service and to encourage added formation of carpools and vanpools. As development increases in the future, these park-and-ride facilities will be expanded as needed, potentially becoming structured facilities perhaps tied to adjoining transit-oriented development.

In the long-term, the configuration of the transit system in the US 1 corridor will be influenced by whether or not regional rail is extended into the corridor. If regional rail is extended north of Spring Forest Road, a logical terminus would be at the NC 98 Bypass on the south side of Wake Forest, with an intermediate station at Burlington Mills Road to intercept US 1 traffic from the north. With regional rail service, the bus service along US 1 should be viewed as a support service to regional rail, serving areas between the regional rail stations, with greater service frequency and hours of operation. This could take the form of bus rapid transit service along US 1 and/or local bus service on the US 1 frontage roads.

Figure 6-3 illustrates the recommended transit service concepts for the US 1 corridor. These proposed transit improvements should be coupled together with the highway improvement as identified in the LPA. Table 6-2 identifies the different access modes associated with the proposed premium bus service along the US 1 corridor.

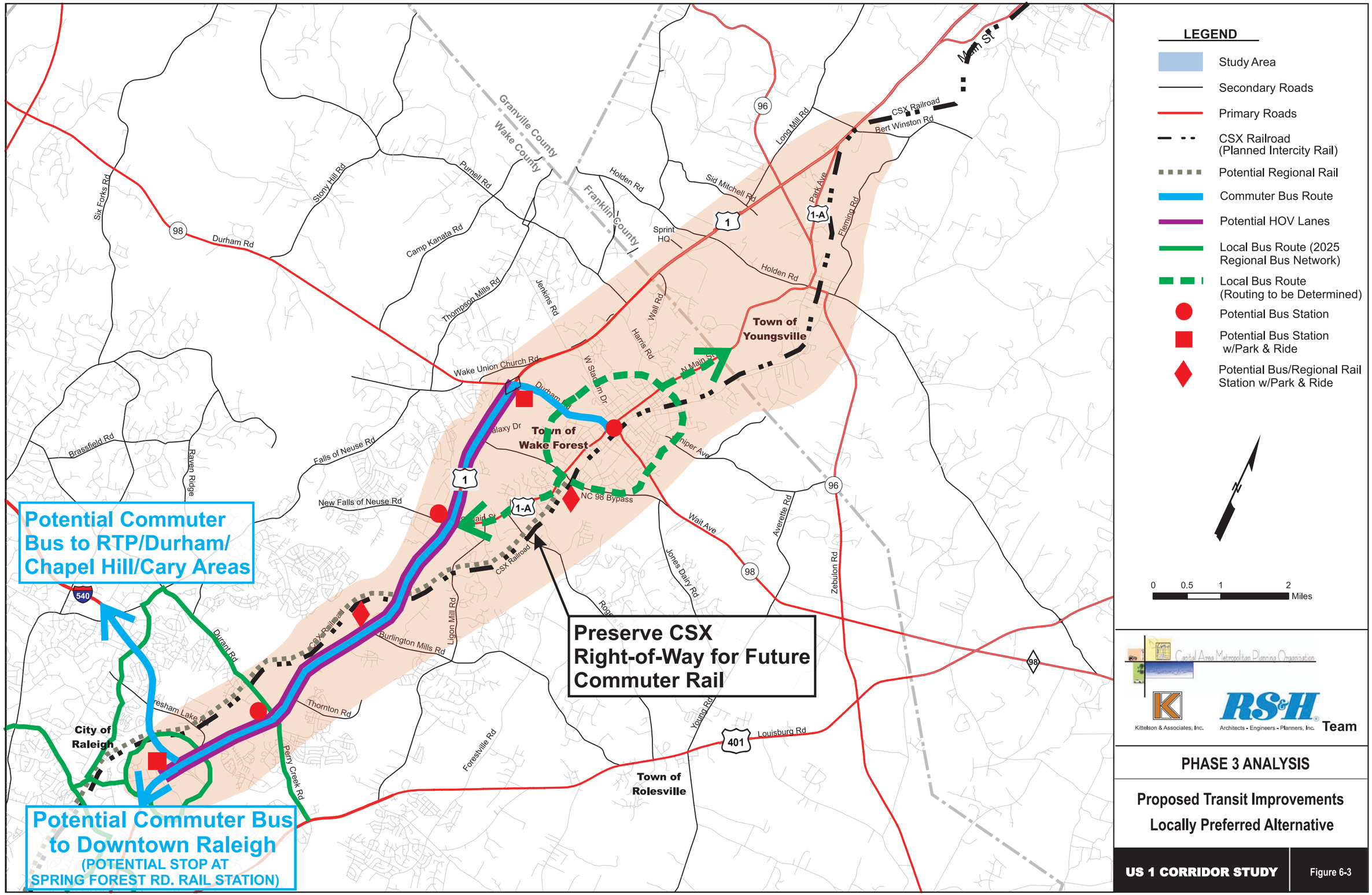
Table 6-2
Transit Station Access Mode Assumptions

Station Location	Transit Station Access Mode										
	Short-Term					Long-Term					
	Commuter Bus (to downtown Raleigh/ RTP)	Local Bus	Park-n-Ride	Kiss-n-Ride	Ped/ Bike Access Locally	Commuter Bus (to RTP)/BRT (to downtown Raleigh)	Local Bus	Park-n-Ride	Kiss-n-Ride	Ped/ Bike Access Locally	Commuter Rail[6]
Downtown Wake Forest	X	X[1]		X	X	X	X		X	X	
US 1/NC 98	X		X[3]	X	X[4]		X	X[5]	X	X	
US 1/New Falls of the Neuse Rd.	X				X[4]	X	X		X	X	
US 1/Burlington Mills Rd.	X		X[3]	X	X[4]	X	X	X[5]	X	X	X
US 1/Durant Rd.	X	X[2]		X	X[4]	X	X		X	X	
US 1/I-540	X		X[3]	X	X[4]	X	X	X[5]	X	X	
US 1A/ NC 98 Bypass							X	X[5]	X	X	X

[1] Assumes new local circulator bus developed initially to serve Wake Forest area
[2] Existing TTA route
[3] No. of parking spaces initially 100-200 spaces
[4] Extent of pedestrian/bike access dependent on level of urban development around station
[5] Larger number of parking spaces required than in short term, could range from 300-500+ spaces
[6] Not assumed to be given, pending status of development of commuter rail line south of Spring Forest Rd. as currently planned

6.2.1 Commuter Bus Service/Bus Rapid Transit

Commuter bus has been identified as the initial premium bus service in the US 1 corridor, oriented to weekdays. Two initial commuter bus routes would be provided; with both originating in the Town of Wake Forest at a future location within or close to the Town's central business district. One route would operate from Wake Forest to downtown Raleigh and the other from Wake Forest to the Research Triangle Park Transit Center. Both routes would operate along NC 98 west to US 1, then south on US 1 to I-540. From that point, the service to downtown Raleigh would continue via Capital Blvd., and the RTP service would use I-540. Each route would operate with 20-30 minute frequency during weekday peak periods, with potential limited added runs during the off-peak period.


