Conceptual Design Plans for I-6055
Sheets 1 of 23 through 10 of 23
(Sections A-G)

FEASIBILITY STUDY

US-74 UPGRADE TO INTERSTATE STANDARDS
from EAST OF HAMLET to EAST OF MAXTON
RICHMOND, SCOTLAND, & ROBESON
COUNTIES

Divisions 6 & 8
FS-1508A

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I. Introduction

This feasibility study evaluates freeway upgrades for US-74 from the US-74 Rockingham-Hamlet Bypass in Richmond County to existing I-74 in Robeson County. The 24-mile portion of US-74 spans across three counties (Richmond, Scotland, and Robeson), and across two NCDOT Highway Divisions (Divisions 6 and 8). The project is located within the Lumber River RPO area. See Figure 1 for the project location.

The upgraded route would improve the regional and statewide traffic operations along the US-74 corridor. The majority of the improvements are confined to the existing corridor but an alternative considers a 2.4-mile southerly bypass of Laurel Hill. North Carolina Department of Transportation's Strategic Highway Corridors Plan recommends that US-74 ultimately function as a freeway from the South Carolina State Line to I-77 in Surry County. Just east of Laurel Hill, exit 181 to US-74 Business forms the dividing line between the partial control of access facility to the west, and the full control of access to the east, which is already signed as Interstate 74.

This feasibility study identifies potential alignments and is the initial step in the planning and design process for this project. It is not the product of exhaustive environmental or design investigations. Its purpose is to describe the proposed project, including costs, and to identify potential problems that may require consideration in the future planning and design phase.

II. Purpose and Need

The US-74 corridor is a vital transportation corridor which runs from western North Carolina to eastern North Carolina. It stretches from the North Carolina/Tennessee state line in Cherokee County to Wrightsville Beach in New Hanover County. US-74 between the Rockingham-Hamlet Bypass in Richmond County and existing I-74 in Robeson County is identified as a Strategic Transportation Corridor.

The purpose of this project is to upgrade the 24-mile portion of US-74 to interstate standards, to improve the regional and statewide traffic operations along the US-74 corridor, and to enhance the ability of US-74 to serve the regional transportation function in accordance with the North Carolina Strategic Transportation Corridors plan.

There are 15 roadway projects near the study area in the 2018-2027 State Transportation Improvement Program (STIP) and Strategic Transportation Investments (STI) P4.0. As shown on Figure 2, these include:

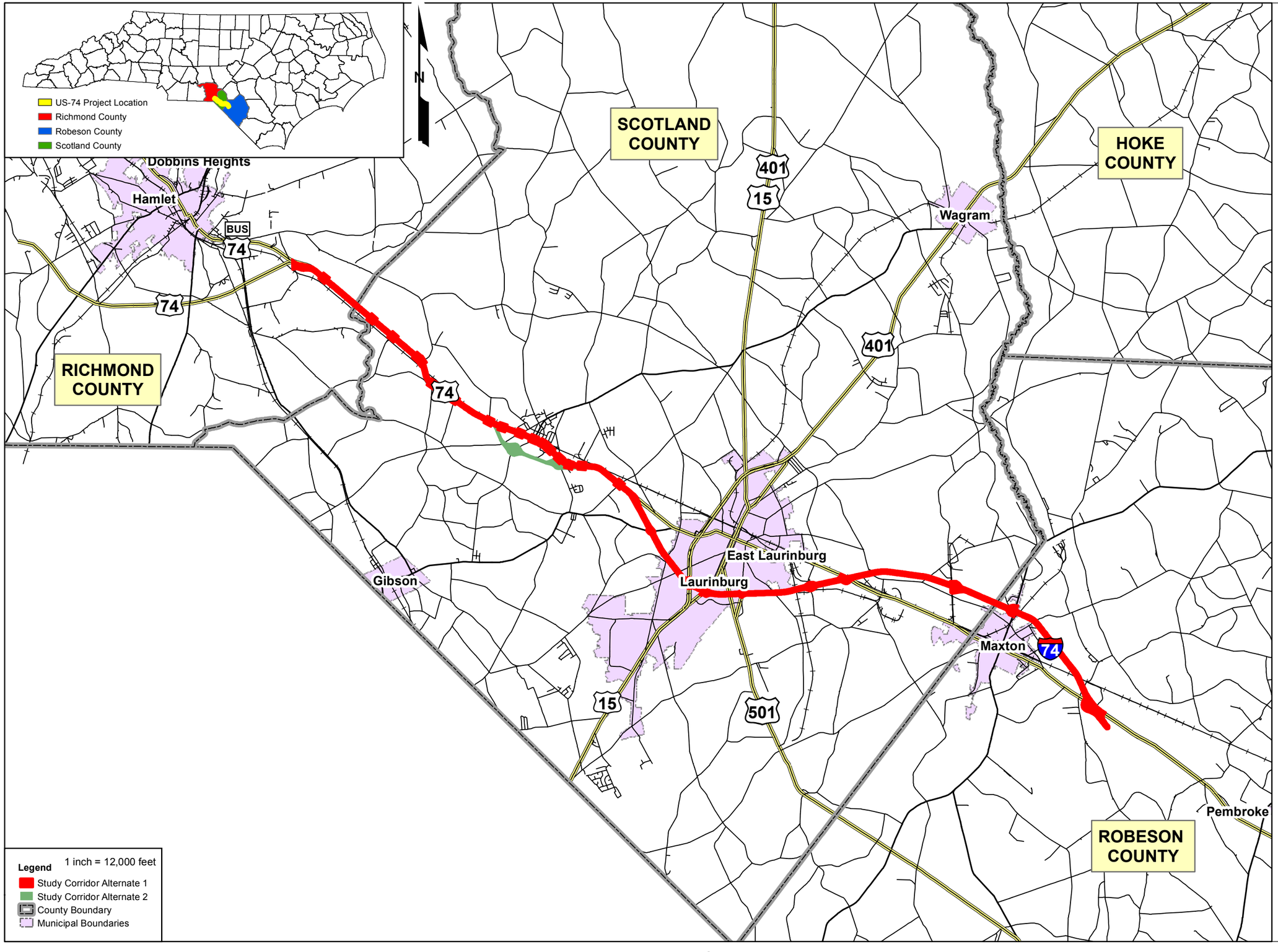
- **I-5732:** Pavement Markings and Markers on I-74/NC 710 interchange to I-74/NC 41 interchange in Robeson County (Project Complete).

- **I-5847:** Pavement Rehabilitation on I-74 from US 74 Business to NC 710 (Under Construction).
- **I-5898:** US-74 upgrade to interstate standards from the US-311/ NC-135 to the Laurinburg Bypass. This project includes the western half of FS-1508A and is scheduled for right of way and construction in FY 2022.
- **I-5938A:** Bridge Rehabilitation I-74 from NC 710 to NC 41 in Robeson County, Construction FY 2018.
- **I-5938B:** Pavement Rehabilitation I-74 from NC 710 to NC 41 in Robeson County, Construction FY 2022.
- **I-5939:** Pavement Rehabilitation I-95 from South Carolina State Line to SR 1155 in Robeson County, FY 2022.
- **U-5706:** Construct 2-lane facility utilizing sections of SR 1641 and SR 1645 in Richmond County, FY 2020.
- **U-5753:** Widen SR 1305 (Wayside Road) to multi-lanes from Plank Road to US 401 in Hoke County, FY 2020.
- **U-5857:** Widen SR 1406 (Rockfish Road) to multi-lanes from SR 1418 to SR 1003 in Hoke County, FY 2020.
- **U-5858:** Widen SR 1418 (Lindsay Road) to multi-lanes from SR 1406 to US 401 in Hoke County, FY 2020.
- **U-5977:** Widen US 15/401 to multi-lanes from South Carolina state line to south of SR 1105 in Scotland County, FY 2024.
- **R-5709:** Widen NC 211 to multi-lanes from US 15/501 to SR 1244/SR 1311 in Hoke and Moore Counties, FY 2020.
- **R-5827:** Widen US 15/501 to multi-lanes from US 401 to US 1 in Hoke, Moore, and Scotland Counties, FY 2024.
- **W-5601**: Ongoing Safety Improvement project along US-74 from SR 1152 (Old Wire Road) to SR 1304 (Armstrong Road) in Laurel Hill, Scotland County.
- **B-5003**: Replace Bridge Number 820081 on Commonwealth Avenue over Leith Creek with a culvert in Laurinburg in Scotland County, Municipal bridge FY 2016.

III. Existing Conditions

The project begins east of Hamlet at the US-74 Rockingham-Hamlet Bypass interchange, travels east through Laurel Hill, Laurinburg, and Maxton, and ends at the I-74 interchange east of Maxton. The US-74 study corridor includes a 4-lane, median-divided highway from the US-74 Rockingham-Hamlet Bypass in Richmond County to east of SR 1321 (Elmore Road) in Scotland County, and a 4-lane freeway from east of SR 1321 (Elmore Road) in Scotland County to existing I-74 in Robeson County.

Land use consists of mostly undeveloped and some rural residential use from the western project terminus until Laurel Hill. In Laurel Hill, the land use along the corridor consists of business and



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF PLANNING AND PROGRAMMING

FEASIBILITY STUDIES UNIT

PROJECT VICINITY MAP

US 74 UPGRADE TO INTERSTATE STANDARDS
RICHMOND, SCOTLAND, ROBESON COUNTIES

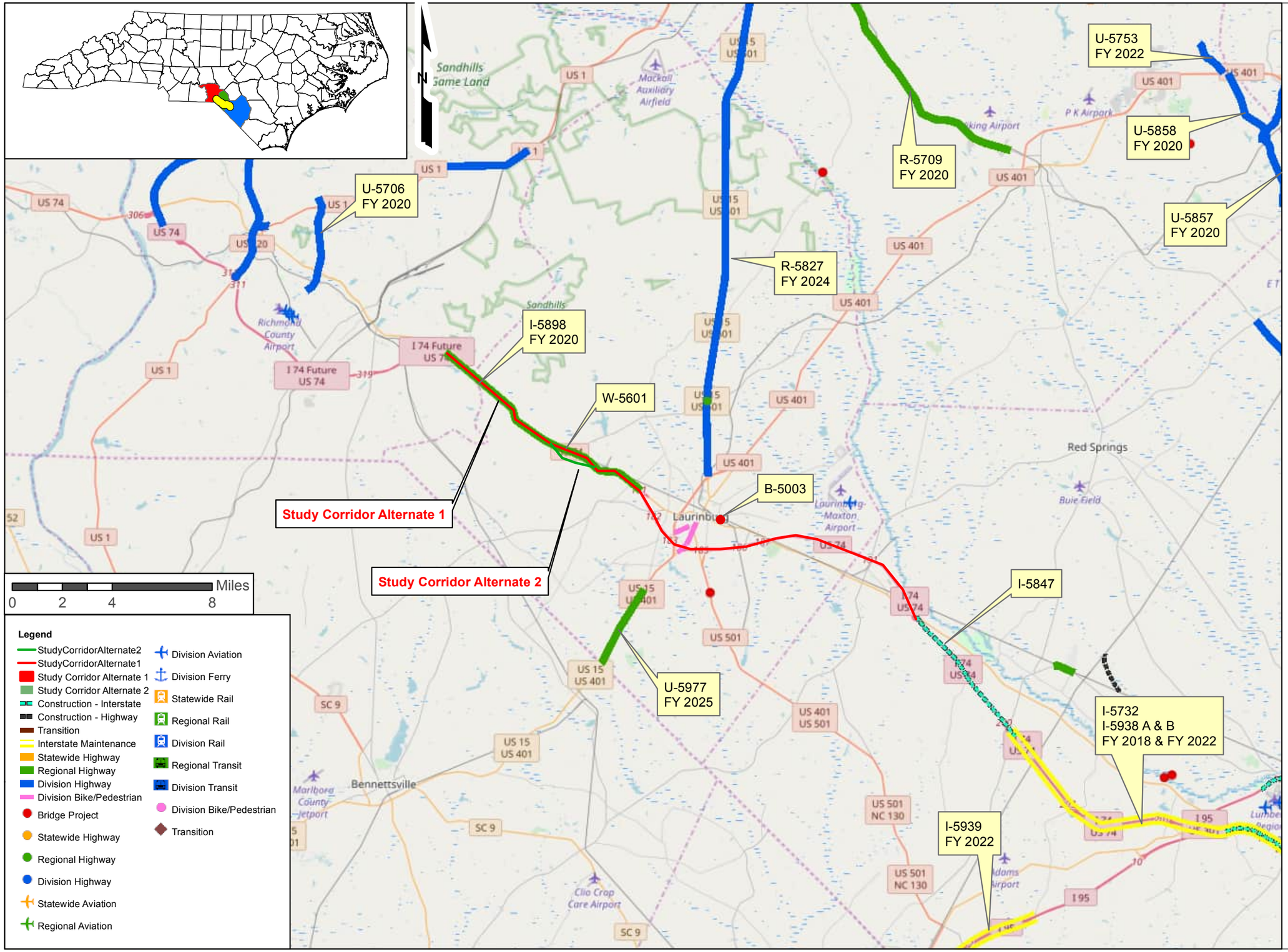
County: **RICHMOND, SCOTLAND, ROBESON**

Div:	TIP#
6 AND 8	**FS-1508A**

JUNE 2017

Data Sources: NCDOT, NC OneMap

FIGURE 1



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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FEASIBILITY STUDIES UNIT

ADJACENT STIP PROJECTS

US 74 UPGRADE TO INTERSTATE STANDARDS
RICHMOND, SCOTLAND, ROBESON COUNTIES

County: **RICHMOND, SCOTLAND, ROBESON**

Div:	TIP#
6 AND 8	**FS-1508A**

JUNE 2017

Data Sources: NCDOT, NC OneMap

FIGURE 2

residential uses. Continuing past Laurel Hill, land use is again mostly undeveloped with some rural residential and business uses. In Laurinburg, the area is more developed with commercial uses. East of Laurinburg, it returns to undeveloped land with light residential and commercial use until the eastern project terminus.

US-74 within the project limits has partial access control from the western project limits to east of SR 1321 (Elmore Road) in Scotland County. Between these limits, there are 11 at-grade intersections, most of which are controlled by stop signs, one railroad grade separation, six median openings, 3 directional crossovers, and one merge/split at the starting point of the project. Two of these intersections are signalized, including US-74 at NC 144/SR 1148 (Morgan Road/St. John's Church Road) and US-74 at SR 1125/SR 1305 (Springs Mill Road/Ida Mill Road). Numerous access points exist within this section.

US-74 from east of SR 1321 (Elmore Road) in Scotland County to the eastern project limits has full access control. Between these limits, there are nine interchanges, one merge/split, six grade separations, and four railroad grade separations.

The speed limit varies from 45-70 miles per hour (mph). The speed limit starts at 70 mph at the western end project limits, drops down to 55 mph at the Scotland County Line, reduces again to 45 mph at SR 1152/SR 1319 (Old Wire Road) through Laurel Hill, increases again after SR 1125/SR 1305 (Springs Mill Road/Ida Mill Road) to 55 mph, where it increases to 70 mph again after exit 181 (US-74BUS) until the eastern terminus of the project.

US-74 is classified as "other highway" throughout the entire project corridor. I-74/Future I-74 is part of the NC Strategic Transportation Corridor H, and US-74W/US-74E is part of NC Strategic Transportation Corridor U.

There are six railroad crossing locations within the study area. The rail lines that could be impacted belong to CSX Transportation (CSX) and the Laurinburg and Southern Railroad Company (LRS).

IV. Description of Alternatives

A four-lane median divided freeway is proposed with 12-foot lanes, 12-foot paved shoulders on the outside and 4-foot paved shoulders on the inside in a 300-foot right of way. A variable median from 36 feet to 68 feet is proposed in order to limit impacts. As determined in discussions with NCDOT, interchanges are proposed at select crossing locations with major roads, with consideration of interchange spacing for traffic operations and safety. In addition to bridges at interchanges, bridges have been included at grade separations with minor roads, as well as railroads and creeks. A 75 mile per hour (mph) roadway design speed with a posted speed limit of 70 mph is proposed. However, the design speed may be lowered in some segments in order to utilize the existing US-74 alignment and limit impacts. Due to the long time horizon anticipated for implementation of this feasibility study, it was assumed for the cost estimate that all existing

bridges crossing US-74 will be replaced. New and replacement bridges should be designed to meet the appropriate vertical clearances for the roadway classification (interstate, etc.).

Preliminary corridors were initially considered with three potential alternatives. As shown on Figure 3, these were refined to form Alternative 1 (using existing US-74 corridor) and Alternative 2 (using existing US-74 corridor except for southerly bypass around Laurel Hill). The third alternative was a northern bypass of Laurel Hill, which was eliminated from further consideration due to impacts to the U.S. Fish & Wildlife Service Safe Harbor tract north of Laurel Hill. Alternatives 1 and 2 have been evaluated in detail in this feasibility study. These alternatives are described below and can be found in Figures 4.1 thru 4.23, *FS-1508A Conceptual Design Plans*, of Appendix A-1.

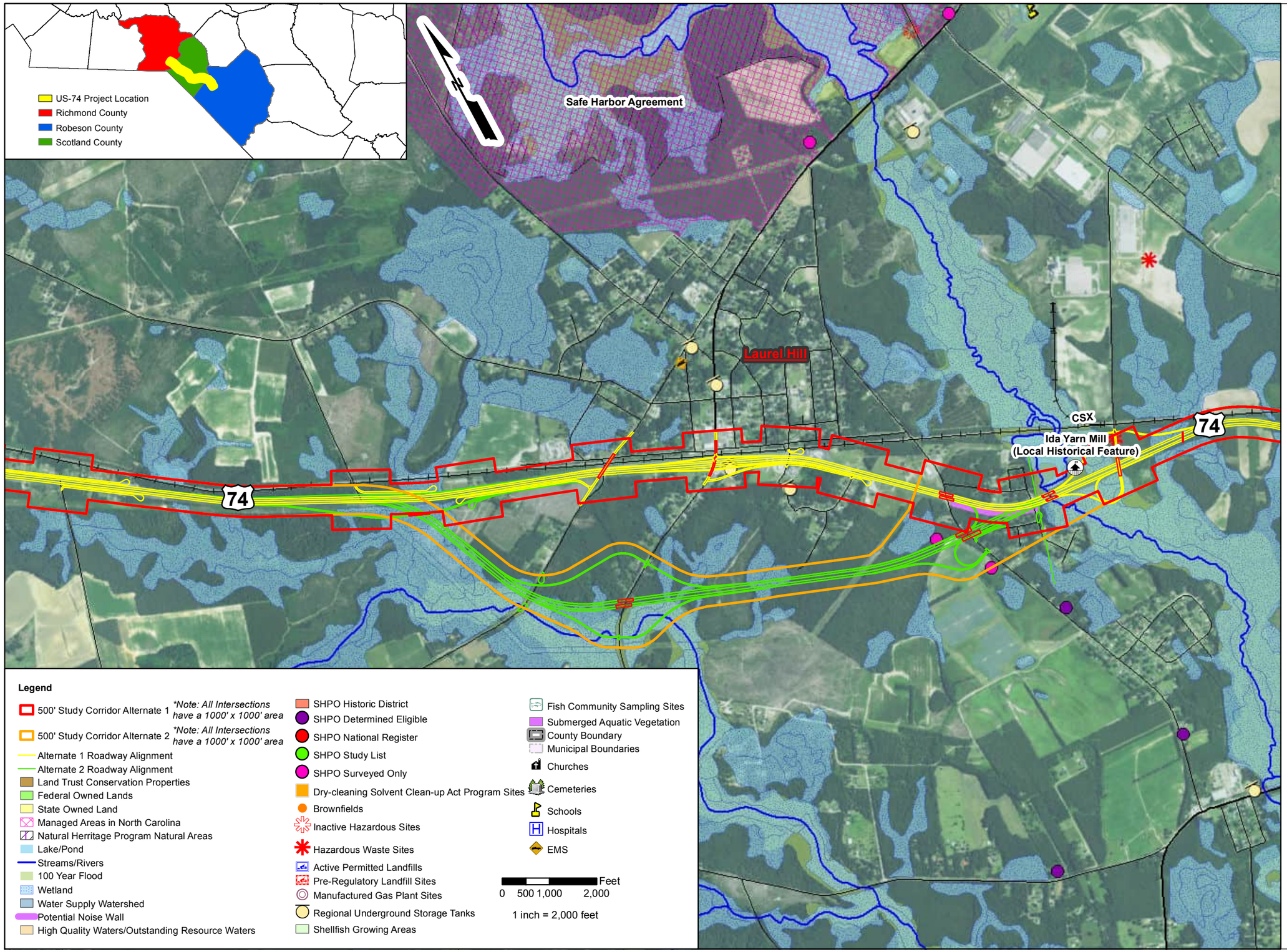
Alternative 1 is upgrading 24 miles of the existing US-74 alignment to interstate standards. It will result in the closure of several existing at-grade intersections, creating grade separations at several other roadway crossings, creating new interchanges, creating new service roads, and improving existing interchanges. A complete list of potential treatments is presented in Table 2, which is an excerpt from the Traffic Memo *FS-1508A US 74 Upgrade to Interstate Standards Capacity Analysis* (CDM Smith, May 24, 2016) found in Appendix A-2.

Alternative 2 follows the alignment of Alternative 1 until SR 1363 (Fred Carter Road), where the southerly bypass around Laurel Hill begins. The southerly bypass ties back in to the existing alignment at SR 1267 (Devon Drive) and continues to follow the existing alignment until the eastern terminus of the project area. This alternative proposes to keep existing US-74 in operation as a business/local route with at-grade intersections and partial control of access.

Due to the 24-mile length of the project, it was segmented into Sections A thru K for potential phasing to align with funding availability, as shown in Table 1.

Table 1: Segment Descriptions & Lengths

Segment	Segment Description	Alt. 1 Length (miles)	Alt. 2 Length (miles)
A	US-74/US-74 Bus Interchange Segment	0.98	0.98
B	Joe's Creek Segment	2.88	2.88
C	Old Hundred Area Segment	0.64	0.64
D	Laurel Hill Segment	3.92	4.08
E	Gum Swamp Segment	0.79	0.79
F	Elmore Road Segment	0.84	0.84
G	Laurinburg Segment	4.93	4.93
H	Laurinburg & Southern RR Segment	0.50	0.50
I	Leith Creek Segment	1.22	1.22
J	Old Lumberton Road Segment	0.69	0.69
K	Maxton Segment	6.56	6.56
	Total:	**23.95**	**24.11**



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FEASIBILITY STUDIES UNIT

LAUREL HILL VICINITY MAP

US 74 UPGRADE TO INTERSTATE STANDARDS
RICHMOND, SCOTLAND, ROBESON COUNTIES

County: **RICHMOND, SCOTLAND, ROBESON**

Div:	TIP#
6 AND 8	**FS-1508A**

JUNE 2017

Data Sources: NCDOT, NC OneMap, NC FRIS, NC SHPO, NCDENR, USFWS, USGS

FIGURE 3

Table 2: Potential Intersection & Interchange Treatments

Crossing Feature/Road	Feature/Road Explanation	Existing Traffic Control	Included in Traffic Forecast	Potential Future Treatments							
				Closure	Cul-De-Sac	Realignment	Grade Separation	Merge/Split	New Interchange	Interchange Access Improvement	Interchange Geometry Improvement
US 74 BR	US 74 Business in Richmond County	Merge/Split	Y					X			X
SR 1846	Question (service road)	Unsignalized			X						
MO #1	Full movement median opening	Unsignalized		X							
MO #2	Full movement median opening	Unsignalized		X							
MO #3	Full movement median opening	Unsignalized		X							
SR 1156/SR 1801	Joes Creek Rd	Unsignalized			X						
SR 1155	Guinns Mill Rd	Unsignalized			X						
SR 1347	McEachin Rd	Unsignalized	Y			X					
Railroad Crossing #1	CSX Railroad	Underpass					X				
SR 1145	Corbitt Rd/Old Hundred Road	Unsignalized	Y						X		
Pate	Private street to Morgan Motors	Unsignalized			X						
SR 1153	Butler Rd	Unsignalized			X						
MO #4	Full movement median opening, residential access on both sides	Unsignalized		X							
MO #5	Full movement median opening	Unsignalized		X							
SR 1363	Fred Carter Rd	Unsignalized			X						
Whispering Pines		Unsignalized			X						
SR 1152/SR 1319	Old Wire Rd	Directional Crossover	Y				X				
NC 144/SR 1148	Morgan Rd/St John's Church Rd	Signalized	Y						X		
SR 1312	Church St/Murdock St	Directional Crossover			X						
SR 1125/SR 1305	Springs Mill Rd/Ida Mill Rd	Signalized	Y				X				
SR 1267	Devon Dr (recently cut-off)	None			X						
Structure	Bridge over hydraulic feature	Bridge									
SR 1304	Armstrong Rd	Unsignalized	Y						X		
Structure	Hydraulic structure	Culvert									
MO #6	Full movement median opening, residential/business access on north side	Unsignalized		X							
SR 1321	Laurel Hill Church Rd/Elmore Rd	Directional Crossover					X				
US 74 Bus	Exit 181: US 74 Bus w. of Laurinburg	Merge/Split	Y					X			X
NC 79	Exit 182: Gibson Rd	Half Interchange	Y							X	X
SR 1105	State Rd Turnpike Rd	Overpass	Y				X				
Structure	Hydraulic structure	Culvert									
SR 1108	X Way Rd	Overpass	Y				X				
US 15/US 401	Exit 183: McColl Rd	Interchange	Y							X	X
US 15 Bus/US 401 Bus	Exit 184: Main St	Interchange	Y							X	X
US 501 Bus	Johns Rd	Overpass	Y				X				
US 501/SR 1438	Exit 185: S Caledonia Rd	Interchange	Y								X
SR 1601	Stewartsville Rd/Old Johns Rd	Overpass	Y				X				
Railroad Crossing #2	Laurinburg & Southern Company	Underpass					X				
SR 1323/SR 1603	Exit 186: Highland Rd	Half Interchange	Y				X				
US 74 Bus	Exit 187: US 74 Bus btw Laurinburg & Maxton	Interchange	Y								X
Railroad Crossing #3	CSX Railroad	Underpass					X				
SR 1369	Old Lumberton Rd	Overpass	Y				X				
Structure	Hydraulic structure	Culvert									
Railroad Crossing #4	CSX Railroad	Underpass					X				
SR 1436	Exit 190: Airport Rd (Laurinburg-Maxton Airport)	Interchange	Y								X
NC 71/NC 130	Exit 191: N Patterson St, Campbell Soup Company	Interchange	Y								X
Railroad Crossing #5	CSX Railroad	Underpass					X				
SR 1303	McCaskill Ave/Old Red Springs Rd	Overpass	Y				X				
Railroad Crossing #6	CSX Railroad	Underpass					X				
US 74/Alt	Exit 194: E Saunders St/Andrew Jackson Highway	Interchange	Y								X

Notes:

1. Intersections, interchanges, and features are listed from project west end to east end.
2. The list of intersection and interchange improvements is preliminary; it is subject to changes with alternative analysis.
3. In one alternative, the interchange at US 15 BUS/US 401 BUS is abandoned due to weaving traffic concerns.

For discussion purposes, a summary of major design features are described below based on the following segments:

- Western terminus to Fred Carter Road (Alternatives 1 & 2 are same).
- Fred Carter Road to Devon Drive (Alternatives 1 & 2 differ).
- Devon Drive to eastern terminus, excluding the Laurinburg area (Alternatives 1 & 2 are same).
- Laurinburg Interchange Options

Western Terminus to Fred Carter Road (Alternatives 1 & 2):

- Proposed partial cloverleaf interchange at Old Hundred Road/Corbitt Road.
  - US-74 bridges proposed over Old Hundred Road/Corbitt Road to limit impacts to Y-Line properties (traffic control impacts).
  - Realign McEachin Road to intersect with Old Hundred Road.
  - New at-grade rail crossing of CSX Railroad at Old Hundred Road.

Fred Carter Road to Devon Drive (Alternative 1):

- Proposed grade separation at Old Wire Road.
  - Old Wire Road bridge proposed over US-74, CSX Railroad, and Malloy Avenue.
  - Retaining walls proposed to limit residential/business property impacts.
- Proposed tight diamond interchange at Morgan Street/St. John's Church Road.
  - US-74 shifted south to create space for ramps adjacent to parallel CSX tracks.
  - Morgan Street bridge proposed over US-74, CSX Railroad, and Malloy Avenue.
  - Retaining walls proposed to limit residential/business and CSX Railroad property impacts.
- Proposed grade separation at Ida Mill Road.
  - US-74 bridges proposed over Ida Mill Road (traffic control impacts).

Fred Carter Road to Devon Drive (Alternative 2):

- Proposed flyover interchange at Fred Carter Road where US-74 southerly bypass begins.
  - Flyover ramp from existing EB US-74 over proposed bypass maintains access to US-74 business/local.
- Proposed diamond interchange at St. John's Church Road.
  - Allows for future loops in each quadrant.
- Proposed partial cloverleaf interchange at Ida Mill Road/Spring Mill Road.
  - Existing EB US-74 traffic will turn right on Ida Mill Road and use loop at new interchange to continue on EB US-74 (Ida Mill Road grade separation only for Alternative 1).

Devon Drive to Eastern Terminus (Alternatives 1 & 2):

- Proposed trumpet interchange at Armstrong Road.
  - Interchange impacts wetlands and floodplain area of Gum Swamp Creek.
- Proposed grade separation at Elmore Road.
  - US-74 bridges proposed over Elmore Road to limit impacts to Y-Line properties (traffic control impacts).

- ❖ Proposed interchange modifications to provide full movements at US-74/Gibson Road interchange.
  - ➢ Relocate existing ramps for new loop and future loop accommodation.
- ❖ Convert existing interchange at US-74/Highland Road to grade separation since traffic volumes on Highland Road do not justify an interchange.

Laurinburg Interchange Options:

Currently there is only 0.4 miles of spacing between the US 15/401 Bypass (McColl Road) and US 15/401 Business (Main Street) interchanges. The current configurations at these two interchanges create short weaving segments along both direction of I-74. The weaving issue is expected to worsen with heavier traffic demand and a large percentage of trucks (36%) shown in the traffic forecast. As shown on Figure 5 in Appendix A-3, the mitigation alternatives include:

- Option 1: Relocating two ramps at the US 15/401 Bypass interchange and two ramps at the US 15/401 Business interchange (Note: Option 1 assumed for cost estimate).
- Option 2: Abandoning two ramps at the US 15/401 Business interchange.
- Option 3: Abandoning the entire interchange at US 15/401 Business.

V. Other Design Considerations

As previously discussed, a third alternative of a northerly bypass of Laurel Hill was considered but eliminated from further consideration. Similar to Alternative 2, it follows the alignment of Alternative 1 until SR 1363 (Fred Carter Road), where the northerly bypass around Laurel Hill begins (see Figure 3). The northerly bypass ties back in to the existing alignment at SR 1267 (Devon Drive) and continues to follow the existing alignment until the eastern terminus of the project area. Alternate 3 was eliminated from further discussion due to a number of factors. Alternate 3 would include two additional railroad crossings, approximately 2 additional miles of roadway, a significantly larger impact to wetland areas, an additional creek crossing, and it would also impact the USFWS Safe Harbor tract north of Laurel Hill.

As the project moves into the functional design phase, consideration should be given to US-74 existing median widths and horizontal curvature, particularly in the non-freeway section between the western project limits to east of SR 1321 (Elmore Road). In some cases the proposed median width or 70 mph design speed may not be achieved without significant impacts to local residents, businesses, and CSX, so reducing widths and design speeds in these areas should be considered while still achieving interstate standards. For both Alternatives 1 and 2, we lengthened short acceleration lanes in some areas to meet current standards but due to impacts, did not upgrade existing loops with radii less than 230 feet.

Constructability of upgrades to US-74 will be a challenge at several proposed interchange and grade separation locations where US-74 is on structure over Y-Lines. This was proposed at some locations in order to limit property impacts along the Y-Lines. However, all bridges and culverts are assumed as being replaced for this feasibility study, so there will be traffic control impacts and

possible use of crossovers, temporary widening, staged construction, onsite detours, and temporary ramp closures.

Several documents were prepared during this feasibility study and are included in the appendix for reference. These include:

- Figure 6: Start of Study Comments found in Appendix A-4.
- Figure 7: NCDOT Rail Division Memo found in Appendix A-5.
- Figure 8: CDM Smith 4-Lane vs 6-Lane Evaluation found in Appendix A-6.

VI. Traffic and Safety

Average Daily Traffic

Based on the traffic survey conducted by NCDOT, the 2014 Annual Average Daily Traffic (AADT) was 11,000 Vehicles per Day (VPD) on US-74 west of the study area, and 16,000 VPD on US-74 east of the US-74 Business merge/diverge in Richmond County; in Scotland County, the 2014 AADT was 18,000 VPD on US-74 at Laurel Hill, 20,000 VPD west of Laurinburg, 19,000 VPD between US 15/US 401 and US 501 Business south of Laurinburg, and 15,000 VPD east of US-74 Business; the 2014 AADT on I-74 was 12,000 VPD east of Maxton in Robeson County.

Level of Service

Traffic operating conditions are measured using levels of service (LOS) represented by a letter designation from A to F. LOS A represents the best operating conditions and LOS F the worst. LOS D is generally considered to be acceptable in urban areas. LOS E designates conditions in which a facility reaches its traffic carrying capacity, and LOS F represents a breakdown in traffic flow. Highway capacity analyses were performed for the years 2015 and 2045 to evaluate existing and future traffic operations along existing US-74 under the Build and No-Build scenarios.

Capacity Analysis

Traffic operations analysis was performed during AM and PM peak hours based on the NCDOT Congestion Management Capacity Analysis Guidelines (January 1, 2012). Traffic operations analysis for freeway segments, interchange ramps, and weaving areas was conducted using Highway Capacity Software (HCS) 2010, Freeway Facilities module, and capacity analysis at the at-grade and ramp intersections was conducted using Synchro 9 with the Highway Capacity Manual (HCM) 2010 methodologies. A summary of intersection levels of service is included at each individual intersection and interchange locations.

The HCS 2010 is developed and maintained as a faithful implementation of the procedures included in Highway Capacity Manual (HCM) 2010, which is a national standard for the traffic operations analysis and evaluation of transportation facilities. The HCS 2010 Freeway Facility

module performs level of service (LOS) analysis for freeway facilities including freeway segments, on-ramps, off-ramps, and weaving areas.

Most ramp intersections are currently unsignalized under existing conditions. When the ramp intersections are projected to operate at failing conditions in the future, signalization will be assumed if the peak hour signal warrants are met based on traffic forecasts. New ramps may be added, ramp intersection spacing may be revised, and auxiliary lanes may be added with interchange upgrades to meet traffic operations and safety requirements.

When new interchanges are constructed, service roads may need to be provided to maintain access, and appropriate traffic control needs to be provided along new traffic routes. Since service roads are expected to carry very light traffic volumes, they are not included in the traffic operations analysis in this project.

HCS and Synchro software output details are included in Attachments C and D, respectively, of the Traffic Memo *FS-1508A US 74 Upgrade to Interstate Standards Capacity Analysis* (CDM Smith, May 24, 2016) found in Appendix A-2.

Crash Analysis

Five-year (February 1, 2011 to January 31, 2016) crash data was analyzed by the NCDOT Traffic Safety Unit along sections of US-74 and I-74 in Richmond, Scotland, and Robeson counties. 649 total accidents occurred along the corridor with 467 property damage only, 268 non-fatal injury, and 5 fatal crashes as a result of these incidents.

The US-74 study corridor includes a 4-lane, median-divided highway from the US-74 Rockingham-Hamlet Bypass in Richmond County to east of SR 1321 (Elmore Road) in Scotland County, and a 4-lane freeway from east of SR 1321 (Elmore Road) in Scotland County to the existing I-74 in Robeson County. Therefore, the crash analysis comparison with Statewide Crash Rates and Critical Crash Rates were based on about 40% of the study corridor as “highway,” and about 60% of the study corridor as “freeway.”

