Feasibility Study

US 117 South Corridor Feasibility Study Goldsboro, NC

Prepared for:
Goldsboro Urban Area Metropolitan Planning Organization
and North Carolina Department of Transportation

January 2004

Kimley-Horn
and Associates, Inc.

FEASIBILITY STUDY

US 117 South Corridor
From NC 581 to US 117 South of Goldsboro

Wayne County

Division 4

Goldsboro MPO Task III-D-3

Prepared by
Kimley-Horn and Associates, Inc.
for the
Goldsboro Urban Area Metropolitan Planning Organization
in coordination with the
Program Development Branch of the
North Carolina Department of Transportation

Ron Hairr
Project Manager
Kimley-Horn and Associates, Inc.

Chuck Allen
Chairman
Goldsboro Transportation Advisory Council

2/20/04
Date

Wayne County

US 117 South Corridor
From NC 581 to US 117 South of Goldsboro

Executive Summary

The Goldsboro Urban Area Metropolitan Planning Organization (MPO) prepared this feasibility study to investigate the extension of US 117 as a freeway-type facility from south of US 13 to NC 581 in Goldsboro, North Carolina. Ten (10) preliminary corridors were initially identified and evaluated. Functional design alternatives and cost estimates were developed for the three most feasible corridors. A Preferred Alternative, Alternative 10, was recommended unanimously by the Goldsboro MPO on December 4, 2003 for consideration by the North Carolina Department of Transportation (NCDOT) as a candidate project for inclusion in the next update of the Transportation Improvement Program (TIP).

I. General Description

This feasibility study describes the proposed US 117 South Corridor in Wayne County. Figure 1 shows the general project location. This study was developed for the MPO in cooperation with the NCDOT.

US 117 has long been a major north-south highway in eastern North Carolina. Several projects through the years have relocated and improved portions of the old US 117 to four-lane freeway type facilities. The most recent project, R-1030, is currently under construction and will provide a freeway facility between Goldsboro and Wilson. Upon completion of project R-1030 (US 117 Bypass), US 117 will be a four-lane freeway/expressway from Interstate 40 near Faison north to Interstate 95 at Wilson *with the exception* of this section of US 117 around Goldsboro identified within this feasibility study as the US 117 South Corridor. The southernmost portion of project R-1030 is R-1030AA, starting in Goldsboro at the existing US 117 Bypass at-grade south of NC 581, crossing NC 581 at-grade, and providing a new interchange on US 70 west of the existing US 117 Bypass before continuing northward.

As part of this study's background research an earlier feasibility study for US 117 prepared by NCDOT in August 1994 was reviewed. The recommended alignment indicated in the 1994 report passed through the former landfill adjacent to or part of the Waynesborough (Waynesboro) State Park near the Neuse River. NCDOT staff at the start of this study indicated that the 1994 study was outdated and that new traffic projections and additional consideration of other alternative alignments that avoided the Waynesborough State Park was advisable. New

traffic projections were developed and approved by NCDOT Statewide Planning (May 23, 2003) prior to the development of preliminary study corridors.

The project study limits for the US 117 South Corridor initially encompassed an area bounded by NC 581 in the north, SR 1008 to the west, the CSX Railroad tracks east of existing US 117, and south to US 13. The study area boundaries were expanded at the project kickoff meeting held March 27, 2003 to include the area north of NC 581 to US 70 and south of US 13 to connect to the controlled access portion of US 117 south of Goldsboro. The study area is shown in Figure 2. The length of the section of US 117 in the expanded study area is approximately 8 miles.

Nine preliminary corridors to relocate and/or improve US 117 were developed for study based on field evaluation, a review of aerial mapping and Geographic Information Systems (GIS) data. An additional alternative, Alternative 10, was later developed based on a variation of the Alternative 9 corridor. The potential impacts of the ten preliminary corridors were summarized and reviewed in detail by a selection committee composed of representatives from Kimley-Horn and Associates (KHA), NCDOT and the Goldsboro MPO. A graphic of all ten preliminary corridors is shown in Figures 7a and 7b. The impacts summary (matrix) of the preliminary corridors is attached as Table 10.

The selection committee chose four feasible corridors (Alternatives 1, 6, 8 and 10) to continue into the functional design phase. Alternative 8 was included at this time pending receipt of additional information concerning a water quality issue and the potential to directly impact a major municipal water intake for the City of Goldsboro. Alternative 8 was subsequently eliminated from further consideration by the Goldsboro MPO following the determination that the alignment impacted both the critical area of a water supply watershed and the intake facility. Functional designs were then prepared to investigate the remaining three corridors.

The three functional design alternatives studied connect the four-lane controlled access section of US 117 south of Goldsboro to the current construction underway with NCDOT Project R-1030AA. The R-1030 project provides for the relocation and upgrade of US 117 to a four-lane freeway facility from US 70 in Goldsboro northward to the Wilson Bypass. An interim connecting link from US 70 southward to NC 581 with a tie-in to the existing US 117 facility is also under construction with R-1030AA (refer to Figure 10). Local concern exists about the current construction of an at-grade intersection at NC 581. For the purposes of this feasibility study, NC 581 is proposed as an interchange west of existing US 117. Each of the three alternatives studied in detail generally parallel the existing US 117 route. Refer to Figures 8a and 8b for an overview of these three alternative alignments.

The proposed cross-section for each of the three alternatives was determined based on the year 2030 traffic projections and consists of a four-lane divided facility with a 46-foot grass median. The typical section is shown in Figure 9. The right-of-way is expected to be 300 feet. A 300-foot corridor was utilized for the environmental screening and impacts evaluation. A detailed description of each alternative's alignment is provided below as well as a preliminary estimate of cost which was completed after preparing construction quantities and using NCDOT approved unit costs for each item. Design evaluation into each alternative also revealed the following potential relocation and right of way (ROW) impacts:

Alternative 1

US 117 South Corridor Alternative 1 begins at a point on existing US 117 approximately 1500 feet south of the intersection with US 117 Alternate. The South Corridor follows and then closely parallels the existing alignment of US 117 northward through the intersection with US 13. The existing at-grade intersection of US 117 at US 13 is replaced with a single point urban interchange (SPUI) with the South Corridor passing over US 13. US 117 Alternate is relocated to parallel the South Corridor from the existing intersection on US 117 to a point approximately 2500 feet north of the existing intersection before turning northeast through the Wayne County Fairgrounds to tie-in at an at-grade intersection on US 13 approximately 600 feet east of the proposed interchange. A concrete barrier separates the proposed alignment of US 117 Alternate from the South Corridor where the two parallel. Existing US 117 is provided access to US 13 via a relocation of the proposed at-grade intersection with US 117 Alternate. US 117 turns northwest through the Heavy Duty industrial property from the at-grade intersection on US 13 to parallel the South Corridor until a point on US 117 approximately 1000 feet southwest of the existing at-grade intersection with SR 1915 (Arrington Bridge Road). At that point, the South Corridor turns north and west to approximately parallel the existing US 117 Bypass at a distance of approximately 500 feet between roadways prior to turning back east and meeting NC 581 in a half-clover interchange. In the vicinity of SR 1915, the bifurcated section of US 117 is relocated to pull the southbound lanes eastward, adjacent to the existing northbound lanes, and provide a space for the South Corridor to turn away from US 117. The South Corridor will align with R-1030AA at NC 581. The link between NC 581 and US 117 Bypass provided in R-1030AA will be removed. In addition, the southbound off-ramp at the existing interchange of US 117 and NC 581 will be relocated north of NC 581 to tie-in across from the northbound South Corridor ramps. Alternative 1 has a total length of 6.4 miles. It is anticipated that there will be approximately 31 residences and 64 businesses relocated due to this alternative. The preliminary cost estimate includes approximately $95.3 million for construction and $42.1 million for ROW for a total cost of $137.4 million.

Alternative 6

US 117 South Corridor Alternative 6 begins at a point on existing US 117 approximately 1500 feet south of the intersection with US 117 Alternate. The South Corridor follows and then closely parallels the existing alignment of US 117 northward through the intersection with US 13. The existing at-grade intersection of US 117 at US 13 is replaced with a single point urban interchange (SPUI) with the South Corridor passing over US 13. US 117 Alternate is relocated to parallel the South Corridor from the existing intersection on US 117 to a point approximately 2500 feet north of the existing intersection before turning northeast through the Wayne County Fairgrounds to tie-in at an at-grade intersection on US 13 approximately 600 feet east of the proposed interchange. A concrete barrier separates the proposed alignment of US 117 Alternate from the South Corridor where the two parallel. Existing US 117 is provided access to US 13 via a relocation of the proposed at-grade intersection with US 117 Alternate. US 117 turns northwest through the Heavy Duty industrial property from the at-grade intersection on US 13 to parallel the South Corridor until a point on US 117 approximately 1000 feet south of the existing at-grade intersection with SR 1926 (Old Mount Olive Highway). After that point, the South Corridor curves to the north and west, crossing the Neuse River Cut-Off and traveling northward through the BUSCO Beach recreational area before turning northeast and meeting NC 581 in a half-clover interchange. The South Corridor will align with R-1030AA at NC 581. The link between NC 581 and US 117 Bypass provided in R-1030AA will be removed. In addition, the southbound off-ramp at the existing interchange of US 117 and NC 581 will be relocated north of NC 581 to tie-in across from the northbound South Corridor ramps. Alternative 6 has a total length of 6.4 miles. It is anticipated that there will be approximately 38 residences and 29 businesses relocated due to this alternative. The preliminary cost estimate includes approximately $111.8 million for construction and $23.9 million for ROW for a total cost of $135.7 million.

Alternative 10

US 117 South Corridor Alternative 10 begins at a point on existing US 117 approximately two miles south of the intersection with US 117 Alternate before turning northwest. Alternative 10 ties into US 117 with a trumpet-style interchange, providing free-flow for all movements on the South Corridor and US 117. A simple diamond interchange is provided on the South Corridor at US 13 approximately 1.5 miles east of US 117. After that point, the South Corridor curves to the northeast, crossing the Neuse River Cut-Off and traveling northward through the BUSCO Beach recreational area before turning northeast and meeting NC 581 in a half-clover interchange. The South Corridor will align with R-1030AA at NC 581. The link between NC 581 and US 117 Bypass provided in R-1030AA will be removed. In addition, the southbound off-ramp at the existing interchange of US 117 and NC 581 will be relocated north of NC 581 to tie-in across from the northbound South Corridor ramps. Alternative 10 has a

total length of 9.3 miles. It is anticipated that there will be approximately 71 residences and 10 businesses relocated due to this alternative. The preliminary cost estimate includes approximately $112.8 million for construction and $13.4 million for ROW for a total cost of $126.2 million.

The project was presented to the Goldsboro MPO on December 4, 2003 in Goldsboro. The ten (10) preliminary corridors and the key factors used in selecting the three (3) alternatives were reviewed. The Transportation Advisory Council (TAC) was informed that they could vote for a preferred alternative from the remaining three (3) after a discussion of the features and impacts of Alternative 1, Alternative 6, and Alternative 10. A motion passed unanimously to select Alternative 10 as the preferred alternative by the TAC.

The Goldsboro Thoroughfare Plan (approved in March 1996) proposes an extension of US 117 as a freeway from US 70 south to an interchange with NC 581, then crossing the Neuse River before paralleling the existing US 117 alignment south to US 13 and tying into existing US 117 south of US 117 Alternate. None of the three alternatives selected for detailed functional design study are in complete conformance with the alignment shown in the approved Thoroughfare Plan. The selection of any of these three alternatives will require amending the current thoroughfare plan to insure compliance with the transportation planning process.