LEGEND
Study Area
Secondary Roads
Primary Roads
CSX Railroad (Planned Intercity Rail)
Potential Regional Rail
Commuter Bus Route
Potential HOV Lanes
Local Bus Route (2025 Regional Bus Network)
Local Bus Route (Routing to be Determined)
Potential Bus Station
Potential Bus Station w/Park & Ride
Potential Bus/Regional Rail Station w/Park & Ride
0 0.5 1 2 Miles
Potential Commuter Bus to RTP/Durham/ Chapel Hill/Cary Areas
Potential Commuter Bus to Downtown Raleigh
(POTENTIAL STOP AT SPRING FOREST RD. RAIL STATION)
Preserve CSX Right-of-Way for Future Commuter Rail
Town of Youngsville
Town of Wake Forest
Town of Rolesville
City of Raleigh
Granville County
Wake County
Franklin County
Durham Rd
Six Forks Rd
Stony Hill Rd
Purnell Rd
Camp Kanata Rd
Thompson Mills Rd
Jenkins Rd
Holden Rd
Sid Mitchell Rd
Long Mill Rd
Sprint HQ
Wall Rd
Harris Rd
Wake Union Church Rd
W Stadium Dr
N Main St
Brassfield Rd
Raven Ridge
Falls of Neuse Rd
New Falls of Neuse Rd
NC 98 Bypass
Wait Ave
Averette Rd
Jones Dairy Rd
Zebulon Rd
CSX Railroad
Bert Winston Rd
Park Ave
Fleming Rd
Burlington Mills Rd
Ligon Mill Rd
Durant Rd
Thornton Rd
Perry Creek Rd
Forestville Rd
Young Rd
Louisburg Rd
Capital Area Metropolitan Planning Organization
Kittelson & Associates, Inc.
RS&H Architects - Engineers - Planners, Inc.
Team
PHASE 3 ANALYSIS
Proposed Transit Improvements
Locally Preferred Alternative
US 1 CORRIDOR STUDY
Figure 6-3

As mentioned previously, as development density increases in the US 1 corridor, the commuter bus service could be transformed into more of a BRT operation, still with limited stops, but improved service frequency and hours of operation, including weekend service.

Initially, the commuter bus service would operate in the general traffic lanes along US 1, with bus signal priority or queue jumps desirable at the signalized intersections. As US 1 is converted to a freeway facility, the commuter bus or BRT service at that time could operate along the freeway's mainlanes or outside HOV lanes (on the outside freeway shoulders). Operating the bus service in the inside HOV lanes would be difficult as the buses would have to weave in and out of the lanes to access the intermediate bus stations, assuming they would be developed to the outside of the roadway. It has been assumed that either the development of "Tee" ramps or median bus stations would be too costly in terms of added right-of-way and construction costs. With the development of two-way frontage roads on both sides of US 1, there is another option of operating the commuter bus/BRT service on one of the frontage roads. Table 6-2 summarizes the impacts associated with the different potential transit operating configurations. Further assessment of these options will be conducted in the future associated with a final assessment of whether HOV lanes will be incorporated into the ultimate cross section of US 1 south of NC 98, and revisions to the premium BRT routing associated with freeway development.

Transit stations associated with the commuter bus service would be provided at the following locations:

- NC 98
- New Falls of the Neuse Road
- Burlington Mills Road
- Durant Road
- I-540

At the NC 98, Burlington Mills Road, and I-540 stations, park-and-ride facilities are proposed to be shared by commuter bus users and carpool/vanpool users. The park-and-ride lots would initially be surface lots with 100-200 spaces. Potential sites for each park-and-ride are as follows:

- NC 98 – east of US 1, either the southeast or northeast quadrant of the interchange
- Burlington Mills Road – west side of US 1 north of Burlington Mills Road and adjacent to the CSX Railroad
- I-540 – in the southwest quadrant of the US 1 and I-540 interchange

Table 6-3
Impact of Premium Bus Routing Options on Transit Operations

Premium Bus Routing	Evaluation Criteria		
	Travel Speed	Conflicts with General Traffic	Access to Transit Stations
Median HOV Lanes	- (delay due to weaving across general traffic lanes to access transit stations)	- (buses would conflict with general traffic to access stations)	- (diversion to access transit stations from median/stations on both sides of roadway or off-roadway diversion to single station)
Outside HOV Lanes	+ (separated from general traffic)	0 (potential conflicts with general traffic at interchange ramps)	0 (stations on both side of roadway, but less off-roadway diversion)
Freeway Shoulder	0 (limited to certain speed above adjacent general traffic lanes)	0 (potential conflicts with stopped vehicles/with general traffic at interchanges)	0 (stations on both side of roadway, but less off-roadway diversion)
Frontage Road	- (mixed traffic operation/added signals/potential out-of-direction routing)	- (mixed traffic operation)	+ (ability to serve transit station without diversion if station located along particular frontage road)

Bus stations initially should be developed on both sides of the roadway, farside of intersections where signal priority is provided and nearside where queue jumps are preferable to mainline signal priority. As US 1 is converted to a freeway facility south of NC 98, the transit stations at a particular intersection could either be moved to the freeway ramps or to one side of the roadway. Having the bus station on the freeway ramps would minimize bus diversion to a consolidated station on one side of the roadway; but would require an overall increase in pedestrian walking time to access the stations. A further decision on the ultimate location of transit stations in the corridor will need to be conducted associated with the final determination on the need for and placement of HOV lanes in the corridor (including potential bus use of the freeways' outside shoulders).

6.2.2 Local Transit Service

Improved local fixed-route bus service in the US 1 corridor should be developed over time as development density increases and more of a local street system with improved connectivity is developed. Fixed-route service improvements should focus on the following:

- New circulator serving the central Wake Forest area
- Added east-west routes along new/extended arterials serving designated transit stations in the US 1 corridor south of NC 98
- Potential added local bus route on US 1 north of NC 98

New fixed-route service will be a combination of both TTA and CAT routes, with the CAT service area impacted by the extent of further City annexation into the area. Service frequency should be at least every 30 minutes during weekday peak periods, with extended service throughout the weekday and on weekends, with at least 60-minute headways. Further transit service planning to tie down a refined local bus service plan should be undertaken separate from this study.

6.2.3 Regional Rail/Southeast High-Speed Rail

If the development density in the US 1 corridor increases in the future to support regional rail, and assuming regional rail is developed in the initially planned Durham to Raleigh segment, then expansion of regional rail into the US 1 corridor should be considered in the longer-term. A logical terminus for regional rail in the corridor would be in the Wake Forest area. Given the limited right-of-way in the CSX corridor through the downtown Wake Forest area (80 feet), and that CSX is requiring that regional rail tracks be developed alongside the current freight rail tracks, there will not be an opportunity to extend regional rail to downtown Wake Forest without extensive right-of-way impact. As such, terminating the service south of downtown Wake Forest should be considered, with the ideal location being in the vicinity of the NC 98 bypass crossing of the CSX corridor. At this location, some park-and-ride provision as well as fixed-route bus access should be provided.

A second regional rail station in the corridor should be developed in the vicinity of the US 1 and Burlington Mills Road intersection. This is where the CSX tracks are close to US 1, and US 1 traffic from the north can be easily diverted to a park-and-ride serving a regional rail station at this location.

Irrespective of a potential expansion of regional rail into the US 1 corridor, there are plans to eventually develop an intercity high-speed rail line from Richmond, Virginia to Charlotte, North Carolina along the CSX corridor through the US 1 area. There has been discussion of having an intercity rail station to serve the Town of Wake Forest area, and the best possible locations for such a station would either be at the NC 98 Bypass or US 1 and Burlington Mills Road intersection.

6.3 Pedestrian and Bicycle Facilities

Within the US 1 corridor there are various existing and proposed pedestrian and bicycle facilities. Figure 6-4 illustrates existing and proposed bikeways/greenways in the study area. This figure includes the results of CAMPO's "Draft" Comprehensive Plan (dated August 2006) which is a compilation of local and regional greenway and bikeway plans in the region.