Table 3: Five-Year Crash Rate Data on US-74 from US-74BYP in Richmond County to US-74BUS in Scotland County

Category	Crashes	Crash Rate	Statewide Average Crash Rate[1]	Critical Crash Rate[2]
Total	284	91.17	216.07	229.93
Fatal	3	0.96	0.91	1.96
Non-Fatal Injury	86	27.61	64.71	72.37
Night	92	29.53	52.79	59.72
Wet	52	16.69	36.68	42.49

[1]2012-2014 NCDOT Statewide Average Crash Rate for All US Routes, 4 or more lanes divided with no access control.
[2]Based on the statewide crash rate (95% level of confidence). The critical crash rate (is a statistically derived value against which a calculated rate can be compared to see if the rate is above an average far enough so that something besides chance must be the cause) is used to denote statistical significance.

The highlighted box in Table 3 indicates that the fatal crash rate on US-74 is higher than the 2014 Statewide Average Crash Rate. Specifically, it is 105% higher.

Table 4: Five-Year Crash Rate Data on I-74 from US-74BUS in Scotland County to 0.5 miles south of US-74ALT in Robeson County

Category	Crashes	Crash Rate	Statewide Average Crash Rate[1]	Critical Crash Rate[2]
Total	365	102.15	85.41	93.59
Fatal	2	0.56	0.36	1.02
Non-Fatal Injury	91	25.47	20.37	24.44
Night	112	31.35	22.91	27.22
Wet	168	47.02	19.97	24

[1]2012-2014 NCDOT Statewide Average Crash Rate for All Interstate Routes, 4 or more lanes divided with no access control.
[2]Based on the statewide crash rate (95% level of confidence). The critical crash rate (is a statistically derived value against which a calculated rate can be compared to see if the rate is above an average far enough so that something besides chance must be the cause) is used to denote statistical significance.

The highlighted boxes in Table 4 indicate that the crash rate was higher than the 2014 State Average Crash Rate and/or the Critical Crash Rate. The total, non-fatal injury, night, and wet crash rates on I-74 in the study area were all higher than the Critical Crash Rates. Specifically, the crash rates are 109%, 104%, 115%, and 196% higher, respectively. The fatal crash rate on I-74 was 156% higher than the Statewide Average Crash Rate.

VII. Evaluation of Alternatives

An evaluation of Alternatives 1 and 2, including costs, potential property effects, and environmental concerns is summarized below in Tables 5 and 6.

Table 5: Comparison of Alternatives

Study Area Resource	Alternative 1	Alternative 2
Length on Existing US-74 (miles)	26.06	23.64
Length on New Location (miles)	0	2.42
Total Length (miles)	26.06	26.06
Construction Cost	$ 224,350,000	$ 235,250,000
Utility Relocation Cost	$ 14,800,000	$ 14,800,000
Right of Way Cost	$ 71,400,000	$ 61,300,000
Total Estimated Cost	$ 310,550,000	$ 311,350,000
Residential Relocations (#)	91	51
Business Relocations (#)	32	13
Church/Non-Profit Relocations (#)	4	0
Relocated Graves (#)	0	0
Number of Interchanges	14	14
Major Stream/Creek Crossings (#)	5	5
Area within NWI Wetlands (acres)	195.68	259.67
High Quality Waters/Outstanding Resource Waters (acres)	206.84	206.84
Natural Heritage Program (Natural Areas)	24.41	24.41
Parks and Recreational Areas	0	0

Table 6: Summary of Cost Estimates by Section[1]

	Alternative 1			Alternative 2		
Section	**Construction**	**Right of Way**	**Utilities**	**Construction**	**Right of Way**	**Utilities**
A	$13,600,000	$600,000	$200,000	$13,600,000	$600,000	$200,000
B	$17,400,000	$5,300,000	$3,400,000	$17,400,000	$5,300,000	$3,300,000
C	$13,100,000	$1,000,000	$2,300,000	$13,100,000	$1,000,000	$2,300,000
D	$31,900,000	$16,200,000	$2,700,000	$42,800,000	$6,100,000	$2,900,000
E	$13,100,000	$600,000	$200,000	$13,100,000	$600,000	$200,000
F	$8,800,000	$4,600,000	$100,000	$8,800,000	$4,600,000	$100,000
G	$49,000,000	$39,400,000	$1,900,000	$49,000,000	$39,400,000	$1,900,000
H	$3,800,000	$100,000	$1,100,000	$3,800,000	$100,000	$1,100,000
I	$17,800,000	$2,700,000	$1,200,000	$17,800,000	$2,700,000	$1,200,000
J	$4,100,000	$200,000	$100,000	$4,100,000	$200,000	$100,000
K	$51,400,000	$700,000	$1,600,000	$51,400,000	$700,000	$1,500,000
ITS[2]	$350,000	-	-	$350,000	-	-
Total	$224,350,000	$71,400,000	$14,800,000	$235,250,000	$61,300,000	$14,800,000

Total for Alternate 1 **$310,550,000** **Total for Alternate 2** **$311,350,000**

[1] Construction estimate assumes all bridges and culverts to be replaced. All existing pavement on US-74 will be overlaid and not full replacement.
[2] Included $350,000 for ITS equipment and installation per Division 8 and ITS Section recommendations.

VIII. Human and Natural Environment Issues

Human Environment Issues

The study area is comprised of large areas of undeveloped land along the proposed bypass routes and commercial and residential land uses along US-74. There would be a few potential impacts to community facilities along the proposed alignments.

To identify potential noise impacts along the corridor, a high-level screening analysis was completed using GIS data, aerial mapping, and land use data to identify potential noise sensitive receptors and to determine locations for noise abatement for the studied alternatives. The screening was consistent with Title 23 Code of Federal Regulations (CFR), Part 772, U.S. Department of Transportation, FHWA, Procedures for Abatement of Highway Traffic Noise and Construction Noise, and the NCDOT Traffic Noise Policy, dated October 6, 2016. No field noise measurements were conducted for this screening analysis.

The proposed upgrade of US-74 to Interstate 74 qualifies as a Type I project in conjunction with a construction or reconstruction project on a section of federal-aid highway, as designated in 23 CFR Part 772.

Consideration of noise abatement measures was given to all receptors that could potentially be impacted due to the Build Alternatives. NCDOT Policy requires the identification of whether it is "likely" or "unlikely" that noise abatement measures will be provided within the study area identified. "Likely" does not mean a firm commitment. The noise abatement measures indicated on the Environmental Features maps are currently considered to be "likely" along the proposed I-74 corridor. During the environmental document phase of the project, it is recommended that a detailed Traffic Noise Analysis or a Design Noise Report be completed to identify and determine abatement measures.

The Environmental Features Maps can be found in Appendix A-4.

The following community facilities are in or near the project study area:

- Xalt Church

There are four underground storage tank sites within the Alternate 1 study area, and three within the Alternate 2 study area.

Natural Environment Issues

A detailed environmental study has not been conducted for this feasibility study, however and environmental screening did find issues that may require further evaluation in later planning and design stages. As of June 16, 2017, the USFWS lists nine federally protected species for Richmond, Scotland, and Robeson Counties. The table below lists the species and their federal status.

Table 7: Federally Protected Species Listed for Richmond, Scotland, & Robeson Counties

Scientific Name	Common Name	Federal Status[1]	County
Acipenser brevirostrum	*Shortnose Sturgeon*	E	Richmond
Helianthus schweinitzii	*Schweinitz's Sunflower*	E	Richmond
Lysimachia asperulifolia	*Rough-leaf Loosestrife*	E	Richmond, Scotland
Picoides borealis	*Red-cockaded Woodpecker*	E	Richmond, Scotland, Robeson
Rhus michauxii	*Michaux's Sumac*	E	Richmond, Scotland, Robeson
Oxypolis canbyi	*Canby's Dropwort*	E	Scotland
Schwalbea americana	*Chaffseed*	E	Scotland
Lasmigona decorate	*Carolina Heelsplitter*	T	Robeson
Alligator mississippiensis	*American Alligator*	T (S/A)	Scotland, Robeson
Mycteria americana	*Wood Stork*	T	Robeson

[1]E=Endangered; T=Threatened; T(S/A)=Threatened due to Similarity of Appearance

Based on a review of Geographic Information System (GIS) data, the following issues may require further evaluation in future project development studies. The Environmental Features Maps can be found in Appendix A-4.

- *Rivers and Streams:* Joes Creek, Gum Swamp Creek, Bridge Creek, Big Branch, Cabin Branch, Leith Creek, McNair Fishpond, McCormick Pond, Shoe Hill Creek, and Maxton Branch all cross the study area. All streams have a water quality classification of C Sw. They are all swamp waters with uses that include aquatic life, secondary recreation, and fresh water. None of these are designated as High Quality Waters, Outstanding Resource Waters, or water supply watersheds.
- *Bridges and Major Drainage Structures:* There were 26 bridges and major drainage structures found within the study area. The rivers and streams listed above are inclusive in the 26 structures.
- *Wetlands:* Potential wetland areas have been identified, and preliminary findings show that Alternate 1 crosses 195.68 acres of wetlands, and Alternate 2 crosses 259.67 acres.
- *Flood Plain:* The 100-year Flood Plain was measured for Richmond, Scotland, and Robeson Counties for alternates 1 and 2. Both alternates cross over 7.14 acres in Richmond County and 33.54 acres in Robeson County. Alternate 1 impacts 78 acres and alternate 2 impacts 109.71 acres in Scotland County.
- *High-Quality Waters/Outstanding Resource Waters:* High Quality Waters are defined as waters which are rated as excellent based on biological and physical/chemical characteristics through Division monitoring or special studies. Outstanding Resource Waters and unique and special waters of exceptional state or national recreational or ecological significance which require special protection to maintain existing uses. The project area has 206.84 acres of high quality waters surrounding the Lumber River towards the eastern project end.
- *Natural Heritage Program (Natural Areas):* Through its Natural Heritage Program (NHP) the NC Department of Environmental and Natural Resources (NCDENR) has identified 2,500 Significant Natural Heritage Areas within the state. According to NCDENR, a Significant Natural Heritage Area is a site of special biodiversity significance. An area's significance may be due to the presence of rare species, exemplary or unique communities, important animal assemblages, or other ecological features. One Significant Natural Resource Heritage Areas bisected by the project study area is the Shoe Heel Creek Floodplain, totaling 24.41 acres inside the study area.
- *Cultural Resources and Section 106 of the National Historic Preservation Act of 1966:* There are no properties listed in the National Register of Historic Places (NRHP) within the project study area. There are also not any NRHP Study List resources are in the project vicinity.
- *Public Parks and Recreation Areas:* There are no public parks or recreation areas in the study area.
- *Underground Storage Tank Sites:* Alternate 1 has 5 underground storage tank sites, and alternate 2 has 3 underground storage tank sites.

IX. Recommendations

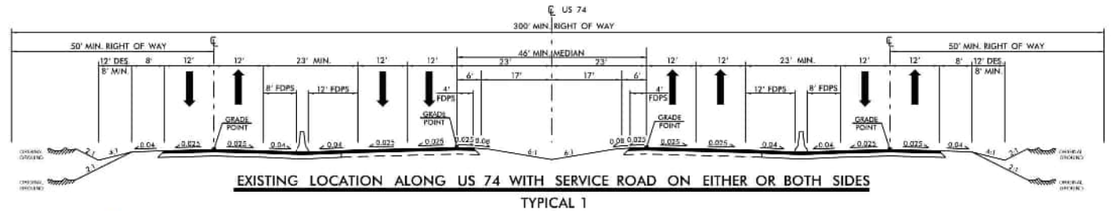
Upgrading US-74 would improve the regional and statewide traffic operations in this corridor. The NCDOT also lists US-74 as a Strategic Highway Corridor and recommends that US-74 ultimately function as a freeway from the South Carolina State Line to I-77 in Surry County. The segment of US-74 from the western terminus to just east of Laurel Hill (exit 181 to US-74 Business) functions as a highway with partial control of access but the remaining segment to the eastern terminus already functions as a freeway and is designated as I-74. The accident rate is above state average in both segments. Future improvements will need to upgrade US-74 from a highway to a freeway with safety in mind, as well as improving the current I-74 segment, particularly in the area of Laurinburg with closely-spaced interchanges.

Both Alternatives 1 and 2 are estimated at approximately the same total project costs, $310,550,000 and $311,350,000, respectively. The lower construction cost of $224,350,000 in Alternative 1 is offset by the higher Right-of-Way cost of $71,400,000. For comparison, the Alternative 2 construction and right-of-way costs are estimated at $235,250,000 and $61,300,000, respectively.

In regard to wetland impacts, Alternative 2 has impacts of 259.67 acres compared to 195.68 acres for Alternative 1, largely due to areas adjacent to Lower Beaverdam Creek.

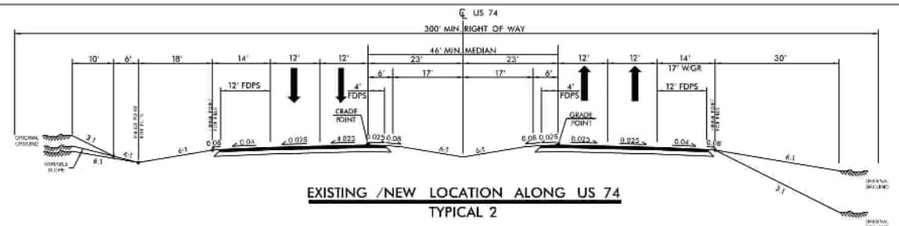
Alternative 1 has 91 estimated residential relocations and 32 business relocations, whereas Alternative 2 has 51 estimated residential relocations and 13 business relocations. This is primarily due to the impacts of Alternative 1 proposed interchanges and grade separations near the Laurel Hill community, which will also require consideration of the CSX Railroad tracks that parallel the existing US-74 corridor.

Appendices



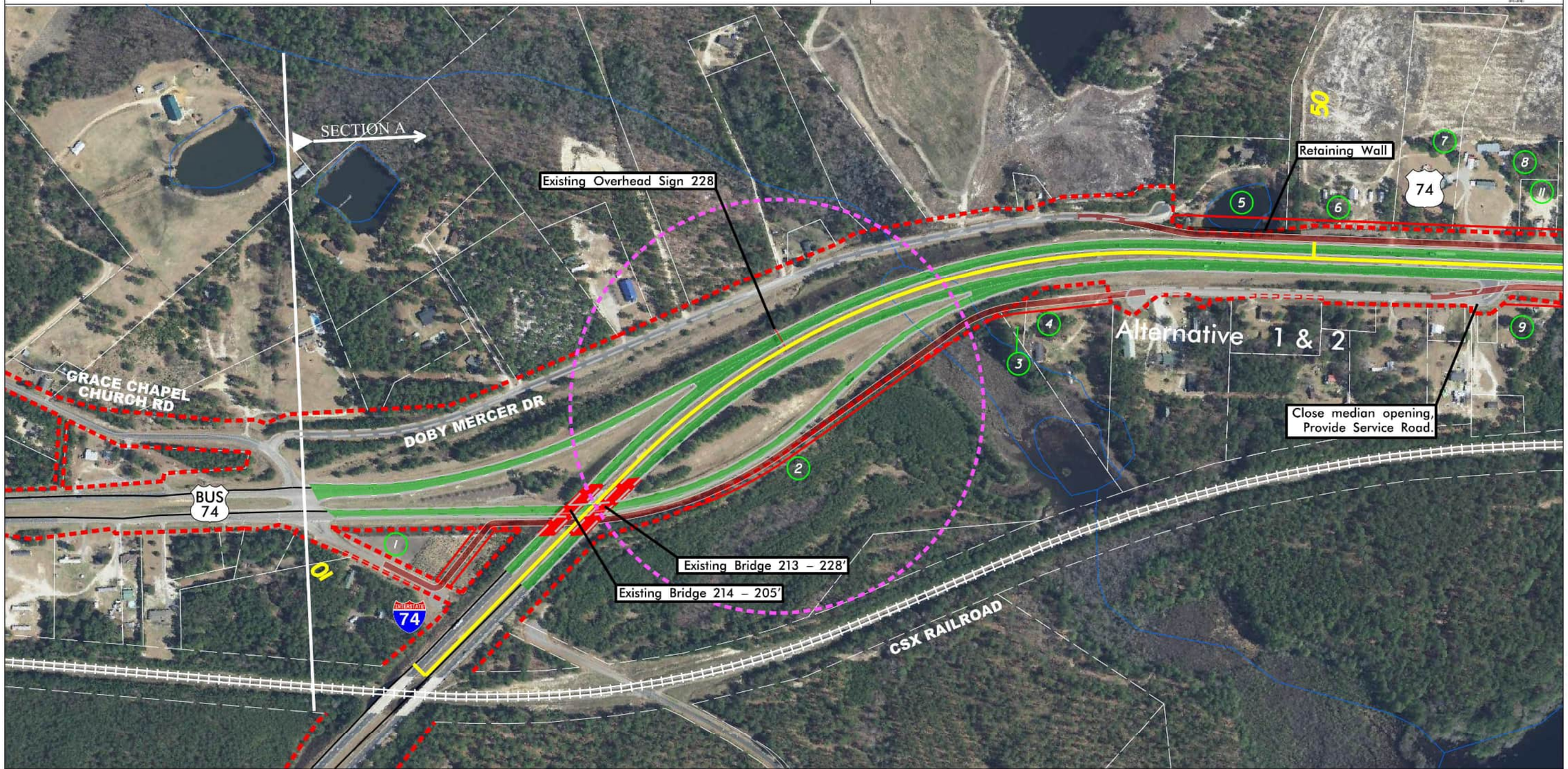
EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2



Legend

Exist. Interchange	Alternative 1	Prop. Right of Way
Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
Prop. Grade Sep.	Demo. Asphalt	County Boundary
Segment Line	Waterway	Exist Property Lines

PRELIMINARY PLANS
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STATE OF NORTH CAROLINA
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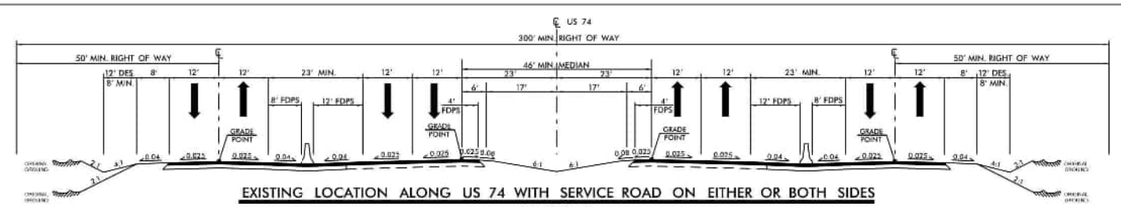
FEASIBILITY STUDIES UNIT

Figure 4.1 - Conceptual Design Plans
FS-1508A

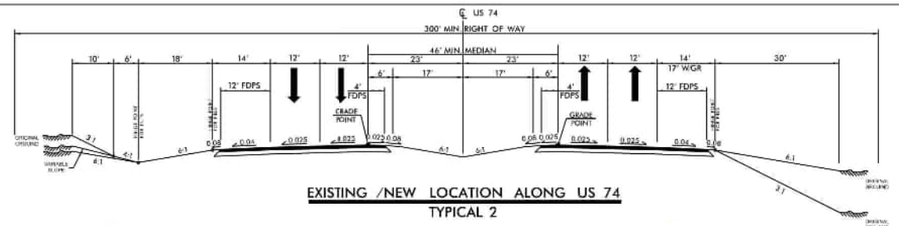
US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

1 of 23



EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2

Legend

Exist. Interchange	Alternative 1	Prop. Right of Way
Prop. Interchange	Alternative 2	Exist. Right of Way
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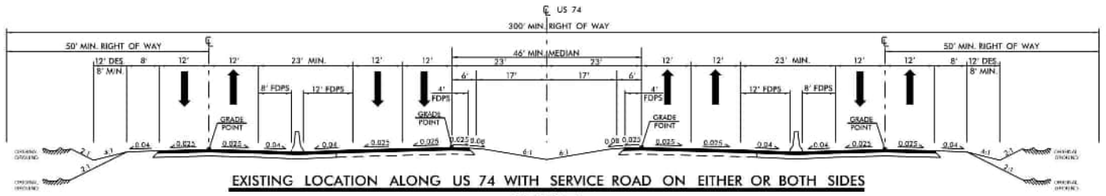
Figure 4.2 - Conceptual Design Plans
FS-1508A

US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

2 of 23



EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

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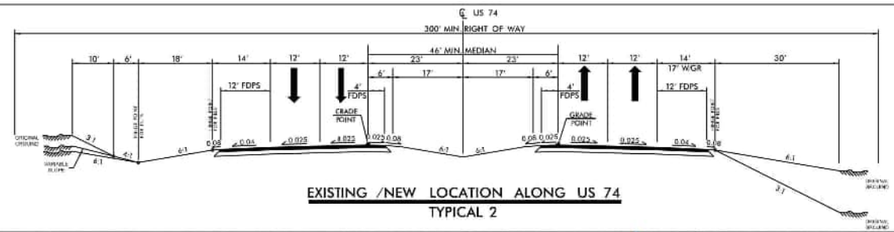

EXISTING /NEW LOCATION ALONG US 74

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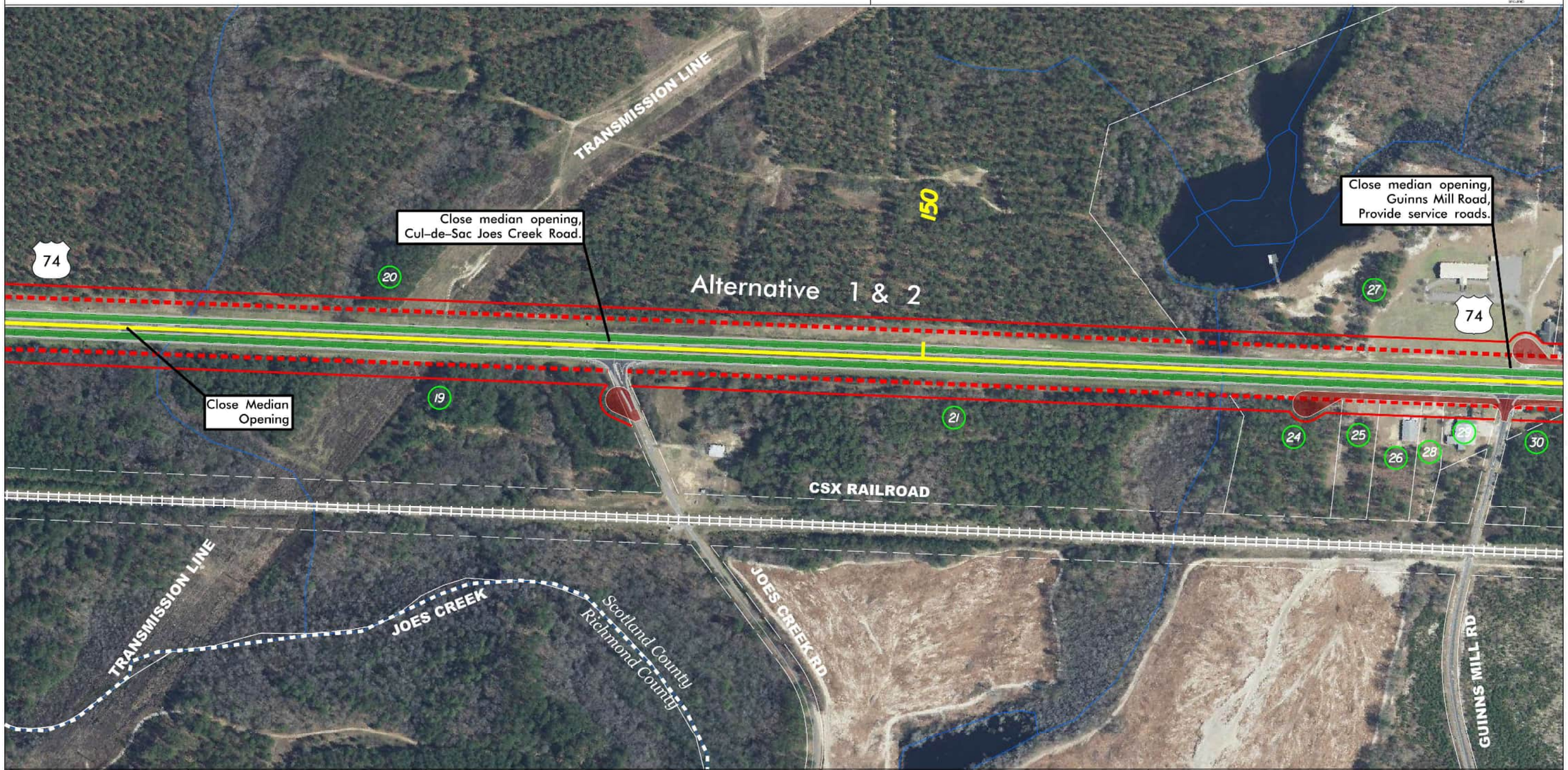

Legend

Exist. Interchange	Alternative 1	Prop. Right of Way
Prop. Interchange	Alternative 2	Exist. Right of Way
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Prop. Grade Sep.	Demo. Asphalt	County Boundary
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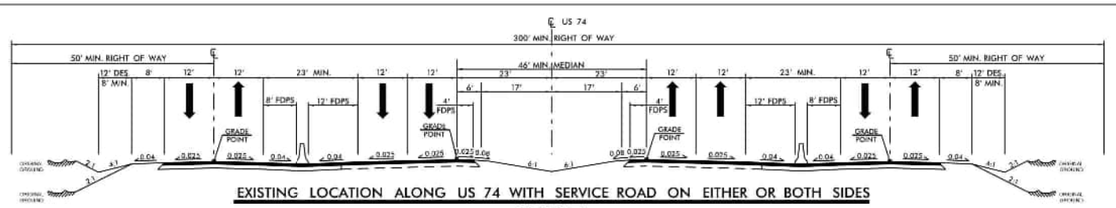
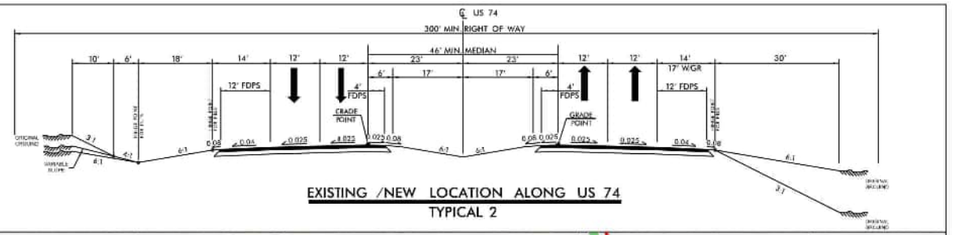
Figure 4.3 - Conceptual Design Plans
FS-1508A
US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

3 of 23



EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2

Legend

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Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
Prop. Grade Sep.	Demo. Asphalt	County Boundary
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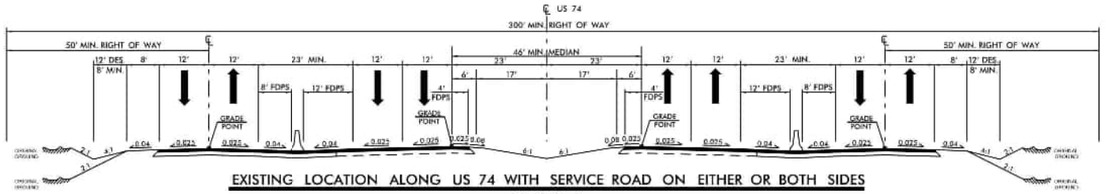
Figure 4.4A - Conceptual Design Plans
FS-1508A

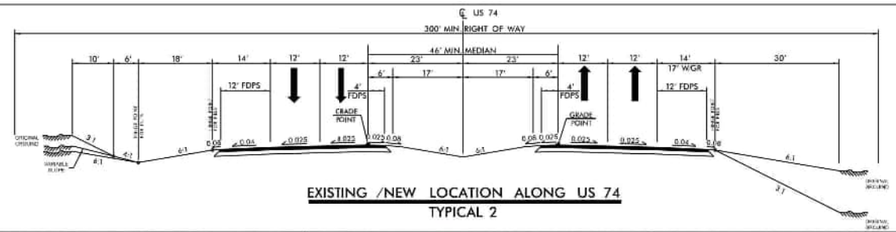
US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

4A of 23



EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2

Legend

Exist. Interchange	Alternative 1	Prop. Right of Way
Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
Prop. Grade Sep.	Demo. Asphalt	County Boundary
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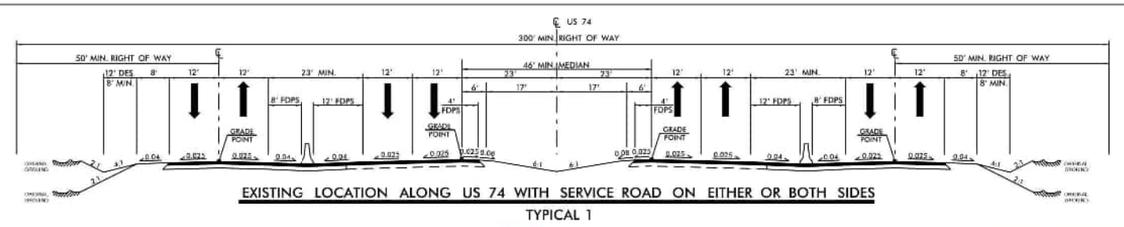
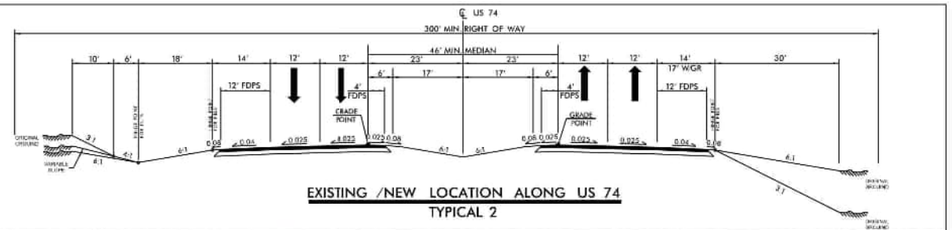
Figure 4.4B - Conceptual Design Plans
FS-1508A
US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

4B of 23



EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2

Legend

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Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
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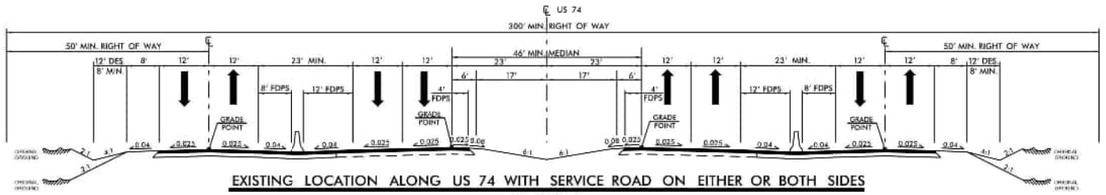
Figure 4.5 - Conceptual Design Plans
FS-1508A

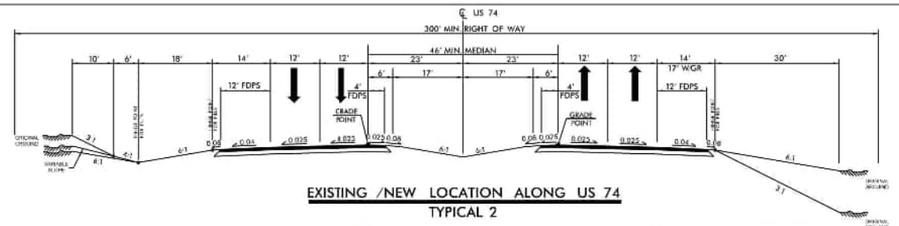
US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

5 of 23



EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2

Legend

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Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
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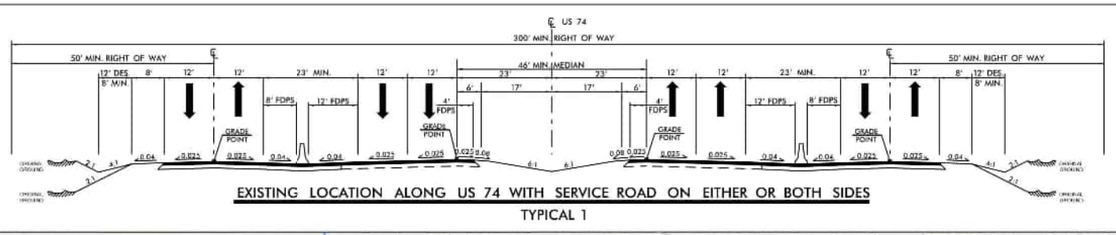
Figure 4.6 - Conceptual Design Plans
FS-1508A

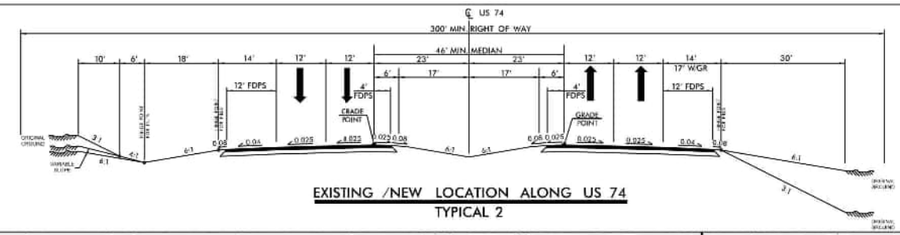
US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

6 of 23



EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2

Legend

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Prop. Interchange	Alternative 2	Exist. Right of Way
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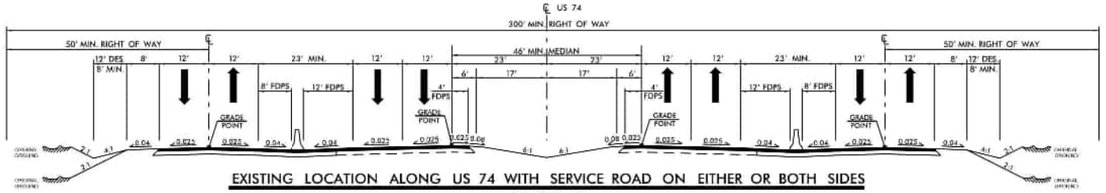
FEASIBILITY STUDIES UNIT

Figure 4.7A - Conceptual Design Plans
FS-1508A

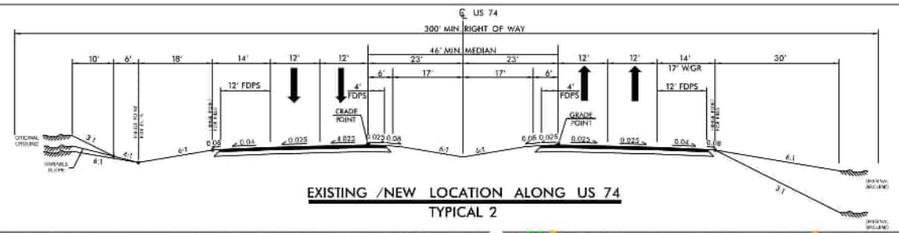
US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

7A of 23



EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2

Legend

Exist. Interchange	Alternative 1	Prop. Right of Way
Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
Prop. Grade Sep.	Demo. Asphalt	County Boundary
Segment Line	Waterway	Exist Property Lines

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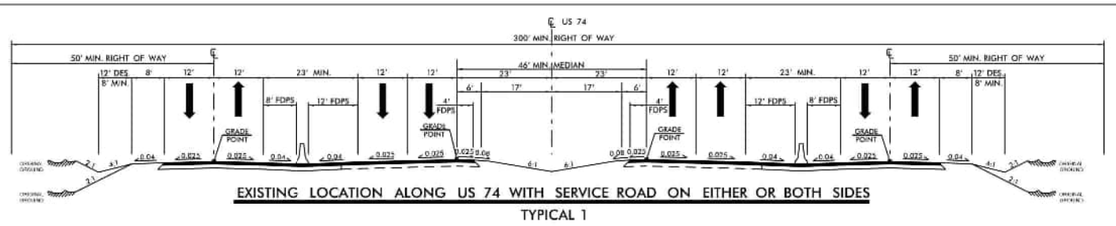
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PROGRAM DEVELOPMENT BRANCH
FEASIBILITY STUDIES UNIT