II. Need for the Project

The purpose of this project is to relieve growing traffic congestion on existing US 117 west of downtown Goldsboro and provide the "missing piece" for US 117 to be a multi-lane, full or partial access-controlled facility from Interstate 40 to Interstate 95.

TIP project R-1030 is currently under construction. The southern portion (R-1030AA) will tie into the existing US 117 Bypass south of NC 581 with an at-grade intersection and connect to NC 581 with an at-grade intersection west of existing US 117 Bypass. The project will then meet US 70 in an interchange and head northward as an access-controlled facility. R-1030 will provide a multi-lane freeway-type facility from US 117 in Goldsboro to the US 264 Bypass in Wilson.

The baseline year 2002 traffic volumes for this study were estimated as if the TIP project R-1030 (future US 117 Bypass) were complete in that year, providing a basis for future traffic growth representative of facilities that will be available. US 117 is currently access-controlled south of US 117 Alternate. Traffic along existing US 117 in Goldsboro is expected to increase due to general area background growth and with the construction of the new facility to the north, thus creating a need to connect the north and south access-controlled facilities with a new or upgraded facility through Goldsboro.

NCDOT Statewide Planning Branch approved the methodology used in forecasting traffic for the project in March 2003. A traffic forecast technical memorandum was later prepared and submitted in draft form for NCDOT review, and the final document was submitted in May 2003. Two corridor scenarios were considered when estimating the future traffic volumes along the US 117 corridor; the retrofit of the existing alignment and the construction of US 117 on new location. Several sources of information were used to provide the best estimation of future traffic volumes along the US 117 corridor. The Census information, Goldsboro travel demand model, historical ADT (Average Daily Traffic) volumes, existing travel volumes, and a classification count (conducted April 2003) were all used to develop a reasonable US 117 trendline forecast. Using a trendline analysis, the traffic volumes were projected to 2025 and compared to the travel model estimates to reflect traffic diversion (i.e., with and without the project) – ultimately, providing estimated turning movement forecasts. Design year 2030 turning movements were then created using the approved (by NCDOT) growth rate.

Initially, the traffic study established the 2002 base year and 2030 design year mainline traffic volumes for the "Retrofit Existing Facility" and "Western Bypass" scenarios as shown in Figures 3 and 4, respectively. The Retrofit scenario would upgrade the existing US 117 Bypass by controlling access, providing interchange access at select crossing roadways and sever connections to others. A retrofit was later determined not to be feasible due to the impacts on the land uses along the existing corridor. The Western Bypass traffic figure represents the traffic for the US 117 South Corridor (new alignment west of the existing facility). The 2030 daily traffic turning movement volumes for the Retrofit (determined not feasible) and the Western Bypass (US 117 South Corridor) are shown in Figures 5 and 6, respectively. The aforementioned traffic volumes were reviewed and approved (letter dated May 23, 2003) by NCDOT Statewide Planning Branch.

Crash Data

Crash data was obtained from NCDOT for the existing US 117 corridor between the years of 2000 and 2002 (the most recent data available). The reported crash rates and comparison data are shown in Table 1.

Table 1
Three Year Crash Rate Comparison
Crashes per 100 Million Vehicle Miles

	Total	Fatal	Non-Fatal Injury	Night	Wet
2000-2002: US 117 Bypass from US 70 to 2 miles south of US 117A	175.65	1.19*	74.68	42.42	38.83
1999-2001: Comparison Data**	282.72	0.88	102.08	55.80	50.17

* Two fatalities were noted during the analysis period
**Based on the rates for 1999-2001 for Urban United States Routes with 4 or More Lanes Divided and Partial Control of Access in North Carolina as published by the North Carolina Department of Transportation

As noted, the total crash rate for the US 117 corridor through Goldsboro falls below the statewide average. The fatality rate however, does exceed the statewide average.

Traffic Analysis

Capacity analyses were performed for the 2002 base year and 2030 design year traffic volumes. To determine the level of service of roadway segments for both the no-build (maintain existing facility) and build (construct a western bypass) condition, *HCM 2000* was utilized. *Synchro version 5* was also utilized to evaluate proposed at-grade interchange ramp junctions on NC 581 and US 13 serving the bypass. The results of the analyses are discussed in the following sections.

For the baseline conditions, existing multi-lane roadway segments on US 117 were studied. The baseline analysis includes year 2002 volumes, developed using the Goldsboro model with project R-1030AA in-place. Level of Service (LOS) D is typically considered acceptable operation for a roadway segment during the peak hours of operation. Table 2 shows the results of the analysis.

Table 2
Existing Multilane Highway
Peak Hour Level-of-Service – Baseline Year 2002†

Highway Segment	Critical Direction Peak Hour LOS
US 117 north of US 117 Bypass	B
US 117 north of Arrington Bridge Road	C
US 117 north of US 117A	B

†Based on year 2002 traffic volumes with the completion of R-1030AA

Based on the results of the analysis, it is evident that the existing US 117 route through Goldsboro is currently operating with an acceptable level of service.

For the 2030 no-build scenario, existing multi-lane roadway segments on US 117 and the proposed US 117 South Corridor were analyzed. Table 3 shows the results of this analysis.

Table 3 Future Mainline Section Operations *Existing Multilane Highway and Proposed Freeway Peak Hour Level-of-Service* *For Design Year 2030*			
Highway Segment	**Existing Facility (No Build) Critical Direction Peak Hour LOS**	**With Proposed US 117 South Corridor Critical Direction Peak Hour LOS**	
		Existing US 117 (With Traffic Diversion to South Corridor)	**US 117 South Corridor (NC 581 to US 13)**
US 117 north of US 117 Bypass	C	C	B
US 117 north of Arrington Bridge Road	F	C	
US 117 north of US 117A	D	C	

Without the proposed US 117 South Corridor, it is anticipated that the existing US 117 route through Goldsboro will experience failing operational conditions on at least one major segment prior to the year 2030. With the US 117 South Corridor in place, it is anticipated that the existing US 117 route will operate at LOS C or better by the year 2030. The US 117 South Corridor is expected to operate at LOS B by the year 2030.

Ramp terminals at interchanges proposed to serve the US 117 South Corridor were also studied. A half-clover at NC 581 with an additional connecting ramp serving the existing southbound US 117 Bypass is proposed. Depending on the chosen alignment, either a simple diamond interchange (Alternative 10) or a single point urban interchange (Alternative 1 and Alternative 6) will serve the connection at US 13. The southernmost connection in Alternative 10 is proposed as a trumpet-style freeway-to-freeway interchange. The results of the analysis are shown in Table 4.

It is anticipated that NC 581 will pass over the US 117 South Corridor. The recommended intersection geometry to serve the at-grade intersections on NC 581 requires eight lanes on the bridge over the US 117 South Corridor for the design year 2030.

Analysis of the simple diamond interchange proposed on US 13 in Alternative 10 is shown in Table 5. The analysis of the SPUI as required in Alternative 1 and Alternative 6 is also shown in Table 5.

Table 4 **Proposed Bypass Interchange Operations - At-Grade Intersections on NC 581** ***Intersection Peak Hour Levels of Service and Average Delay (seconds/vehicle)*** ***For Design Year 2030***		
Intersection	**AM Peak Hour LOS (Delay)**	**PM Peak Hour LOS (Delay)**
Southbound Ramp/Loop	C (25.2)	C (21.3)
Northbound Ramps/Loop	C (26.0)	B (18.1)

Table 5 **Proposed Bypass Interchange Operations - At-Grade Intersections on US 13** ***Intersection Peak Hour Levels of Service and Average Delay (seconds/vehicle)*** ***For Design Year 2030***		
Intersection	**AM Peak Hour LOS (Delay)**	**PM Peak Hour LOS (Delay)**
Southbound Ramps (Alt 10)	C (21.0)	C (22.8)
Northbound Ramps (Alt 10)	B (16.4)	B (13.1)
Single-Point Urban Interchange (Alt 1 and Alt 6)	C (28.4)	C (32.0)

In Alternative 10, it is anticipated that US 13 will pass under the US 117 South Corridor. The recommended intersection geometry to serve the at-grade ramp intersections on US 13 requires a five-lane section on US 13. In Alternative 1 and Alternative 6, it is also anticipated that US 13 will pass under the US 117 South Corridor. Retaining walls and a bridge must be built to accommodate the SPUI design with a five-lane section on US 13. Single left turn lanes were assumed exiting the ramps at the traffic signal, and single right turn lanes were assumed exiting at stop-controlled intersections on either side along US 13.

III. Environmental Screening

The following is a preliminary review of environmental issues that have a potential impact to the project. The information obtained for the environmental screening is from readily available database information. No survey work other than a field inspection was prepared for this study. The environmental screening is not a substitute for the project planning/environmental documentation process. The purpose of environmental screening is to identify potential environmental issues early in the process. For the purpose of this study, potential environmental issues were identified within the proposed corridors for the US 117

South Corridor. Figures 7a and Figure 7b show the location of potential environmental issues with the ten Preliminary Corridors overlaid on the aerial mapping. Figures 8a and Figure 8b show the location of potential environmental issues with the three Functional Design Alternatives overlaid on the aerial mapping.

The project study area includes residential, commercial, recreational, and industrial areas. There are multiple corridors being assessed within the study area. The largest impact will be to the Neuse River and associated wetlands and habitat. There are three different types of land use that could be impacted, undeveloped forested, agricultural, or developed lands (residential or commercial/ industrial).

Historic Properties and Archeology

Mapping was reviewed at the North Carolina Office of State Archeology (OSA) on May 27 and June 2, 2003 to determine if any archeology sites were within the study area. Four archeology sites were identified as listed in Table 6, and all of those were prehistoric unassessed sites. If a selected alignment potentially impacts any of the four sites, an archeological survey must be ordered for the affected locations. Alternative 1 potentially impacts one of these sites, shown as WY 251 in Table 6.

Mapping was reviewed at the North Carolina State Historic Preservation Office (SHPO) on May 27 and June 2, 2003 to determine if any historic resources on the National Register of Historic Places (NRHP) or State Study List exist within the study area. Four historic sites were identified and are also listed in Table 6. Three of those sites were individual buildings (outside the historic district), and one was the historic district itself in downtown Goldsboro. The historic district contains numerous Locally Designated, Study List and National Register properties. SHPO mapping did not indicate any eligible or registered properties within any of the proposed corridors. Should this project be programmed into the TIP, it is recommended that a survey of the corridors be conducted by an architectural historian to identify other potentially eligible properties.