Future greenway and bikeway plans along the corridor include the following primary features:

- Rerouting the Mountains to Sea Trail to cross beneath U S1 at the Neuse River crossing
- Constructing the Perry Creek Greenway
- Constructing the Richland Creek Greenway
- Various new on-road and off road bicycle routes and greenways in the vicinity of the US 1 corridor, including the Town of Wake Forest, Wakefield and the Triangle Town Center Mall
- Frontage and backage roads along US 1 between I-540 and Park Avenue (US 1A) in Franklin County with widened outside lanes for bicycles and sidewalks for pedestrians

Enhanced pedestrian and bicycle connections are suggested to be maintained across the US 1 Corridor at the seven proposed grade-separated crossings, located at the Perry Creek Greenway, the Neuse River (Mountains-to-Sea Trail), Height Lane, Common Oaks Drive, the Richland Creek Greenway, Jenkins Road/Stadium Drive, Wall Road and Green Road. Pedestrian and bicycle traffic will be able to cross US 1 at the three existing and seven proposed interchanges with US 1. However, grade-separated crossings will generally be more pedestrian and bicycle-friendly than interchanges due to the size of the structure, higher vehicular cross-street volumes and heavy ramp movements associated with entering and exiting traffic from US 1. Therefore pedestrian and bicycle movements should be encouraged and integrated into the design at all the grade-separated crossings except at the CSX railroad.

6.4 Land Use and Economic Development Opportunities

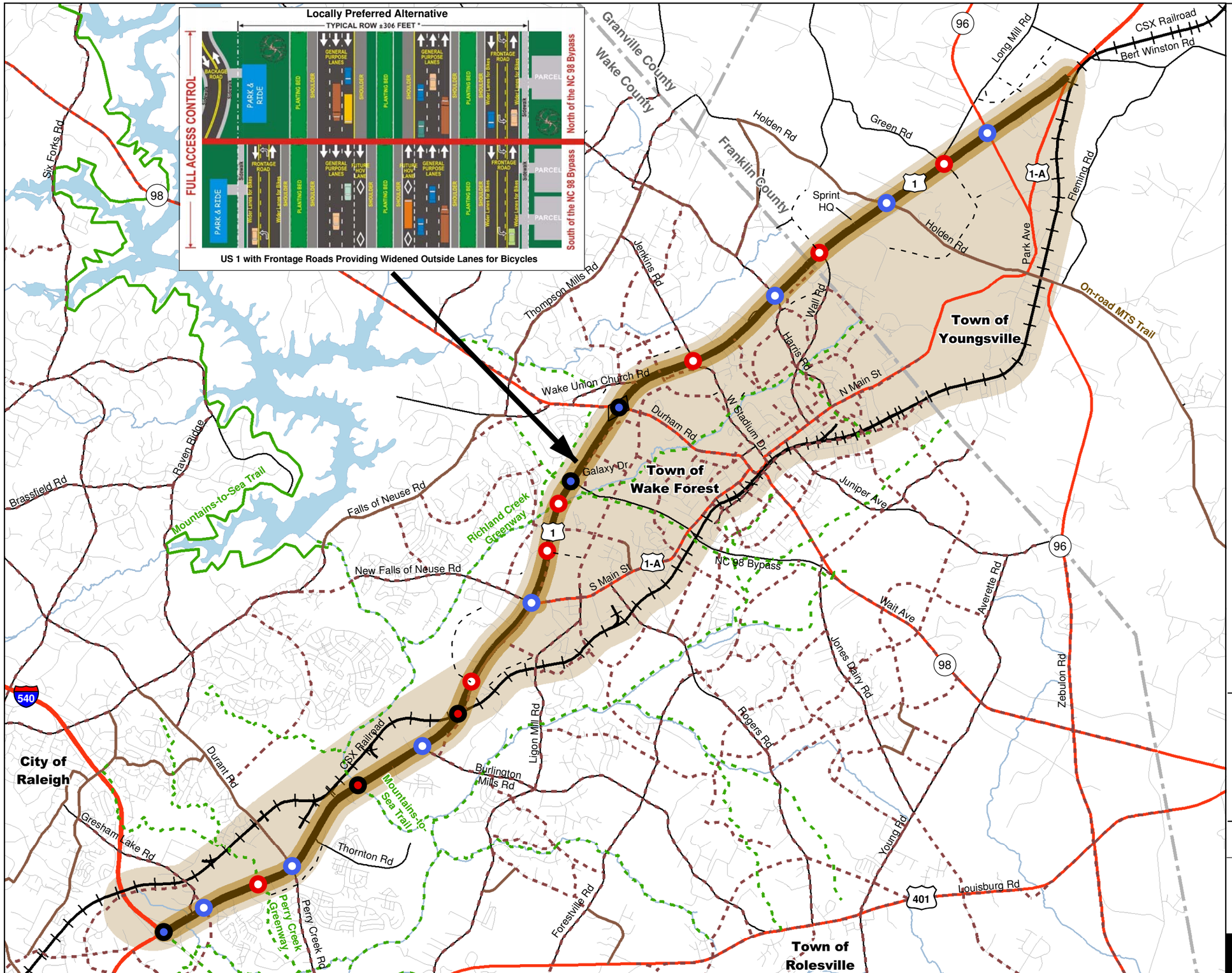
This analysis identified the magnitude of future development/redevelopment opportunities in the US 1 Corridor and the inadequacy in many cases of existing zoning classifications to promote changing notions of mixed-use, multi-modal development. New development will occur over several years, but planning a framework for the integration of land use and transportation improvements is a key objective of the US 1 Corridor Study.

While the scope of the effort completed did not allow for a detailed Future Land Use Plan, key considerations affecting land use and zoning have emerged from the analysis and input of stakeholders and interests. Given the length of the corridor, future land use and development will, as today, likely vary from more intense urban development near I-540 to less intense development and more rural preservation on the periphery of the study area to the north.

6.4.1 Photomontages and Perspectives

Two key linkages between the land use vision and the transportation investment lie in establishing consensual development standards and in promoting an effective secondary, local network of streets, bikeways and pedestrian streetscapes that can accommodate local trips and establish desirable activity centers at key locations. As illustrated in Figure 6-5 (US 1 at Gresham Lake Road) and Figure 6-6 (US 1 at the NC 98 Bypass), the transportation improvements are designed to create a limited access thoroughfare in the southern section of the corridor, complemented by additional grade-separated local roads crossing the corridor. The improvements in this area would accompany development standards of a landscaped, raised median, the development of a network of frontage and "backage" roads that included bike and pedestrian facilities and additional landscaping, the consolidation of curb cuts and access points, and a more urban siting strategy for new development. Specific standards conceptualized include smaller required front setbacks to local roads, the provision of a separation between roadways and pedestrian facilities, the screening of parking and limitations on signage.

The locations of potential activity centers, which can complement existing activity centers at Wakefield, Wake Forest and Youngsville, are determined largely by their access to US 1 and the proposed secondary roadway improvements. In between activity centers, it is likely that an increasing trend of redevelopment of commercial areas into more intensive commercial development and, in many cases, mid-density residential will likely occur.