Figure 4.7B - Conceptual Design Plans
FS-1508A

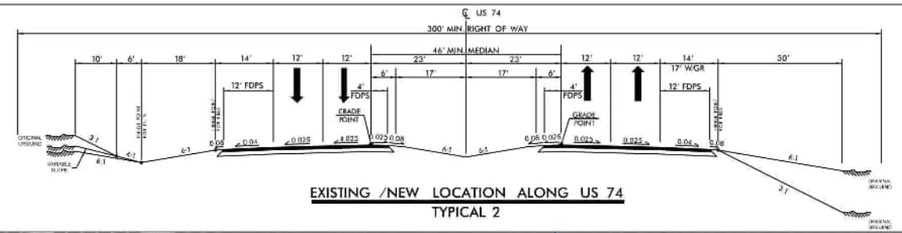
US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

7B of 23



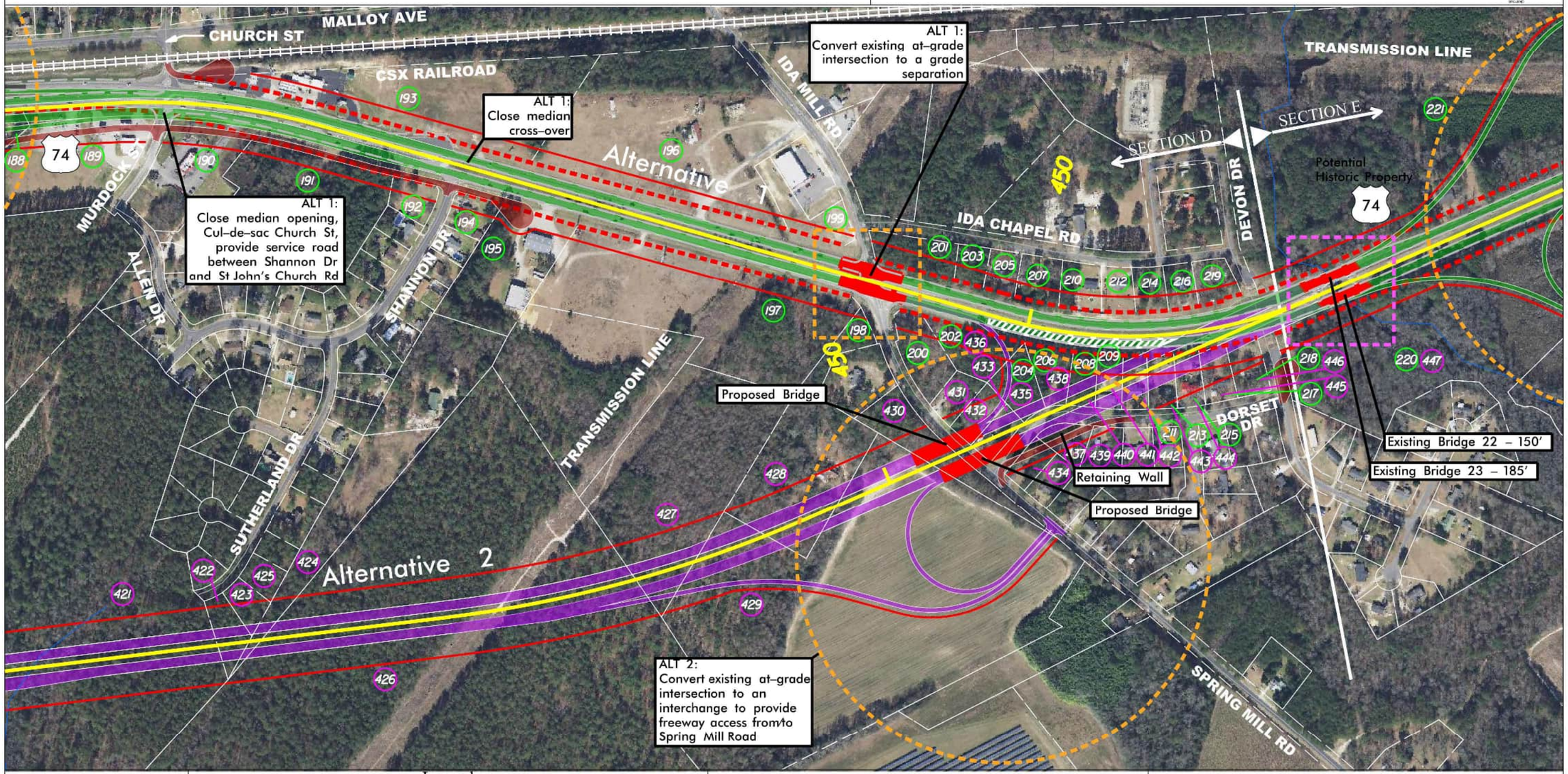
EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2



Legend

Exist. Interchange	Alternative 1	Prop. Right of Way
Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
Prop. Grade Sep.	Demo. Asphalt	County Boundary
Segment Line	Waterway	Exist Property Lines

PRELIMINARY PLANS
SUBJECT TO CHANGE WITHOUT NOTICE

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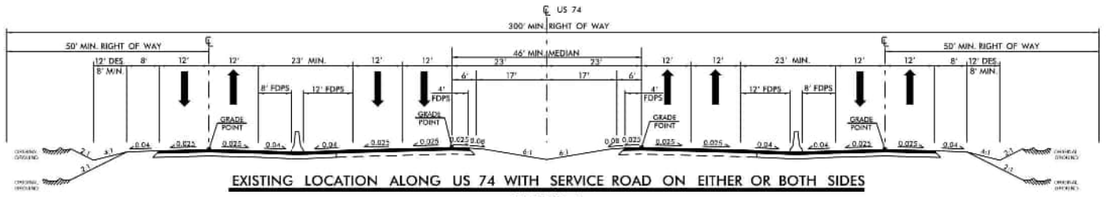
0 200' 400' 800'

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PROGRAM DEVELOPMENT BRANCH
FEASIBILITY STUDIES UNIT

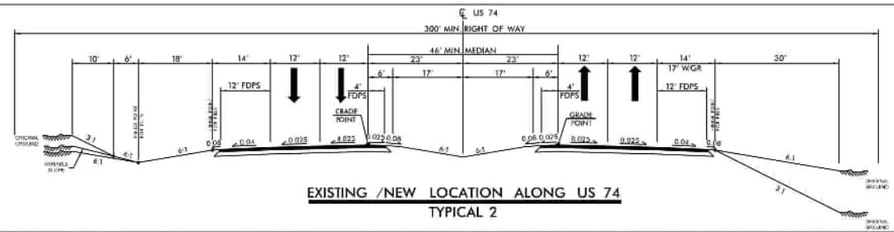
Figure 4.8 - Conceptual Design Plans
FS-1508A
US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

8 of 23



EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2

Legend

Exist. Interchange	Alternative 1	Prop. Right of Way
Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
Prop. Grade Sep.	Demo. Asphalt	County Boundary
Segment Line	Waterway	Exist Property Lines

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0 200' 400' 800'

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PROGRAM DEVELOPMENT BRANCH
FEASIBILITY STUDIES UNIT

Figure 4.9 - Conceptual Design Plans
FS-1508A

US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

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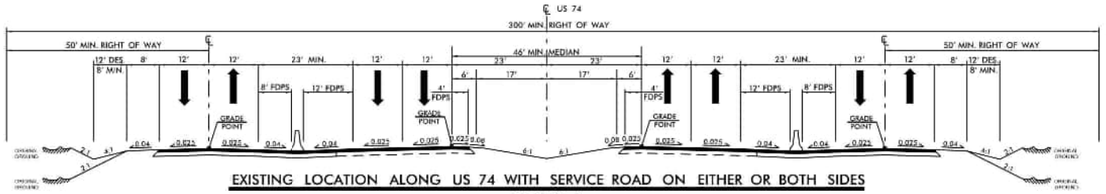
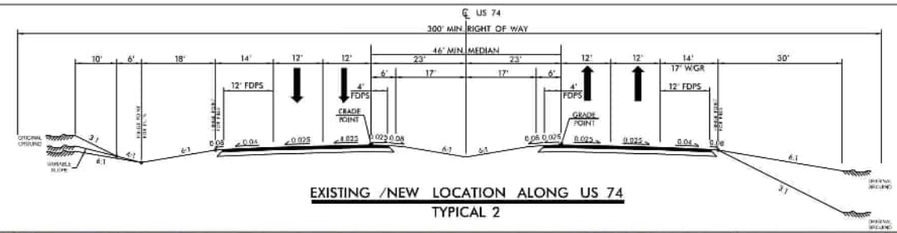


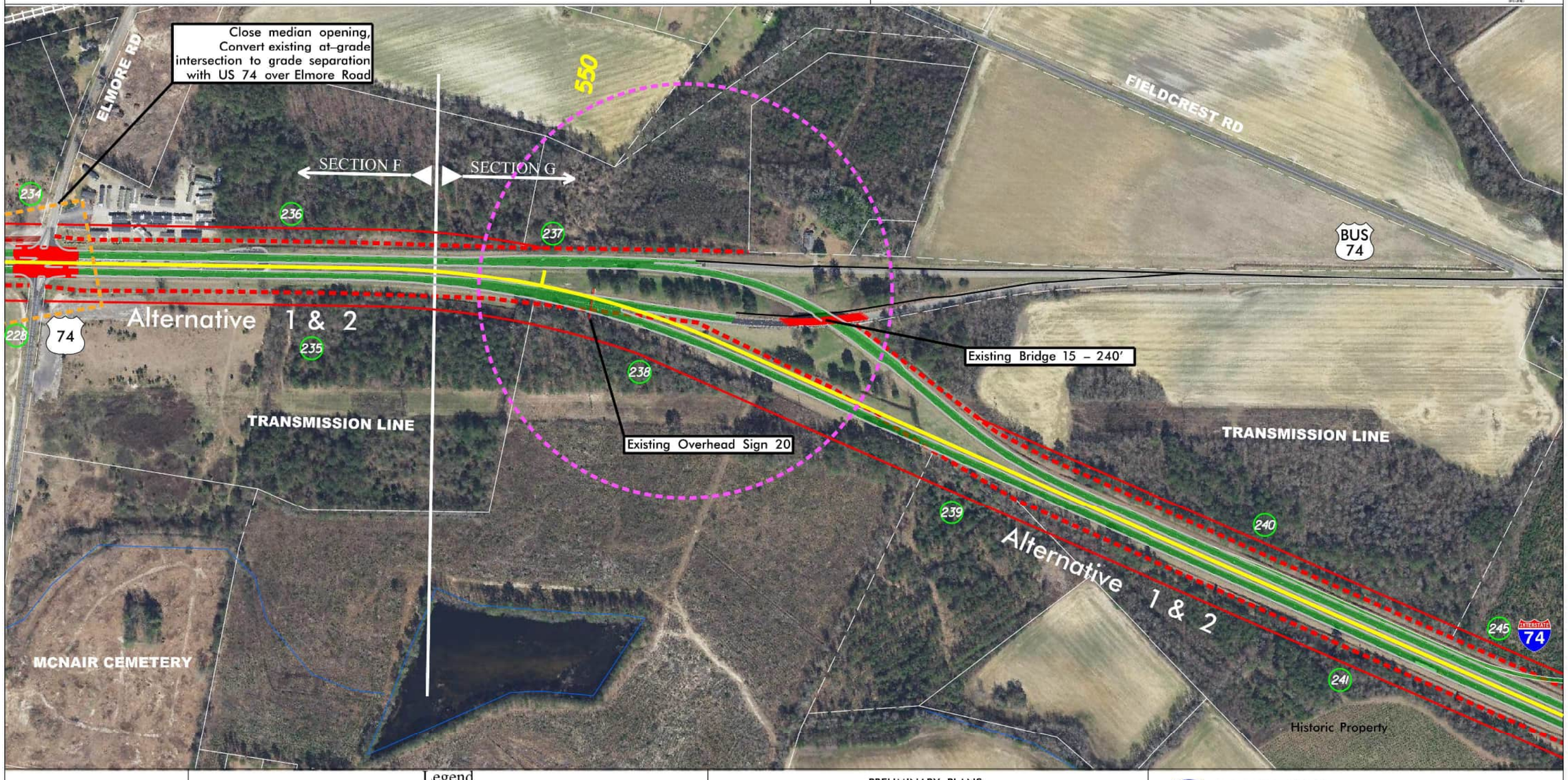
EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2



Legend

Exist. Interchange	Alternative 1	Prop. Right of Way
Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
Prop. Grade Sep.	Demo. Asphalt	County Boundary
Segment Line	Waterway	Exist Property Lines

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0 200' 400' 800'

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PROGRAM DEVELOPMENT BRANCH
FEASIBILITY STUDIES UNIT

Figure 4.10 - Conceptual Design Plans
FS-1508A
US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

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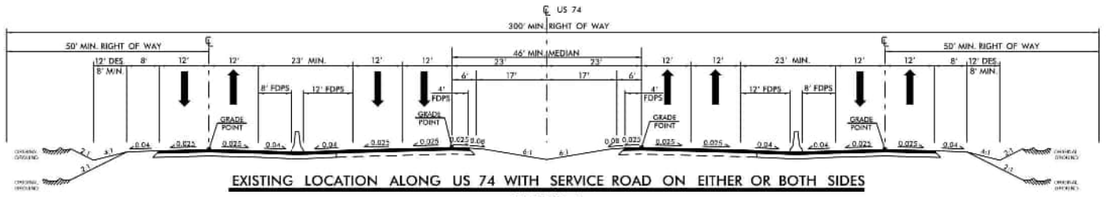
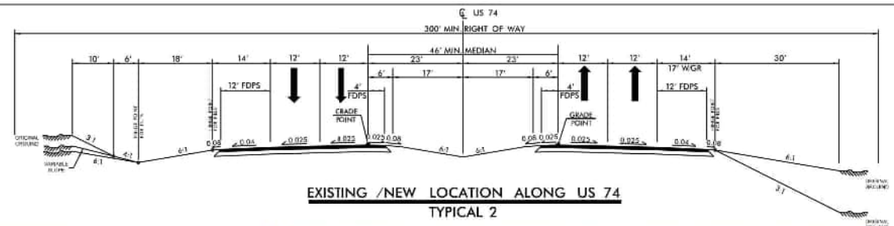


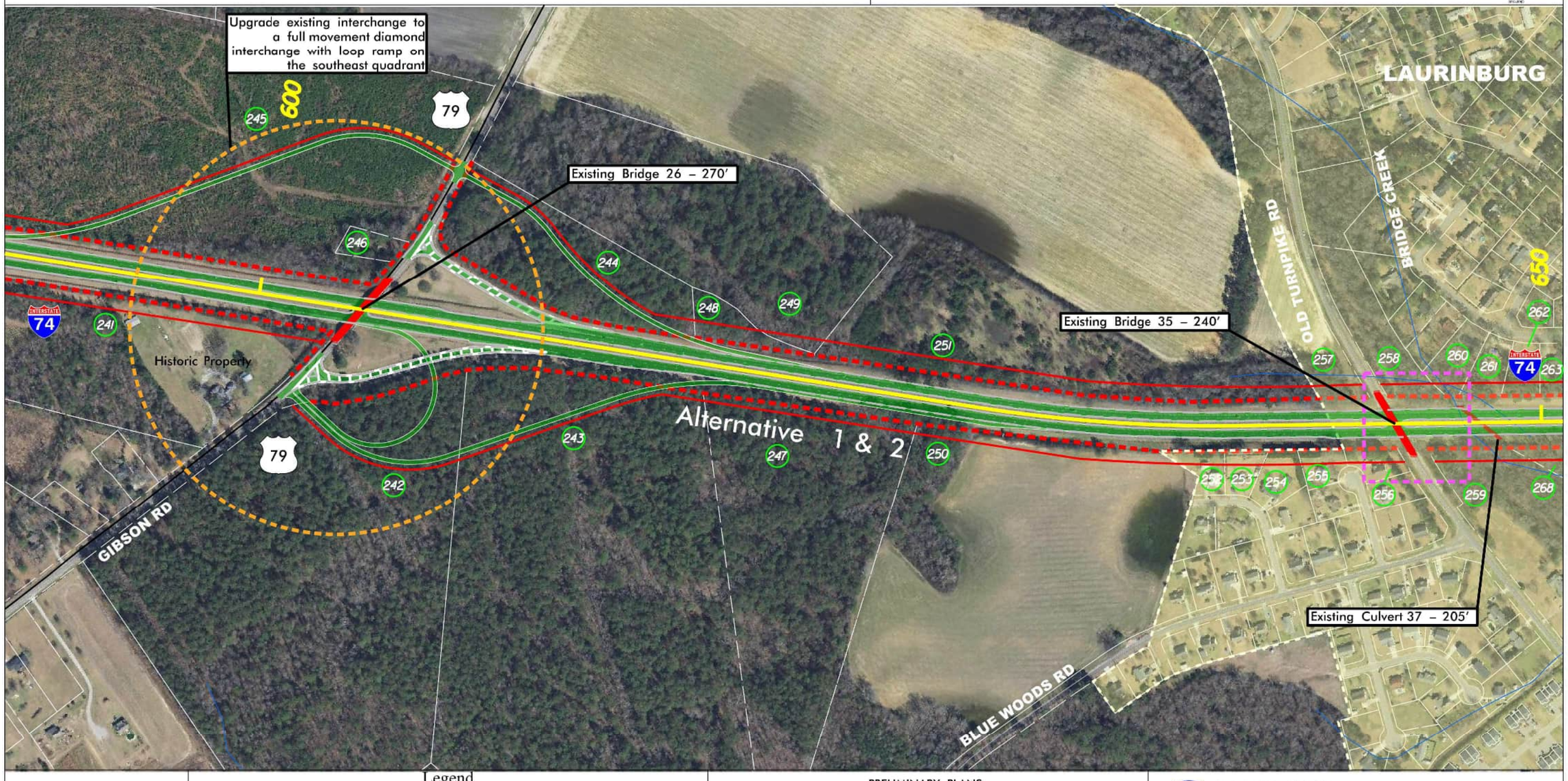
EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2



Legend

Exist. Interchange	Alternative 1	Prop. Right of Way
Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
Prop. Grade Sep.	Demo. Asphalt	County Boundary
Segment Line	Waterway	Exist Property Lines

PRELIMINARY PLANS
SUBJECT TO CHANGE WITHOUT NOTICE

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0 200′ 400′ 800′

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PROGRAM DEVELOPMENT BRANCH
FEASIBILITY STUDIES UNIT

Figure 4.11 - Conceptual Design Plans
FS-1508A

US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

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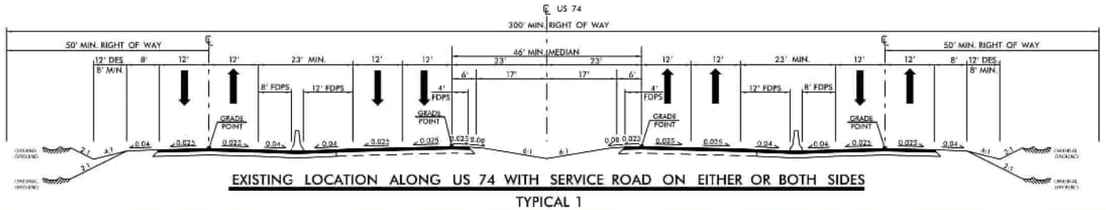
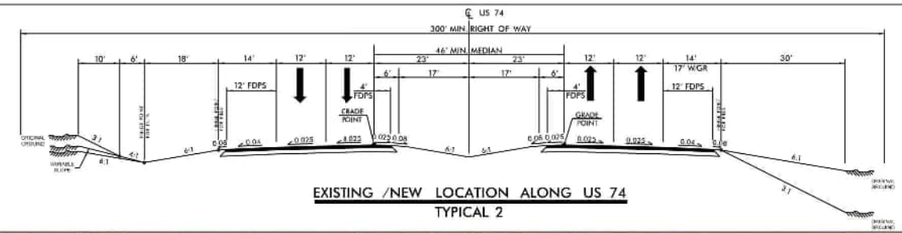


EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2

Legend

Exist. Interchange	Alternative 1	Prop. Right of Way
Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
Prop. Grade Sep.	Demo. Asphalt	County Boundary
Segment Line	Waterway	Exist Property Lines

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SUBJECT TO CHANGE WITHOUT NOTICE

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0 200′ 400′ 800′

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PROGRAM DEVELOPMENT BRANCH
FEASIBILITY STUDIES UNIT

Figure 4.12 - Conceptual Design Plans
FS-1508A

US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

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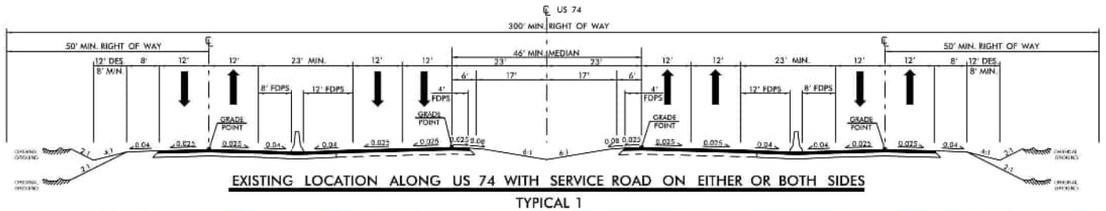
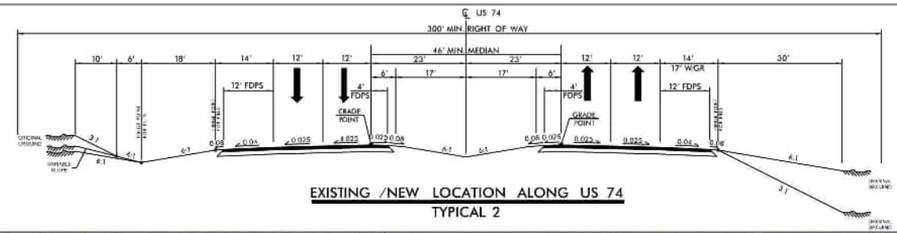


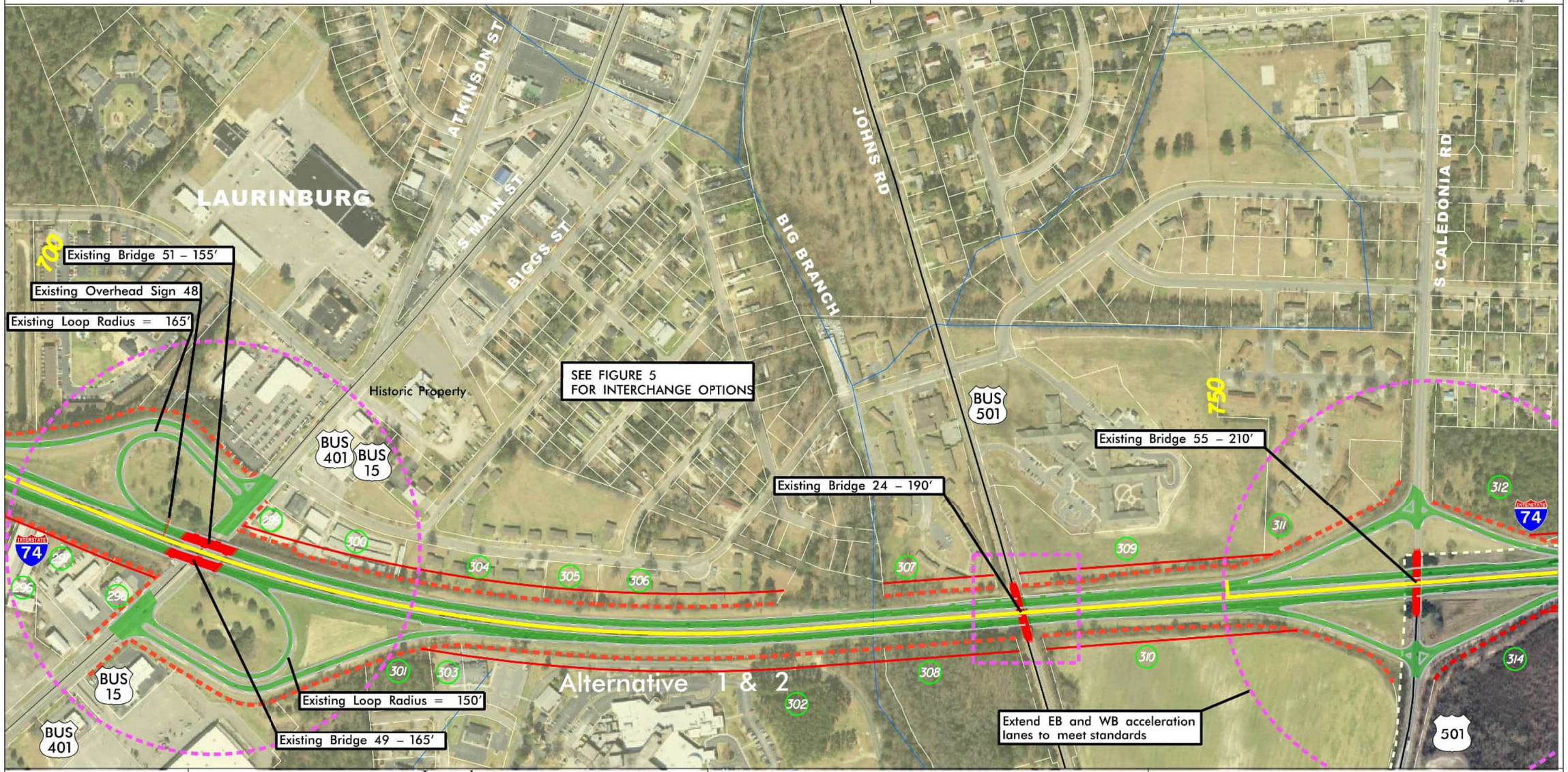
EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2



Legend

Exist. Interchange	Alternative 1	Prop. Right of Way
Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
Prop. Grade Sep.	Demo. Asphalt	County Boundary
Segment Line	Waterway	Exist Property Lines

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0 200' 400' 800'

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PROGRAM DEVELOPMENT BRANCH
FEASIBILITY STUDIES UNIT

Figure 4.13 - Conceptual Design Plans
FS-1508A
US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

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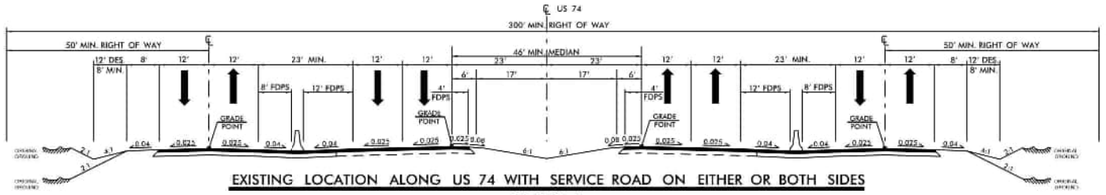
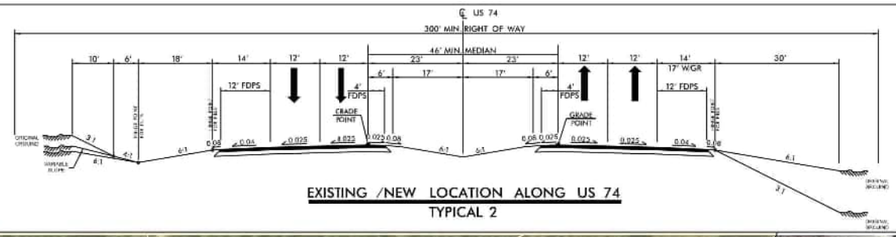


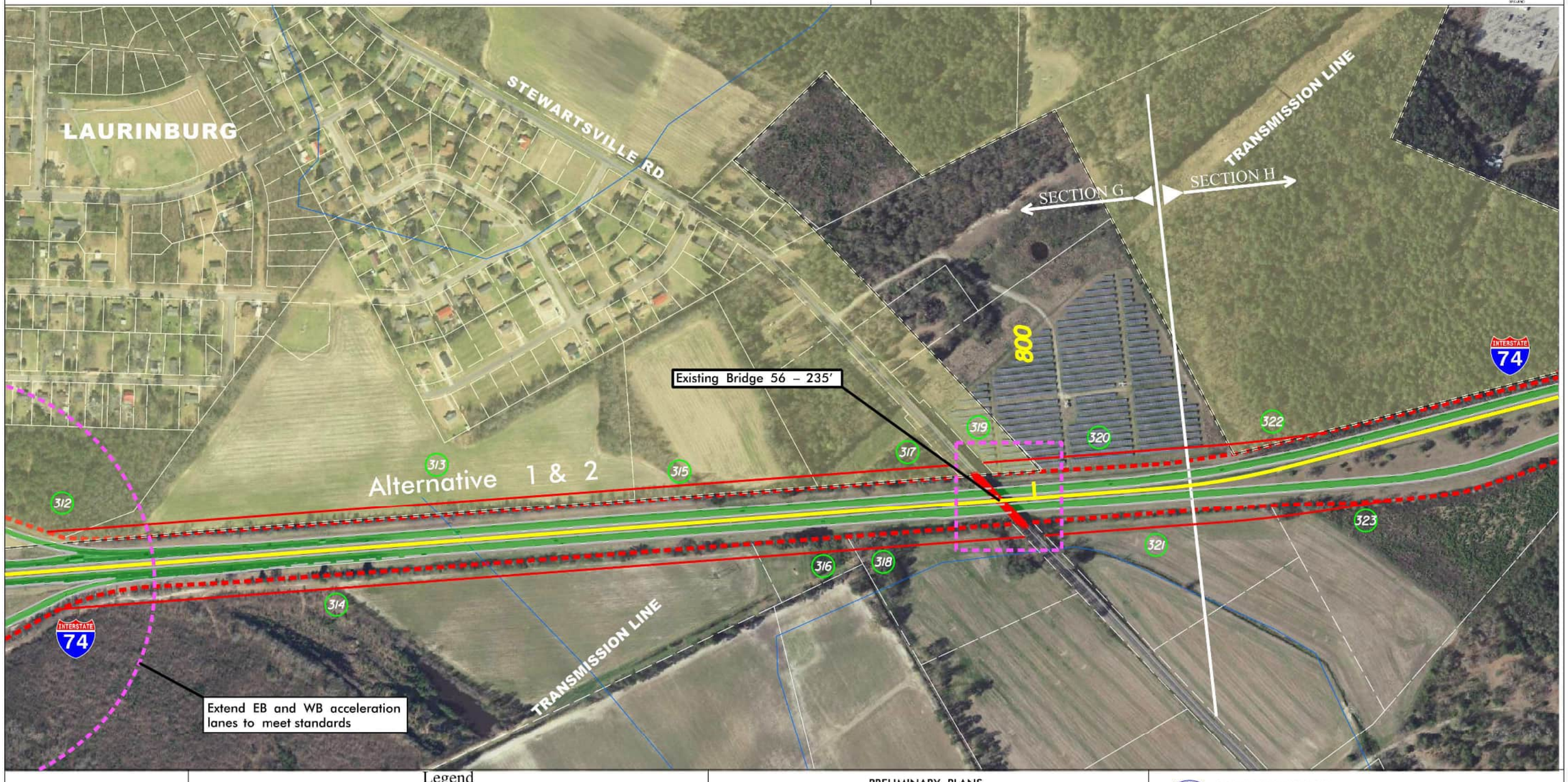
EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2



Legend

Exist. Interchange	Alternative 1	Prop. Right of Way
Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
Prop. Grade Sep.	Demo. Asphalt	County Boundary
Segment Line	Waterway	Exist Property Lines

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0 200' 400' 800'

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PROGRAM DEVELOPMENT BRANCH
FEASIBILITY STUDIES UNIT

Figure 4.14 - Conceptual Design Plans
FS-1508A
US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

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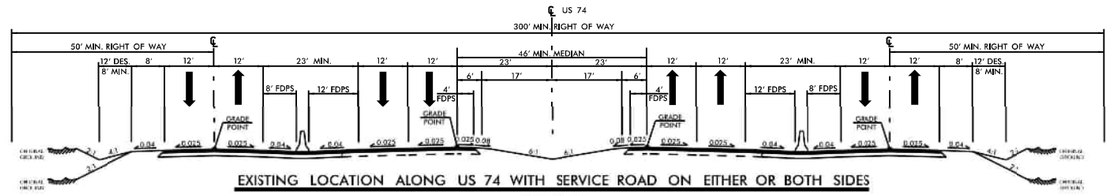
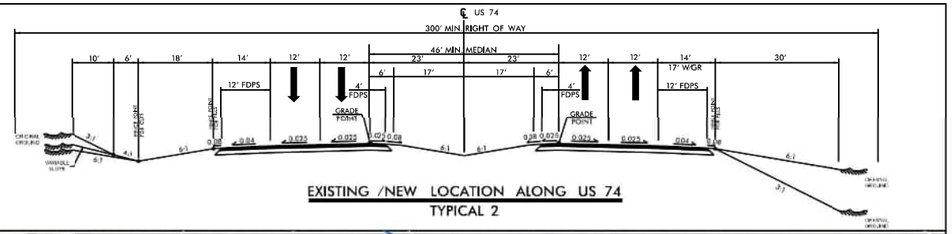


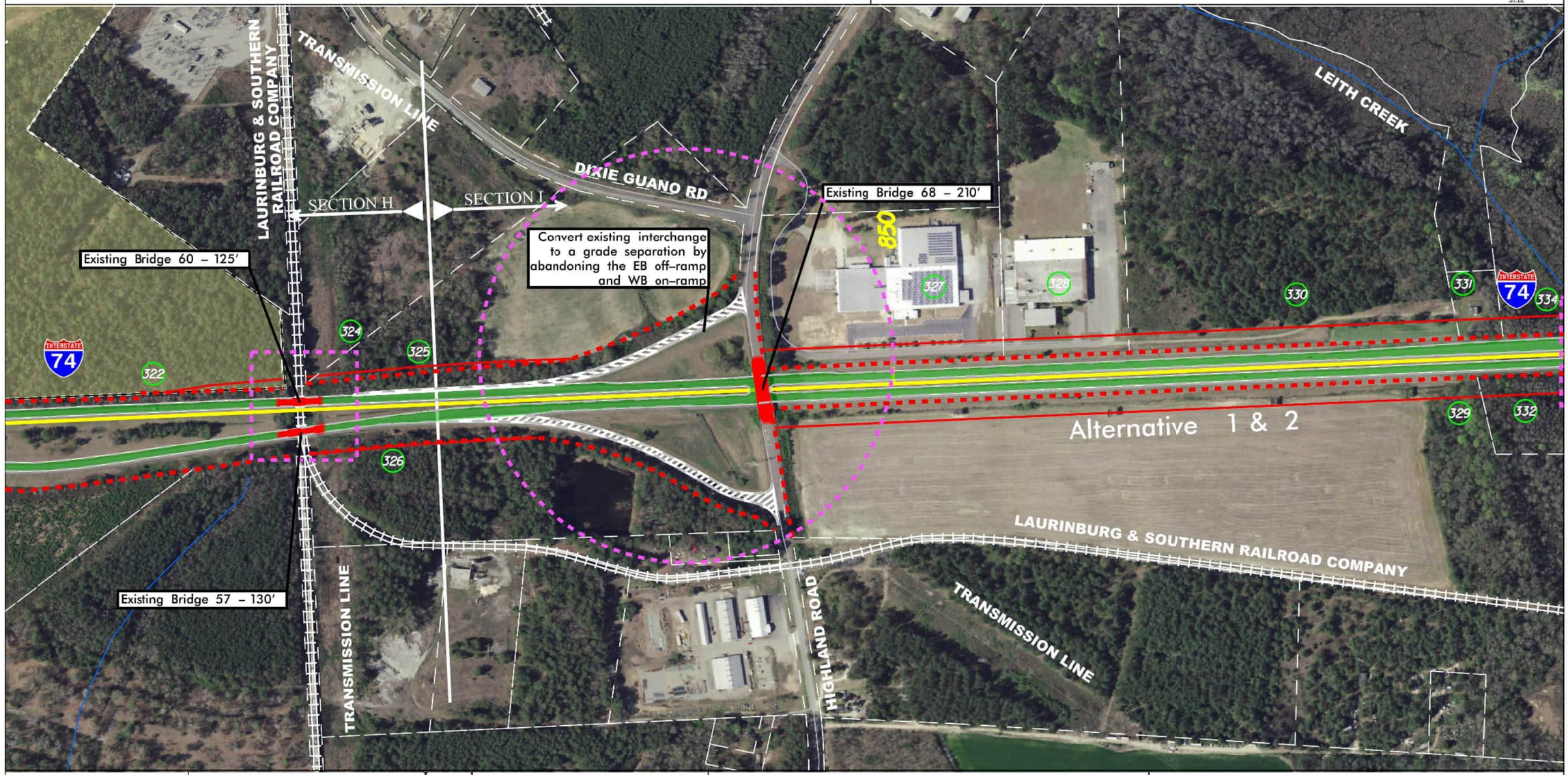
EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2