Table 6
Identified Archeology and Historically Listed/Designated Sites Within the Study Area

Site Type – ID	Goldsboro Quad Map	Approximate Location	Description
Archeology – WY 225	Southwest	NE of US 117/US 13 Intersection	Prehistoric, Not Assessed

Archeology – WY 232	Southwest	South of Quaker Neck Lake and West of Neuse River	Prehistoric, Not Assessed
Archeology – WY 233	Southwest	South of Quaker Neck Lake and West of Neuse River	Prehistoric, Not Assessed
Archeology – WY 251	Southwest	SW of US 117 Bypass/US 117 Business Intersection	Prehistoric, Not Assessed
Historic – WY 8 (NR)	Northwest	SE of US 117 Bypass/NC 581 Interchange (and West of RR)	Henry Weil House, 200 W. Chestnut St.; Solomon Weil House, 204 W. Chestnut St.
Historic – WY 60 (SL)	Northwest	South of Elm Street and East of US 117 Bypass (and East of RR)	Dillard High School, 504 W. Elm St.
Historic – WY 105 (LD)	Northwest and Northeast	SE of US 117 Bypass/US 70 Interchange (Downtown)	Goldsboro Historic District
Historic – WY 391 (SL)	Southwest	SE of US 13/SR 1130 Intersection (East of Woodland Friends Church)	Everettsville Woodland Academy, 0.3 mi. south of US 13 junction

WY = Wayne County listing
LD = Locally Designated (Determined by local zoning board)
SL = Study List (Designation before National Register listing through NEPA or Section 106 review process)
NR = National Register (Listed in the Federal/National Register of Historic Places)

Rivers and Streams

The proposed project is located in the Neuse River Basin. The crossing of the Neuse River is unavoidable. There are various named and unnamed tributaries to the Neuse River that will be impacted. Named and unnamed tributaries to the Neuse River will be crossed by all proposed corridors. Some areas could not be evaluated during field reconnaissance but map features indicate there could be more crossings than are known.

All streams and rivers impacted by the project listed below are freshwater classified (C) nutrient sensitive waters (NSW) with the exception of an unnamed tributary impacted by the southern interchange in Alternative 10 only, classified as a freshwater (B-NSW) stream. Class (C) is the minimum classification for a freshwater stream. Alternative 1 requires four new crossings of the North Carolina Department of Environment and Natural Resources (NCDENR), Division of Water Quality (DWQ) classified rivers/streams including Borden Field

Ditch, Neuse River, Big Ditch, and an unnamed tributary. Alternative 6 requires five new crossings of DWQ classified rivers/streams including Borden Field Ditch, Little River, Neuse River, Neuse River Cut-Off, and an unnamed tributary. Alternative 10 requires five new crossings of DWQ classified rivers/streams including Borden Field Ditch, Little River, Neuse River, Neuse River Cut-Off, and an unnamed tributary.

The number of stream/river crossings and impacted buffer acreage is shown in Table 10. It should be noted that the calculations are based off of field reconnaissance and map interpretations and should only be used for planning purposes. Any stream crossing will be under the guidance of NCDENR's Division of Water Quality and the Neuse River Buffer Rules. During any environmental documentation study, the appropriate coordination with NCDENR and the U.S. Army Corps of Engineers (USACE) should occur.

Wetlands and Floodplains

Wetlands will be impacted by each of the proposed corridors. The total acreage impacts to mapped wetlands and hydric soils (another indicator of wetland presence) are shown in Table 10. The Neuse River and associated wetlands will be the largest impact. The types of wetlands that can be anticipated to be impacted near the Neuse River and other areas will be Palustrine Forested – Broad Leaved Deciduous and Needle Leaved, Palustrine Shrub – Scrub, Palustrine Emergent. These types of wetlands are characterized by the following types of vegetation. Loblolly Pine, Long Leaf Pine, Bald Cypress, Sweetgum, Tulip Poplar, Water Oak, Green Ash, Swamp Tupelo, etc. Some other areas where wetlands will be impacted will be associated with streams or isolated pockets within the undeveloped forested areas or agricultural lands. Other types of characterized wetlands that could be impacted are Palustrine Open water areas; including ponds, pits, and lagoons. Most of these are characterized by unknown bottom designation. Included in this designation are farm ponds, mining ponds or lakes. Gross wetland areas were calculated based on hydric soils, soil inclusions and forested areas. This calculation did not include wet farmlands or open water areas.

The largest floodplain area will be associated with the Neuse River. Most of the northern portion of the study area is located within the floodplain of the Neuse River. Total floodplain acreage impacts with respect to preliminary corridors are shown in Table 10.

FEMA Issues

The potential use of land/properties noted as Federal Emergency Management Agency (FEMA) properties for use in the upgrade of the US 117 facility was identified as a potentially significant issue during the background research performed for this feasibility study. These properties acquired by Wayne County and the City of Goldsboro using the FEMA Hazard Mitigation

Grant Program (HMGP, 44 C.F.R. § 206.434) funding are highlighted in Figures 7a, 7b, 8a, and 8b.

This issue requires further evaluation due to the restrictions placed on the use of the HMGP properties. It is noted that the restrictions placed on the uses allowed for these properties (*i.e., conditions which are intended to restrict the use of the land to open space in perpetuity in order to protect and preserve natural floodplain values*) may ultimately prohibit their use as highway right of way. This could potentially force the alignment of any future US 117 South Corridor to be shifted much further west of the preferred alternative as presented herein.

Federal Emergency Management Agency representatives were contacted on June 2, 2003 to determine FEMA's position with respect to use of HMGP lands for highway purposes. Mr. Todd Owen of FEMA (Raleigh) indicated that as a result of coordination between NCDOT and FEMA on the R-1030AA project (specifically the use of HMGP purchased properties at the future US 70 interchange with US 117) the FEMA Regional Office has determined that the placement of impervious surface (new pavement) was an "unacceptable use of land" for the properties in question.

He stated that any post acquisition use of property is determined by the FEMA Regional Office after consulting with the FEMA National Office in Washington, D.C. However, Mr. Owen stated FEMA currently (to his knowledge) does not have a position on the use of HMGP properties involving a causeway or other bridge structures to cross over these properties. He suggested that the Goldsboro MPO put in writing the options or proposals they would like considered as "eligible uses" for the HMGP properties in question and forward that to FEMA for a review and decision.

Mr. Owen further indicated that the lower elevation of any structure would at a minimum have to be above the 100-year base flood elevation plus 1 foot of freeboard. Base flood elevation in this area of the Neuse River appears to be at Elevation 76 (about 8 feet above existing ground). The number of HMGP properties crossed by each of the preliminary corridors is indicated in Table 10.

Hazard Mitigation Grant Program properties have been bridged in each of the functional design alternatives developed to potentially satisfy possible conditions as described by Mr. Owen. The preliminary cost estimates for each of the three design alternatives include these structures.

Threatened and Endangered Species

A review of the US Fish and Wildlife Service (FWS) database for Wayne County and the Natural Heritage Program (NHP) database maps was conducted. In Wayne County, the only federally listed species by the FWS is the red-cockaded woodpecker *(Picoides borealis)*. The NHP has documented five

known occurrences of this species within the study area. Four of the five are located in the northwest corner and western central portion of the study area and are not close to any of the proposed corridors. The fifth recorded occurrence is approximately 1.1 miles west of the US 13 / US 117 split on the north side of US 13.

The project study area was evaluated for potential red-cockaded woodpecker habitat. One area was observed during field reconnaissance that contains possible habitat. This area is located in the westernmost portion of the study area outside of any proposed corridors. Table 7 lists the Threatened and Endangered Species in Wayne County.

Table 7.
Threatened and Endangered Species in Wayne County

Name *(Scientific Name)*	Federal Status[1]	State Status[2]	Area of Listing
Red-cockaded Woodpecker *(Picoides borealis)*	LE	E	Wayne County

[1]Definition of Federal Status: LE=Listed Endangered
[2]Definition of State Status: E= Endangered

Source: United States Fish and Wildlife Service, 2003.
North Carolina Natural Heritage Program, 2003.

Environmental Justice (EJ)

Executive Order 12898 requires that Federal agencies identify and address disproportionately high and adverse effects of federally funded projects on minority and low-income populations. The Census 2000 demographic data were reviewed at the block level for high levels of minority and low-income populations. Potential EJ concerns related to minority populations were noted along the northern portion of Alternative 1 (between West Elm Street and South George Street), and along the mid and southern portions of Alternative 10 (near Lexington Drive, and between US 13 and existing US 117 respectively). Alternative 6 appears to have minimal, if any, EJ concerns along its corridor.

The relocation of homes with the Hazard Mitigation Grant Program (HMGP), many of which were minority households in the flood prone areas near these alternative corridors, may have occurred after the census data was compiled. If so, then the EJ concerns noted may be reduced or non-existent.

Hazardous Materials

Several Superfund sites are located within the study area and are shown on Figures 7a and 7b. These sites were identified from the GIS databases evaluated and were considered during the development of the alignments for the

preliminary corridors. The General Signal Power Systems, Inc. (Heavy Duty) site may be of consequence with respect to two of the three alternatives evaluated. This site is located in close proximity to Alternative 1 and Alternative 6 near the intersection of US 13 and existing US 117. Right of way for an interchange may encroach on this property with both Alternatives 1 and 6. Should either of these alternatives be pursued after the US 117 South Corridor project is programmed in the TIP, a Phase 1 environmental audit should be conducted to precisely determine the extent of contamination and/or liability prior to the decision to purchase right of way.

Other Significant Findings

Other items that were observed during field reconnaissance included the BUSCO recreational area (privately owned) located north of the Neuse River Cut-Off near a sand/gravel pit area. It was observed to be a small outdoor recreational area for campers consisting of a swimming area with motor sports, a snack/restaurant area and an overnight camping area for tents or campers. Northwest of the intersection of Sandhill Drive and Buckhorn Road the aerial photo indicated farm land but a sand/gravel operation was observed. Also there is an area located north of Old Grantham Road, east of Providence Church Road that is shown on the aerial as an undeveloped forested area containing streams. During field reconnaissance the area was observed to be new residential homes with empty lots for sale.

Waynesborough State Park is impacted by Alternative 1. Therefore, a Section 4(f) will be required for that alternative. Alternative 6 and Alternative 10 do not impact the park. The park is currently closed and it is not known if it will reopen due to maintenance cost concerns.

IV. Description of Functional Design Alternatives

The three preliminary corridors that were determined to have the most potential were taken forward into functional design. The proposed design criteria are shown in Table 11. Figures 8a and 8b reveal the proposed alignments of these preliminary corridors.

Alternative 1

Alternative 1 most closely parallels existing US 117, intersecting US 13 in a single point urban interchange (SPUI) west of US 117 where the existing road (US 117) is converted to a service road. Due to its close proximity to US 117, Alternative 1 requires a realignment of the bifurcated section of the existing road west of the connection with Arrington Bridge Road (NC 581 east). Alternative 1 requires that US 117A be converted to a service road to intersect US 13 and the realigned existing US 117 at an at-grade intersection east of the proposed SPUI. Special consideration for close spacing of at-grade intersections on US 13 is

anticipated. A half-clover interchange is proposed at NC 581 with a southbound off-ramp from existing US 117 Bypass connecting at the east side of the interchange. The proposed off-ramp would require that the existing service road be terminated in a cul-de-sac prior to that location. Alternative 1 is anticipated to have the highest impact on existing businesses and nearby properties accessing the existing US 117 corridor with moderate FEMA property impacts.

Alternative 6

Alternative 6 follows Alternative 1 on the south end (south of the existing at-grade intersection of US 117 with SR 1131/SR 1926) and then turns to an alignment west of Alternative 1. Alternative 6 also interchanges US 13 in a SPUI and requires that US 117/117A be converted to a service road to intersect US 13 at an at-grade intersection west of the proposed SPUI. Special consideration for close spacing of at-grade intersections on US 13 is anticipated. Alternative 6 also includes a half-clover interchange at NC 581 with an additional southbound off-ramp from US 117 Bypass connecting with the east side of the proposed interchange. Alternative 6 is anticipated to have the lowest impacts on existing businesses and the least number of total properties impacted, but has the highest impacts on FEMA properties.