LEGEND

- Study Area
- US 1 Study Corridor
- Primary Road
- streets selection
- Existing On-Road Bike Route
- Proposed On-Road Bike Route
- Existing Greenway
- Proposed Greenway
- Secondary Road
- Proposed Road
- CSX Railroad
- Rivers & Streams
- Interchange, Existing
- Interchange, Proposed
- Grade Separation, Existing
- Grade Separation, Proposed
- Proposed US 1 with Two-way Frontage Road Improvements

0 0.5 1 2 Miles

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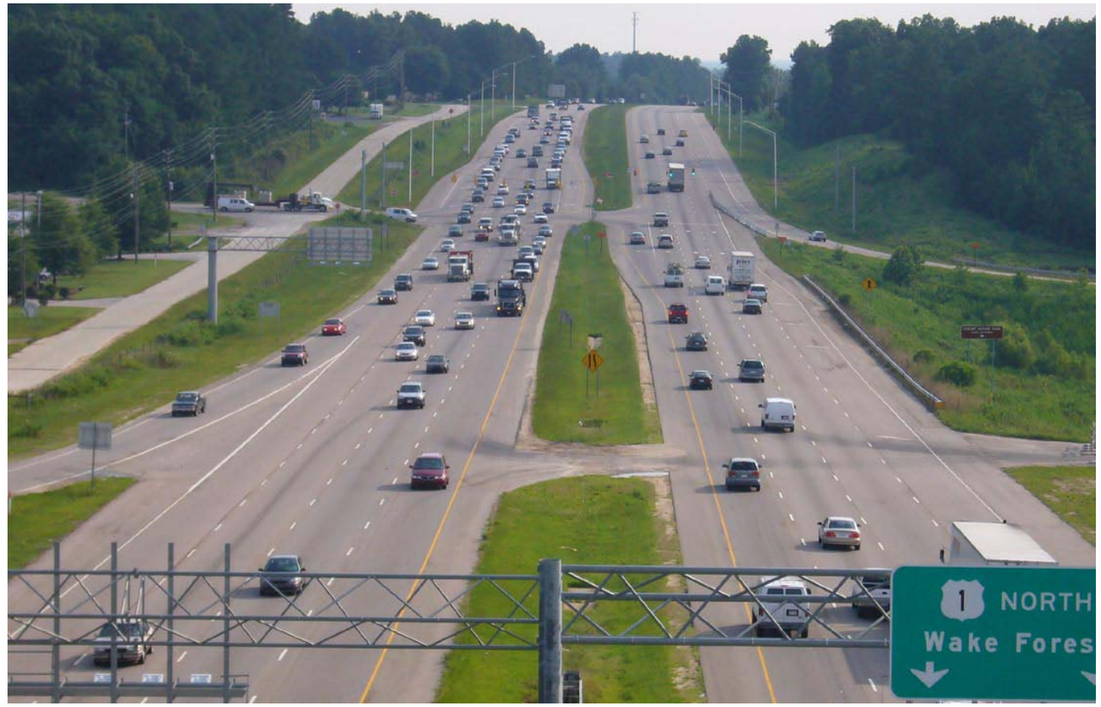
PHASE 3 ANALYSIS

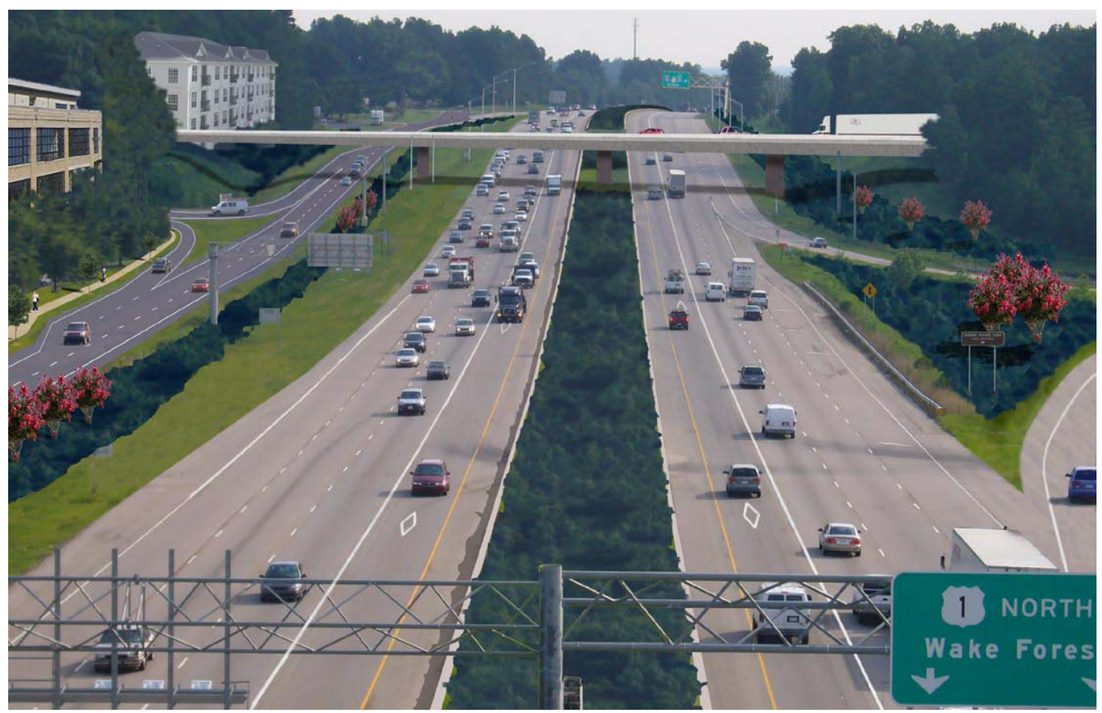
Existing and Proposed Bikeways and Greenways Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-4
Sheet 1 of 1



EXISTING VIEW OF US 1 AT GRESHAM LAKE ROAD LOOKING NORTH



VIEW OF US 1 AT GRESHAM LAKE ROAD LOOKING NORTH WITH PROPOSED IMPROVEMENTS

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Collage

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PHASE 3 ANALYSIS

Photomontage
US 1 at Gresham Lake Road
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-5
Sheet 1 of 1

EXISTING VIEW OF US 1 AT NC 98 BYPASS LOOKING NORTH

VIEW OF US 1 AT NC 98 BYPASS LOOKING NORTH WITH PROPOSED IMPROVEMENTS

Capital Area Metropolitan Planning Organization

Collage

RS&H Architects - Engineers - Planners, Inc. Team

PHASE 3 ANALYSIS

Photomontage
US 1 at NC 98 Bypass
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-6
Sheet 1 of 1

6.4.2 Conceptual Site Development (Activity Center) Diagrams

To illustrate the potential integration of land use and transportation investment at different activity centers along the corridor, the Team also created diagrammatic "Development Diagrams" of two emerging activity centers. First, Figure 6-7 (US 1 and Burlington Mills Road) illustrates the potential for more urban, transit-oriented development near the site of a future commuter bus/rail station. Ideally, short-term investment in park-and-ride lots can be transformed into express bus and, possibly, commuter rail stations along the existing rail corridor. The concept illustrated centers around potential transit investment to create a new mixed use activity center along Burlington Mills Road, with higher density development (7-15 dwelling units/acre and .70 FAR) immediately adjacent to the station (following Raleigh's Regional Rail and Transit-Oriented Development and Station Area Planning Guidelines) and dropping in intensity to lower-scale mixed use and existing/proposed commercial and institutional development. It also illustrates the importance of creating a street presence around the station area and making connections, particularly for pedestrians, between potential transit stops and existing neighborhoods. As illustrated, it will be important to establish easy access and drop-off of potential bus service from the US 1 corridor to the transit stop locations. Finally, the illustration demonstrates how a small-scale open space system can connect the many pieces of transit-oriented development.

The next development diagram, Figure 6-8 (US 1 and NC 96), illustrates the nature of proactively guiding development along US 1 and the surrounding local network to create a more humane, mixed-use land use pattern in suburban portions of the corridor. At this location, a combination of using existing roads and connecting existing roads using extensions negates the need for visually unappealing frontage roads and allows for smaller-scaled, pedestrian-oriented retail/employment and residential centers to be developed with access from US 1. These centers would likely be the location of local-serving retail and employment and can minimize the need for many local trips to utilize US 1. Care should be given to integrate existing residential neighborhoods and to create attractive local road frontages by encouraging shared rear parking and service behind new buildings. Portions of existing rural lands could be preserved between activity centers and new open spaces can be amenities to new development. Transportation improvements on local roads can include pedestrian and bike facilities and roundabouts within activity centers.