Legend

Exist. Interchange	Alternative 1	Prop. Right of Way
Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
Prop. Grade Sep.	Demo. Asphalt	County Boundary
Segment Line	Waterway	Exist Property Lines

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0 200' 400' 800'

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PROGRAM DEVELOPMENT BRANCH
FEASIBILITY STUDIES UNIT

Figure 4.15 - Conceptual Design Plans
FS-1508A

US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

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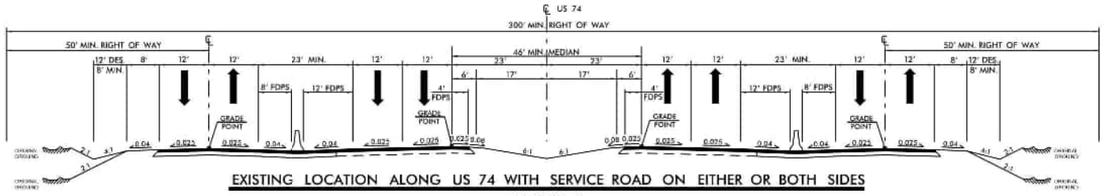
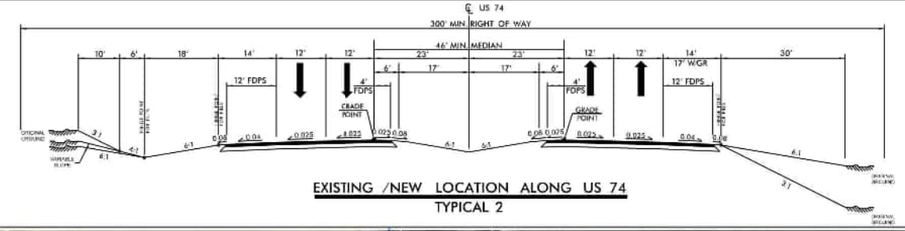


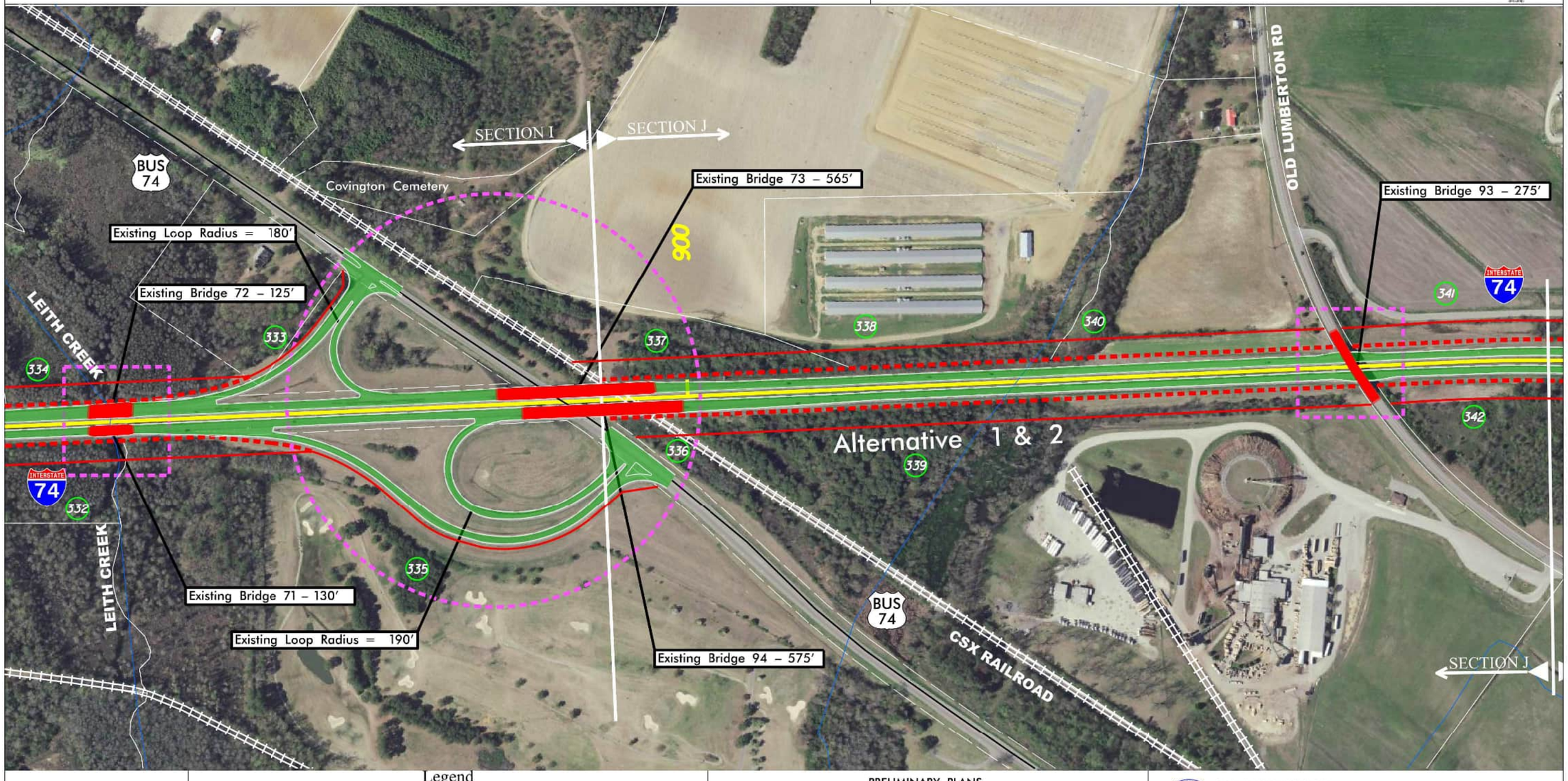
EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2



Legend

Exist. Interchange	Alternative 1	Prop. Right of Way
Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
Prop. Grade Sep.	Demo. Asphalt	County Boundary
Segment Line	Waterway	Exist Property Lines

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0 200' 400' 800'

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PROGRAM DEVELOPMENT BRANCH
FEASIBILITY STUDIES UNIT

Figure 4.16 - Conceptual Design Plans
FS-1508A

US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

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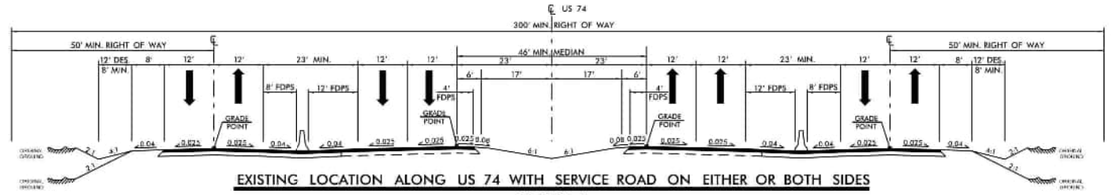
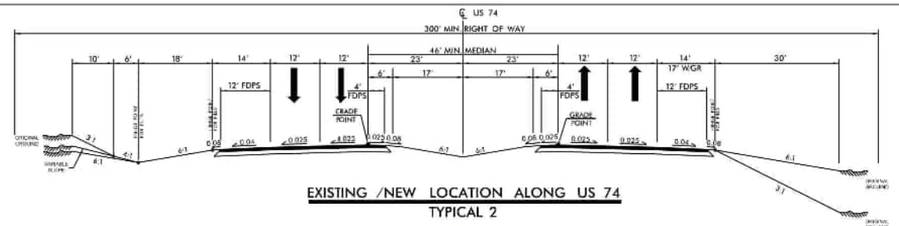


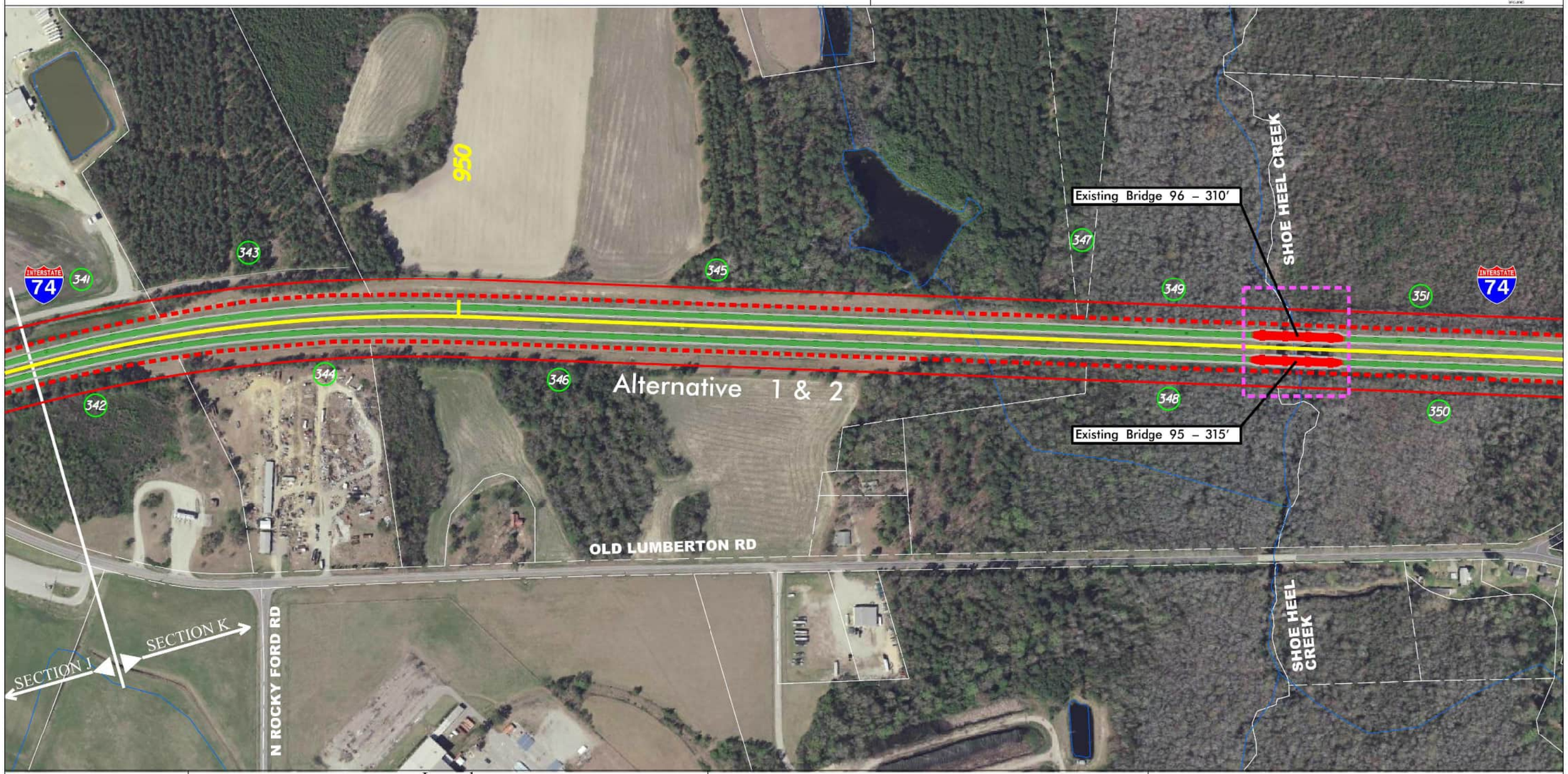
EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2



Legend

Exist. Interchange	Alternative 1	Prop. Right of Way
Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
Prop. Grade Sep.	Demo. Asphalt	County Boundary
Segment Line	Waterway	Exist Property Lines

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0 200' 400' 800'

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PROGRAM DEVELOPMENT BRANCH
FEASIBILITY STUDIES UNIT

Figure 4.17 - Conceptual Design Plans
FS-1508A
US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

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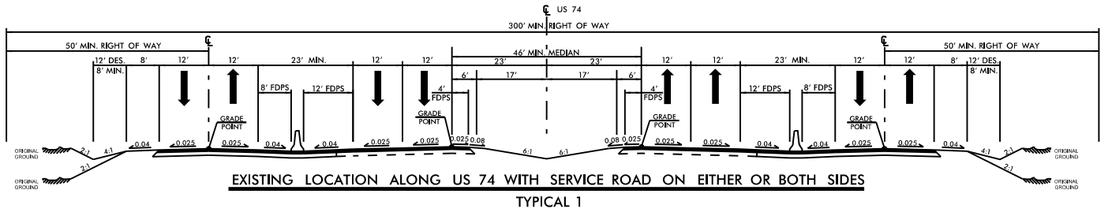
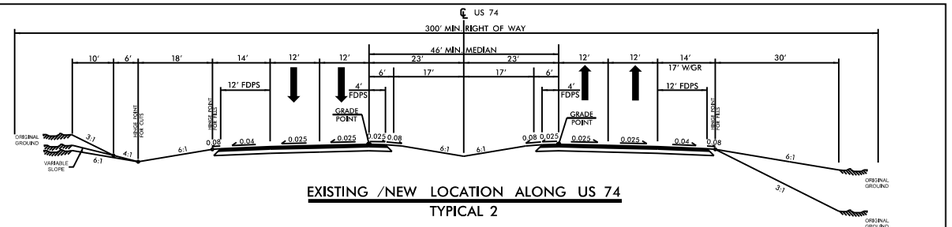


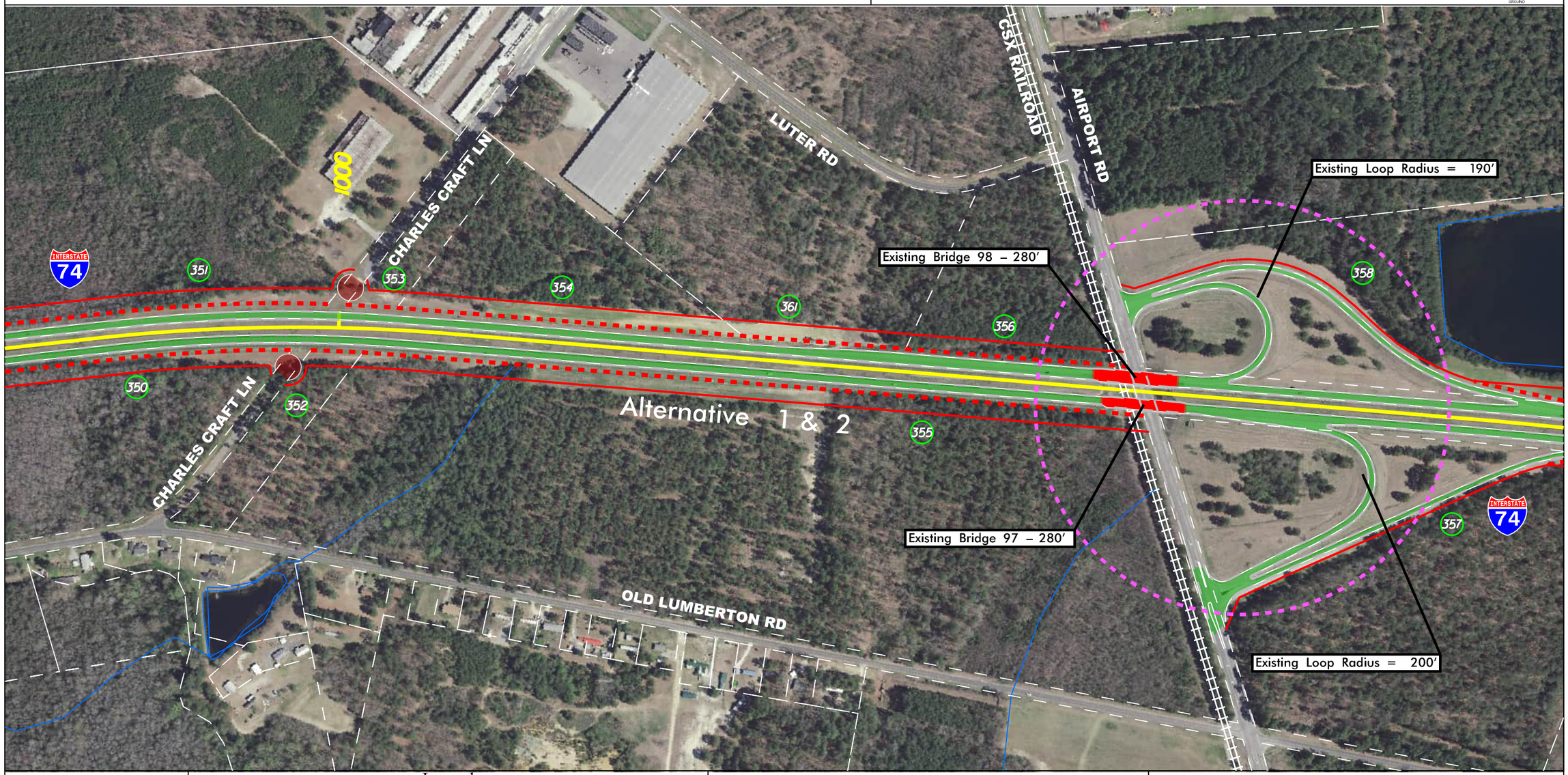
EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2



Legend

Exist. Interchange	Alternative 1	Prop. Right of Way
Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
Prop. Grade Sep.	Demo. Asphalt	County Boundary
Segment Line	Waterway	Exist Property Lines

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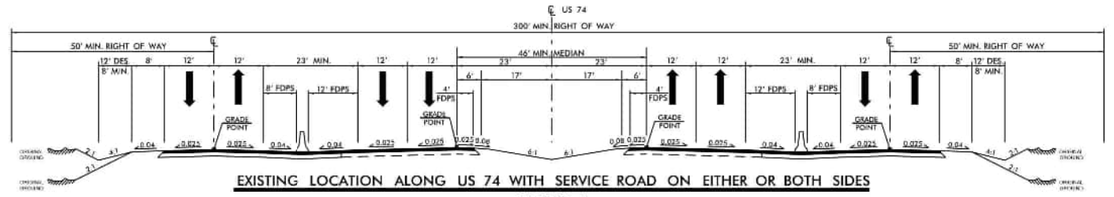
0 200' 400' 800'

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PROGRAM DEVELOPMENT BRANCH
FEASIBILITY STUDIES UNIT

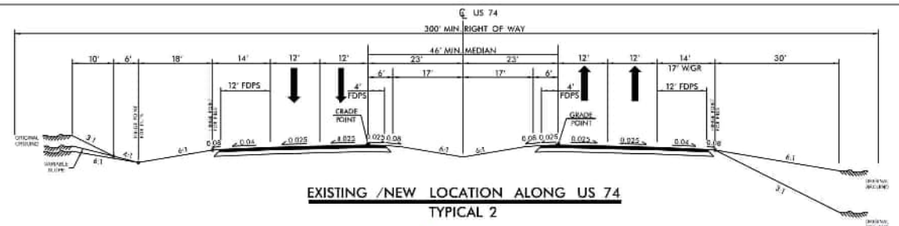
Figure 4.18 - Conceptual Design Plans
FS-1508A
US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

Project Length: *23.4 miles* *18 of 23*



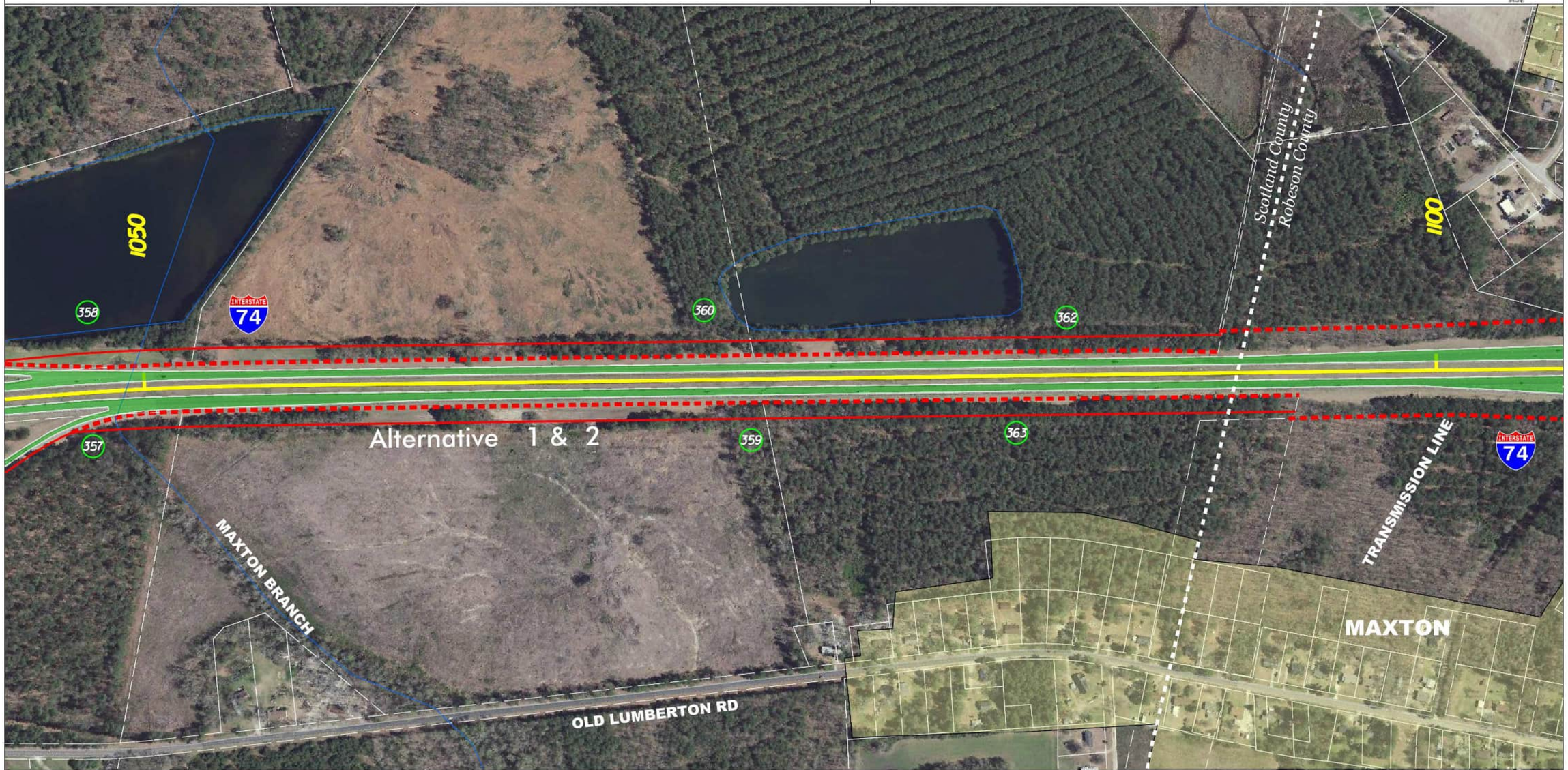
EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2



Legend

Exist. Interchange	Alternative 1	Prop. Right of Way
Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
Prop. Grade Sep.	Demo. Asphalt	County Boundary
Segment Line	Waterway	Exist Property Lines

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0 200' 400' 800'

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PROGRAM DEVELOPMENT BRANCH
FEASIBILITY STUDIES UNIT

Figure 4.19 - Conceptual Design Plans
FS-1508A
US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

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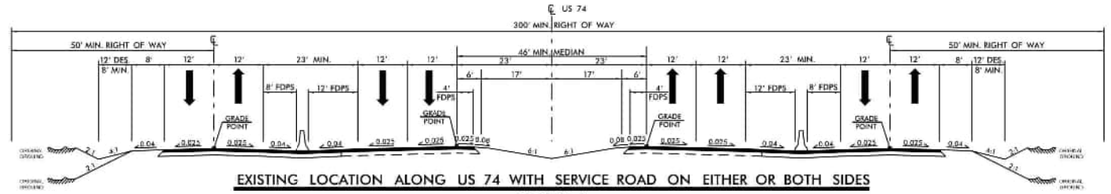
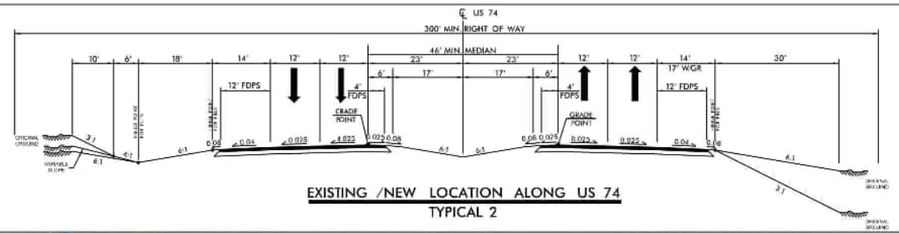


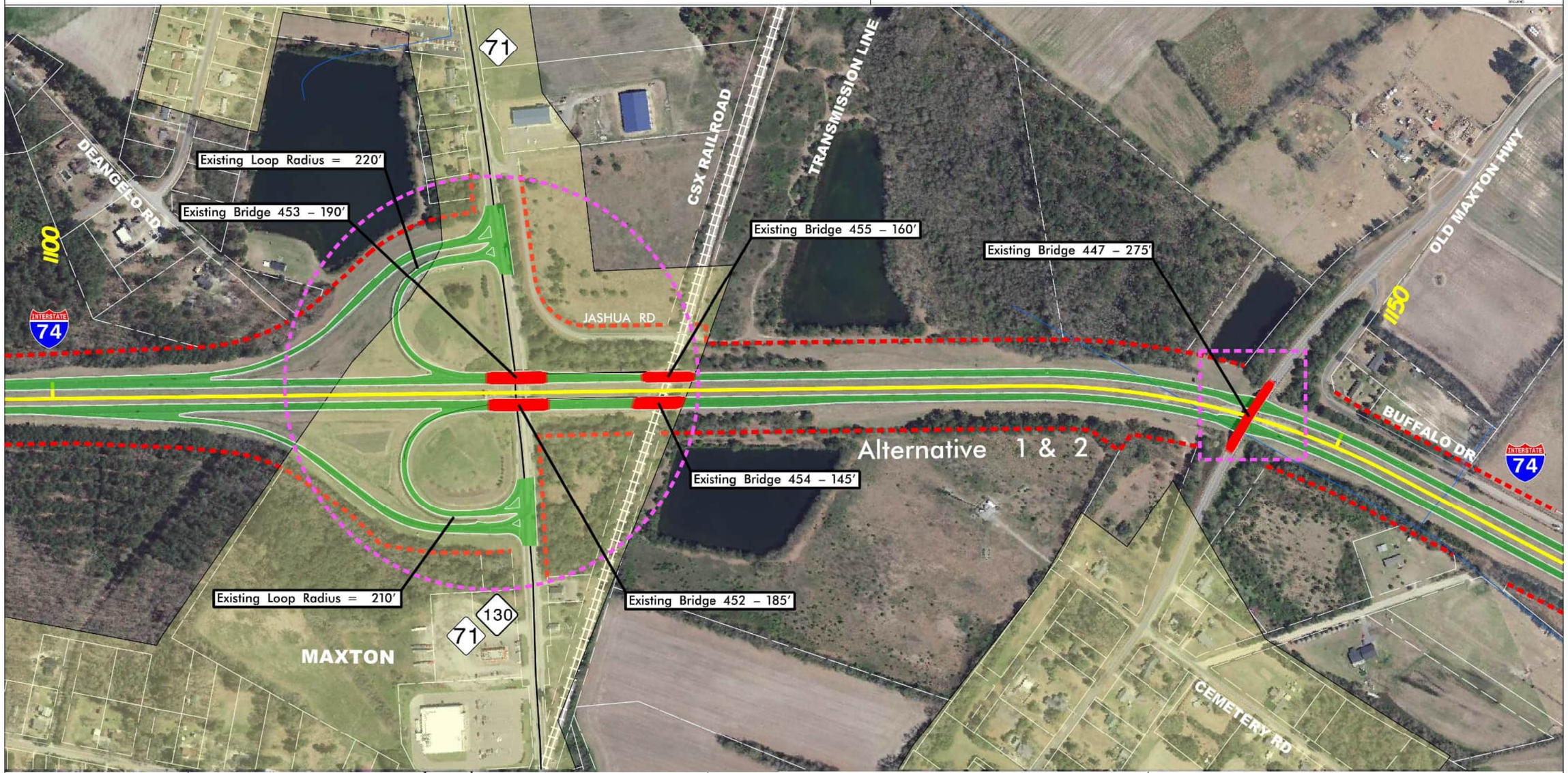
EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2



Legend

Exist. Interchange	Alternative 1	Prop. Right of Way
Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
Prop. Grade Sep.	Demo. Asphalt	County Boundary
Segment Line	Waterway	Exist Property Lines

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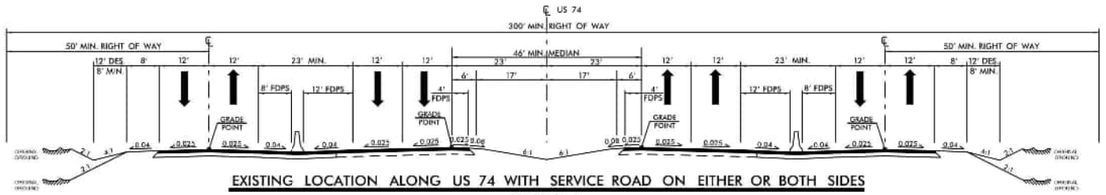
0 200′ 400′ 800′

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PROGRAM DEVELOPMENT BRANCH
FEASIBILITY STUDIES UNIT

Figure 4.20 - Conceptual Design Plans
FS-1508A

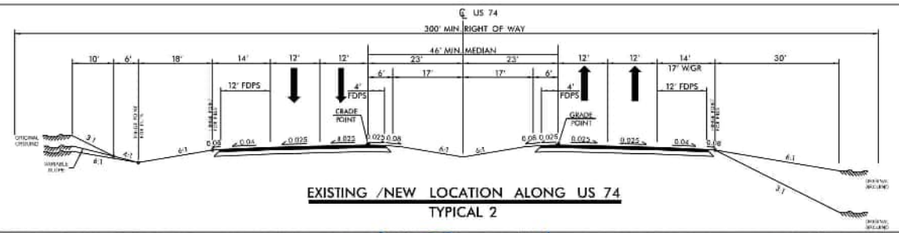
US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

20 of 23



EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2

Legend

Exist. Interchange	Alternative 1	Prop. Right of Way
Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
Prop. Grade Sep.	Demo. Asphalt	County Boundary
Segment Line	Waterway	Exist Property Lines

PRELIMINARY PLANS
SUBJECT TO CHANGE WITHOUT NOTICE

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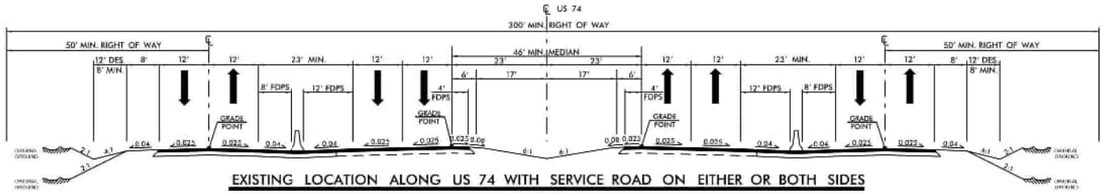
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PROGRAM DEVELOPMENT BRANCH
FEASIBILITY STUDIES UNIT

Figure 4.21 - Conceptual Design Plans
FS-1508A

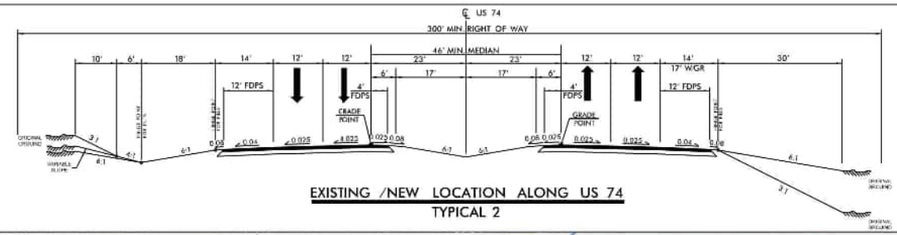
US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

21 of 23



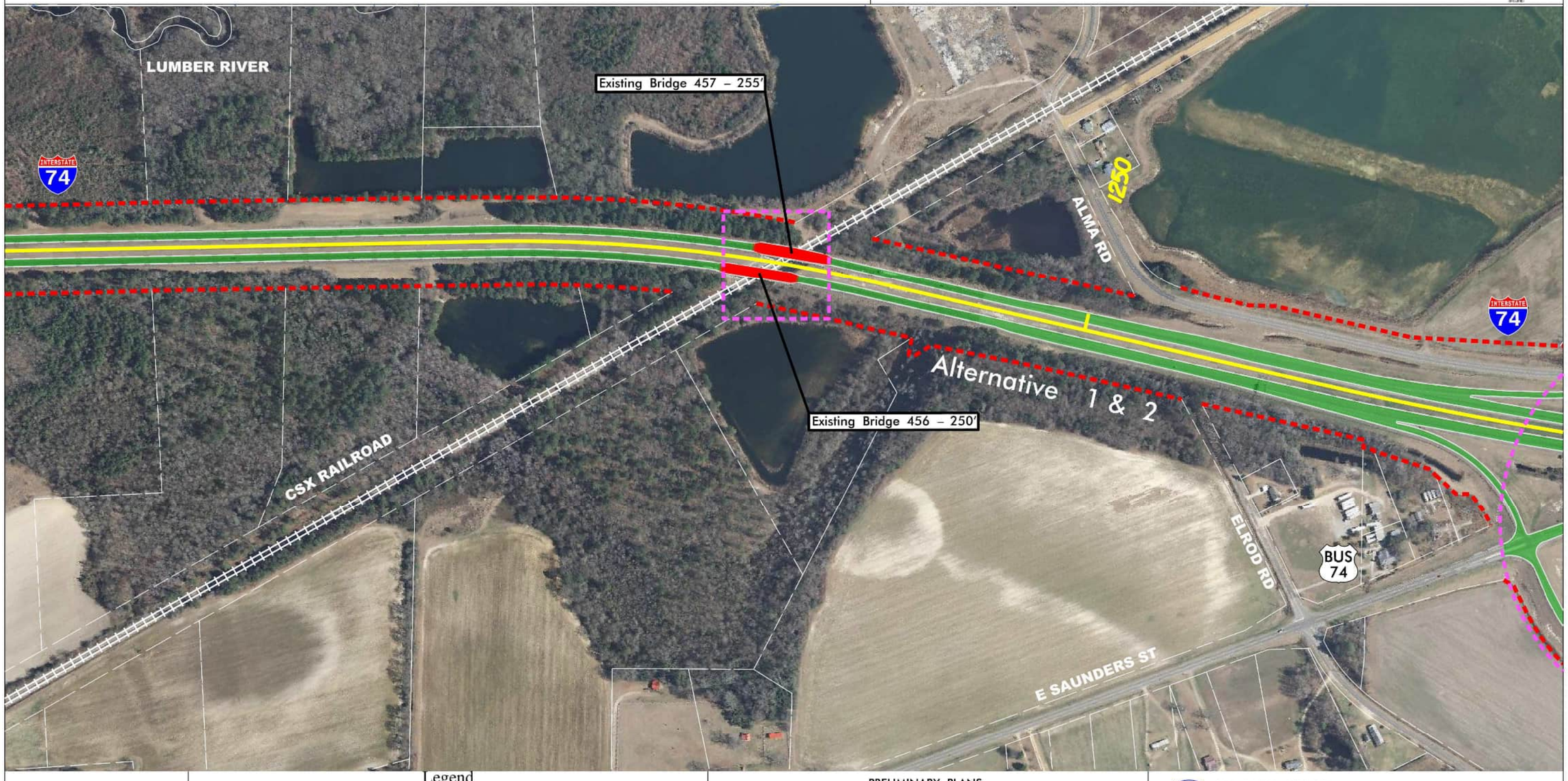
EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2



Legend

Exist. Interchange	Alternative 1	Prop. Right of Way
Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
Prop. Grade Sep.	Demo. Asphalt	County Boundary
Segment Line	Waterway	Exist Property Lines

PRELIMINARY PLANS
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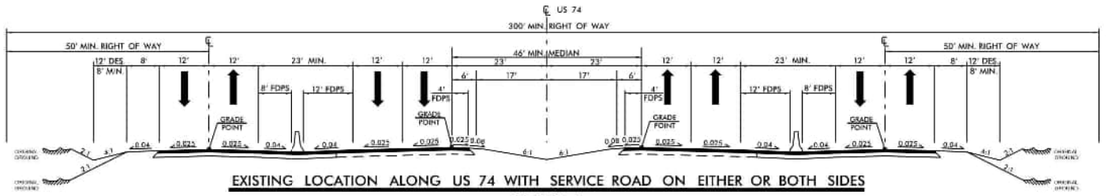
0 200' 400' 800'

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PROGRAM DEVELOPMENT BRANCH
FEASIBILITY STUDIES UNIT

Figure 4.22 - Conceptual Design Plans
FS-1508A

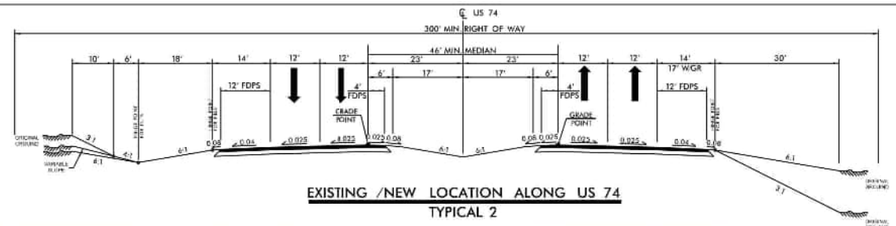
US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

22 of 23



EXISTING LOCATION ALONG US 74 WITH SERVICE ROAD ON EITHER OR BOTH SIDES

TYPICAL 1



EXISTING /NEW LOCATION ALONG US 74

TYPICAL 2

Legend

Exist. Interchange	Alternative 1	Prop. Right of Way
Prop. Interchange	Alternative 2	Exist. Right of Way
Exist. Grade Sep.	Service Road	Municipal Boundary
Prop. Grade Sep.	Demo. Asphalt	County Boundary
Segment Line	Waterway	Exist Property Lines

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PROGRAM DEVELOPMENT BRANCH
FEASIBILITY STUDIES UNIT

Figure 4.23 - Conceptual Design Plans
FS-1508A
US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

23 of 23

Memorandum

To: *Sonya Tankersley, PE, NCDOT Feasibility Studies Unit*

From: *Mark Pierce, PE, CDM Smith*

Date: *May 24, 2016*

Subject: *FS-1508A US 74 Upgrade to Interstate Standards Capacity Analysis*

CDM Smith, Inc. (CDM Smith) is preparing a Feasibility Study (FS-1508A) for the North Carolina Department of Transportation (NCDOT). The NCDOT STIP Project FS-1508A, US 74 Upgrade to Interstate Standards in Richmond, Scotland, and Robeson Counties, includes the development and evaluation of improvements needed to upgrade a 23.4-mile portion of US 74, starting from the US 74 Rockingham-Hamlet Bypass in Richmond County and ending at Existing I-74 in Robeson County, across two NCDOT Highway Divisions (Divisions 6 and 8). This memo provides a summary of the Traffic Capacity Analysis as the basis for alternative development and conceptual design for this feasibility study.