Alternative 10

Alternative 10 provides the westernmost alignment and connects to US 117 the furthest south of the three alternatives. It intersects US 117 south of US 117A in a “trumpet” freeway-freeway interchange. It intersects US 13 in a simple diamond interchange west of existing US 117. Alternative 10 does not require any service roads and does not impact properties along the existing alignment of US 117. It intersects NC 581 in a half-clover interchange with an additional southbound off-ramp from US 117 Bypass connecting with the east side of the proposed interchange as in Alternative 1 and Alternative 6. Alternative 10 is anticipated to have moderate impacts to existing businesses, the least impact on FEMA properties, and the lowest total cost. Alternative 10 does however have the highest number of residential impacts.

The impacts for the three Functional Design Alternatives are shown in Table 8. The typical cross-sections proposed are shown in Figure 9. The Functional Design Alternatives were presented for review to the Goldsboro MPO and NCDOT during the Functional Review Meeting held on September 23, 2003.

Table 8 Alternative Impacts Matrix *Functional Design Alternatives*			
Factors	**ALT. 1**	**ALT. 6**	**ALT. 10**
Length (miles)	**6.4**	**6.4**	**9.3**
Area (acres)	**297**	**295.9**	**441.7**
Interchanges	**2**	**2**	**3**
Y-Line Structures	**11**	**9**	**13**
Railroad Crossings	**2**	**1**	**1**
Construction Cost ($, Includes E & C)	**$95.3 mil**	**$111.8 mil**	**$112.8 mil**
Right-of-Way Cost ($)	**$42.1 mil**	**$23.9 mil**	**$13.4 mil**
Total Cost ($)	**$137.4 mil**	**$135.7 mil**	**$126.2 mil**
Residential Relocations [1]	**31**	**38**	**71**
Business Relocations [1]	**64**	**29**	**10**
Large Industry Relocations [1]	**3**	**0**	**0**
Schools Impacted	**0**	**0**	**0**
Parks Impacted	**1***	**0**	**0**
Churches Impacted	**1**	**1**	**0**
Cemeteries Impacted	**2**	**1**	**0**
Eligible Historic Sites	**0**	**0**	**0**
Recorded Historical Sites and Historic Districts Impacted	**0**	**0**	**0**
Stream Crossings/Buffer acreage/Neuse River Crossings	**12/10.3/1**	**14/19.9/2**	**16/22.6/2**
Hydric Soils (acres)	**47.7**	**47.9**	**82.3**
Other Soils with Hydric Inclusions (acres)	**74.9**	**76.6**	**82.9**
Forestland (acres)	**20.4**	**69.9**	**131.9**
Cultivated/Pastureland (acres)	**59.9**	**91.9**	**155.9**
Residential/Community (acres)	**217.6**	**134.6**	**155.6**
Total NWI Wetland Impacts (acres)	**46.2**	**60.9**	**95.9**
Floodplains (acres)	**220.3**	**219.1**	**208.5**
FEMA Properties	**29**	**63**	**22**

*Waynesborough State Park currently not in use and closed to public

[1]The number of relocations identified in Table 8 were based on functional designs and GIS tax map information. These estimates of relocations are more accurate than the preliminary corridor data as noted in Table 10 which were based on aerial photography only.

Cost Estimates

Table 9 provides a breakdown of the cost estimates for the Functional Design Alternatives.

Table 9
Cost Estimates for Functional Design Alternatives

	Alternative 1	Alternative 6	Alternative 10
Construction	$95,300,000	$111,800,000	$112,800,000
Right of Way	$42,100,000	$23,900,000	$13,400,000
Total	**$137,400,000**	**$135,700,000**	**$126,200,000**

Additional Design Considerations

Due to the nature of the area (i.e. low elevation, significant water features and extensive wetlands), it is anticipated that there will be significant hydraulic design challenges with this project. Bridges and causeways have been proposed in the functional design alternatives when crossing major water features and HMGP properties. Additional study and design of hydraulic structures are needed should this project be programmed.

A meeting was held on October 31, 2003 between NCDOT and KHA to review comments from the program development, design services and traffic congestion units. During the review meeting and in later discussions, it was understood that the Roadway Design branch had concerns over the limitations of the current scope of the study to address design issues around the NC 581 interchange area. Figure 10 shows the proposed interchange at NC 581 in an enlarged format. The current R-1030AA project will place an at-grade signal on NC 581 west of the US 117 Bypass. The close spacing between the connection with NC 581 and the existing substandard interchange with the US 117 Bypass requires additional considerations for design. A design has been proposed with this study as one possible compromise to provide interchange access to NC 581 given the existing roadway conditions. An additional study should be undertaken to fully evaluate the NC 581 interchange area to arrive at a more compatible solution. Consideration of eliminating the existing US 117 Bypass interchange and/or converting it into an at-grade signalized intersection should be included in the additional study.

Based on discussions with NCDOT and the Goldsboro MPO, it is recommended that a more detailed study be conducted to concentrate on the construction phasing and ultimate design of the connections of both the US 117

Bypass and the R-1030AA Project/US 117 South Corridor along NC 581. Specifically, the Goldsboro MPO indicated a desire to evaluate an interim design solution that would allow for grade separation of R-1030AA at NC 581 while accommodating the US 117 South Corridor plans as currently envisioned. It is anticipated that there would be a need for a more comprehensive design study to address concerns should this project move forward. The entire area involving the US 70 and NC 581 junctions with the US 117 Bypass and R-1030AA/US 117 South Corridor should be reviewed to identify potential revisions to the existing network and future facility to provide the best overall design solution that would be acceptable to both NCDOT and the Goldsboro MPO.

In addition, NCDOT expressed concern over the use of a SPUI interchange and the spacing between the proposed interchange on US 13 and the realigned US 117 service road in Alternative 1 and Alternative 6. The configuration proposed was with the intent to reduce impacts and is not optimal from a design perspective. It will need to be evaluated further should the project be programmed.

V. Preferred Alternative

The project was presented to the Goldsboro MPO on December 4, 2003. A motion passed unanimously to recommend Alternative 10 as the Preferred Alternative for the US 117 South Corridor.

Figure 11 shows the Preferred Alternative (Alternative 10). The Preferred Alternative impacts the existing business properties and US 117 corridor the least of the three alternatives and has the lowest total cost. The Preferred Alternative has the highest number of residential relocations, but does not impact any churches or cemeteries as with the other two alternatives.

In addition, the Preferred Alternative has the lowest number of FEMA properties and lowest acreage of floodplains impacted. The Preferred Alternative does however, have the highest impacts to wetlands and stream buffers of the three alternatives studied.

Table 10
Alternative Impacts Matrix for Preliminary Corridors
US 117 South Corridor Feasibility Study

Factors	ALT. 1	ALT. 2	ALT. 3	ALT. 4	ALT. 5	ALT. 6	ALT. 7	ALT. 8	ALT. 9	ALT. 10
Length (miles)	6.2	8.2	8.4	8.2	8.8	6.0	8.9		8.6	8.9
Area (acres)	225.3	301.2	307.4	301.5	319.1	221.2	323.8		306.6	324.6
Interchanges	1	2	3	3	3	2	3	3	3	3
Y-Line Structures	2	4	7	5	6	5	4	2	6	5
Railroad Crossings	2	2*		2	3					
Construction Cost ($, Includes E & C)	96,429,000	108,482,000	125,964,000	118,007,000	128,048,000	121,970,000	128,117,500	132,061,000	122,736,000	117,101,500
Right-of-Way Cost ($)										
Total Cost ($)										
Residential Relocations	6	14	34	39	41	9	34	28	39	41
Business Relocations	34	18	21	7	4	8	1	1	3	3
Large Industry Relocations	4	2		1		1		0	0	0
Schools Impacted	0	0	0	0	0	0	0	0	0	0
Parks Impacted**	1	1	0	1	0	0	0	0	0	0
Churches Impacted	1	0	2	0	0	1		0	0	0
Cemeteries Impacted		2	1		0	1		2	0	0
Eligible Historic Sites	0	0	0	0	0	0	0	0	0	0
Recorded Historical Sites and Historic Districts Impacted	0	0	0	0	0	0	0	0	0	0
Stream Crossings/Buffer acreage/Neuse River Crossing	12 /11.8/1	16/19.4/1	13/17.7/1	14/13.1/2	16/25.4/2	12/19.0/2	21/19.1/2	23/23.5/2	17/23.7/2	14/16.0/2
Hydric Soils (acres)	44.5	68.3	85.1	53.9	63.8	34.8	99.8	87.4	49.1	45.7
Other Soils with Hydric Inclusions (acres)	42.1	59.2	69.9	77.4	74.7	59.8	81.1	62.9	82.9	68.2
Forestland (acres)		43.6	74.6	103.8	117.2	71.9	143.0	176.9	109.8	119.4
Cultivated/Pastureland (acres)	21.1	21.1	81.0	89.9	85.0	57.1	118.8	124.9	96.4	126.4
Residential/Community (acres)	182.2	236.0	152.3	107.7	116.2	92.3	63.2	51.9	101.0	79.1
Total NWI Wetland Impacts (acres)	22.0	51.1	59.7	58.7	87.7	58.9	109.5	110.7	74.0	62.0
Floodplains (acres)	190.6	181.4	192.3	166.1	201.7	186.5	188.1	186.7	170.6	174.0
FEMA Properties	27	27	38	21	67	65	0	0	23	23

*Corridor overlaps parallel to railroad; **Park currently not in use and closed to public. † Estimates of relocations are preliminary and based on aerial photography only.

Table 11
Proposed Design Criteria
US 117 South Corridor Feasibility Study

Line	-L-	Ramps	Loops
Classification	Major State Thoroughfare	-	-
Terrain Type	Flat	Flat	Flat
Design Speed (mph)	70	50	30
Posted Speed (mph)	65	45	25
Prop. R/W Width (ft)	-	-	-
Control of Access	Y	Y	Y
Rumble Strips (Y/N)	N	N	N
Typical Section Type	4 Lane Div	-	-
Lane Width (ft)	12	16	18
Sidewalks (Y/N)	N	N	N
Bicycle Lanes (Y/N)	N	N	N
Median Width (ft)	46	-	-
Med. Protect. (Gr/Barrier)	-	-	-
Shoulder Width (total)			
Median (ft)	6	-	-
Outside w/o Gr (ft)	12	12	12
Outside w/ Gr (ft)	15	15	15
Paved Shoulder			
Outside Total / FDPS (ft)	10	4	4
Median Total / FDPS (ft)	4	-	-
Grade			
Max.	4	5	6
Min.	0.3	0.5	0.5
K Value			
Sag	181	96	37
Crest	247	84	19
Horiz. Align.			
Max. Super.	0.1	0.08	0.08
Min. Radius (ft)	1640	600	200
Spiral (Y/N)	Y	Y	Y
Cross Slopes			
Pavement (%)	2%	2%	2%
Paved Shoulder (%)	2%	2%	2%
Turf Shoulder (%)	8%	8%	8%
Median Ditch (%)	-	-	-
Ditch Typical (A, B, C)	A	A	A
Clear Zone 4:1 Fill Slopes (ft)	44	30	18