6.4.3 Future Opportunities

It is likely that over time the existing dominant commercial and industrial zoning on the corridor will transition, at least within new activity centers, to mixed-use, medium density residential and higher institutional/commercial categories. This transition provides the opportunity for the local jurisdictions to create new zoning classifications, including Transit-Oriented Development (TOD) overlays near I-540, based on more detailed plans and projects in each area. Care will need to be given to preserve existing environmental features, watersheds and, particularly in the more rural portions of the corridor, open space. In addition, the preservation of historic districts such as Youngsville will likely necessitate zoning compatibility standards such as those in the Town of Wake Forest downtown. Figure 4-3 in the Phase 1 Analysis identifies agricultural, forested and vacant land within the US 1 Corridor that would provide development opportunities in the future.

LEGEND

- Commercial
- Office Institutional
- Mixed Use
- Future Residential
- Open Space/ Park
- High Density Residential
- Rail / Bus Transit Station
- Parking
- New Roadways
- Primary Streetscape
- Local Connectors
- Pedestrian Connector
- Foot-over Bridge
- Existing Roadways

0 200 400 800 Feet

Capital Area Metropolitan Planning Organization

Collage

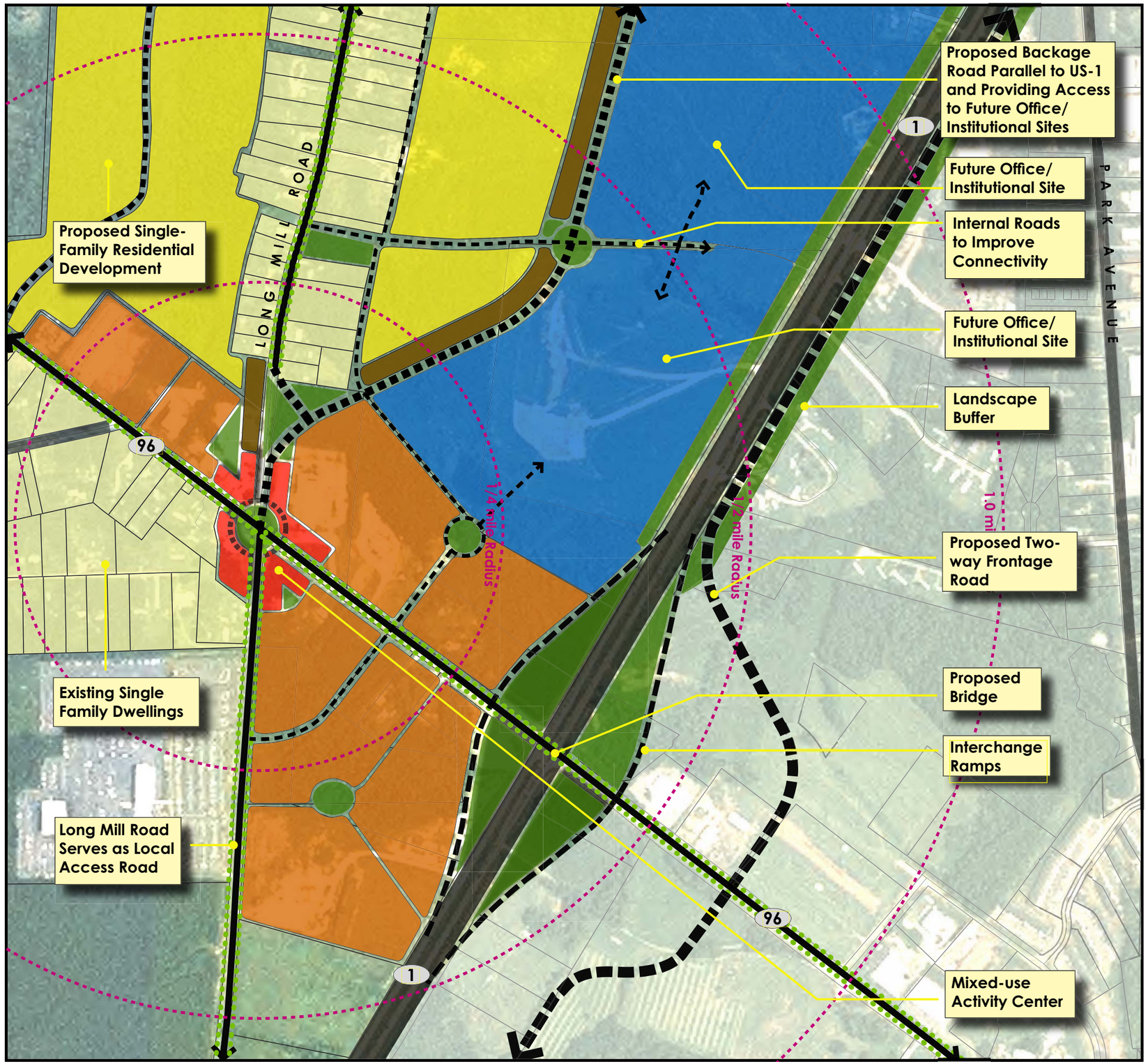
RS&H Architects - Engineers - Planners, Inc. Team

PHASE 3 ANALYSIS

Conceptual Development Diagram
US 1 at Burlington Mills Road
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-7
Sheet 1 of 1



LEGEND

- Commercial
- Office Institutional
- Mixed Use
- Existing Single Family Dwellings
- Future Subdivision
- Open Space/ Park
- High Density Residential
- New Roadways
- Intersection Improvement
- Primary Streetscape
- Local Connectors
- Existing Roadways

0 200 400 800 Feet

Capital Area Metropolitan Planning Organization

Collage

RS&H Architects - Engineers - Planners, Inc. Team

PHASE 3 ANALYSIS

Conceptual Development Diagram
US 1 at NC 96
Locally Preferred Alternative

US 1 CORRIDOR STUDY

Figure 6-8
Sheet 1 of 1

6.5 Planning Construction and Right of Way Cost Estimates

Planning level construction cost estimates were developed for the locally preferred alternative. The cost estimates were based on 2006 average unit costs obtained from the NCDOT's Project Services Unit. NCDOT provided to the study team detailed unit costs for over 30 major construction items derived from their historical cost estimates and knowledge of similar long-range freeway planning estimates in the Raleigh area.

Right of way planning cost estimates were developed for the LPA, based on an average cost per acre. These costs were based on NCDOT projects that have been recently constructed along the corridor and in the Raleigh area. The land use varies greatly along the corridor changing from a densely populated urban environment near I-540 to a sparsely populated rural environment in Franklin County. This results in right of way costs which range between $13.00 and $1 per square foot. After consulting with NCDOT it was determined a corridor-wide average right of way unit cost of $7.00 per square foot should be used for the study.

Table 6-4 summarizes the Year 2006 planning-level construction and right of way cost estimates. Table 6-4 does not include the estimated costs associated with the US 1 and I-540 interchange reconstruction or the three raised landscaped planting beds along the corridor. Appendix E provides a detail spreadsheet of the freeway and two-way frontage road construction items, engineering and construction contingency costs.