Traffic Demand Projections

The study segment of US 74 is a portion of NCDOT Strategic Transportation Corridor H (I-74/ Future I-74) and Corridor U (US 74W/US 74E). Based on the traffic survey conducted by NCDOT, the 2014 Annual Average Daily Traffic (AADT) was 11,000 Vehicles per Day (VPD) on I-74 west of the study area, and 16,000 VPD on US 74 east of the US 74 Business merge/diverge in Richmond County; in Scotland County, the 2014 AADT was 18,000 VPD on US 74 at Laurel Hill, 20,000 VPD west of Laurinburg, 19,000 VPD between US 15/US 401 and US 501 Business south of Laurinburg, and 15,000 VPD east of US 74 Business; the 2014 AADT on I-74 was 12,000 VPD east of Maxton in Robeson County.

Traffic forecast developed by Hatch Mott MacDonald (HMM), dated December 10, 2015, was used as the basis for traffic capacity analysis in this project. The traffic forecast only included the 2015 Base Year No-Build and 2045 Future Year Build conditions. As stated in the forecast, the construction of the FS-1508A was not assumed to substantially impact traffic volumes. As such, the 2015 Base Year No-Build forecast is a proxy for the 2015 Base Year Build Scenario, and the 2045 Build forecast is a proxy for the 2045 No-Build Scenario. The December 2015 traffic forecast diagrams were included in Appendix A.

Based on the traffic forecast, peak hour traffic volumes are calculated using Intersection Analysis Utility (IAU), which is a standard tool developed by NCDOT to calculate peak hour turning movement and peak hour through movement volumes at intersections given the information

typically provided in NCDOT project level traffic forecasts. IAU calculations are made using a method documented in the National Cooperative Highway Research Program (NCHRP) Report #255, Chapter 8. Starting with the supplied input derived from traffic forecasts, the method proceeds through an iterative computational technique to produce a final set of peak hour movement volumes. The IAU calculation worksheets are included in Attachment B.

Alternative Development

Upgrading the study portion of US 74/I-74 to interstate standards requires significant access changes, intersection improvements, and interchange upgrades at certain locations, particularly along the west 4-lane highway segment. In this project, the consideration factors in alternative development include spacing issues and requirements, environmental constraints, constructability, and community impacts. Each alternative includes recommended improvements including interchange locations, interchange configurations, auxiliary turn lanes, side street improvements, traffic signals, and grade separations.

A typical interchange configuration is a diamond interchange with room allowing for future loops. However, in this project, there may be an issue with right-of-way, environmental constraints, or conflicts with railroad tracks.

The project team collected input from NCDOT and local agency representatives, and developed design alternatives in this study. A summary of the potential intersection and interchange treatments is provided below.

Table 1: Summary of Potential Intersection and Interchange Treatments

Crossing Feature/Road	Feature/Road Explanation	Existing Traffic Control	Included in Traffic Forecast	Potential Future Treatments							
				Closure	Cul-De-Sac	Realignment	Grade Separation	Merge/Split	New Interchange	Interchange Access Improvement	Interchange Geometry Improvement
US 74 BR	**US 74 Business in Richmond County**	**Merge/Split**	**Y**					**X**			**X**
SR 1846	Question (service road)	Unsignalized			X						
MO #1	Full movement median opening	Unsignalized		X							
MO #2	Full movement median opening	Unsignalized		X							
MO #3	Full movement median opening	Unsignalized		X							
SR 1156/SR 1801	Joes Creek Rd	Unsignalized			X						
SR 1155	Guinns Mill Rd	Unsignalized			X						
SR 1347	McEachin Rd	Unsignalized	Y			X					
Railroad Crossing #1	CSX Railroad	Underpass					X				
SR 1145	**Corbitt Rd/Old Hundred Road**	**Unsignalized**	**Y**						**X**		
Pate	Private street to Morgan Motors	Unsignalized			X						
SR 1153	Butler Rd	Unsignalized			X						
MO #4	Full movement median opening, residential access on both sides	Unsignalized		X							
MO #5	Full movement median opening	Unsignalized		X							
SR 1363	Fred Carter Rd	Unsignalized			X						
Whispering Pines		Unsignalized			X						
SR 1152/SR 1319	Old Wire Rd	Directional Crossover	Y				X				
NC 144/SR 1148	**Morgan Rd/St John's Church Rd**	**Signalized**	**Y**						**X**		
SR 1312	Church St/Mudock St	Directional Crossover			X						
SR 1125/SR 1305	Springs Mill Rd/Ida Mill Rd	Signalized	Y				X				
SR 1267	Devon Dr (recently cut-off)	None			X						
Structure	Bridge over hydraulic feature	Bridge									
SR 1304	**Armstrong Rd**	**Unsignalized**	**Y**						**X**		
Structure	Hydraulic structure	Culvert									
MO #6	Full movement median opening, residential/business access on north side	Unsignalized		X							
SR 1321	Laurel Hill Church Rd/Elmore Rd	Directional Crossover					X				
US 74 Bus	**Exit 181: US 74 Bus w. of Laurinburg**	**Merge/Split**	**Y**					**X**			**X**
NC 79	**Exit 182: Gibson Rd**	**Half Interchange**	**Y**							**X**	**X**
SR 1105	State Rd Turnpike Rd	Overpass	Y				X				
Structure	Hydraulic structure	Culvert									
SR 1108	X Way Rd	Overpass	Y				X				
US 15/US 401	**Exit 183: McColl Rd**	**Interchange**	**Y**							**X**	**X**
US 15 Bus/US 401 Bus	**Exit 184: Main St**	**Interchange**	**Y**							**X**	**X**
US 501 Bus	Johns Rd	Overpass	Y				X				
US 501/SR 1438	**Exit 185: S Caledonia Rd**	**Interchange**	**Y**								**X**
SR 1601	Stewartsville Rd/Old Johns Rd	Overpass	Y				X				
Railroad Crossing #2	Laurinburg & Southern Company	Underpass					X				
SR 1323/SR 1603	Exit 186: Highland Rd	Half Interchange	Y				X				
US 74 Bus	**Exit 187: US 74 Bus btw Laurinburg & Maxton**	**Interchange**	**Y**								**X**
Railroad Crossing #3	CSX Railroad	Underpass					X				
SR 1369	Old Lumberton Rd	Overpass	Y				X				
Structure	Hydraulic structure	Culvert									
Railroad Crossing #4	CSX Railroad	Underpass					X				
SR 1436	**Exit 190: Airport Rd (Laurinburg-Maxton Airport)**	**Interchange**	**Y**								**X**
NC 71/NC 130	**Exit 191: N Patterson St, Campbell Soup Company**	**Interchange**	**Y**								**X**
Railroad Crossing #5	CSX Railroad	Underpass					X				
SR 1303	McMcaskill Ave/Old Red Springs Rd	Overpass	Y				X				
Railroad Crossing #6	CSX Railroad	Underpass					X				
US 74/Alt	**Exit 194: E Saunders St/Andrew Jackson Highway**	**Interchange**	**Y**								**X**

Note:
1. Intersections, interchanges, and features are listed from project west end to east end. Those already identified in the traffic forecasts requested are shown in bold.

2. The list of intersection and interchange improvements is preliminary; it is subject to changes with alternative analysis.

3. In one alternative, the interchange at US 15 BUS/US 401 BUS is abandoned due to weaving traffic concerns.

Typical interchange spacing requirements are 1 mile for urban freeways and 3 miles for rural freeways. The distance along US 74, from US 74 Business in Richmond County to US 74 Business west of Laurinburg, is approximate 10.5 miles, allowing for up to 3 interchanges in the middle. The first candidate interchange location is at SR 1347 (McEachin Rd) or SR 1145 (Corbitt Road) based on spacing considerations. However, options of interchange configurations are constrained by the spacing between US 74 and parallel railroad tracks at either McEachin Road or Corbitt Road. A baseline alternative is to realign McEachin Road to connect to Old Hundred Road, and convert the Corbitt Road at-grade intersection to a tight diamond or partial cloverleaf interchange. If this alternative proves to be too cost prohibitive due to right-of-way constraints or community impacts, a bypass will be considered at a later time. The second candidate location is at or near the Laurel Hill community, where a southerly bypass route is also considered. Converting the at-grade intersection of NC 144 (Morgan Road) and SR 1148 (St. John's Church Road) to an interchange is preferred due to the "gateway" status to the Laurel Hill community. If an interchange at the current location has constructability issues, an interchange at the bypass route should be constructed where it intersects St. John's Church Road. The third candidate location is at SR 1304 (Armstrong Road). However, this location may shift to SR 1305 (Ida Mill Road) if the Laurel Hill bypass creates spacing issues between interchange ramps.

The current I-74 freeway segment in Laurinburg is 7 miles with 4 full interchanges at US 15/401 (McColl Road), US 15/401 Business (Main Street), US 501/SR 1438 (Caledonia), and US 74 Business east of Laurinburg), and 2 partial interchanges at NC 79 (Gibson Road) and SR 1603 (Highland Road). It is concerning that there is only 0.4 miles of spacing between the US 15/401 (McColl Road) and US 15/401 Business (Main Street) interchanges. The current configurations at these two interchanges created short weaving segments along both directions of I-74, and weaving maneuvers are more challenging since ramp traffic needs to merge onto I-74 that is elevated across these two interchanges. The weaving issue is expected to worsen with heavier traffic demand and a large percentage (36%) of trucks shown in the traffic forecast. The mitigation alternatives include abandoning the entire interchange at US 15/40 Business, abandoning two ramps at the US 15/401 Business interchange, or relocate one ramp at the US 15/401 interchange and two ramps at the US 15/401 Business interchange. At Gibson Road, two ramps need to be added to provide access between all possible movements. Abandoning the two existing ramps at Highland Road is considered since traffic volumes on Highland Road do not justify retaining the partial interchange nor upgrading it to a full interchange.

The current I-74 freeway segment between US 74 Bus between Laurinburg and Maxton and US 74 Alt east of Maxton is 7 miles with two interchanges (SR 1436 (Airport Rd), NC 71/130) in between and 2 interchanges at both ends, meeting the spacing requirements.

Traffic Capacity Analysis

Traffic operations analysis was performed during AM and PM peak hours based on the NCDOT Congestion Management Capacity Analysis Guidelines (January 1, 2012). Traffic operations analysis

for freeway segments, interchange ramps, and weaving areas was conducted using Highway Capacity Software (HCS) 2010, Freeway Facilities module, and capacity analysis at the at-grade and ramp intersections was conducted using Synchro 9 with the Highway Capacity Manual (HCM) 2010 methodologies. A summary of intersection levels of service is included at each individual intersection and interchange locations.

The HCS 2010 is developed and maintained as a faithful implementation of the procedures included in Highway Capacity Manual (HCM) 2010, which is a national standard for the traffic operations analysis and evaluation of transportation facilities. The HCS 2010 Freeway Facility module performs level of service (LOS) analysis for freeway facilities including freeway segments, on-ramps, off-ramps, and weaving areas.

Most ramp intersections are currently unsignalized under existing conditions. When the ramp intersections are projected to operate at failing conditions in the future, signalization will be assumed if the peak hour signal warrants are met based on traffic forecasts. New ramps may be added, ramp intersection spacing may be revised, and auxiliary lanes may be added with interchange upgrades to meet traffic operations and safety requirements.

When new interchanges are constructed, service roads may need to be provided to maintain access, and appropriate traffic control needs to be provided along new traffic routes. Since service roads are expected to carry very light traffic volumes, they are not included in the traffic operations analysis in this project.

HCS and Synchro software output details are included in Attachments C and D, respectively.

Results Summary and Tentative Conclusions

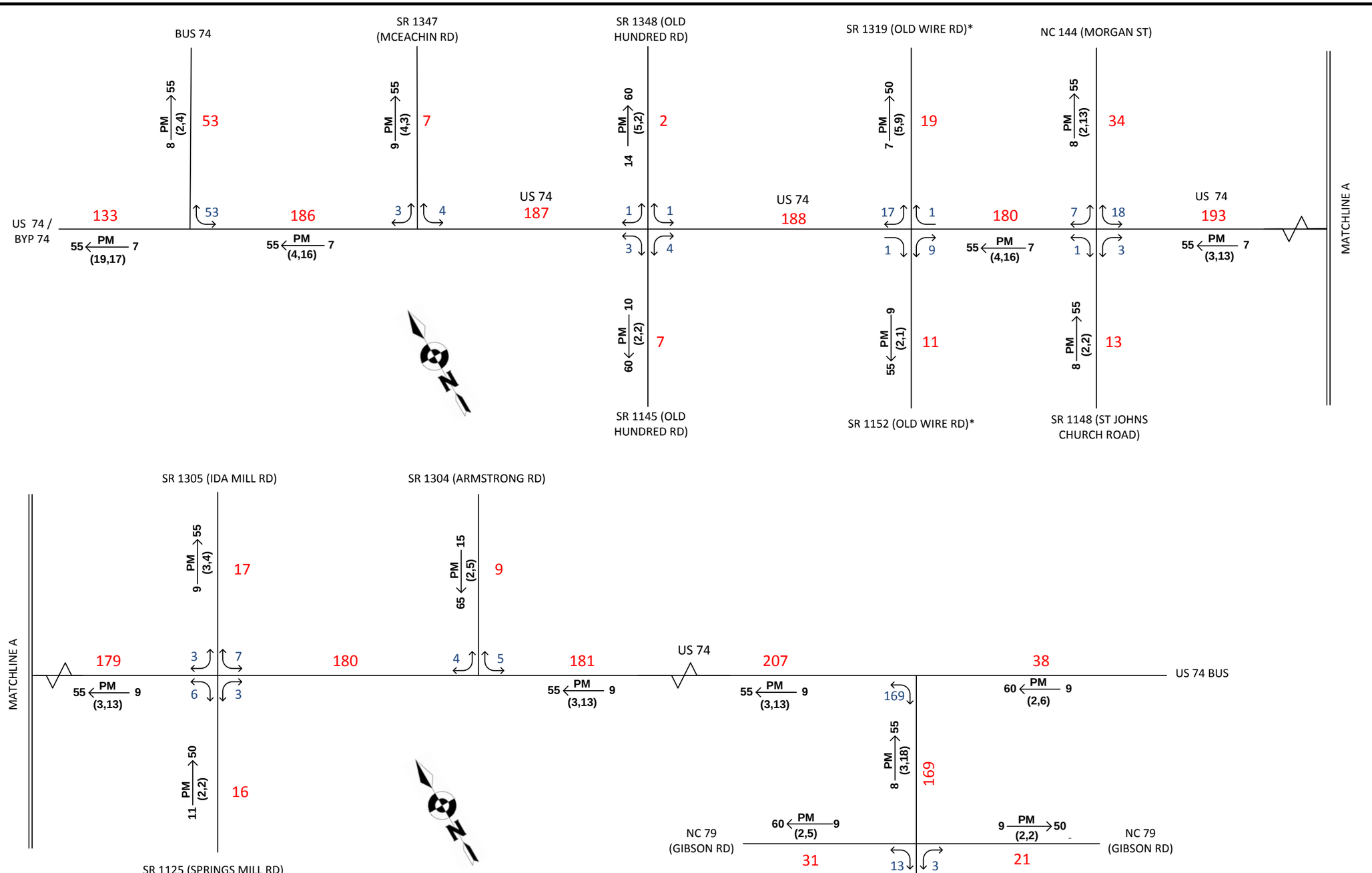
A capacity analysis was conducted for the FS-1508A project. As indicated in the planning-level screening analysis, a 4-lane freeway facility along future I-74 within the project limits should provide sufficient capacity for the 2045 Build conditions under a typical annual growth rate (1% or 2%) or a conservative rate (3%). An in-depth freeway and interchange traffic operations analysis indicates that that the segment of I-74/US 74 between NC 79 (Gibson Rd) and SR 1438 (S Caledonia Rd) in south Laurinburg, Scotland County will become the critical segment for future capacity improvements. Further traffic analysis should be conducted with the final traffic forecasts, particularly the weaving traffic demand between the US 15/US 401 and US 501 BUS interchanges, in order to determine if additional improvements are needed along this segment.

At this time, this preliminary analysis was conducted based on NCDOT historical traffic data and currently available information. The analysis should be updated once the final traffic forecasts are released.

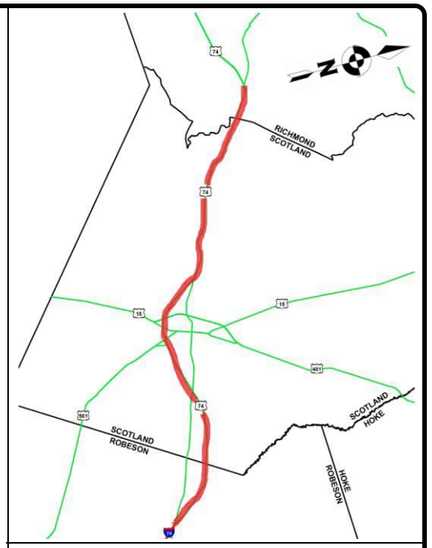
Attachments

Attachment A

Traffic Forecast Diagrams



* Note: This intersection has restricted movements (leftover – no through or left turns).



2015

AVERAGE ANNUAL DAILY TRAFFIC

NO BUILD

SHEET 1 OF 2

L E G E N D

K PM → D
(d, t)

###	No. of Vehicles Per Day (VPD) in 100s
1-	Less than 50 VPD
X	Movement Prohibited
-------	Roadway
K	Design Hour Factor (%)
PM	PM Peak Period
D	Peak Hour Directional Split
→	Indicates Direction of D
(d,t)	Duals, TT-STs (%)

TIP: FS-1508A

WBS: 34263.1.1

COUNTY: Richmond, Scotland, Robeson

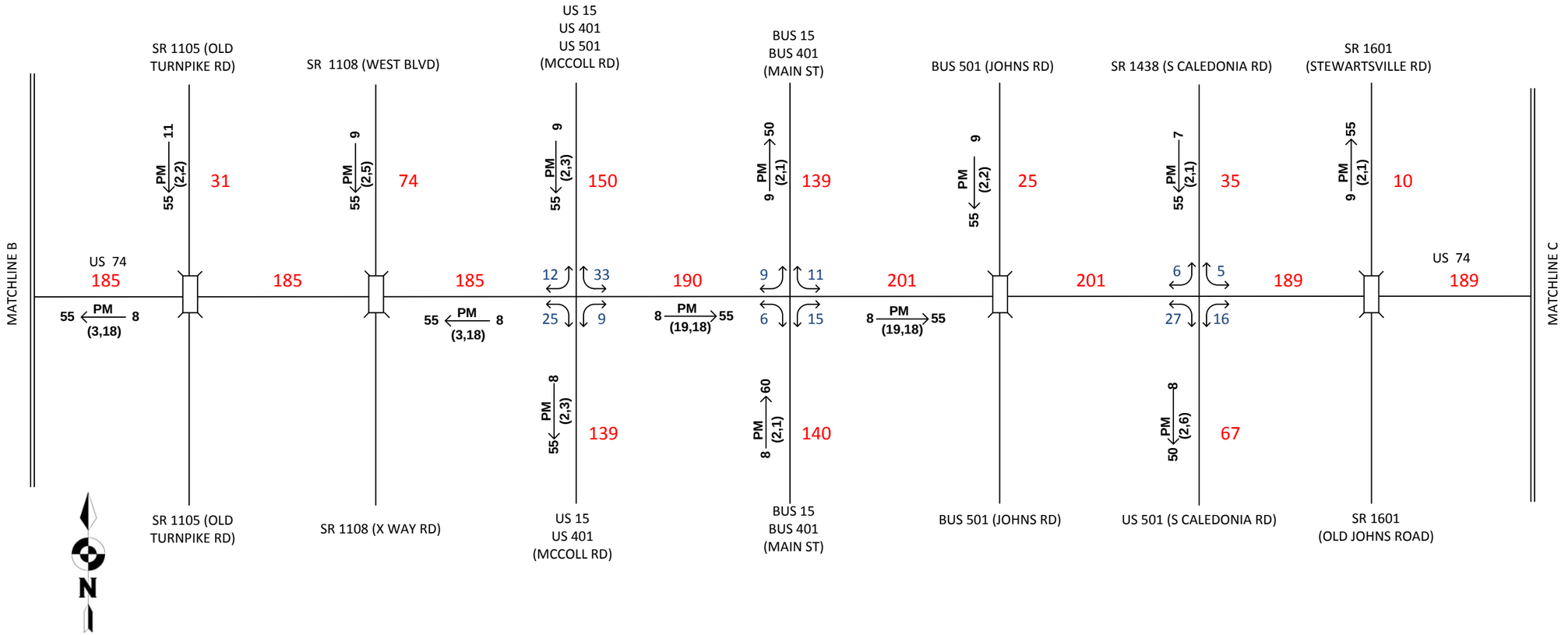
DIVISION: 6&8

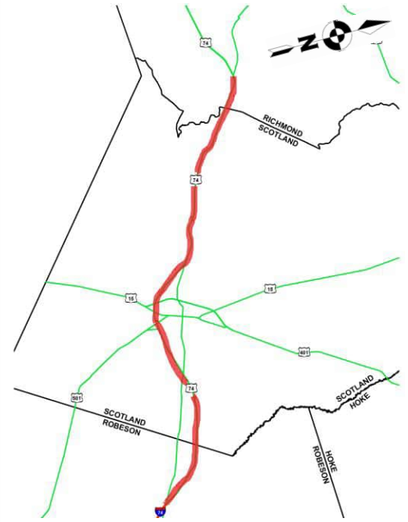
DATE: December 2015

PREPARED BY: Kimberly Levine

LOCATION: US 74 From existing US 74 Business/74 Bypass interchange to US 74 and US 74 Business interchange

PROJECT: US 74 Upgrade to Interstate Standards





2015

AVERAGE ANNUAL DAILY TRAFFIC

NO BUILD

SHEET 2 OF 2

L E G E N D

PM
K → D
(d, t)

###	No. of Vehicles Per Day (VPD) in 100s
1-	Less than 50 VPD
X	Movement Prohibited
-------	Roadway
K	Design Hour Factor (%)
PM	PM Peak Period
D	Peak Hour Directional Split
→	Indicates Direction of D
(d,t)	Duals, TT-STs (%)

TIP: FS-1508A

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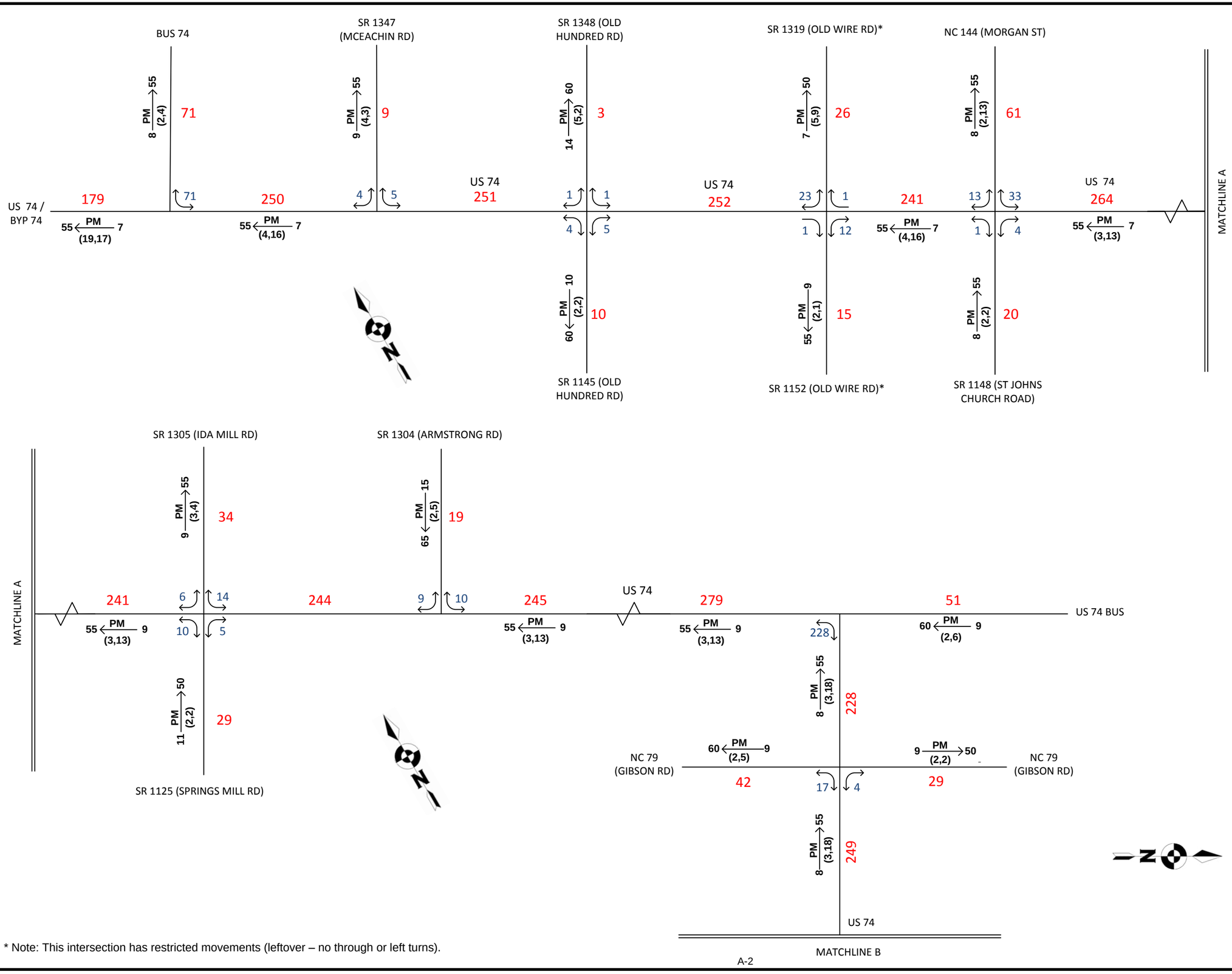
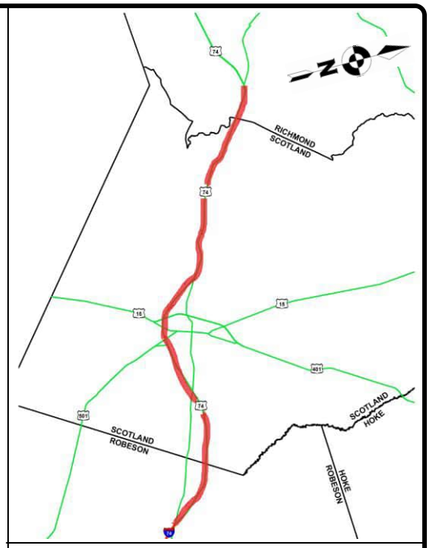




2045

AVERAGE ANNUAL DAILY TRAFFIC

BUILD

SHEET 1 OF 2

L E G E N D

PM K → D (d, t)

###	No. of Vehicles Per Day (VPD) in 100s
1-	Less than 50 VPD
X	Movement Prohibited
-------	Roadway
K	Design Hour Factor (%)
PM	PM Peak Period
D	Peak Hour Directional Split
→	Indicates Direction of D
(d,t)	Duals, TT-STs (%)

TIP: FS-1508A

WBS: 34263.1.1

COUNTY: Richmond, Scotland, Robeson

DIVISION: 6&8

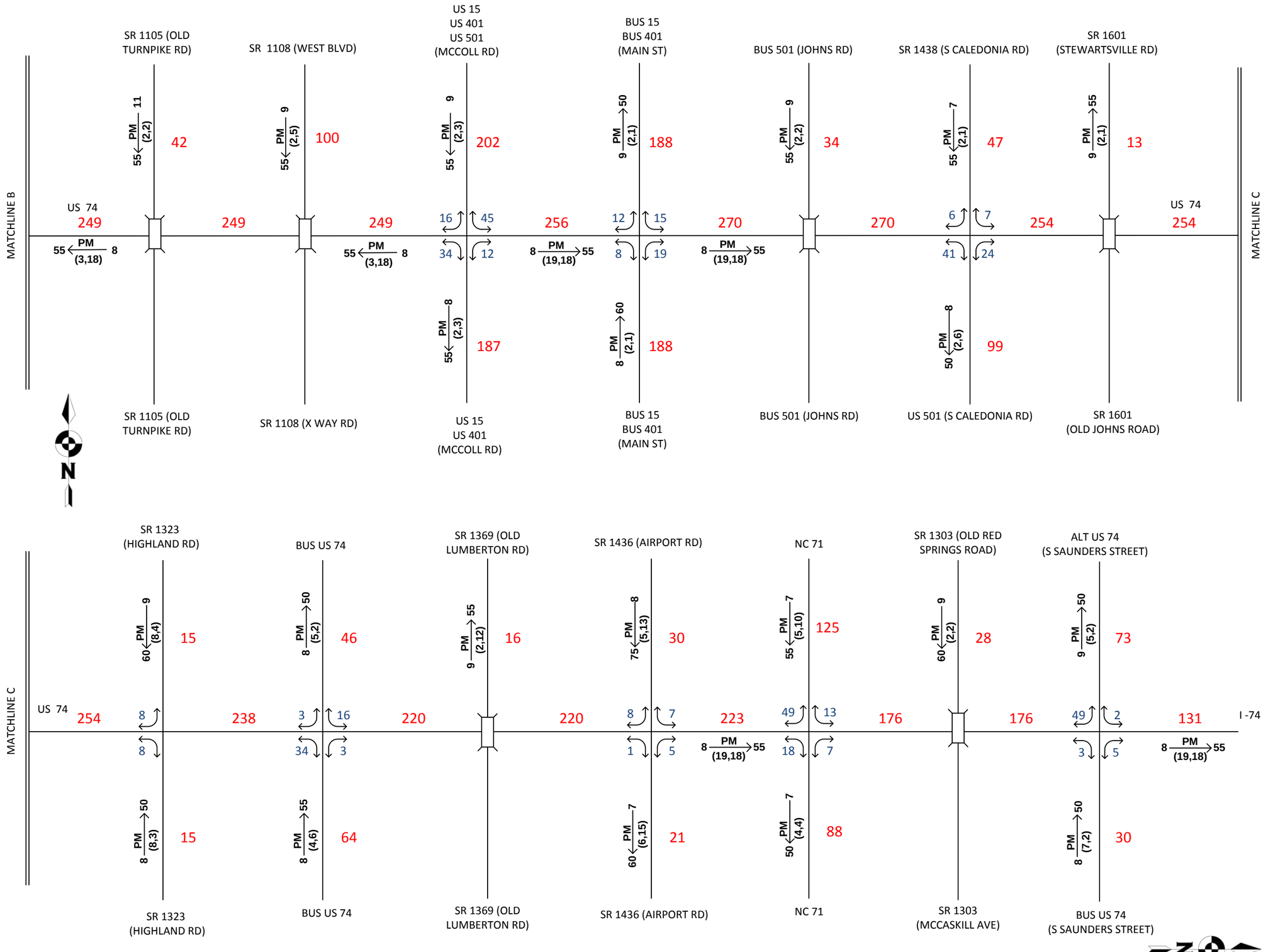
DATE: December 2015

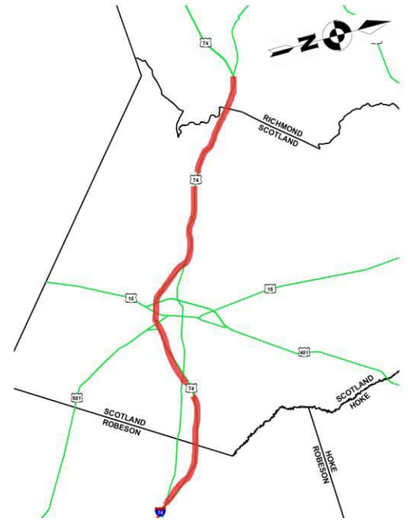
PREPARED BY: Kimberly Levine

LOCATION: US 74 From existing US 74 Business/74 Bypass interchange to US 74 and US 74 Business interchange

PROJECT: US 74 Upgrade to Interstate Standards

* Note: This intersection has restricted movements (leftover – no through or left turns).