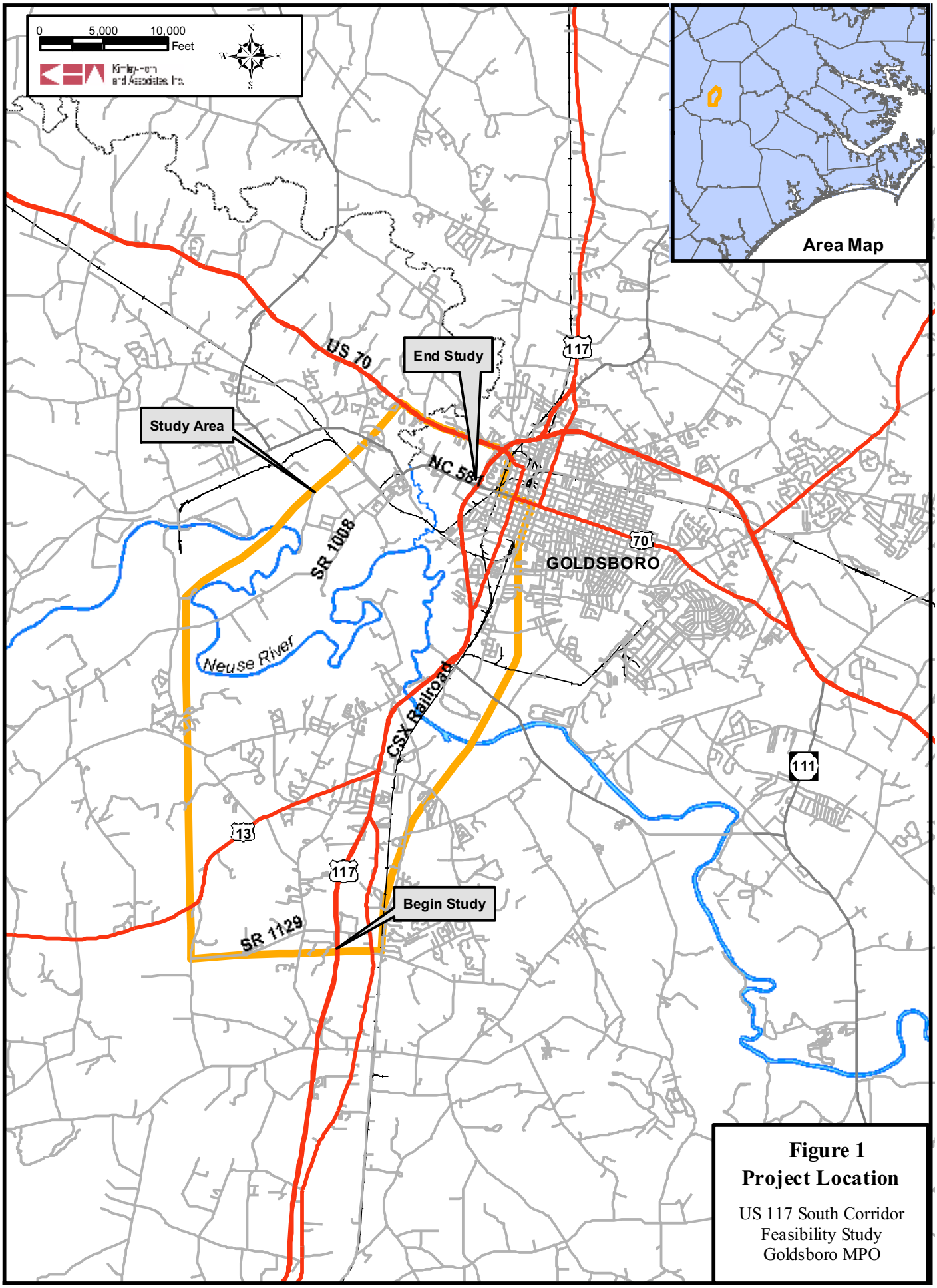


Figure 1
Project Location

US 117 South Corridor
Feasibility Study
Goldsboro MPO

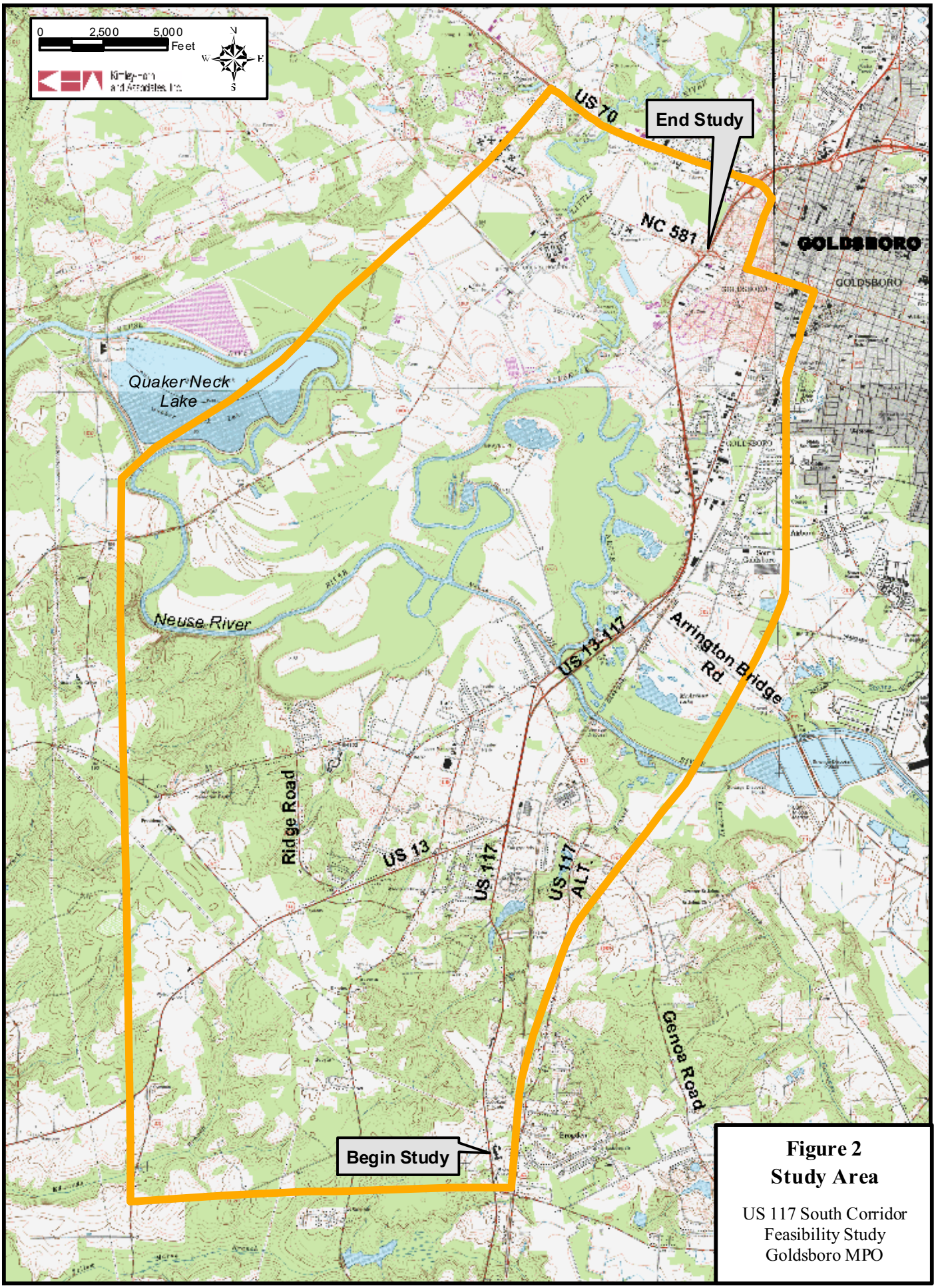


Figure 2
Study Area

US 117 South Corridor
Feasibility Study
Goldsboro MPO

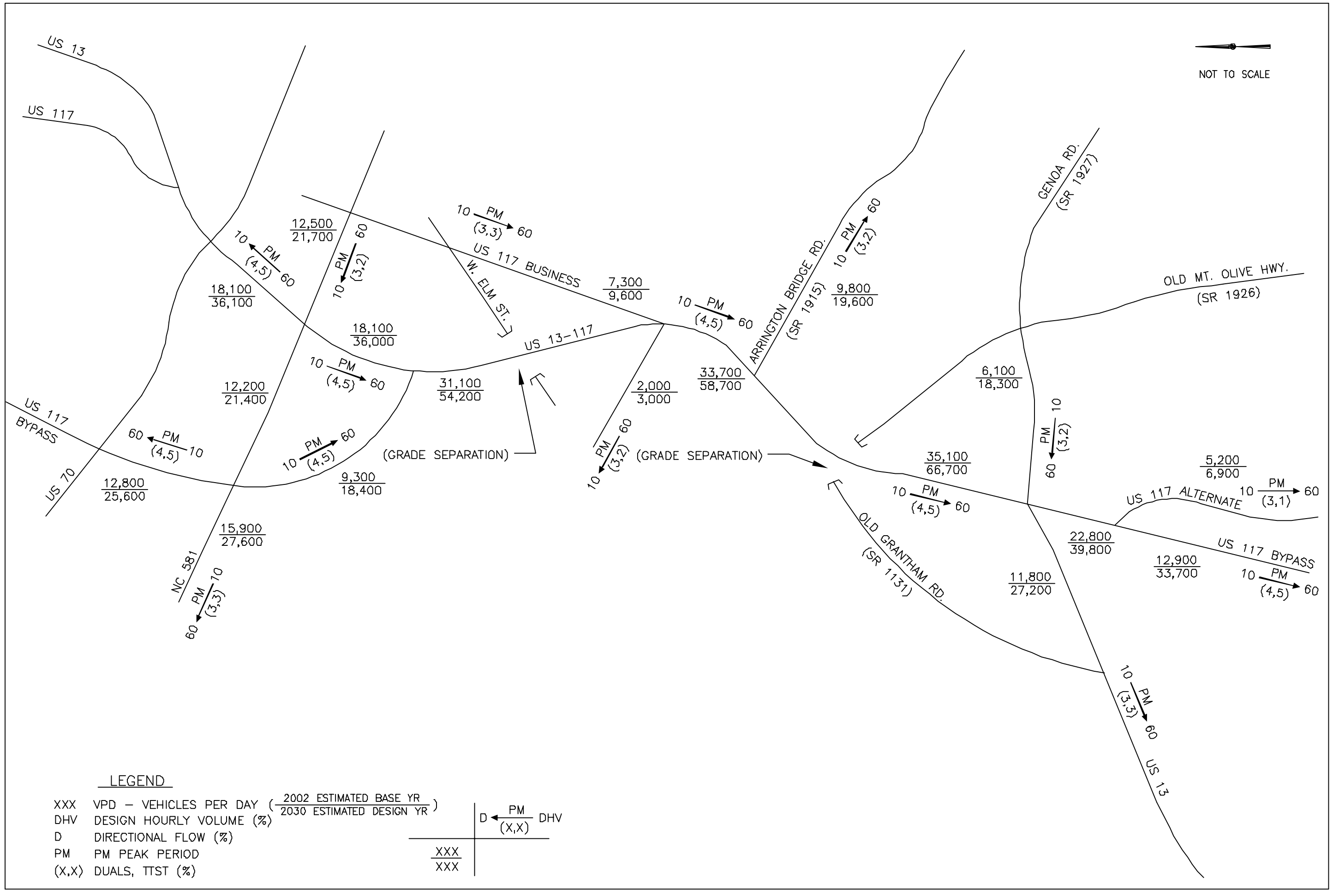


FIGURE 3

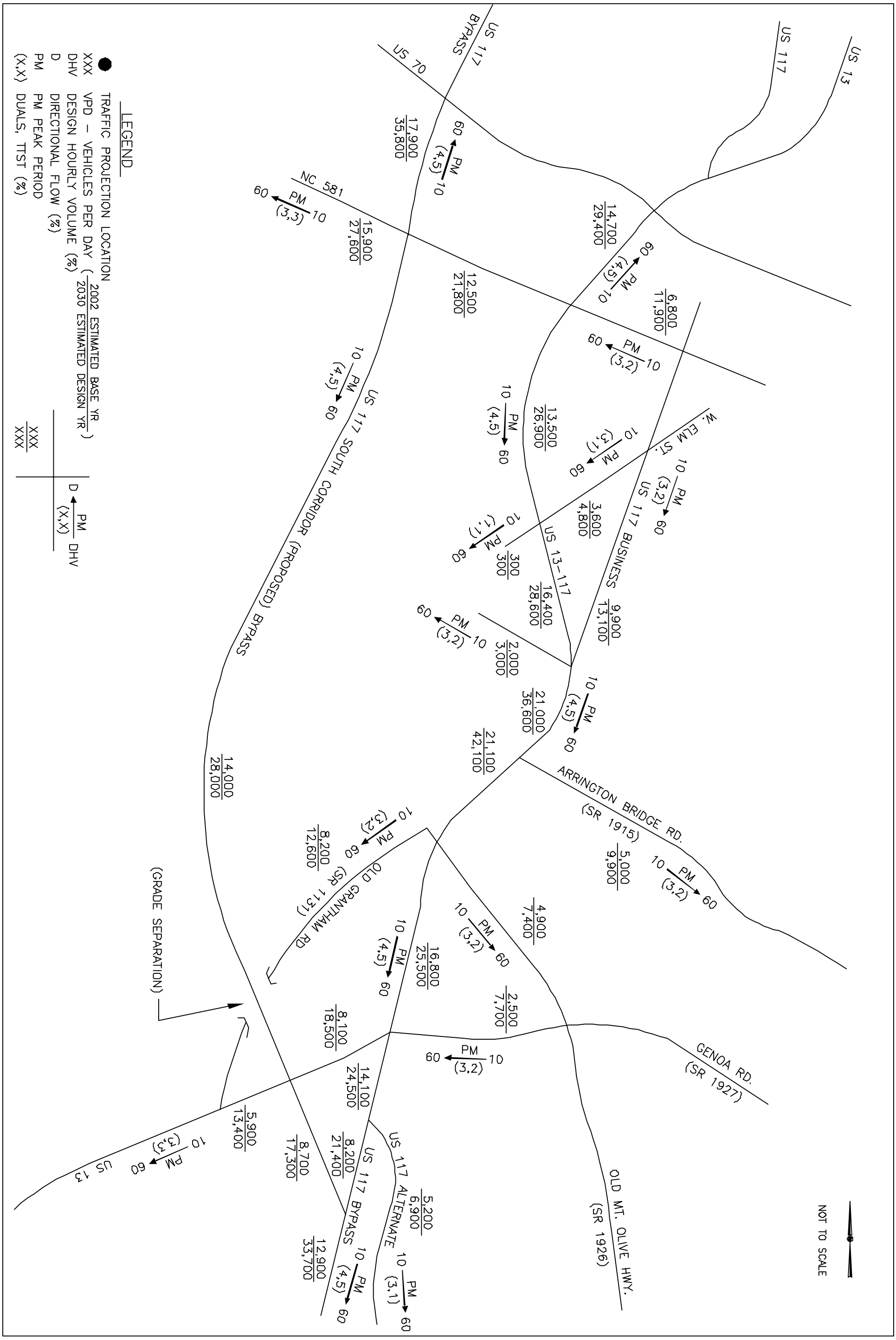
ESTIMATED DAILY MAINLINE TRAFFIC VOLUMES WITH RETROFIT ON EXISTING US117 ALIGNMENT (FREEWAY TYPE FACILITY)

US 117 SOUTH CORRIDOR FEASIBILITY STUDY GOLDSBORO, NC

Kimley-Horn and Associates, Inc

T:\012413000\feasibility US 117.dwg