Table 6-4
LPA Planning-Level Construction and Right-of-Way Cost Estimates

Parcels Impacted	Total Takes	Total Acreage Taken	Right of Way Costs	Construction Costs	Total Estimated Costs
343	37	296 Acres	$ 103,716,144	$ 383,310,900	$ 487,027,044

6.6 US 1 Corridor Memorandum of Understanding

This Memorandum of Understanding, agreed upon by the participating local planning agencies is a key step in realizing the interrelationship of transportation facility design, development standards and desired land use. Through the Memorandum of Understanding, participating agencies would use the organizing committee as a forum to jointly agree upon land use changes to realize the multimodal transportation and land use vision of the US 1 Corridor Study. This agreement could be supplemented over time with more detailed considerations of area-specific land use, zoning and transportation improvements. While the Memorandum of Understanding will provide the framework for future land use changes, the study team recommends that the constituent jurisdictions conduct an additional localized study into specific future land use, zoning modifications and local street/access networks.

The following is a draft of the Memorandum of Understanding as of September 5, 2006 is found in the below document:

Capital Area Metropolitan Planning Organization
US-1 Corridor

Memorandum of Understanding Between

the Counties of Franklin, and Wake,; the City of Raleigh; the Towns of Wake Forest, and Youngsville; the Capital Area Transit; the Kerr Area Rural Transit System; the Triangle Transit Authority; the Capital Area Metropolitan Planning Organization, and the North Carolina Department of Transportation

THIS MEMORANDUM OF UNDERSTANDING is made and entered into on the date herein below last written, by and between the **Counties of Franklin and Wake the City of Raleigh and the Towns of Wake Forest, and Youngsville; the Capital Area Transit; the Kerr Area Rural Transit System; the Triangle Transit Authority; the Capital Area Metropolitan Planning Organization, and the North Carolina Department of Transportation** for land use and transportation planning purposes along Highway US-1 referred to hereinafter as the Corridor.

Background

Between November 2005 and September 2006, a project to study the US-1 Corridor between Interstate Highway 540 in Wake County and US Highway 1A in Franklin County was funded by the North Carolina Capital Area Metropolitan Planning Organization (Capital Area MPO), the City of Raleigh, Town of Wake Forest, the North Carolina Department of Transportation (NCDOT), and the Triangle Transit Authority (TTA). [The term "Corridor" in this Memorandum refers the area lying roughly within one thousand feet in either direction of the centerline of the US-1 right of way between the highway's intersections with Interstate 540 in Wake County, and with US-1A in Franklin County.]

Increased development pressures along the Corridor, and the resulting vehicular burdens, have stressed the roadway's capability to serve as a reliable transportation facility for its many users. Moreover, all parties recognized four key factors: 1) considerable physical improvement will be required to address corridor issues; 2) current and foreseeable future land uses along the Corridor need to be evaluated before making any capital investment in improving the roadway itself, 3) the need to preserve future right-of-way and ensure connections to existing and new developments must be addressed, and 4) transportation planning must seek to include balanced, multi-modal improvements.

Beginning with this broad consensus, the Capital Area MPO, the City of Raleigh, the Town of Wake Forest, NCDOT and TTA hired the consulting firm of RS&H to perform this study. The contract for these planning services was executed in November 2005; and the consultant's analysis began shortly thereafter.

Public Information Workshops were held in the Town of Wake Forest on March 14, 2006 and July 27, 2006. The consultant's work has been guided by a steering committee comprised of representatives of all municipalities and counties having land use planning jurisdiction over property along the Corridor. Also included in this steering committee were representatives of economic development, the Wake County Public School System, private sector and neighboring planning organizations affected by the US-1's

capacity, NCDOT, and the four transit organizations that have or can provide service to the area. In particular, corresponding to various Corridor segments show the existing and proposed land uses for each segment. These segment maps also display the recommended improvements to the US-1 roadway and to roads and streets connected to US-1 within the Corridor.

Understanding

1. **Parties to this Understanding:** The Parties are:

   a. The municipalities and the counties having direct jurisdiction over 1) land use ordinances and determinations of whether land uses within the US-1 Corridor Study Area are in compliance with such ordinances; or 2) public investments along the corridor.

   b. The inter-governmental planning organizations having administrative duties for transportation planning along the US-1 Corridor.

   c. The North Carolina Department of Transportation (NCDOT).

2. **Corridor Study Recommendations:** Each Party commits to accept the recommendations as compiled within the US 1 Corridor Study Report and to ensure that consistent and compatible land use decisions are made within the Party's jurisdiction as well as extraterritorial jurisdiction along the corridor.

3. **Transportation Management:** Each Party recognizes the current limitations to the transportation infrastructure, and therefore commits to a multi-jurisdictional approach to address transportation improvements. The transportation improvements include and are not limited to:

   a. access management and cross-sectional expansions,
   b. multi-modal improvements (bicycle-pedestrian, transit, etc),
   c. site planning standards for the corridor and its frontage/backage road system, and
   d. creating a local connectivity plan for local road access as a complement to improvements along US-1.

4. **Inducements to Other Parties:** Each Party understands that a commitment to its respective component of the US-1 Corridor Plan has induced other Parties to make like commitments for its respective segments of the US-1 Corridor Plan insofar as that Party has jurisdiction over the land uses within its US-1 Corridor Plan segment.

5. **Future Collaboration Among Parties:** The US-1 Corridor Plan designates that certain areas along the Corridor require collaboration where their land use jurisdiction boundaries of parties abut. In such cases, each Party commits its best efforts to undertake that collaborative planning, including providing direction to its planning staff and/ or consultants involved in such planning purposes.

6. **Council of Planning:** The Parties agree that, over time, periodic reviews of the land uses and public investment along the Corridor will be required. Mindful of future growth and planned transportation improvements, 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 chosen from but not limited to the members of the Capital Area MPO, and shall be comprised of at least one representative from each Party, knowledgeable in regional planning issues. The Council will serve as an advisory group, and will meet periodically to:

   1) Review all land use developments and transportation projects of regional significance, working in tandem with the NCDOT District Engineer. [The term "regional significance" in this Memorandum of Understanding refers to land-use and highway projects that will have a major impact on congestion and travel movements (i.e. interchange construction, "big box" retail, single-family subdivisions of or above one-hundred lots, etc].

   2) Review any changes to the US-1 Corridor Plan, and will coordinate community involvement activities when necessary to ensure the integrity of the Plan.

   3) Develop and/or update a Comprehensive Land Use Plan that covers the corridor which shall include but is not limited to (a) proposed land uses along the corridor which are consistent and compatible with the transportation recommendations (b) a local connectivity plan, and (c) a series of best practice access management and development standards.

Members listed in this document shall incorporate the Council of Planning advisory role into their development review process.

7. **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 periodically review the status of land use and public investment decisions along the Corridor. The Parties, in good faith, further 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 these periodic meetings is to promote discussions of municipal and/or county goals, plans and strategies for maintaining effective development patterns, public investment and transportation flow along US-1.

8. **MPO:** The Capital Area Metropolitan Planning Organization commits to considering Transportation Plan amendments as necessary to incorporate US-1 Corridor elements; and working for inclusion of the US-1 Corridor on the State Transportation Improvement Program as appropriate.

9. **NCDOT:** NCDOT recognizes the importance of and appreciates the long range land use planning envisioned by the Plan. All Parties agree that NCDOT's only responsibility under this MOU is to share information relating to transportation planning within the area. It is understood by all Parties that NCDOT does not have the authority to approve or dictate land use plans. To that end, NCDOT will consider the Plan and incorporate elements of it, as appropriate, in future long range transportation plans and the Driveway Permitting process. NCDOT will consider individual projects along the US-1 Corridor for inclusion in the State Transportation Improvement Program as deemed appropriate by NCDOT and in accordance with all state and federal laws and regulations.