2045
AVERAGE ANNUAL DAILY TRAFFIC

BUILD

SHEET 2 OF 2

L E G E N D

K PM (d, t) D

###	No. of Vehicles Per Day (VPD) in 100s
1-	Less than 50 VPD
X	Movement Prohibited
-------	Roadway
K	Design Hour Factor (%)
PM	PM Peak Period
D	Peak Hour Directional Split
→	Indicates Direction of D
(d,t)	Duals, TT-STs (%)

TIP: FS-1508A

WBS: 34263.1.1

COUNTY: Richmond, Scotland, Robeson

DIVISION: 6&8

DATE: December 2015

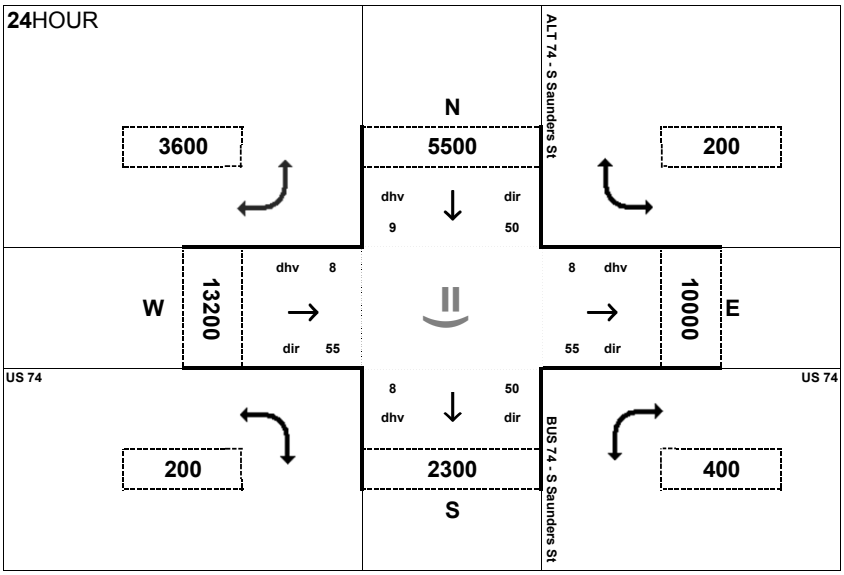
PREPARED BY: Kimberly Levine

LOCATION: US 74 From existing US 74 Business/74 Bypass interchange to US 74 and US 74 Business interchange

PROJECT: US 74 Upgrade to Interstate Standards

Attachment B

IAU Calculations

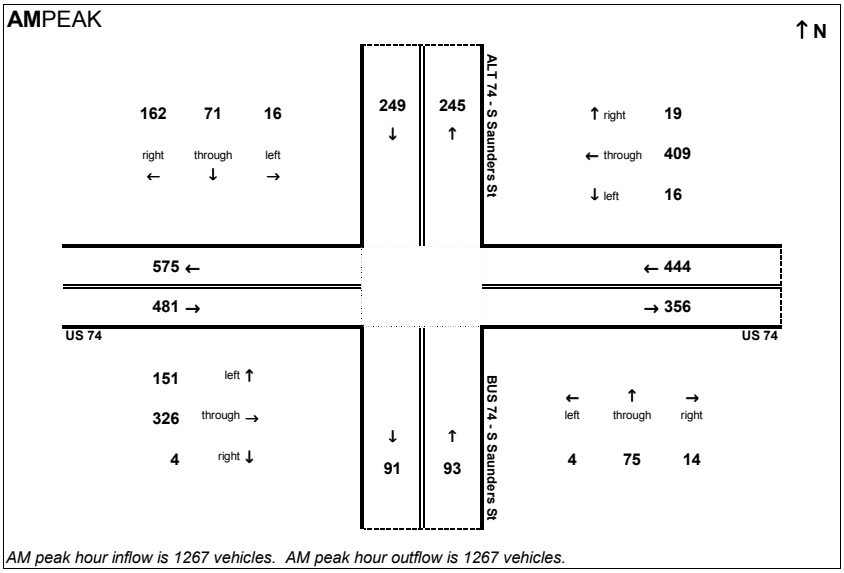


Peak Hour Volume Breakouts Report:
Intersection of US 74 and ALT 74/BUS 74 (S Saunders St) in Robeson County

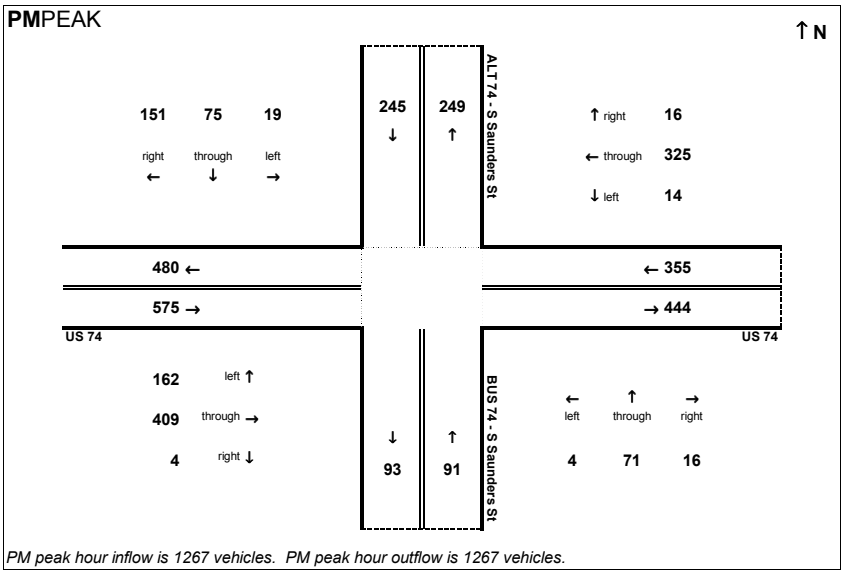
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2015 No-Build

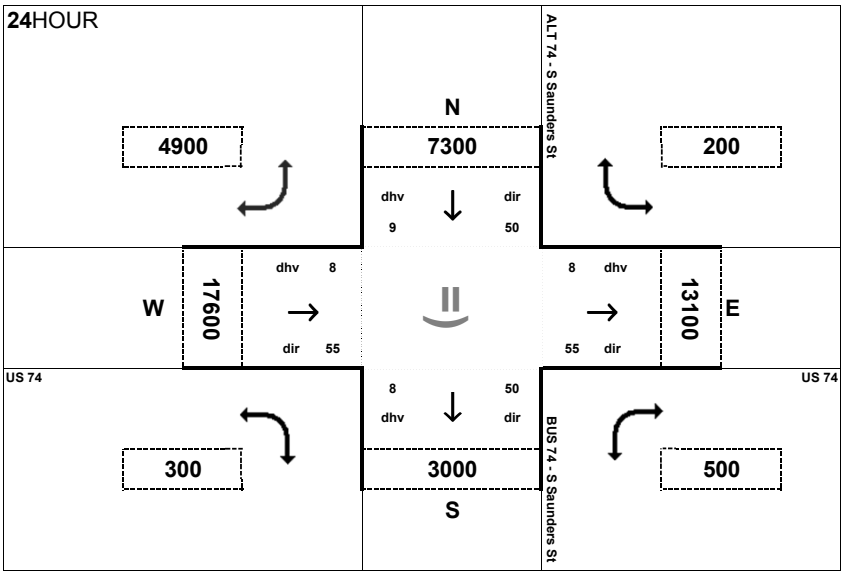
Project:
FS-1508A



AM peak hour inflow is 1267 vehicles. AM peak hour outflow is 1267 vehicles.



PM peak hour inflow is 1267 vehicles. PM peak hour outflow is 1267 vehicles.

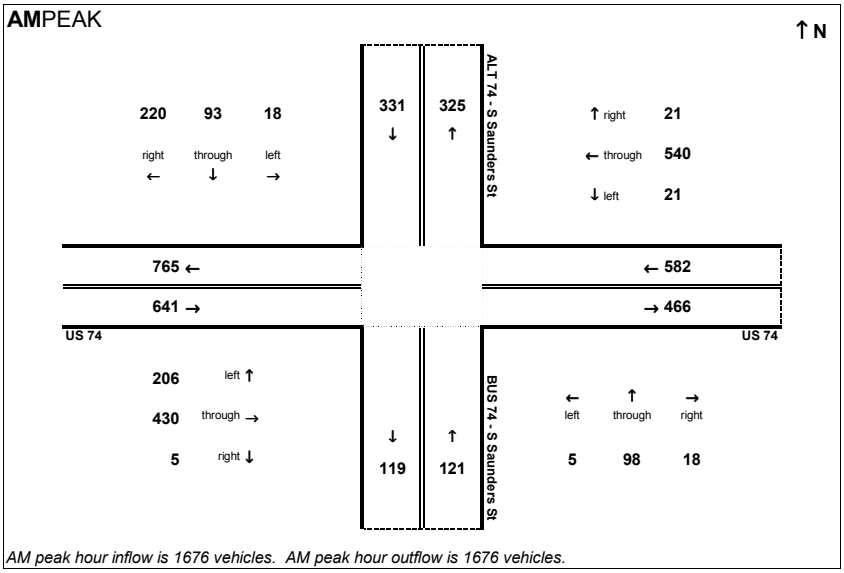


Peak Hour Volume Breakouts Report:
Intersection of US 74 and ALT 74/BUS 74 (S Saunders St) in Robeson County

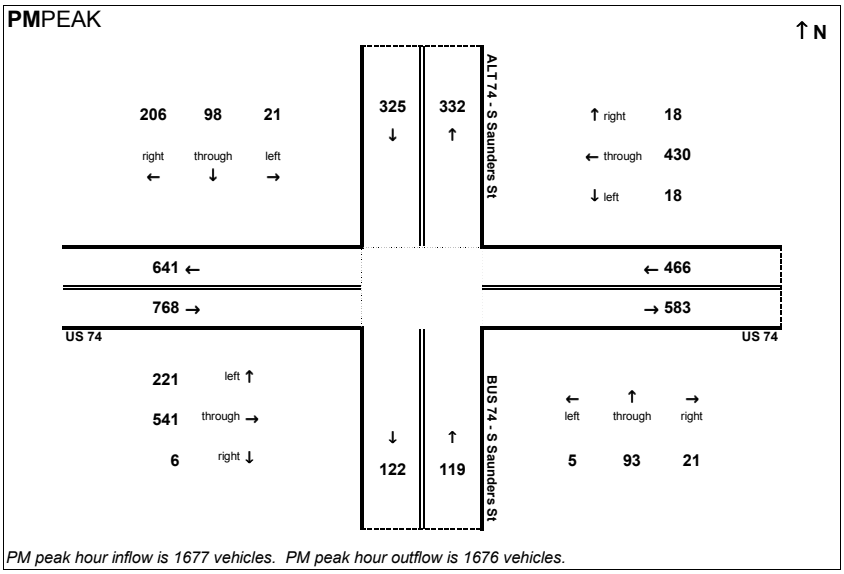
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2015 No-Build

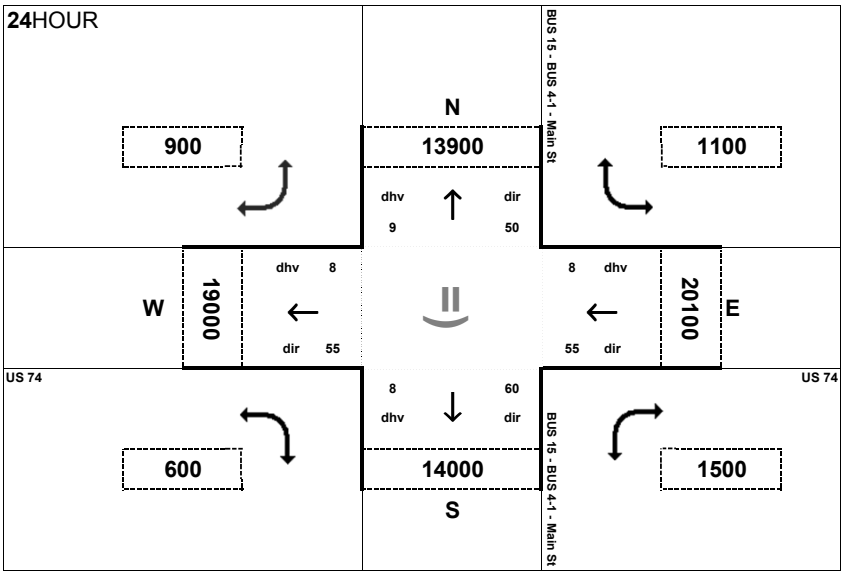
Project:
FS-1508A



AM peak hour inflow is 1676 vehicles. AM peak hour outflow is 1676 vehicles.



PM peak hour inflow is 1677 vehicles. PM peak hour outflow is 1676 vehicles.

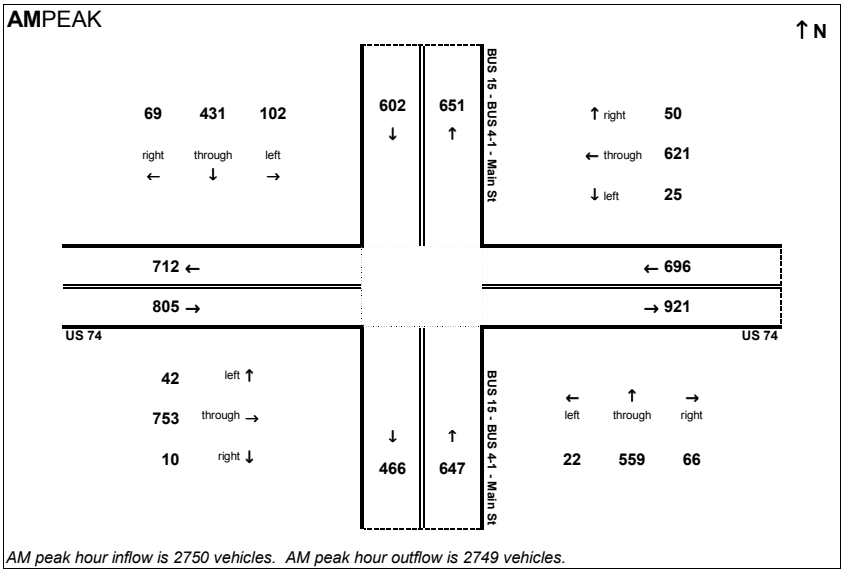


Peak Hour Volume Breakouts Report:
Intersection of US 74 and BUS 15/BUS 401 (Main St) in Scotland County

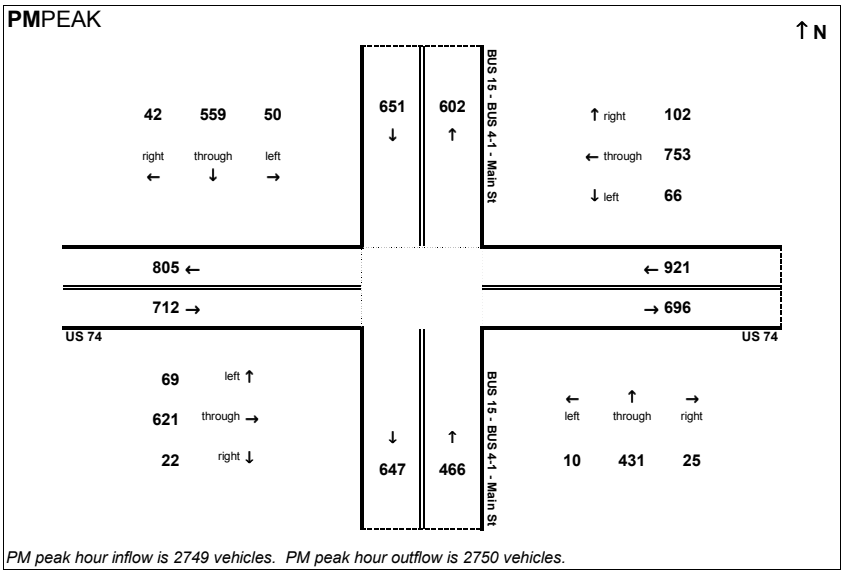
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2015 No-Build

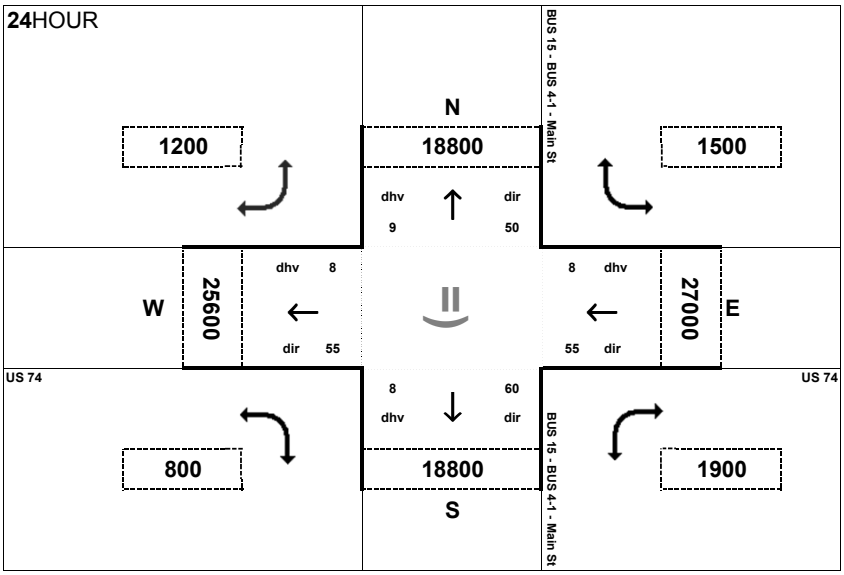
Project:
FS-1508A

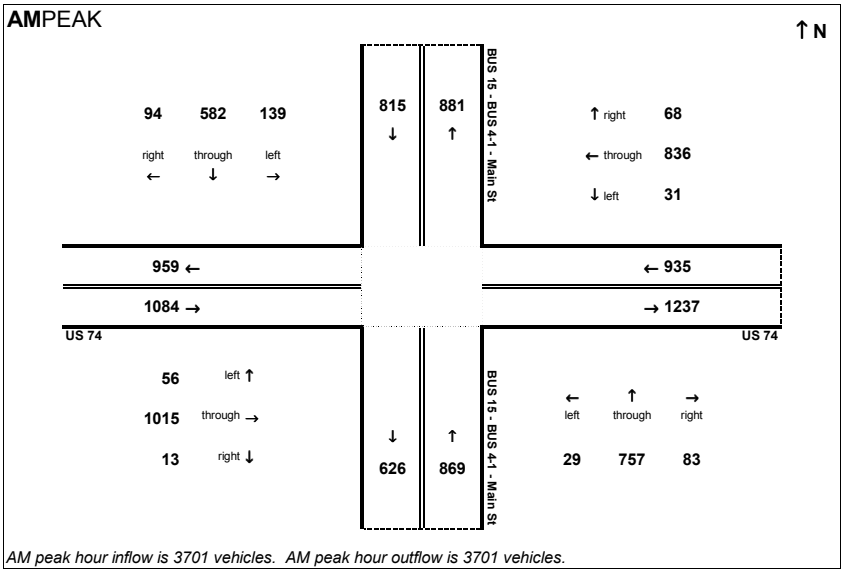


AM peak hour inflow is 2750 vehicles. AM peak hour outflow is 2749 vehicles.

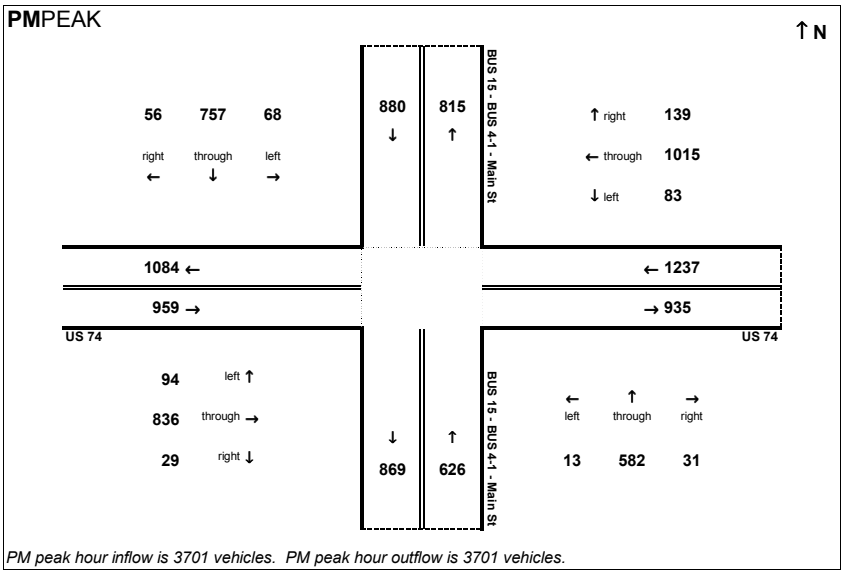


PM peak hour inflow is 2749 vehicles. PM peak hour outflow is 2750 vehicles.





AM peak hour inflow is 3701 vehicles. AM peak hour outflow is 3701 vehicles.



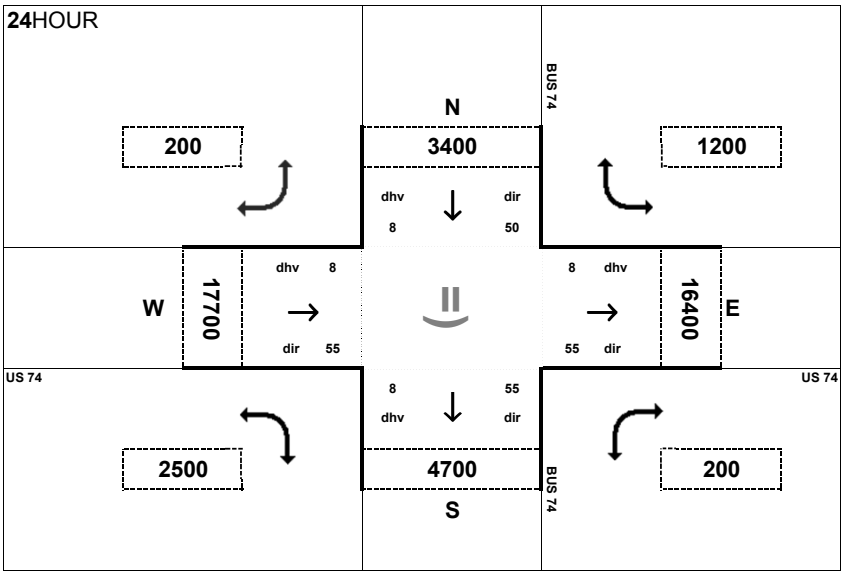
PM peak hour inflow is 3701 vehicles. PM peak hour outflow is 3701 vehicles.

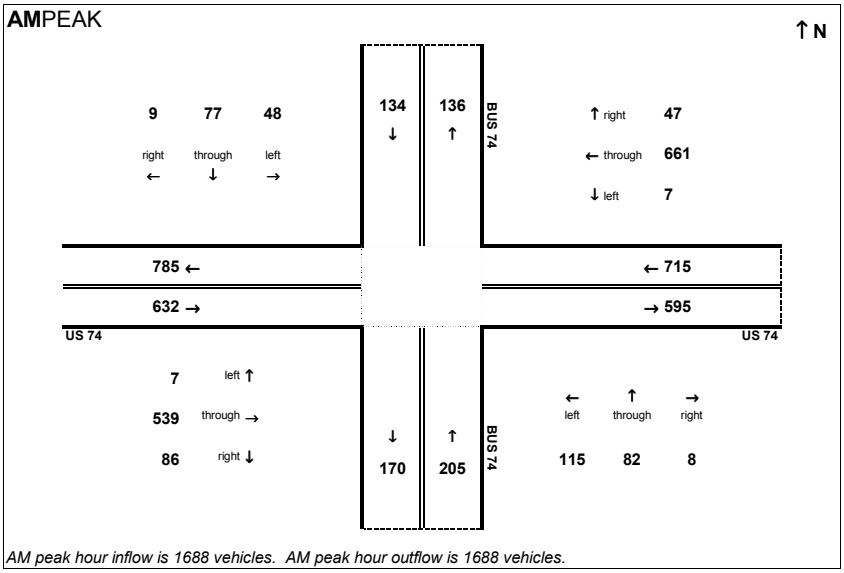
Peak Hour Volume Breakouts Report:
Intersection of US 74 and BUS 15/BUS 401 (Main St) in Scotland County

Traffic Forecast Release Date:
December-15

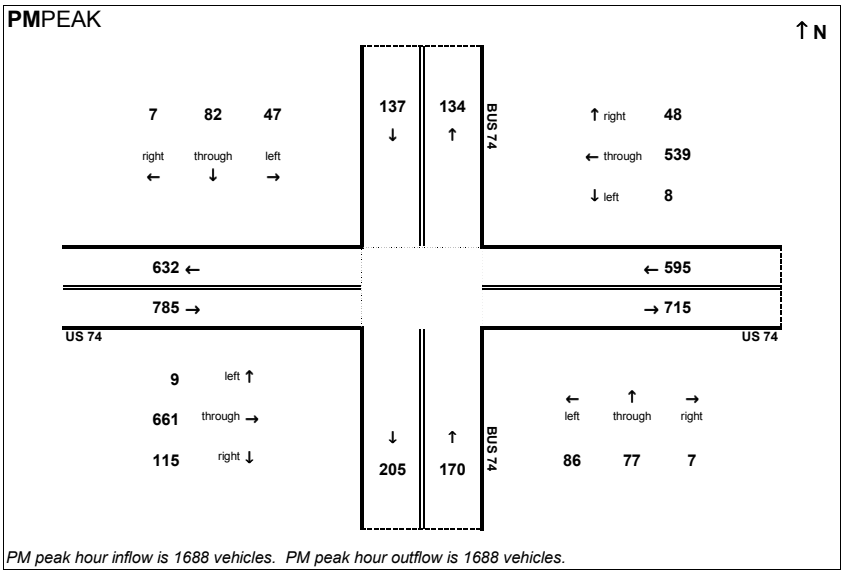
Traffic Data Year:
2045 Build

Project:
FS-1508A





AM peak hour inflow is 1688 vehicles. AM peak hour outflow is 1688 vehicles.



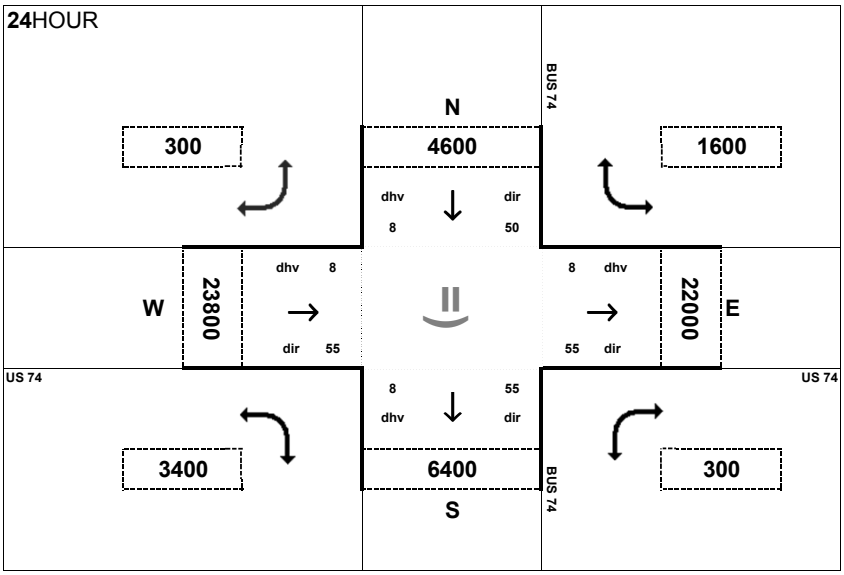
PM peak hour inflow is 1688 vehicles. PM peak hour outflow is 1688 vehicles.

Peak Hour Volume Breakouts Report:
Intersection of US 74 and BUS 74 (2) in Scotland County

Traffic Forecast Release Date:
December-15

Traffic Data Year:
2015 No-Build

Project:
FS-1508A

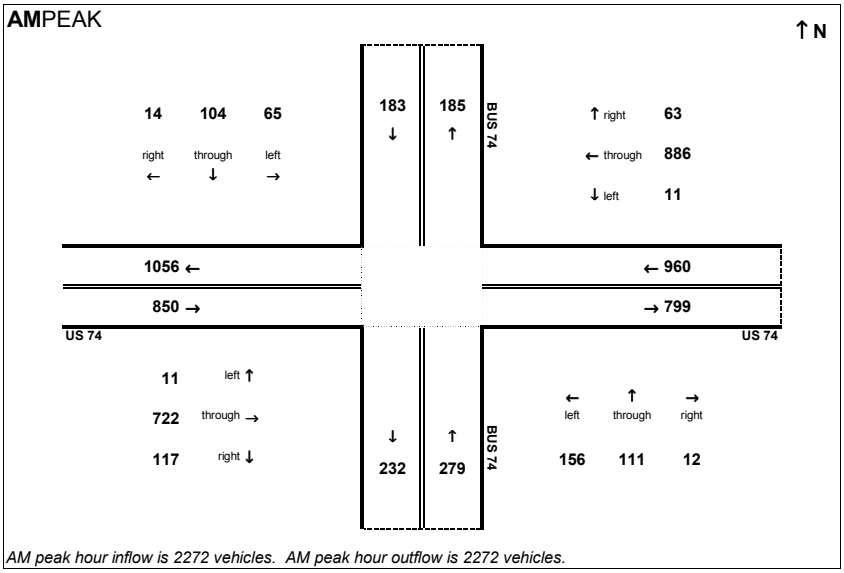


Peak Hour Volume Breakouts Report:
Intersection of US 74 and BUS 74 (2) in Scotland County

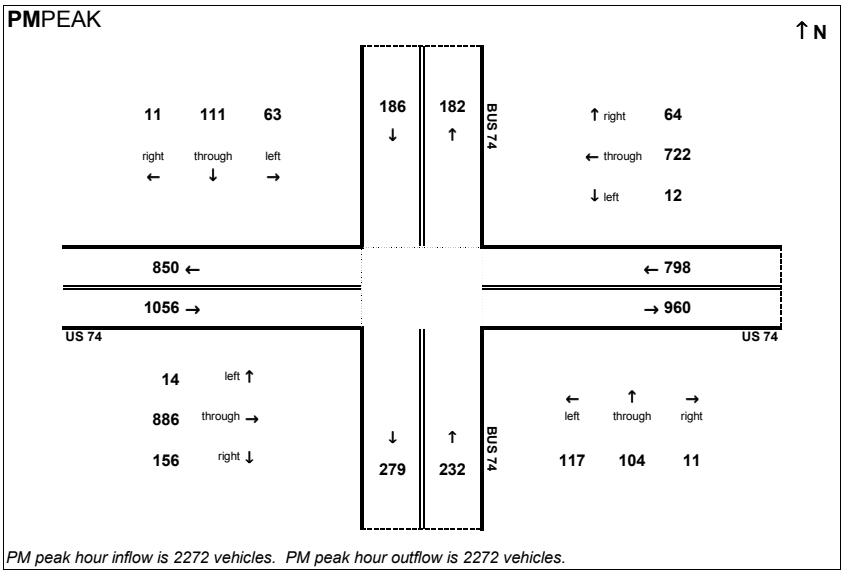
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2045 Build

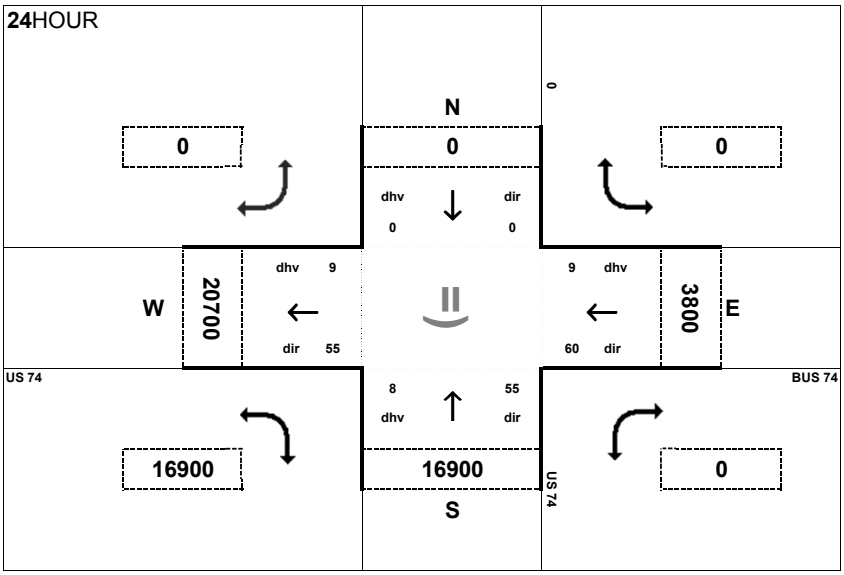
Project:
FS-1508A

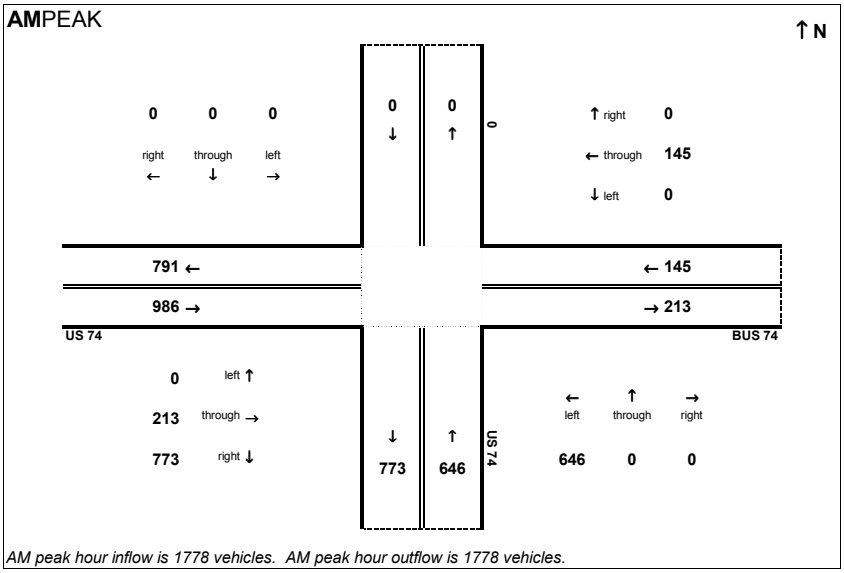


AM peak hour inflow is 2272 vehicles. AM peak hour outflow is 2272 vehicles.

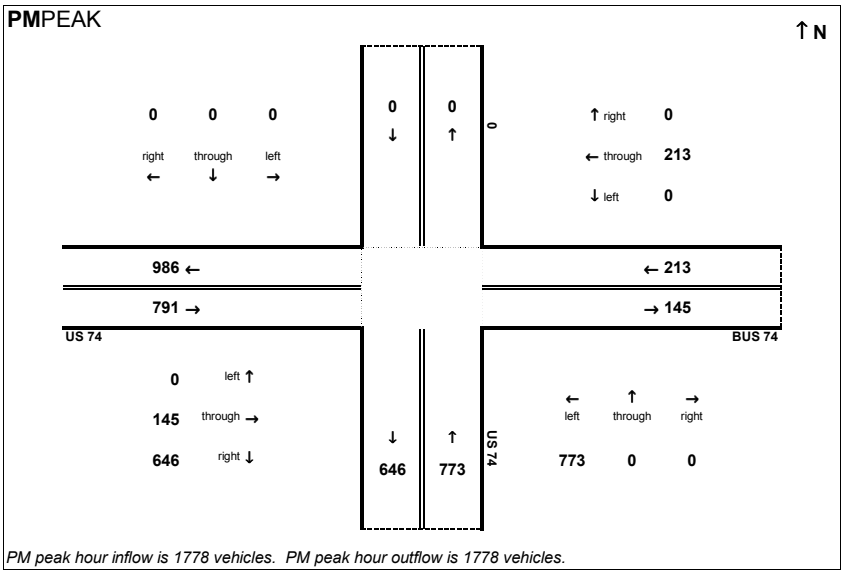


PM peak hour inflow is 2272 vehicles. PM peak hour outflow is 2272 vehicles.





AM peak hour inflow is 1778 vehicles. AM peak hour outflow is 1778 vehicles.