T:\012413000\feasibility US 117.dwg



LEGEND

- TRAFFIC PROJECTION LOCATION
- XXX VPD — VEHICLES PER DAY (2002 ESTIMATED BASE YR / 2030 ESTIMATED DESIGN YR)
- DHV DESIGN HOURLY VOLUME (%)
- D DIRECTIONAL FLOW (%)
- PM PM PEAK PERIOD
- (X,X) DUALS, TTST (%)

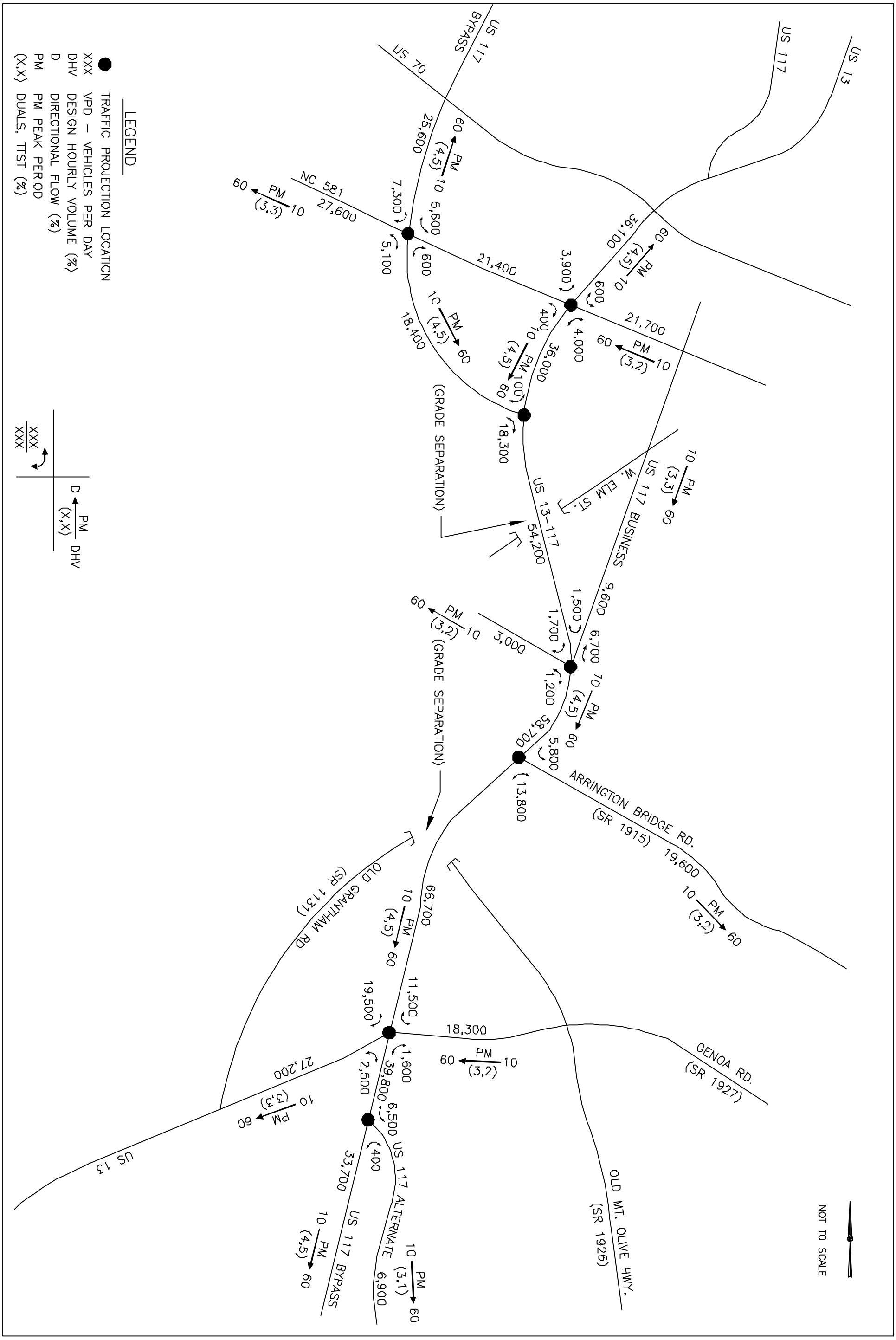
XXX / XXX

D PM (X,X) DHV

(GRADE SEPARATION)

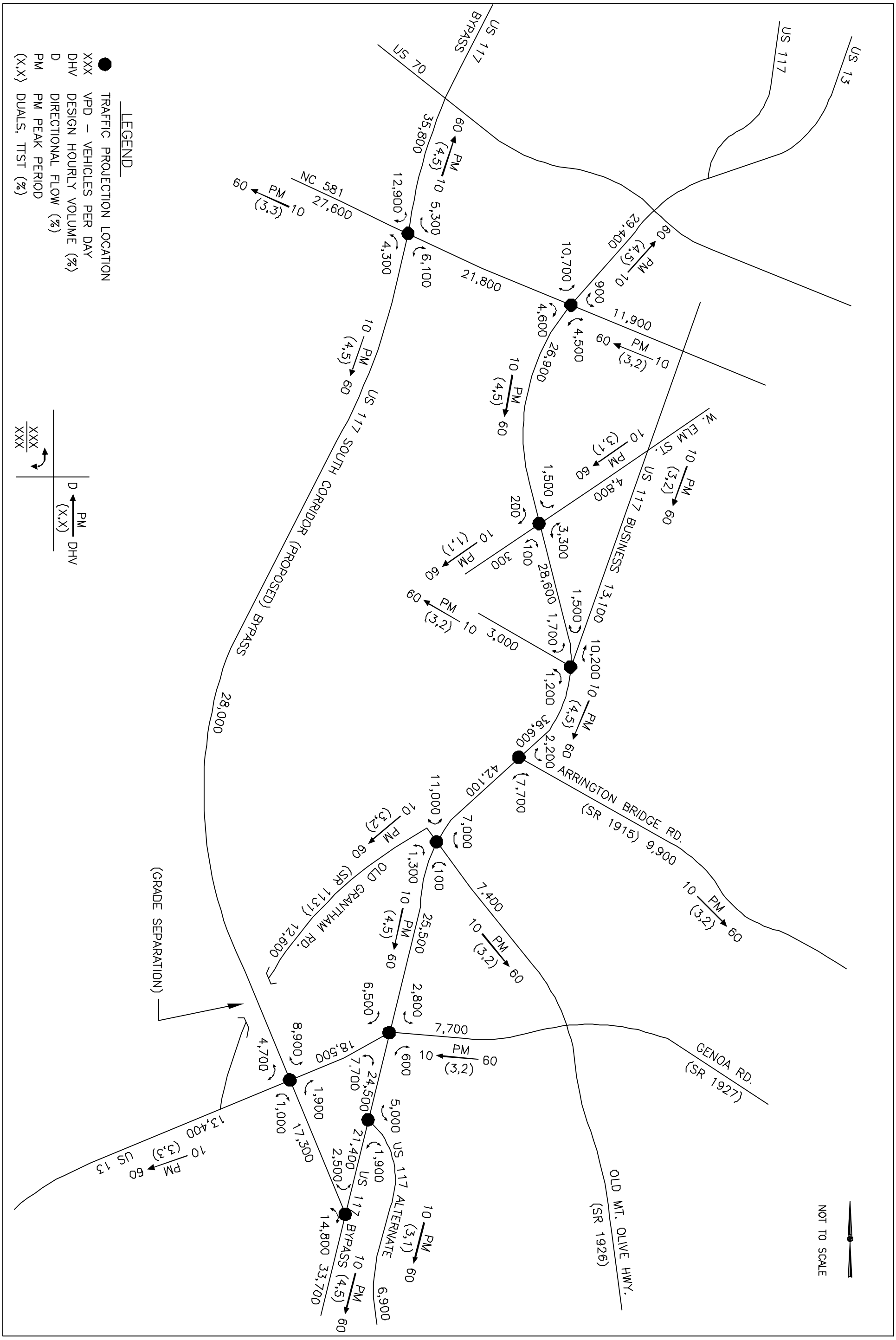
Kimley-Horn and Associates, Inc	US117 SOUTH CORRIDOR FEASIBILITY STUDY GOLDSBORO, NC	ESTIMATED DAILY MAINLINE TRAFFIC VOLUMES WITH CONSTRUCTION OF US117 SOUTH CORRIDOR (WESTERN BYPASS ALIGNMENT)	FIGURE 4