IN WITNESS WHEREOF, the Parties as listed, but not limited to, through their duly authorized representatives, have executed this Memorandum of Understanding and have attached maps relating to their respective jurisdictions, effective this _____ day of _____, 2006.

CITY OF RALEIGH
By
_____
_____
(Title)

TOWN OF WAKE FOREST
By
_____
_____
(Title)

TOWN OF YOUNGSVILLE
By
_____
_____
(Title)

COUNTY OF FRANKLIN
By
_____
_____
(Title)

COUNTY OF WAKE
By
_____
_____
(Title)

CAPITAL AREA TRANSIT
By
_____
_____
(Title)

KERR AREA RURAL TRANSIT SYSTEM
By
_____
_____
(Title)

TRIANGLE TRANSIT AUTHORITY
By
_____
_____
(Title)

CAPITAL AREA METROPOLITAN PLANNING ORGANIZATION
By
_____
_____
(Title)

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
By
_____
_____
(Title)

CHAPTER 7.0
IMPLEMENTATION OF THE RECOMMENDED LOCALLY PREFERRED ALTERNATIVE

7.0 Implementation of the Recommended Locally Preferred Alternative

This study begins a process to implement an alternative to move people through the corridor, while aiming to meet other corridor-specific goals, such as those related to safety, transit, land-use, etc. From the project oversight teams to public workshop meetings, momentum is generated and consensus is gained toward a locally preferred alternative.

7.1 Capital Area Metropolitan Planning Organization Approvals

With the completion of the US 1 Corridor Study, the recommended improvements will need to be included in CAMPO's 2030 Regional Transportation Plan (RTP) for the Raleigh area. This will involve initial review and approval of the recommended corridor improvements by CAMPO's Transportation Technical Committee (TTC) followed by the Transportation Advisory Committee (TAC). In association with these approvals, letters supporting the identified improvements from NCDOT, Wake and Franklin Counties, the City of Raleigh, the Town of Wake Forest, and the Triangle Transit Authority will be required. Ultimately the CAMPO TAC will need to adopt the US 1 locally preferred alternative into the RTP.

7.2 US 1 Schematic Design and Environmental Documentation

Once adoption by CAMPO is secured, design and environmental documentation can be completed. This stage of project development will be completed in two phases: phase one will consist of preliminary schematic design studies, which is intended to allow for full environmental documentation and analysis of alternatives, as well as development of mitigation strategies. Schematic design studies will further refine interchange design type, intersection lane configurations, and horizontal and vertical control associated with detail right-of-way requirements. As US 1 is under NCDOT jurisdiction, and therefore federal and state funding will be used to develop the recommended improvements, an environmental documentation process will also be required. Once the environmental clearance is obtained the second phase will likely begin. At this point, the corridor will be divided into reasonable segments in order to develop final design plans (plans, specifications, and estimates).

7.3 Triangle Transit Authority and Capital Area Transit Planning

Given its regional nature, the initial proposed commuter bus service should be under Triangle Transit Authority (TTA) jurisdiction. Hence TTA should take the lead in further assessment to finalize the routing, schedule, and station locations associated with the new service. This should also include an assessment of the type of vehicle to be used for the service, in particular an assessment of whether an intercity coach-type vehicle should be applied. Tying down final station locations and the extent and configuration of associated park-and-ride and bus transfer facilities will require coordination with the Town of Wake Forest, Wake and Franklin Counties, and the City of Raleigh. TTA should also work with these jurisdictions to foster transit-oriented development around station locations over time to make premium transit service more viable. This will include local jurisdictions taking the lead in creating refined zoning and development incentives that encourage higher density around stations, and requiring adequate pedestrian connections from neighboring development to transit stations and stops. Following the adoption of the US 1 Corridor Memorandum of Understanding, the development of a corridor-wide land use plan should occur to ensure that future public transportation investments align with future land uses along the corridor.

TTA and Capital Area Transit (CAT) will need to coordinate further local transit service planning and development in the US 1 corridor. As the supporting street network to US 1 evolves over the upcoming years given added development density, new fixed-route bus service should be provided. The service should include improved east-west bus service, and local bus service on US 1 north of NC 98. Local bus service should be oriented to serve the premium transit stations to be developed along the US 1 corridor south of NC 98.

TTA should continue the pursuit of funding to develop an initial regional rail line connecting Durham and Raleigh. If an initial starter line to Spring Forest Road becomes reality, further planning for a potential future regional rail extension to Wake Forest should also be undertaken. This should verify final regional rail station locations, and the extent and configuration of associated park-and-ride and bus transfer facilities.

7.4 Access Management and Intelligent Transportation Systems (ITS) Planning

Before US 1 is constructed to a freeway facility, access management guidelines should be developed and adopted by each jurisdictional agency within the study area. These best access management practices should be applied to all future roads built within the study area to ensure the capacity and safety objectives are maintained for each capital roadway investment. The US 1 Council of Planning as identified in the Memorandum of Understanding associated with this study should be responsible for the future corridor-wide access management guildlines and its implementation.

Intelligent Transportation systems (ITS) are a combination of computer and communication technologies, as well as institutional partnerships, which can allow US 1 to operate more efficiently and safely. Intelligent Transportation Systems technology includes:

- Traffic monitoring through detectors and closed circuit video equipment as well as better traffic management through computerized signal systems
- Transit management systems (i.e., Transit Signal Priority), regional transportation management centers, and provision of real-time information to travelers through the use of electronic message signs and other means
- 511 telephone services, Websites, road weather information systems, and other devices that are used to manage, monitor, and control traffic in order to improve traffic flow

Coordinated traffic signal systems coupled with access management should be implemented on the following roadway sections:

- Along US 1 between I-540 eastbound ramp and South Main Street (US 1A)
- Along US 1 between Wake Union Church Road and NC 96
- Along NC 98, west of US 1 between the proposed NC 98 Bypass and US 1 northbound exit ramp

With the conversion of the US 1 corridor to a freeway facility, it will be critical to implement access management along the corridor to assure safe and efficient traffic operations. The most substantial access management improvement will be the construction of the two-way frontage/backage road system on both sides of the roadway where local access will eventually be focused and removed from US 1. This may require modifications to the existing development access, as well as having new development and/or redevelopment orient their access to the new frontage/backage road system. Perhaps as new development locates adjacent and fronts to US 1, these property owners should contribute toward the construction of the frontage or backage roads adjacent to their site. Good access management guildlines

on the frontage road system will need to be applied to locate and design local access that will provide safe and efficient traffic operations.

Access management in the vicinity of interchanges will also be required to divert access away from interchange ramp terminals (usually signalized). NCDOT access management standards will need to be applied related to restricted access in interchange areas. If possible, NCDOT's planning guidelines suggest a minimum of 1,000 feet between the ramp terminal signal and the first major cross street intersection (i.e. frontage or backage road).

Associated with the implementation of premium bus service in the US 1 corridor, a strategy for implementation of transit signal priority (TSP) at major signalized intersections should be developed. In certain locations, queue jump treatments from right turn lanes might be an appropriate alternative to signal priority in the mainline lanes. The need for and impact of developing TSP and queue jump treatments in the short-term while US 1 is still operating with traffic signals should be assessed as part of further planning for premium bus service implementation in the corridor. In the longer term, as US 1 is converted into a freeway facility, TSP would be oriented to certain interchange ramp terminal intersections and other intersections along major cross streets in the corridor, along bus routes to transit stations off of the corridor. Existing traffic signalized intersections on Capital Boulevard, south of I-540 should also be considered for TSP treatment to decrease bus travel times to downtown Raleigh.