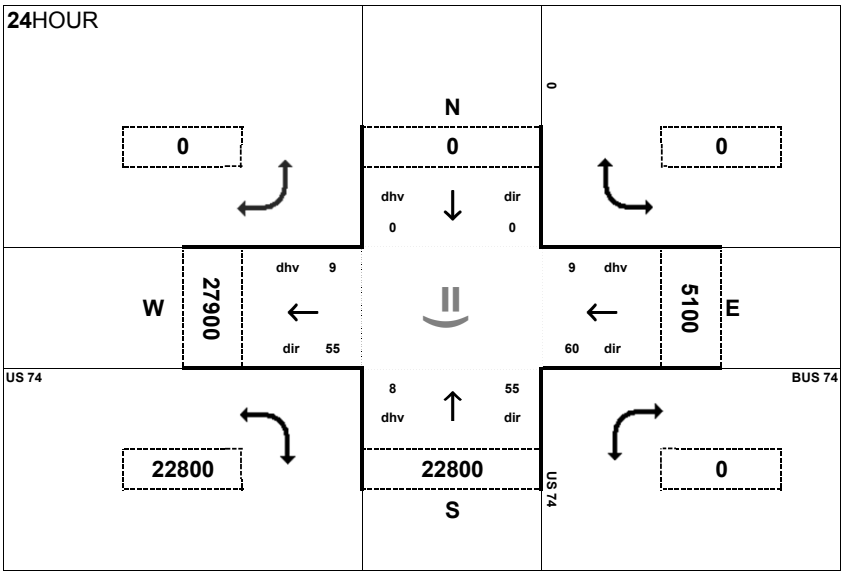
PM peak hour inflow is 1778 vehicles. PM peak hour outflow is 1778 vehicles.

Peak Hour Volume Breakouts Report:
Intersection of US 74 and BUS 74 in Scotland County

Traffic Forecast Release Date:
December-15

Traffic Data Year:
2015 No-Build

Project:
FS-1508A

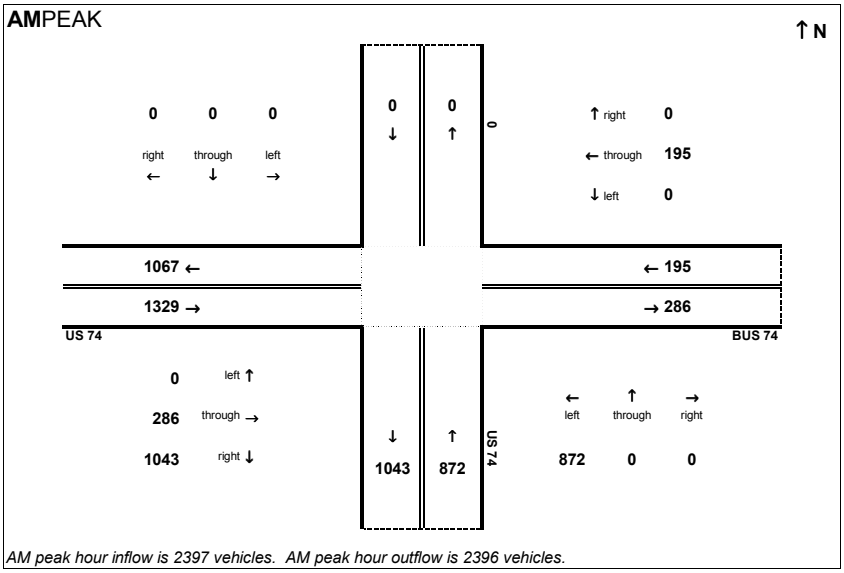


Peak Hour Volume Breakouts Report:
Intersection of US 74 and BUS 74 in Scotland County

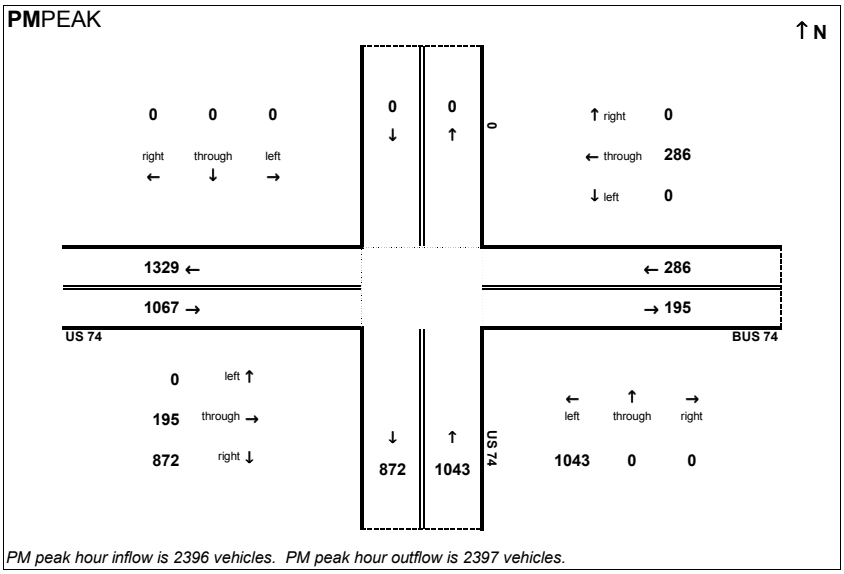
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2045 Build

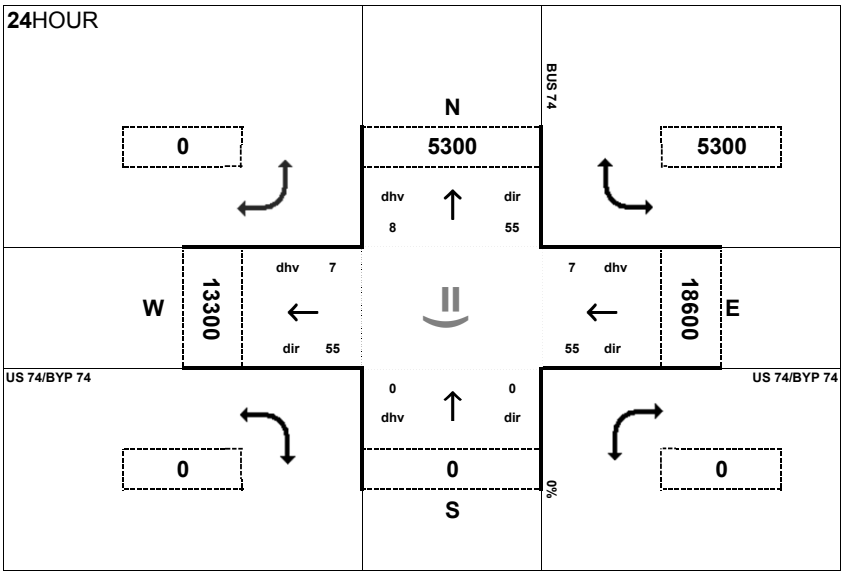
Project:
FS-1508A



AM peak hour inflow is 2397 vehicles. AM peak hour outflow is 2396 vehicles.



PM peak hour inflow is 2396 vehicles. PM peak hour outflow is 2397 vehicles.

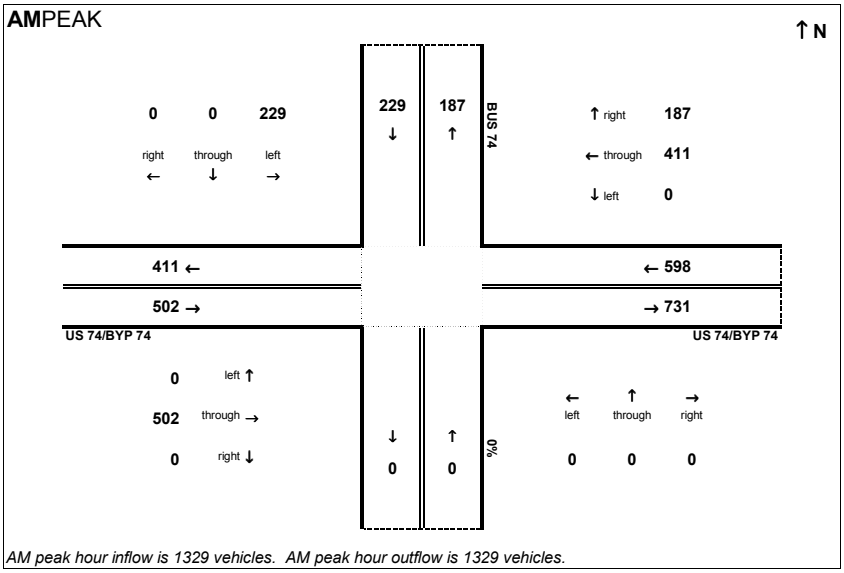


Peak Hour Volume Breakouts Report:
Intersection of US 74/BYP 74 and BUS 74 in Richmond County

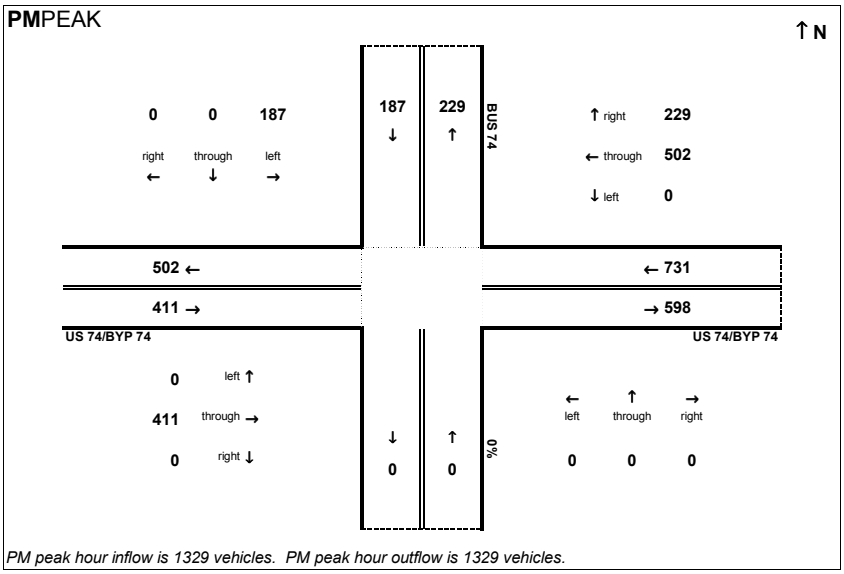
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2015 No-Build

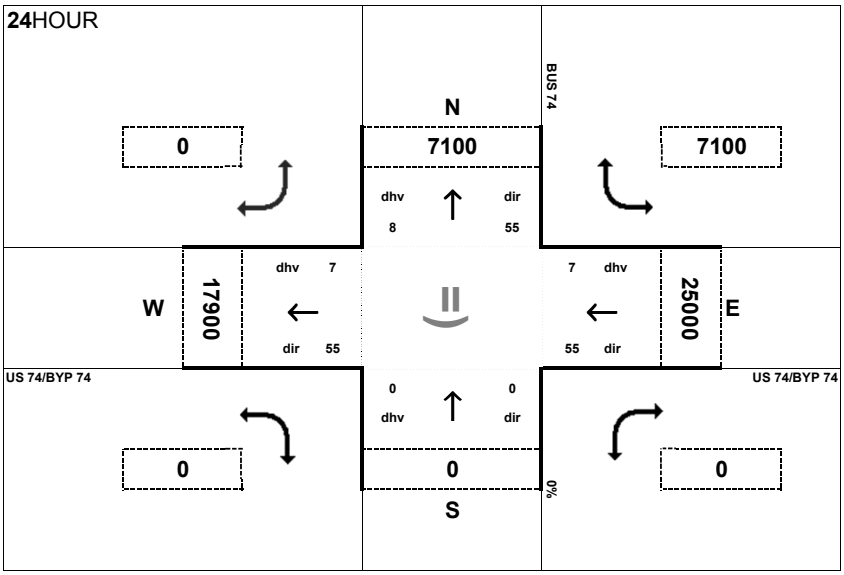
Project:
FS-1508A



AM peak hour inflow is 1329 vehicles. AM peak hour outflow is 1329 vehicles.



PM peak hour inflow is 1329 vehicles. PM peak hour outflow is 1329 vehicles.

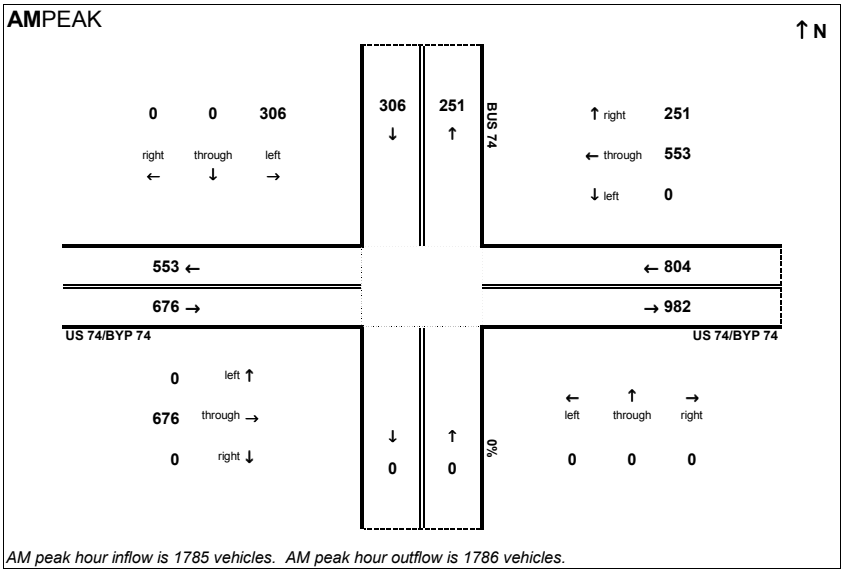


Peak Hour Volume Breakouts Report:
Intersection of US 74/BYP 74 and BUS 74 in Richmond County

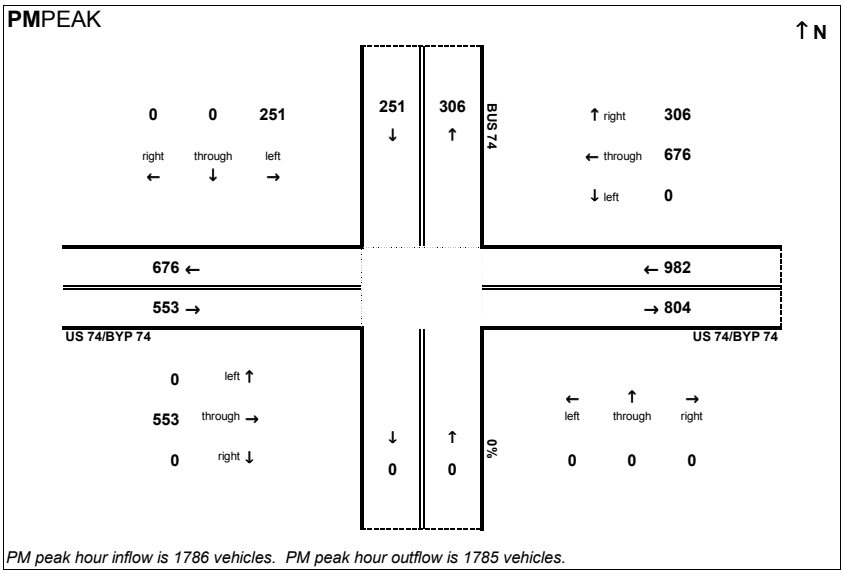
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2045 Build

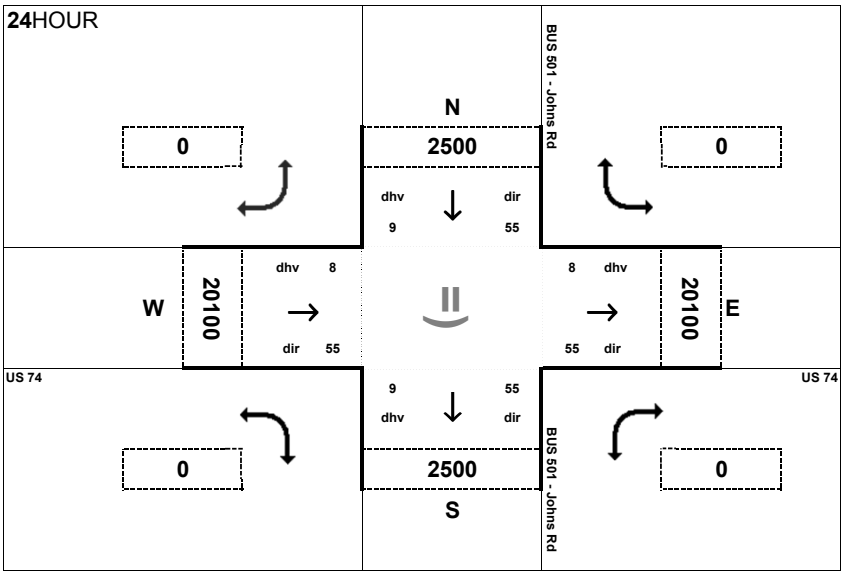
Project:
FS-1508A



AM peak hour inflow is 1785 vehicles. AM peak hour outflow is 1786 vehicles.



PM peak hour inflow is 1786 vehicles. PM peak hour outflow is 1785 vehicles.

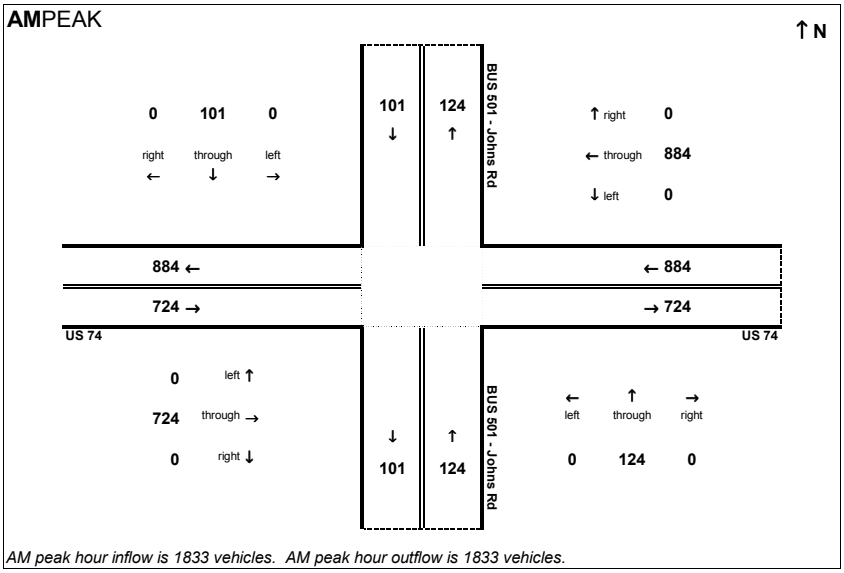


Peak Hour Volume Breakouts Report:
Intersection of US 74 and BUS 501 (Johns Rd) in Robeson County

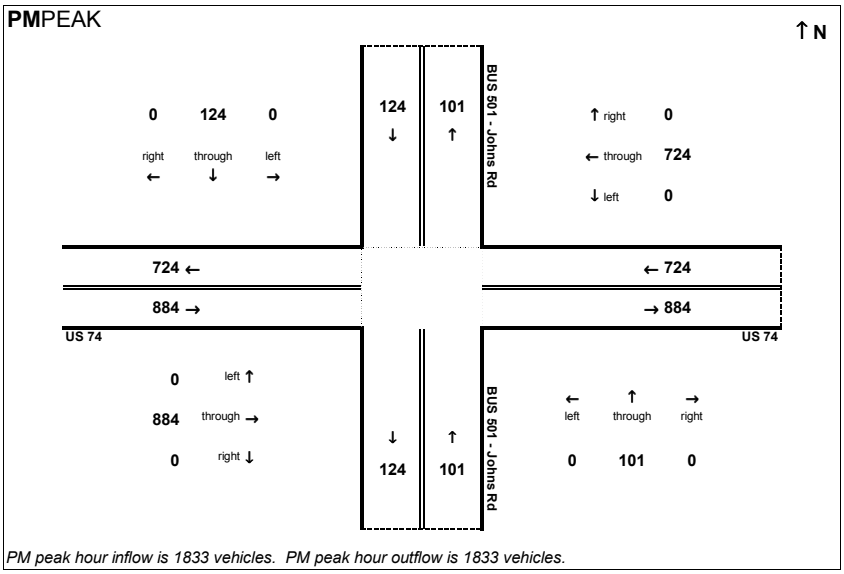
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2015 No-Build

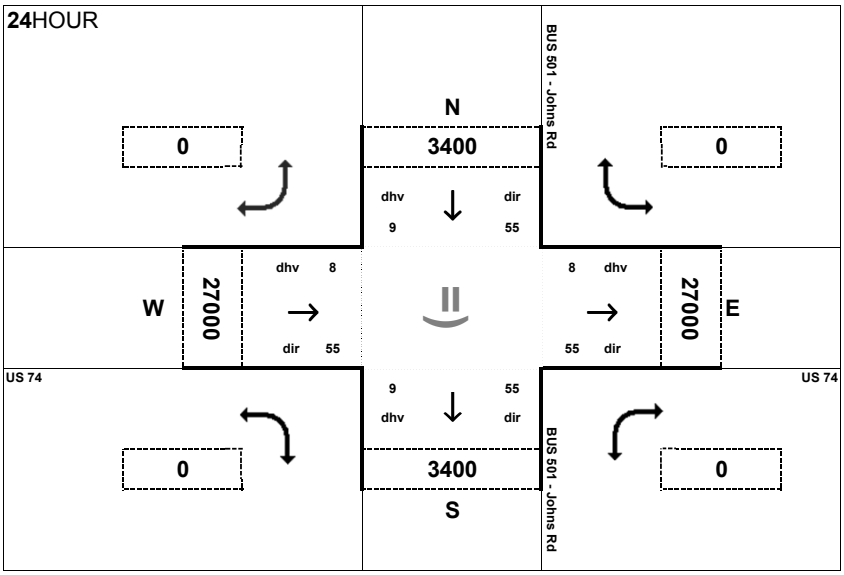
Project:
FS-1508A



AM peak hour inflow is 1833 vehicles. AM peak hour outflow is 1833 vehicles.



PM peak hour inflow is 1833 vehicles. PM peak hour outflow is 1833 vehicles.

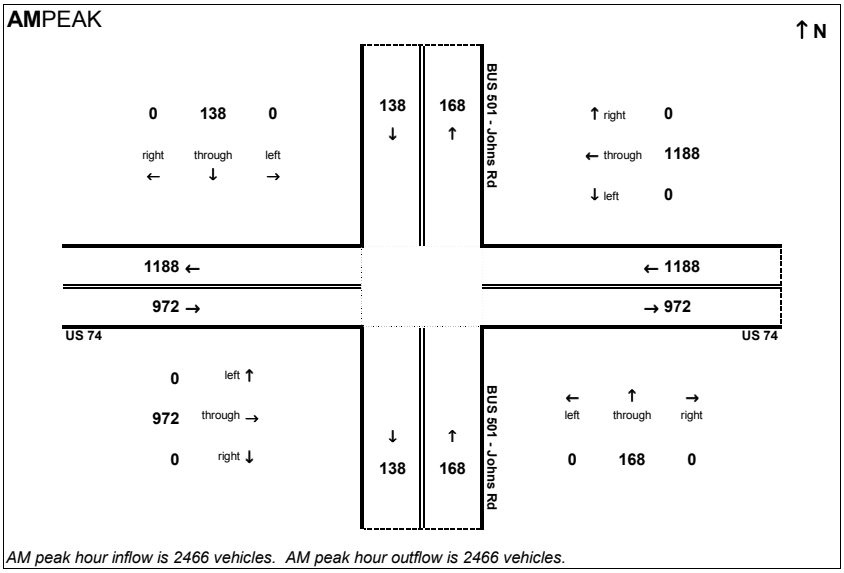


Peak Hour Volume Breakouts Report:
Intersection of US 74 and BUS 501 (Johns Rd) in Robeson County

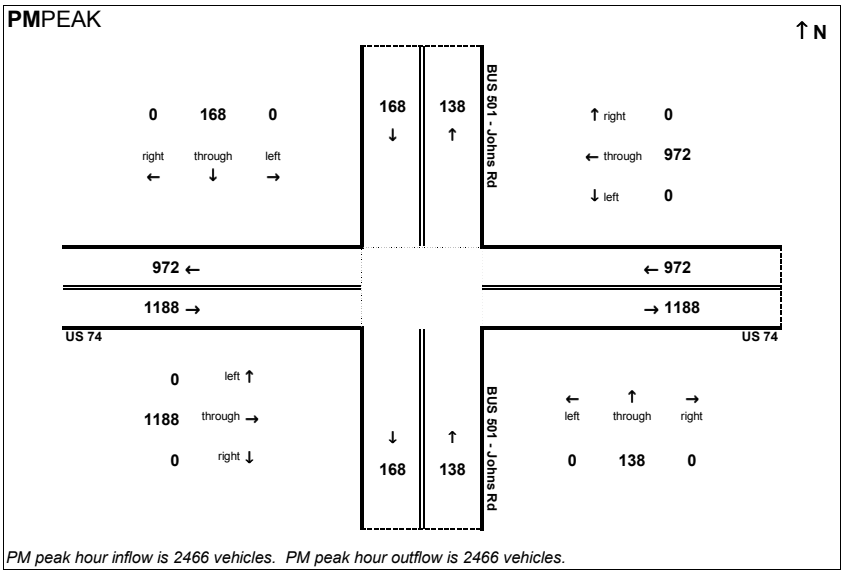
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2045 Build

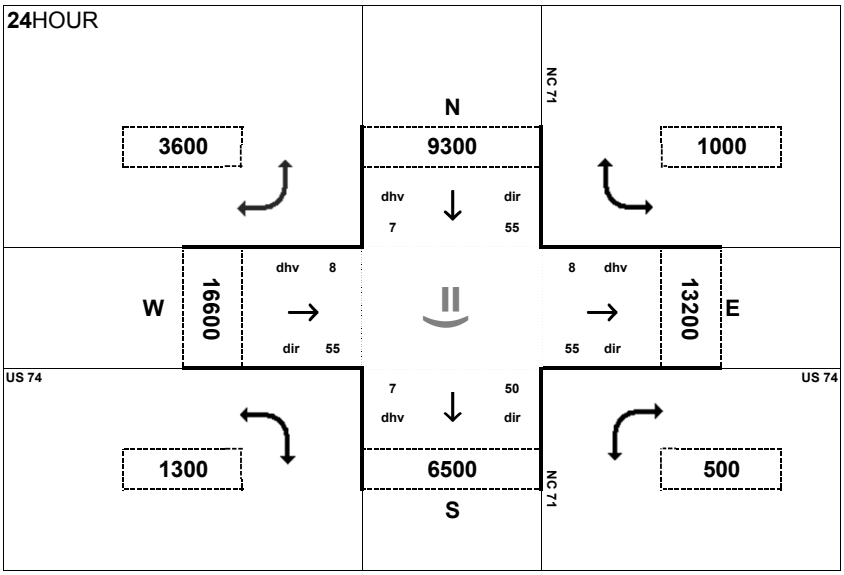
Project:
FS-1508A



AM peak hour inflow is 2466 vehicles. AM peak hour outflow is 2466 vehicles.



PM peak hour inflow is 2466 vehicles. PM peak hour outflow is 2466 vehicles.

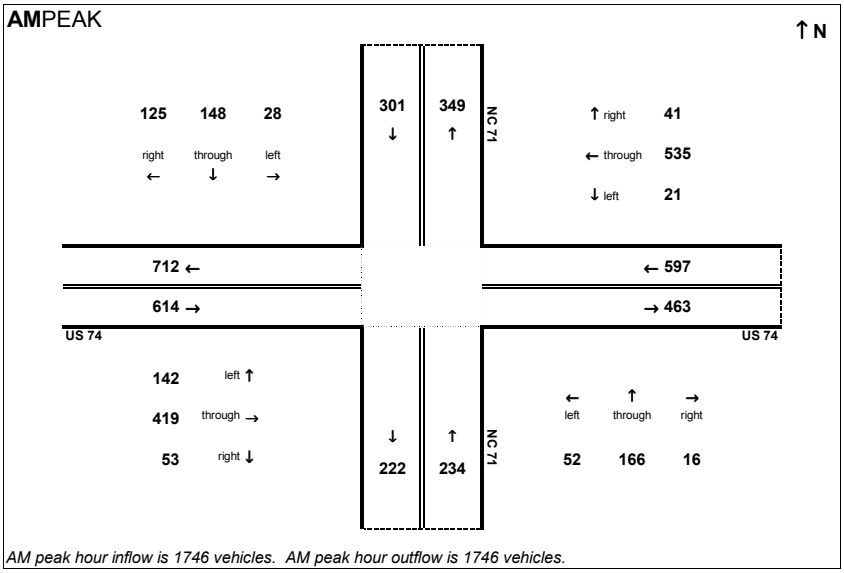


Peak Hour Volume Breakouts Report:
Intersection of US 74 and NC 71 in Robeson County

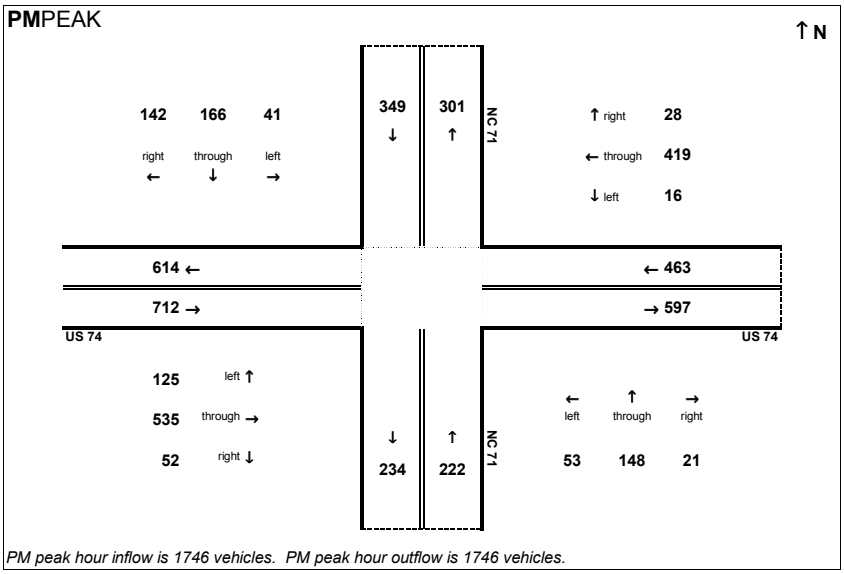
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2015 No-Build

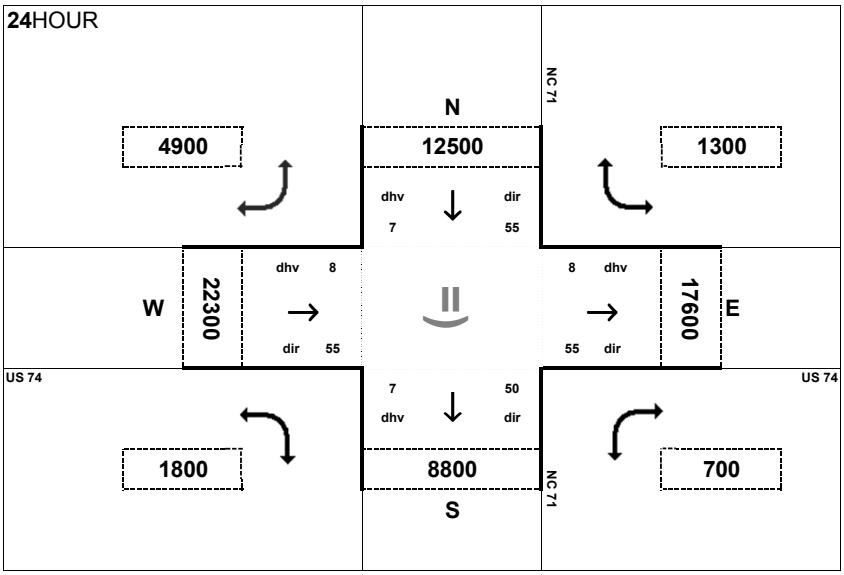
Project:
FS-1508A



AM peak hour inflow is 1746 vehicles. AM peak hour outflow is 1746 vehicles.



PM peak hour inflow is 1746 vehicles. PM peak hour outflow is 1746 vehicles.

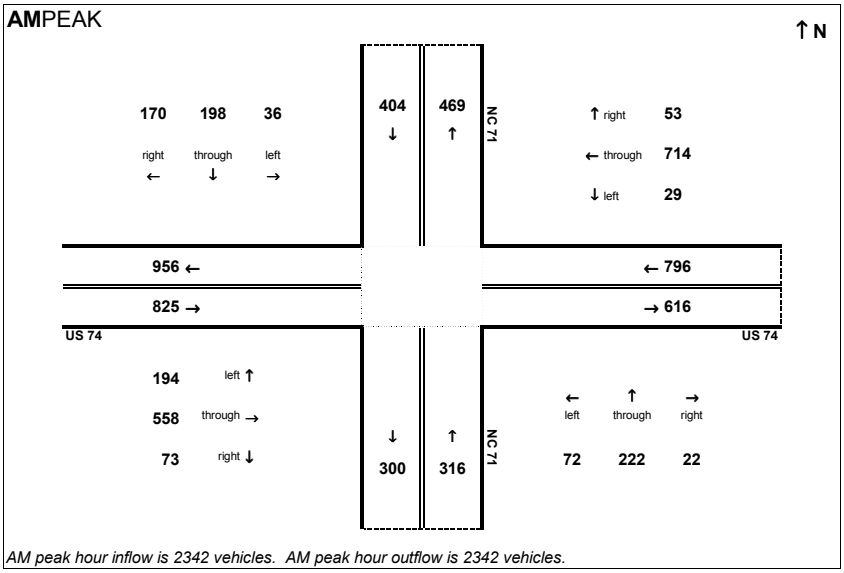


Peak Hour Volume Breakouts Report:
Intersection of US 74 and NC 71 in Robeson County

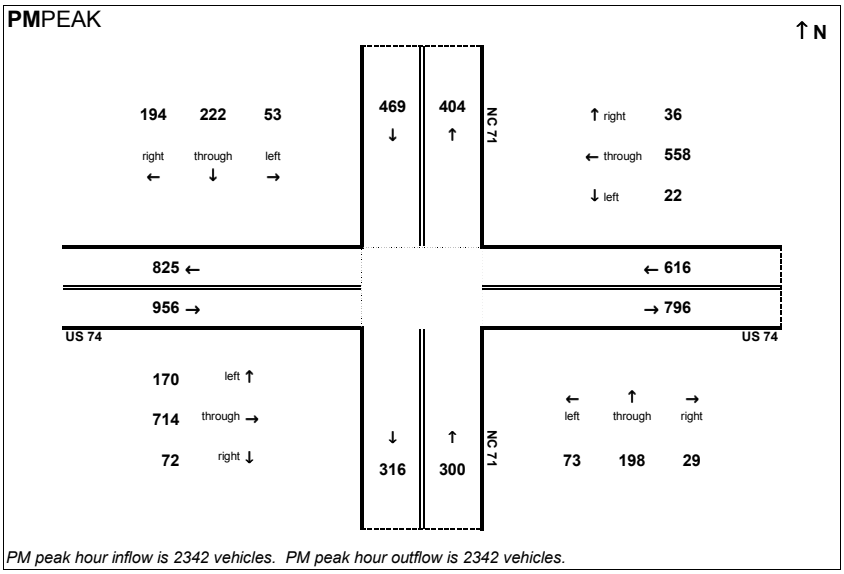
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2045 Build

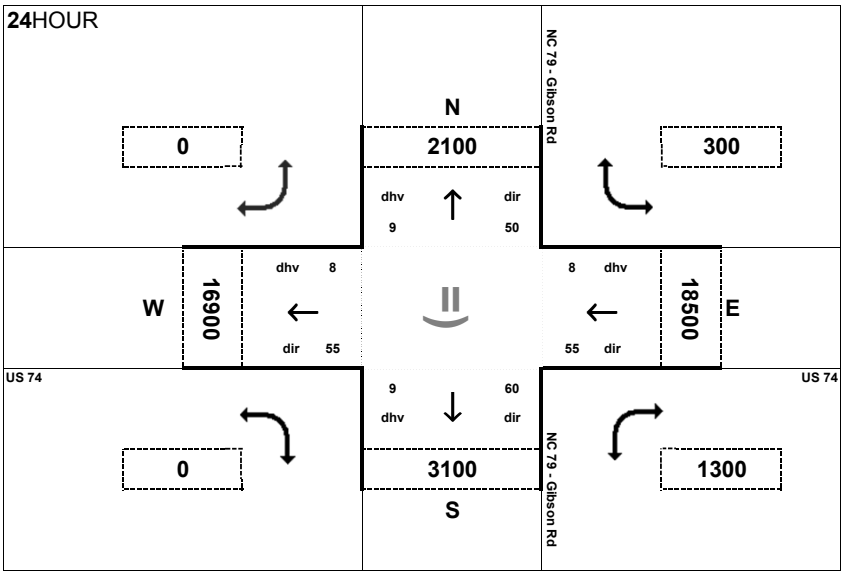
Project:
FS-1508A



AM peak hour inflow is 2342 vehicles. AM peak hour outflow is 2342 vehicles.