T:\012413000\feasibility US 117.dwg



Kimley-Horn and Associates, Inc	US 117 SOUTH CORRIDOR FEASIBILITY STUDY GOLDSBORO, NC	YEAR 2030 ESTIMATED DAILY BIDIRECTIONAL TURN VOLUMES WITH RETROFIT ON EXISTING US117 ALIGNMENT (FREEWAY TYPE FACILITY)	FIGURE 5

T:\012413000\feasibility US 117.dwg



Kimley-Horn and Associates, Inc	US117 SOUTH CORRIDOR FEASIBILITY STUDY GOLDSBORO, NC	YEAR 2030 ESTIMATED DAILY BIDIRECTIONAL TURN VOLUMES WITH CONSTRUCTION OF US117 SOUTH CORRIDOR (WESTERN ALIGNMENT)	FIGURE 6

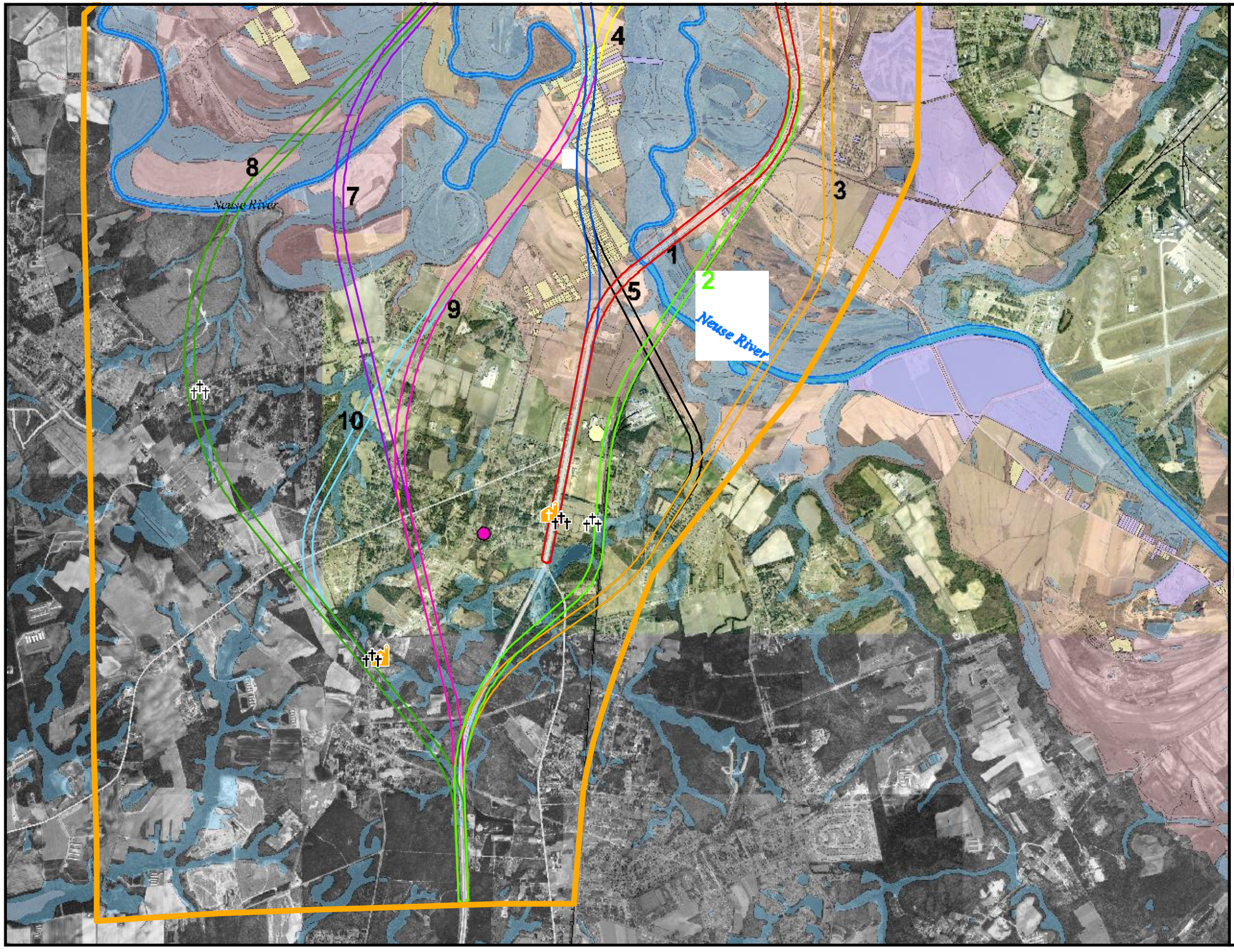


Figure 7a

Preliminary Corridors Human and Natural Environment

US 117 South Corridor
Feasibility Study
Goldsboro MPO

Legend

- Study Area
- Roads
- Railroad
- Major Water Bodies
- Major Rivers/Streams
- NWI Wetlands
- Floodplains
- City FEMA Properties/City Properties
- County FEMA Properties
- Superfund Sites
- Historic Districts
- Historic Places
- Park
- Schools
- Church
- Cemetery
- Corridor 1
- Corridor 2
- Corridor 3
- Corridor 4
- Corridor 5
- Corridor 6
- Corridor 7
- Corridor 8
- Corridor 9
- Corridor 10

N
W
E
S

0 3,000 6,000
Feet

Kimley-Horn and Associates, Inc.

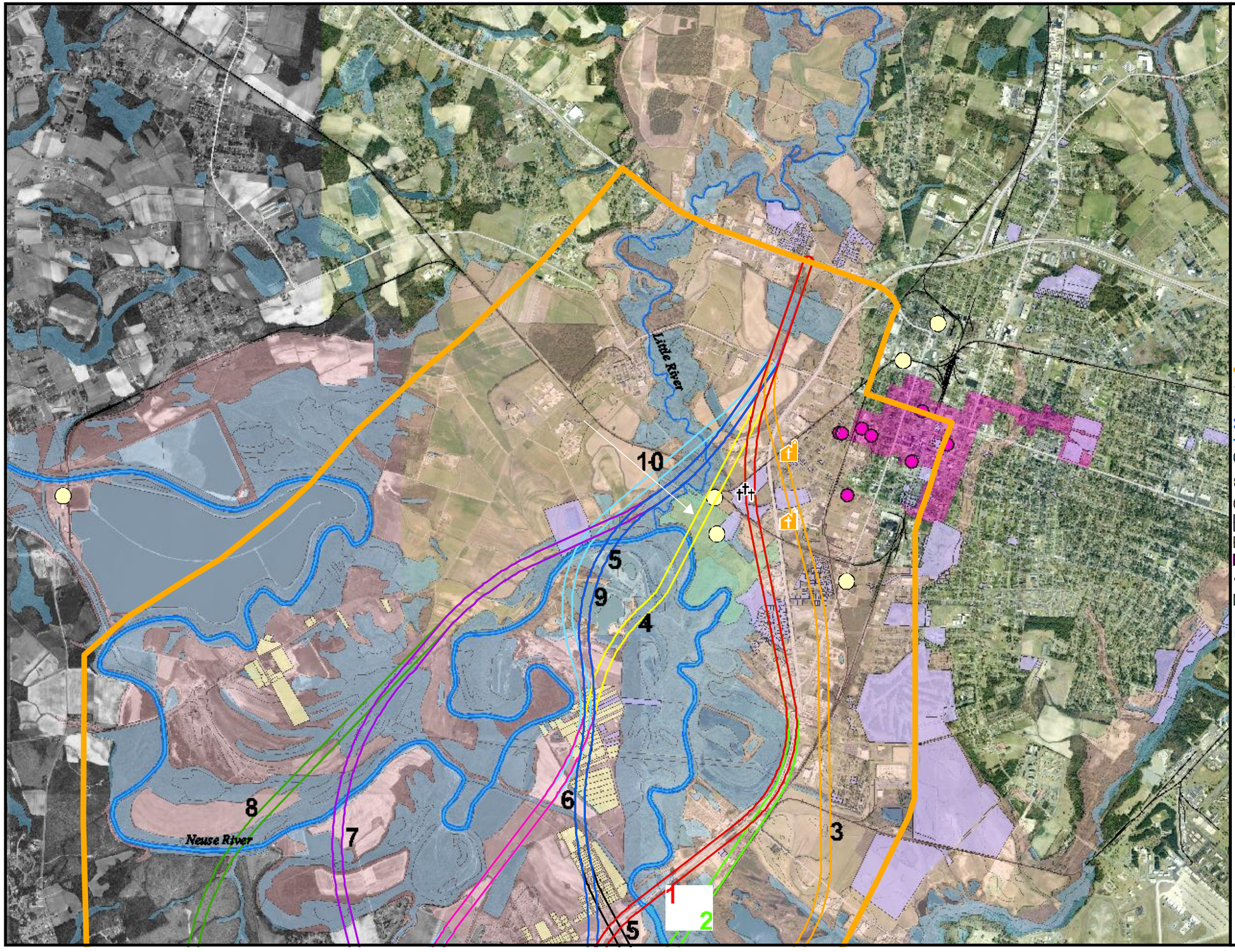


Figure 7b

Preliminary Corridors Human and Natural Environment

US 117 South Corridor
Feasibility Study
Goldsboro MPO

Legend

- Study Area
- Roads
- Railroad
- Major Water Bodies
- Major Rivers/Streams
- NWI Wetlands
- Superfund Sites
- Floodplains
- City FEMA Properties/City Properties
- County FEMA Properties
- Historic Districts
- Historic Places
- Park
- Schools
- Church
- Cemetery
- Corridor 1
- Corridor 2
- Corridor 3
- Corridor 4
- Corridor 5
- Corridor 6
- Corridor 7
- Corridor 8
- Corridor 9
- Corridor 10

N
W E
S

0 3,000 6,000
Feet

Kimley-Horn and Associates, Inc.