7.5 Implementation Sequence

The year 2030 travel demand modeling undertaken for the US 1 Corridor Study indicated a variable need for widening of this roadway pending the degree of future special purpose or high-occupancy vehicle (HOV) lanes. For the scenario where HOV formation would increase 5 to 10% in the future, the modeling identified that an eight-lane freeway facility from a capacity perspective will be needed through 2030 between I-540 and NC 98. NC 98 is a logical breakpoint for eight-lanes because at this point potential future HOV lanes and premium bus service would begin to use the US 1 roadway to the south. Between NC 98 and Holden Road, a six-lane freeway facility would provide adequate capacity through 2030. A four-lane freeway would be adequate north of Holden Road to US 1A North (Park Avenue) through 2030. However, it is realized that the 2030 traffic projections developed through the modeling undertaken in this study are reflective of population and employment projections for the corridor (in the current regional travel demand model) which are lower than the latest estimates, and that the year 2030 traffic projections might be higher than projected in this study. Given this uncertainty, the locally preferred alternative for highway improvements has made a conservative assumption to provide right-of-way preservation for a possible eight-lane roadway (in the long-term covering the period even beyond 2030) all the way to the northern project limits, US 1A North in Franklin Country.

Given that today the greatest congestion in the US 1 corridor is associated with traffic backups associated with at-grade signalized intersections in the south section, initially focusing on interchange improvements at the major intersections from I-540 to NC 98 with a gradual widening of US 1 to six lanes from south to north and added interchanges and grade separation improvements at more minor cross streets would be an appropriate roadway improvement sequence in the corridor. All interchange and grade separation improvements should be in place by 2030. The initial widening along different segments of the corridor would focus on widening to six general purpose lanes. The need for further widening to eight lanes in certain roadway sections, and whether this widening should add two more general purpose lanes or two concurrent flow HOV lanes, should reflect an assessment of traffic volumes and vehicle occupancy characteristics after the six-lane widening and interchanges are completed and open to traffic for some period of time in a future study.

With respect to transit improvements in the corridor, the proposed initial premium transit service to be implemented is limited commuter bus service during weekdays from Wake Forest to both downtown Raleigh and the Research Triangle Park. Initially, this service would operate in mixed traffic with transit signal priority or queue jumps at major signalized intersections. Transit stations would evolve over time from initial bus stops along US 1, to potential off-roadway stations (park-and-ride), either on interchange ramps or off-roadway sites. Access to these transit stations would be provided the cross streets served by the proposed US 1 interchanges or grade separations. The commuter bus service over time could evolve into a more frequent bus rapid transit (BRT) service with greater service frequency and hours of operation, including weekend service. Local bus service in the corridor would be developed as development and a more defined street network occurs, with east-west service connecting with transit stations along US 1. Regional rail is a potential added transit service improvement in the corridor in the long-term if the starter line to the south of the corridor is eventually constructed.

7.6 Staging

Given the general implementation sequence identified in Section 7.5, a potential staging of identified multi-modal transportation improvements in the US 1 corridor is noted in this section. The specific timing and packaging of improvements will be reflective of actual funding available. At this time, the short-term is assumed to reflect approximately the 0-10 year time frame, the mid-term the 10-25 year time frame, and long-term representing post 25 years.

7.6.1 Access Management/Intelligent Transportation Systems

In the near term, as US 1 widening and roadway improvement funds are being secured, lower capital costs transportation system management projects should be designed and implemented. Interchanges at major cross streets along the southern section of the corridor should be planned and designed. Equally important should be the planning of the local roadway system that supports the ultimate US 1 freeway widening improvements by the local jurisdictions and NCDOT. A summary of corridor improvements during the next 10 years are as follows:

Access Management / Traffic Signal Systems:

- Along US 1 between I-540 eastbound ramp and South Main Street (7 signals)
- Along US 1 between Wake Union Church Road and NC 96 (6 signals)
- Along NC 98 the proposed NC 98 Bypass and US 1 northbound exit ramp (6 signals)
- Transit signal priority traffic signals near transit stations and along Capital Boulevard south of I-540 to downtown Raleigh.
- Incorporate electronic messaging, monitoring to ensure efficient traffic flow throughout the improvement stages proposed for US 1

Widening / Roadway:

- Gresham Lake Road interchange
- Durant Road / Perry Creek Road interchange
- Burlington Mills Road interchange
- South Main Street (US 1A) / New Falls of the Neuse Road interchange
- Widen US 1 to six general purpose lanes from I-540 to NC 98 (Durham Road)
- Construct a two-way frontage or backage road system from I-540 to NC 98

- Develop local roadway system that parallels US 1 and provides connectivity to neighborhood and activity centers along the corridor so that local trips are not forced to use US 1.

Transit:

- Initiate new commuter bus service to downtown Raleigh and Research Triangle Park transit centers
- Construct initial transit station development in downtown Wake Forest, and along US 1 at NC 98, New Falls of the Neuse Road, Burlington Mills Road, Durant Road, and I-540
- Construct 100-200 space surface parking lots at the NC 98, Burlington Mills Road, and I-540 transit stations
- Initiate local circulator bus route in Wake Forest
- Initiate new east-west bus service on major cross streets to US 1 as street network develops

7.6.2 Mid-Term Improvements

During the mid-term phase of implementation and once the frontage/back road system south of NC 98 is completed roadway improvements should focus to construct US 1 to a full-access control freeway from I-540 to NC 98, interchanges north of NC 98 and grade-separations throughout the corridor to promote east-west connectivity and pedestrian/bicycle across US 1. Roadway and major transit improvements/upgrades project are listed below:

Widening / Roadway:

- Construct US 1 to a full-access controlled freeway between I-540 to NC 98, including widening to 8 lanes in this section (either two HOV lanes or two general purpose lanes)
- Construct two-way frontage/backage and local road systems from NC 98 to Park Avenue
- Reconstruct US 1 / I-540 interchange to provide full directional ramps (not included in cost estimate)
- Reconstruct US 1 / Neuse River Bridge to provide eight lanes
- Reconstruct US 1 / CSX Railroad to provide eight lanes
- Reconstruct US 1 / NC 98 overpass to provide six lanes
- Construct Harris Road / Purnell Road interchange
- Construct Holden Road interchange
- Construct NC 96 interchange
- Construct Height Lane grade separation
- Construct Common Oaks Drive grade separation
- Construct Wake Union Church Road grade separation
- Construct Perry Creek Greenway grade separation
- Construct Richland Creek / Richland Creek Greenway grade separation (pedestrian underpass)
- Construct Stadium Drive / Jenkins Road grade separation
- Construct Wall Road grade separation
- Construct Green Road grade separation

Transit:

- Convert commuter bus service to bus rapid transit service
- Relocate / expand transit stations at NC 98, New Falls of the Neuse Road, Burlington Mills Road, Durant Road, and I-540
- Expand park-and-ride facilities at NC 98, Burlington Mills Road, and I-540 (500+ spaces)
- Extend, if justified, regional rail north of Spring Forest Road, with stations developed at Burlington Mills Road and at NC 98 Bypass (joint station with high speed rail)*
- Continue to develop local transit service improvements, including local bus service on US 1 north of NC 98
- Develop intercity rail station at NC 98 Bypass associated with Richmond-Charlotte high speed rail

*Could be potential long-term improvement pending the overall staging of rail project

7.6.3 Long-Term Improvements

Long term improvements beyond 25 years will included the completion of US 1 as a freeway north of NC 98 and potential intercity rail service within the corridor. Candidate projects are as follows:

Roadway:

- Construct US 1 to a full-access controlled freeway with six general purpose lanes from NC 98 to Park Avenue (US 1A North)

Transit:

- Continue development of local transit service improvements