Figure 8a

Functional Design Alternatives Human and Natural Environment

US 117 South Corridor
Feasibility Study
Goldsboro MPO

Neuse River

Neuse River

10

6

BEGIN STUDY

Legend

- Study Area
- Roads
- Railroad
- Major Water Bodies
- Major Rivers/Streams
- NWI Wetlands
- Floodplains
- County FEMA Properties
- Superfund Sites
- Historic Districts
- City FEMA Properties/City Properties
- Historic Places
- Park
- Schools
- Church
- Cemetery

N
W
E
S

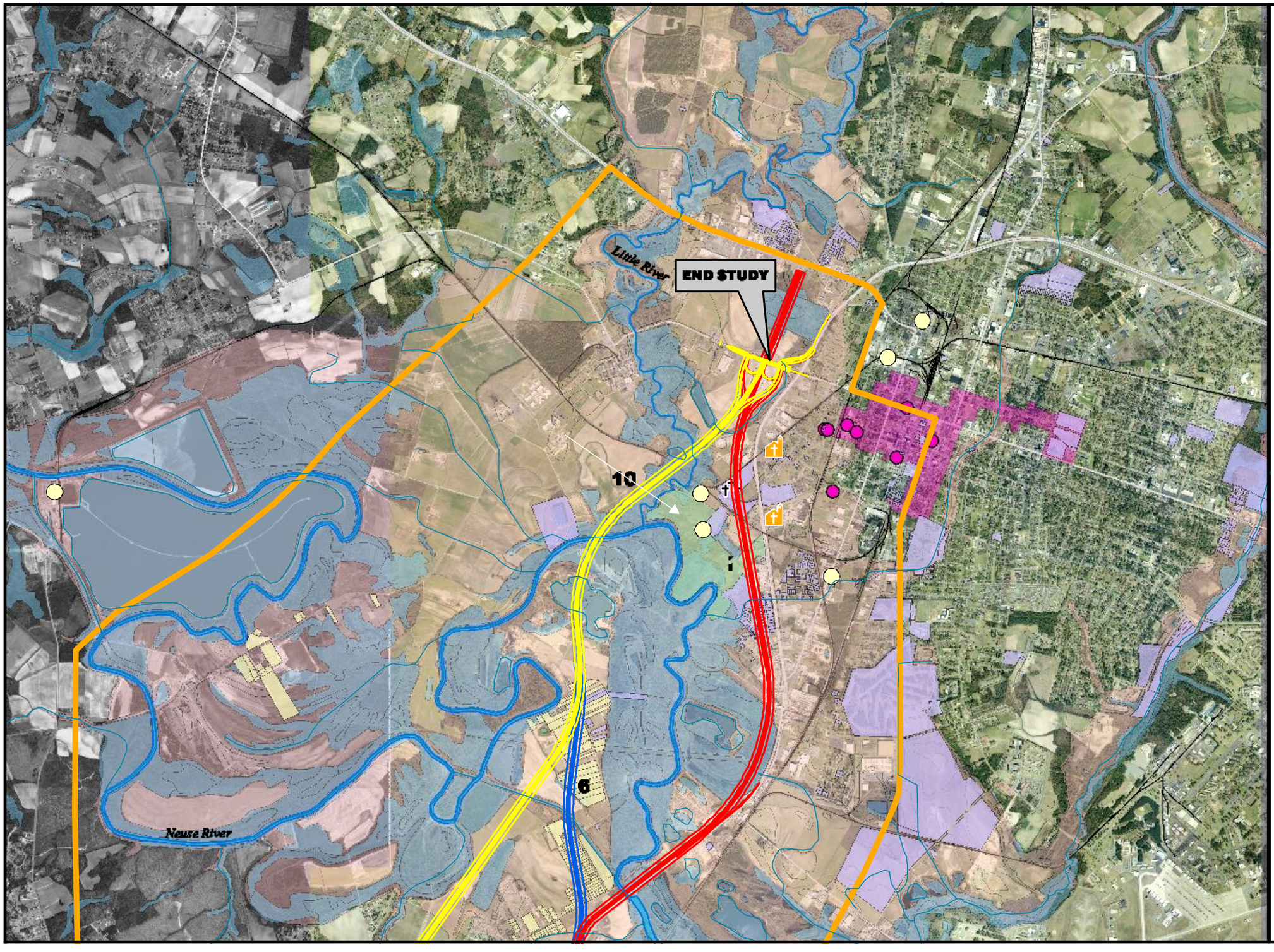
0 3,000 6,000
Feet

Kimley-Horn and Associates, Inc

Figure 8b

Functional Design Alternatives Human and Natural Environment

US 117 South Corridor
Feasibility Study
Goldsboro MPO



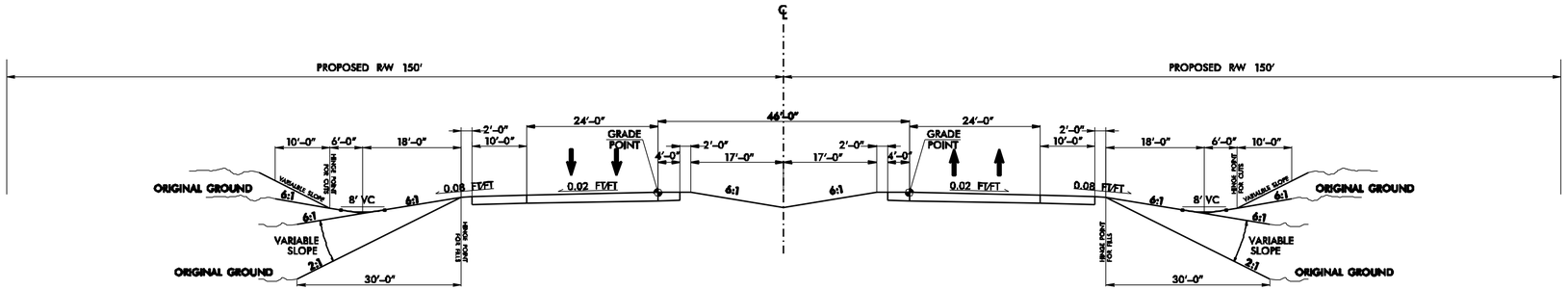
Legend

- Study Area
- Roads
- Railroad
- Major Water Bodies
- Major Rivers/Streams
- NWI Wetlands
- Floodplains
- Superfund Sites
- City FEMA Properties/City Properties
- County FEMA Properties
- Historic Districts
- Historic Places
- Park
- Schools
- Church
- Cemetery

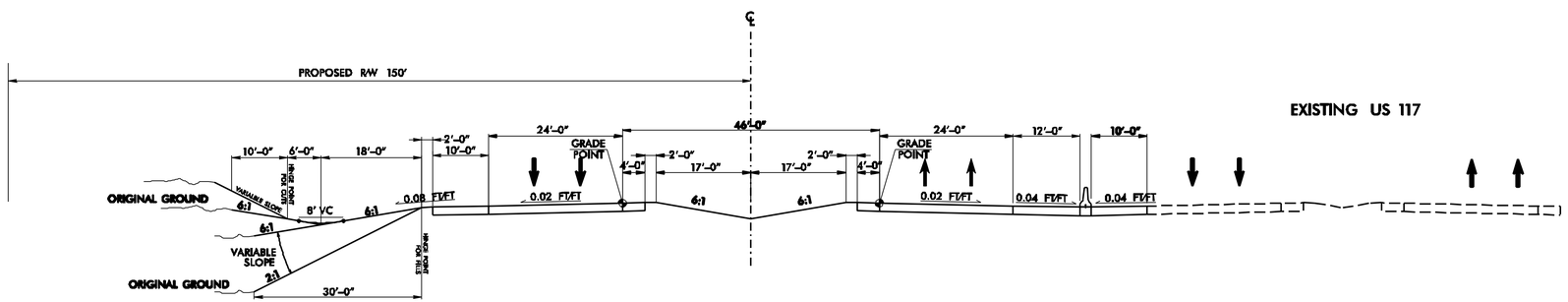
N
W E
S

0 3,000 6,000 Feet

Kimley-Horn and Associates, Inc.



PROPOSED US 117 TYPICAL SECTION
NEW LOCATION



PROPOSED US 117 TYPICAL SECTION
PARALLEL TO EXISTING US 117

1:\prj\pn\012413000\Figures\fig9-typicalsection.dgn

02/12/2004

Figure 9

Typical Sections

US 117 South Corridor
Feasibility Study
Goldsboro MPO

Kimley-Horn and Associates, Inc.

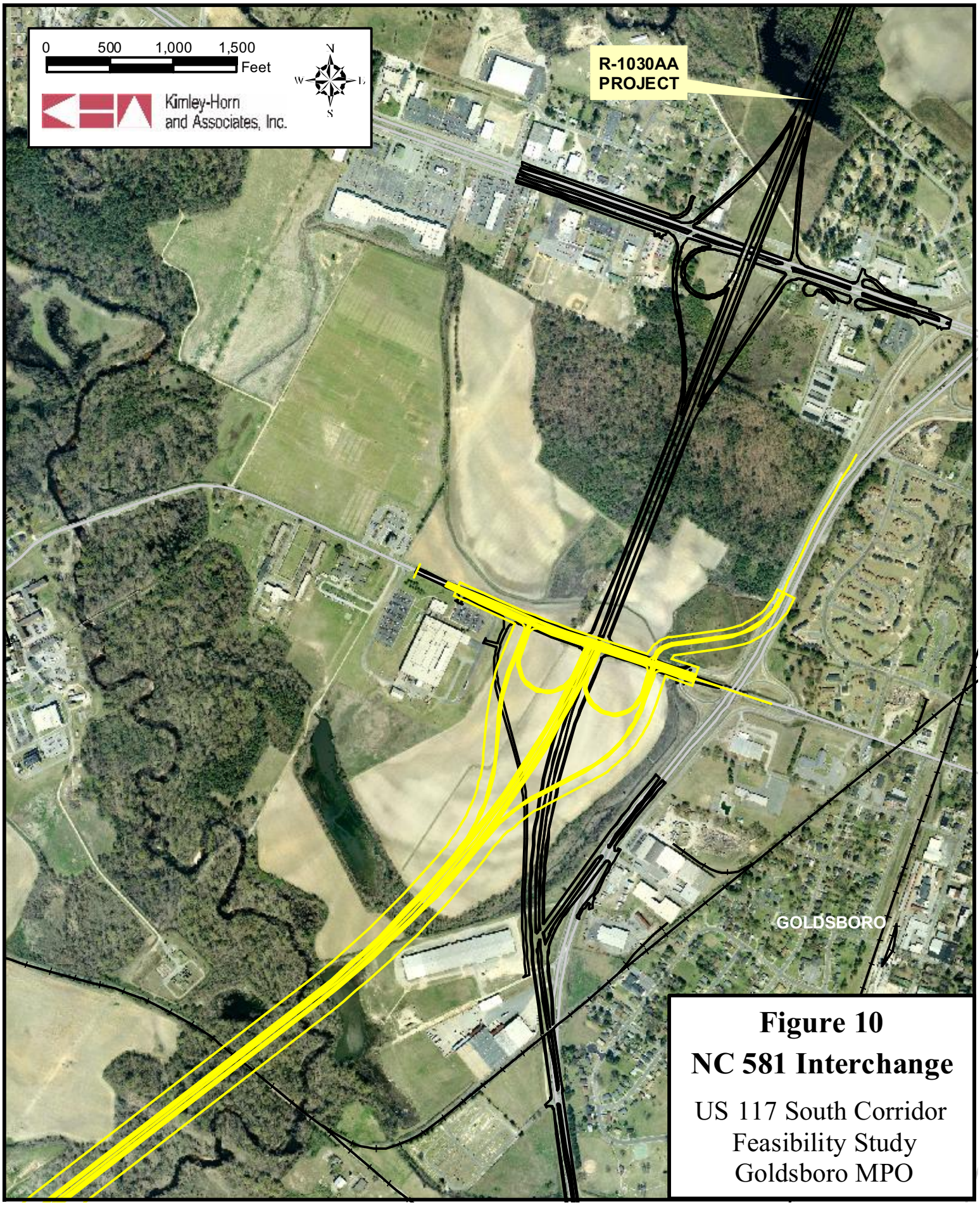


Figure 10
NC 581 Interchange

US 117 South Corridor
Feasibility Study
Goldsboro MPO

Figure 11
Preferred Alternative

US 117 South Corridor
Feasibility Study
Goldsboro MPO