PM peak hour inflow is 2342 vehicles. PM peak hour outflow is 2342 vehicles.

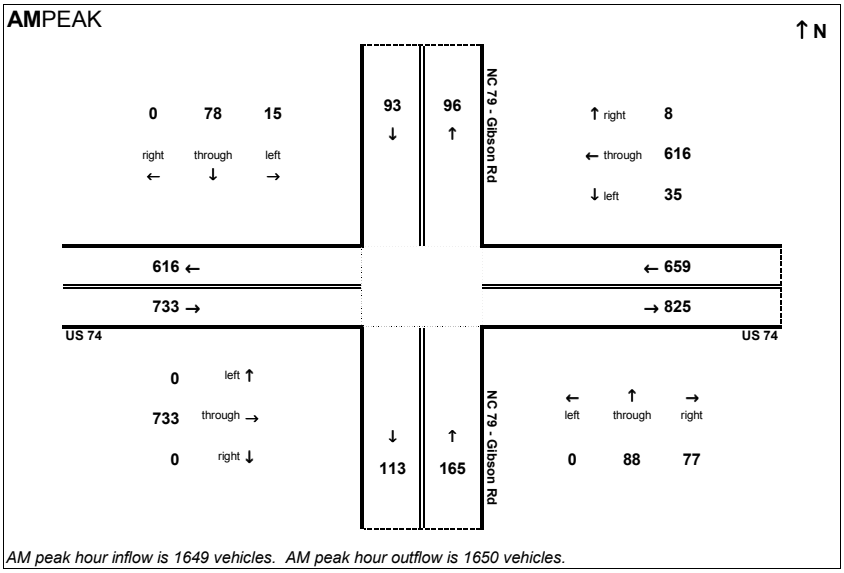


Peak Hour Volume Breakouts Report:
Intersection of US 74 and NC 79 (Gibson Rd) in Scotland County

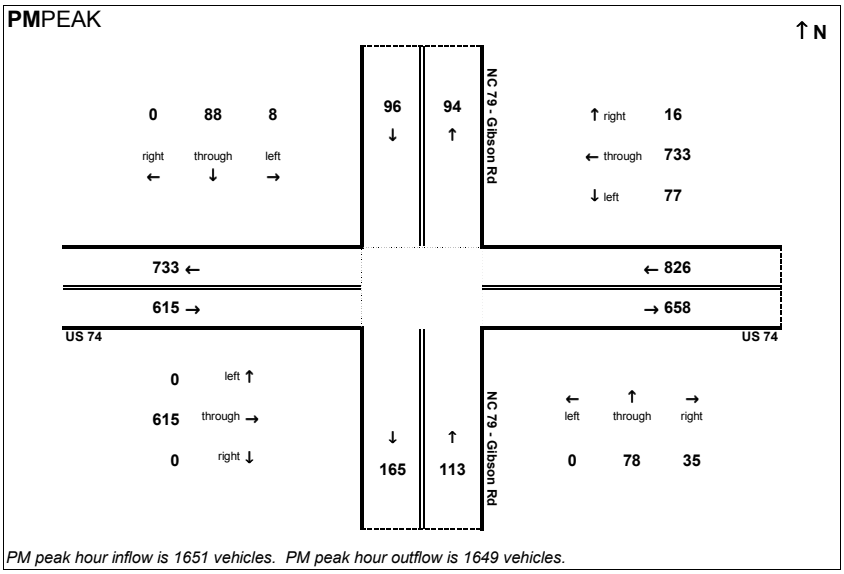
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2015 No-Build

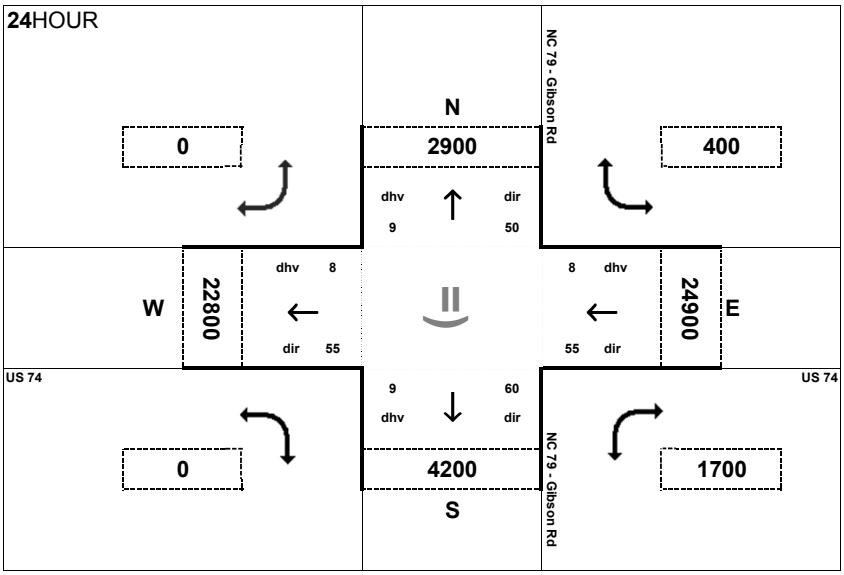
Project:
FS-1508A



AM peak hour inflow is 1649 vehicles. AM peak hour outflow is 1650 vehicles.



PM peak hour inflow is 1651 vehicles. PM peak hour outflow is 1649 vehicles.

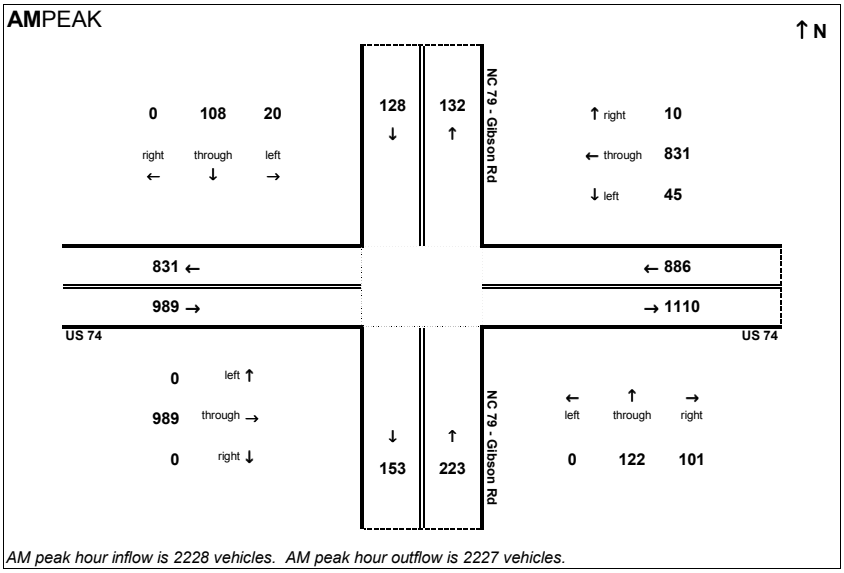


Peak Hour Volume Breakouts Report:
Intersection of US 74 and NC 79 (Gibson Rd) in Scotland County

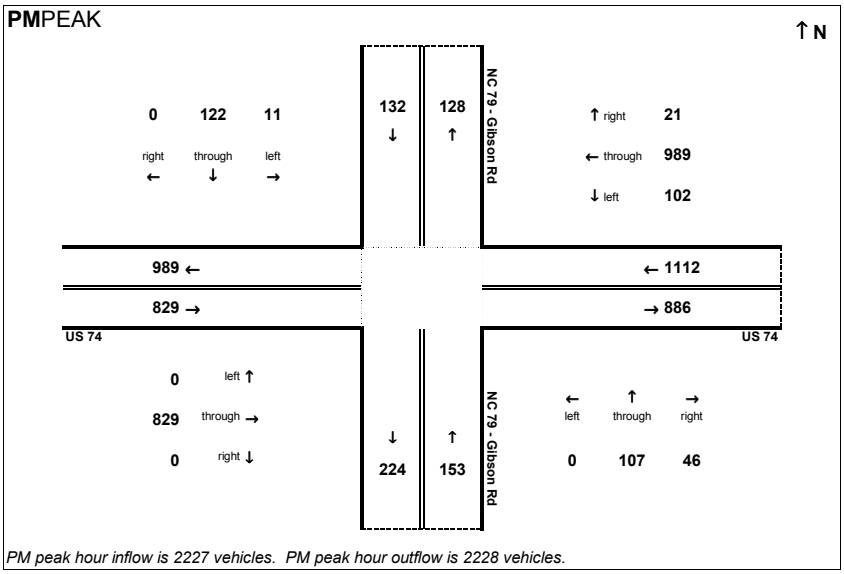
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2045 Build

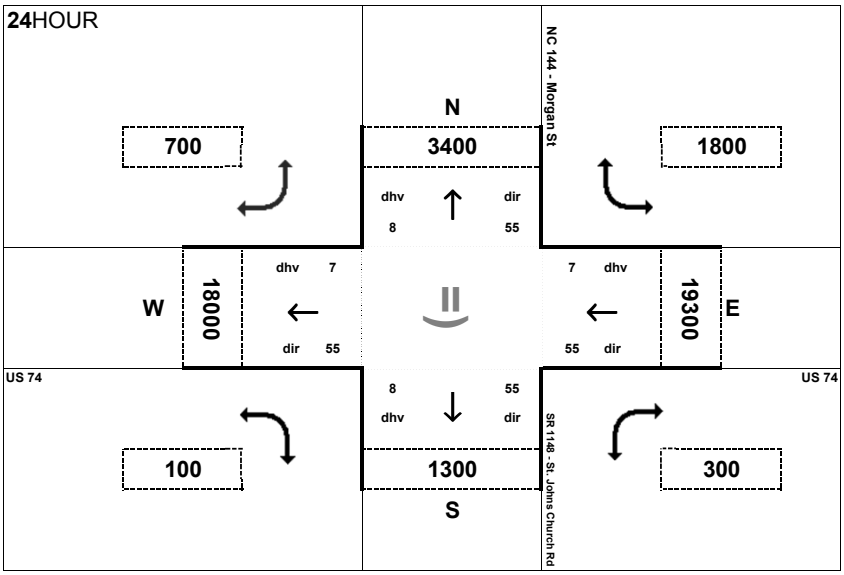
Project:
FS-1508A



AM peak hour inflow is 2228 vehicles. AM peak hour outflow is 2227 vehicles.



PM peak hour inflow is 2227 vehicles. PM peak hour outflow is 2228 vehicles.

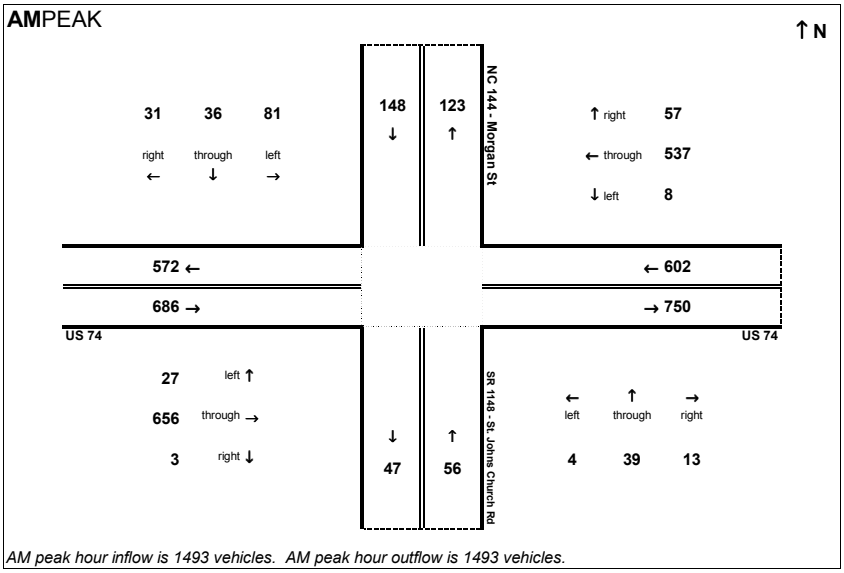


Peak Hour Volume Breakouts Report:
Intersection of US 74 and NC 144 (Morgan St)/SR 1148 (St. Johns Church Rd) in Scotland County

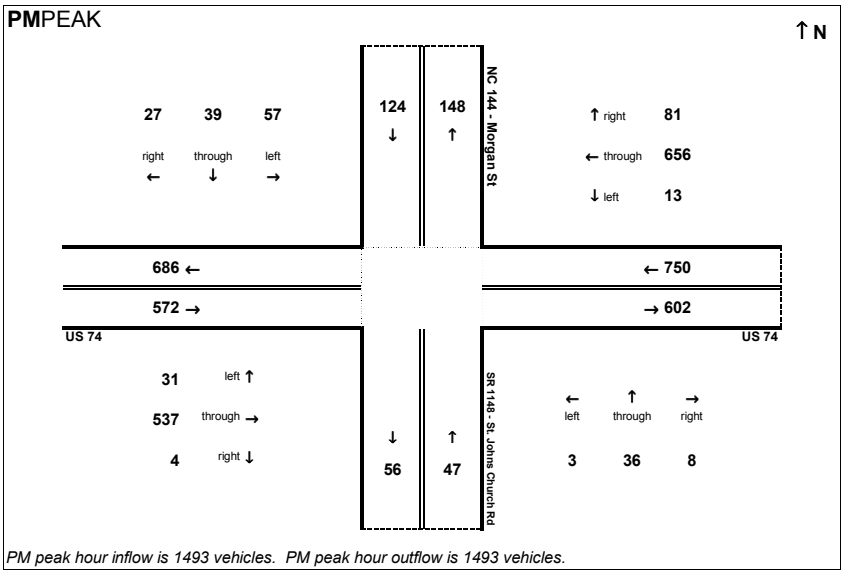
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2015 No-Build

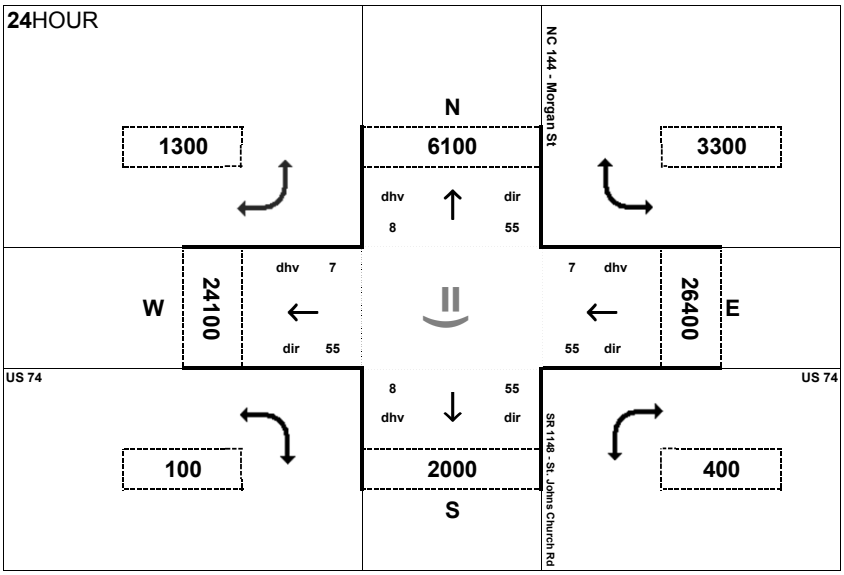
Project:
FS-1508A



AM peak hour inflow is 1493 vehicles. AM peak hour outflow is 1493 vehicles.



PM peak hour inflow is 1493 vehicles. PM peak hour outflow is 1493 vehicles.

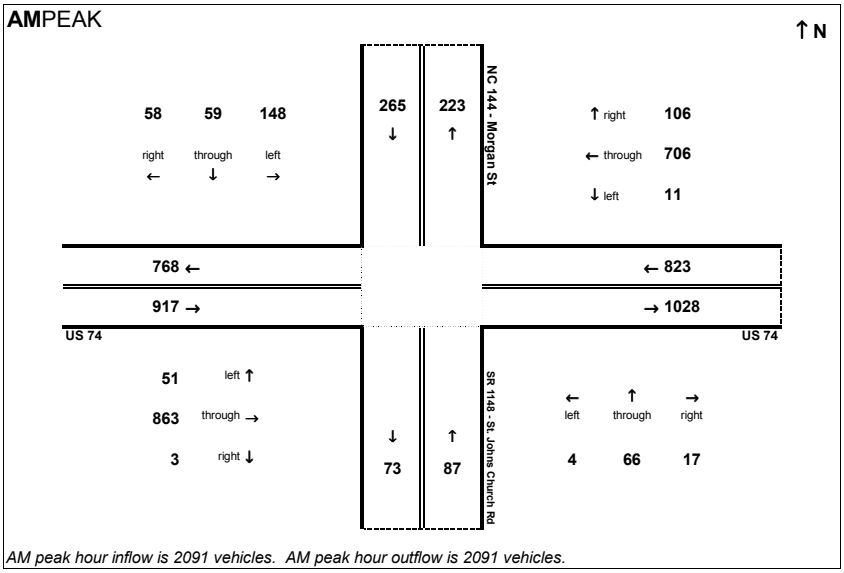


Peak Hour Volume Breakouts Report:
Intersection of US 74 and NC 144 (Morgan St)/SR 1148 (St. Johns Church Rd) in Scotland County

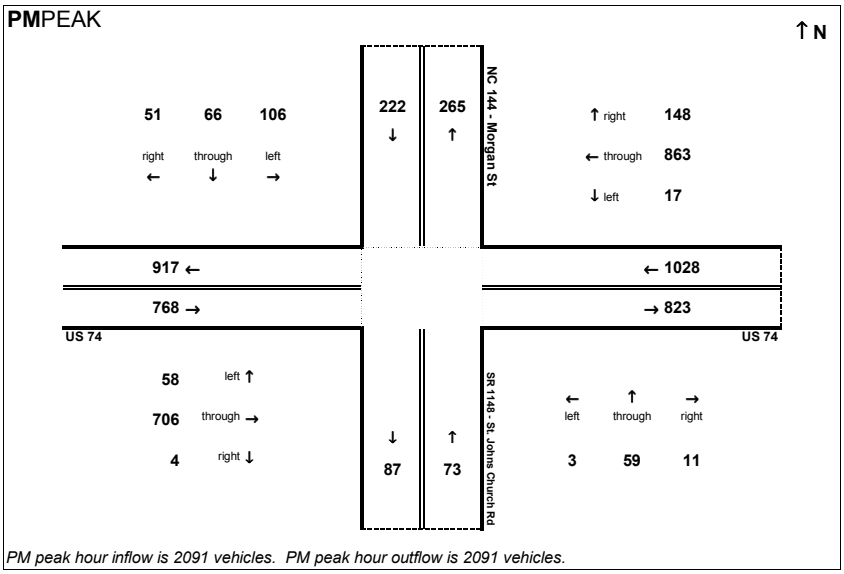
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2045 Build

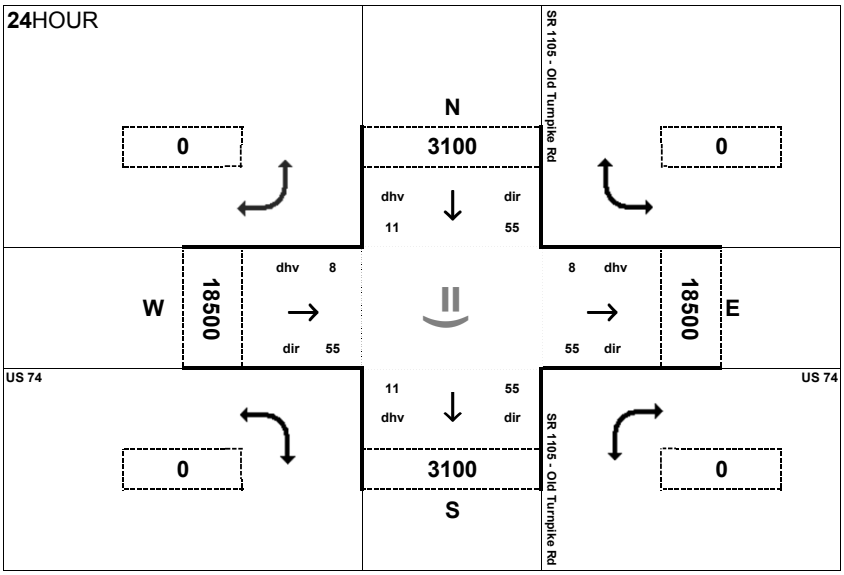
Project:
FS-1508A

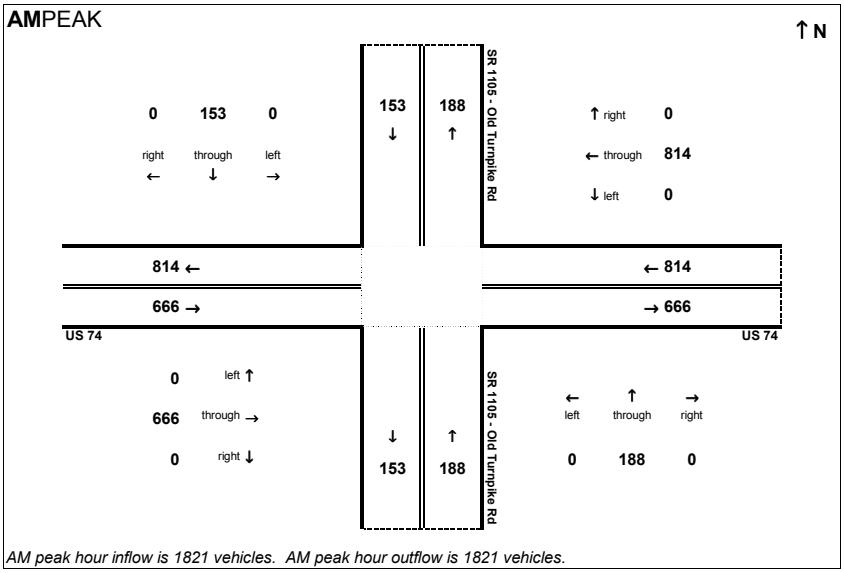


AM peak hour inflow is 2091 vehicles. AM peak hour outflow is 2091 vehicles.

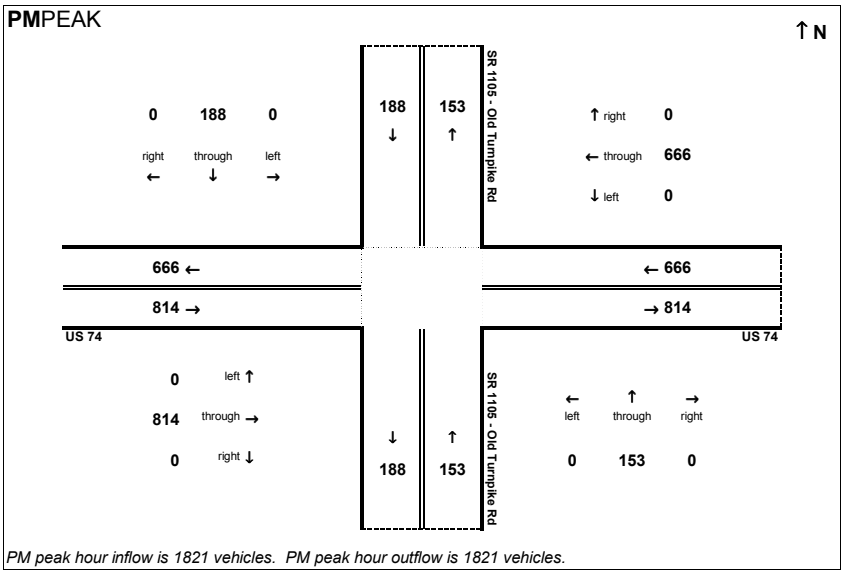


PM peak hour inflow is 2091 vehicles. PM peak hour outflow is 2091 vehicles.





AM peak hour inflow is 1821 vehicles. AM peak hour outflow is 1821 vehicles.



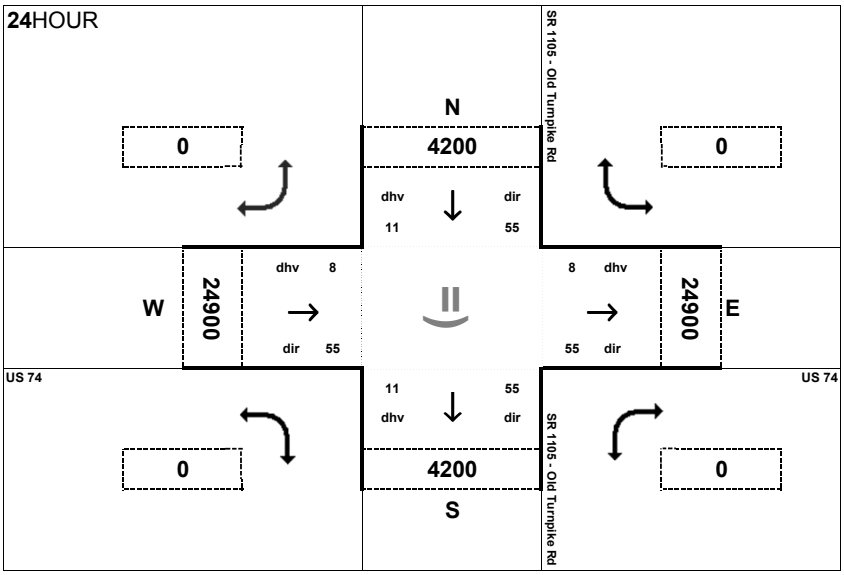
PM peak hour inflow is 1821 vehicles. PM peak hour outflow is 1821 vehicles.

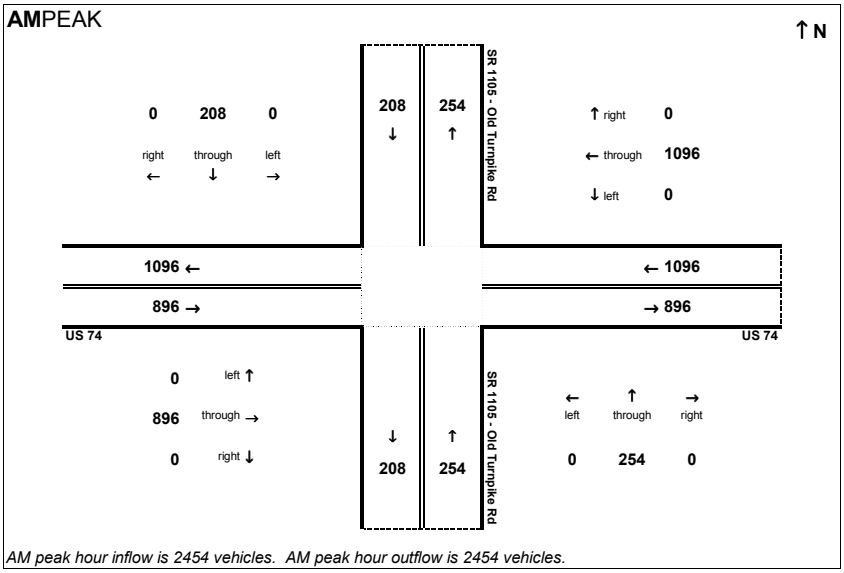
Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1105 (Old Turnpike Rd) in Scotland County

Traffic Forecast Release Date:
December-15

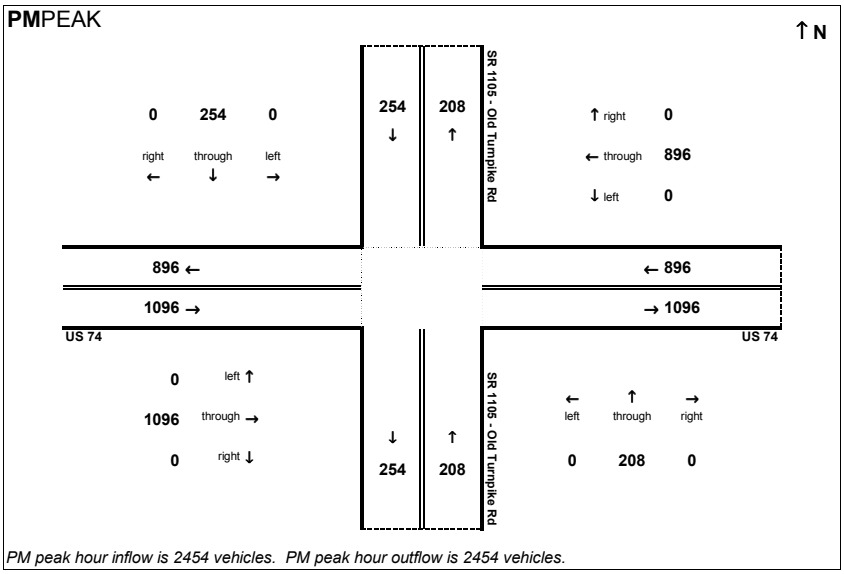
Traffic Data Year:
2015 No-Build

Project:
FS-1508A





AM peak hour inflow is 2454 vehicles. AM peak hour outflow is 2454 vehicles.



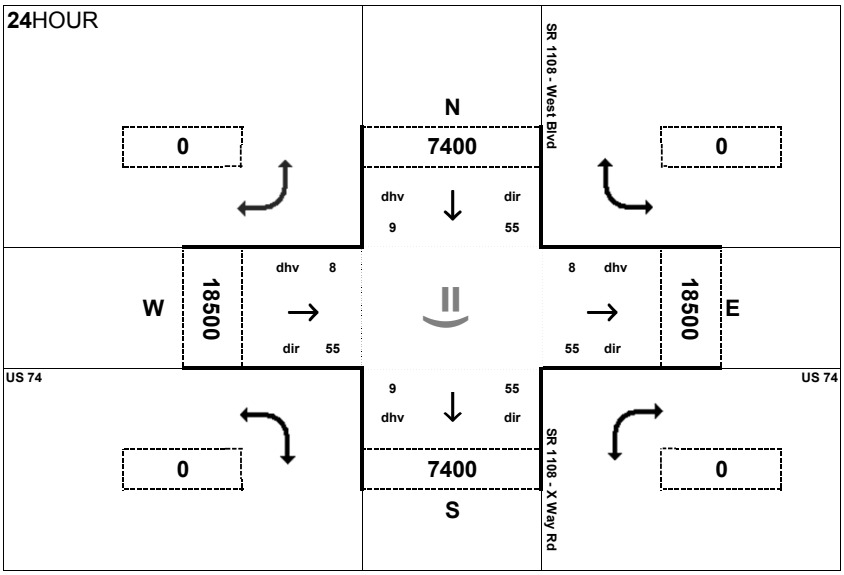
PM peak hour inflow is 2454 vehicles. PM peak hour outflow is 2454 vehicles.

Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1105 (Old Turnpike Rd) in Scotland County

Traffic Forecast Release Date:
December-15

Traffic Data Year:
2045 Build

Project:
FS-1508A

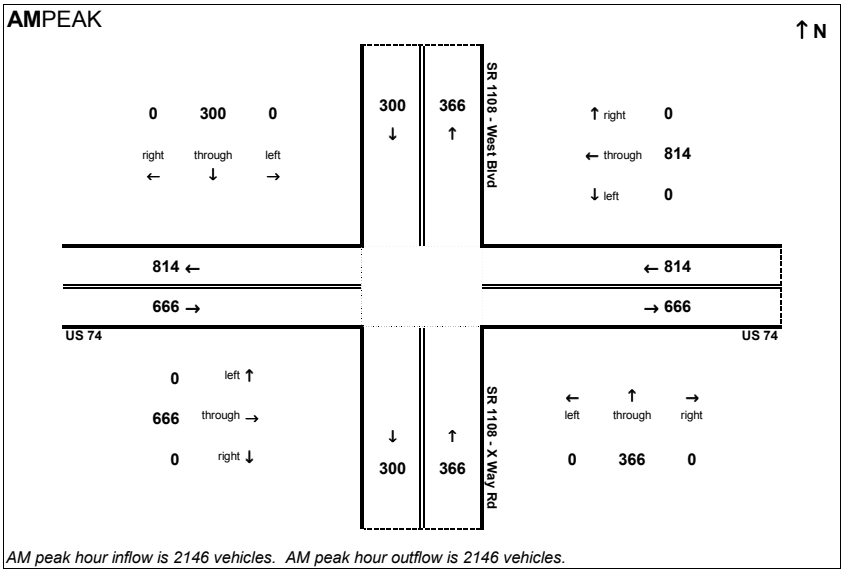


Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1108 (West Blvd/X Way Rd) in Scotland County

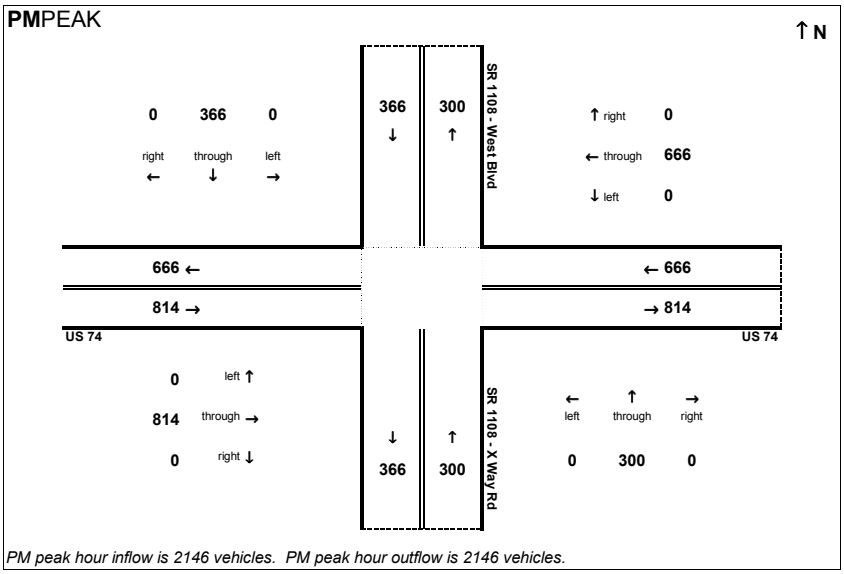
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2015 No-Build

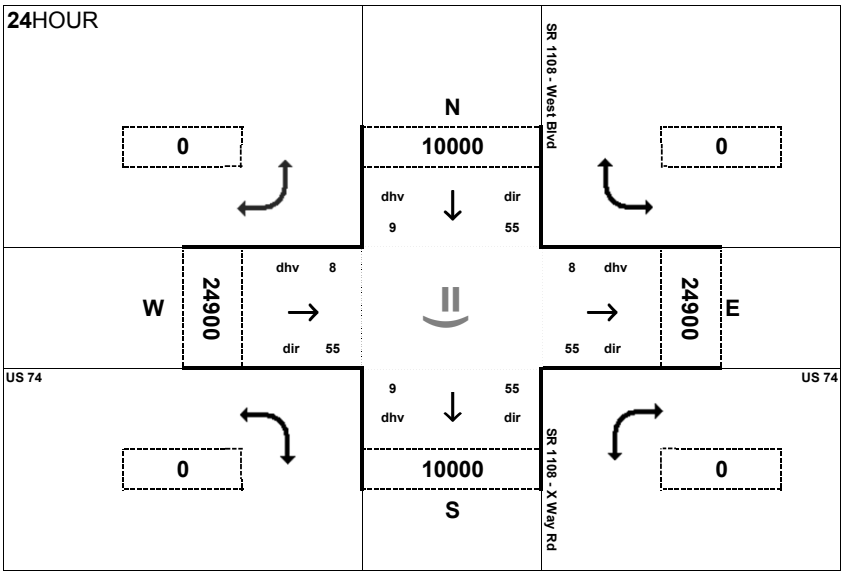
Project:
FS-1508A



AM peak hour inflow is 2146 vehicles. AM peak hour outflow is 2146 vehicles.



PM peak hour inflow is 2146 vehicles. PM peak hour outflow is 2146 vehicles.

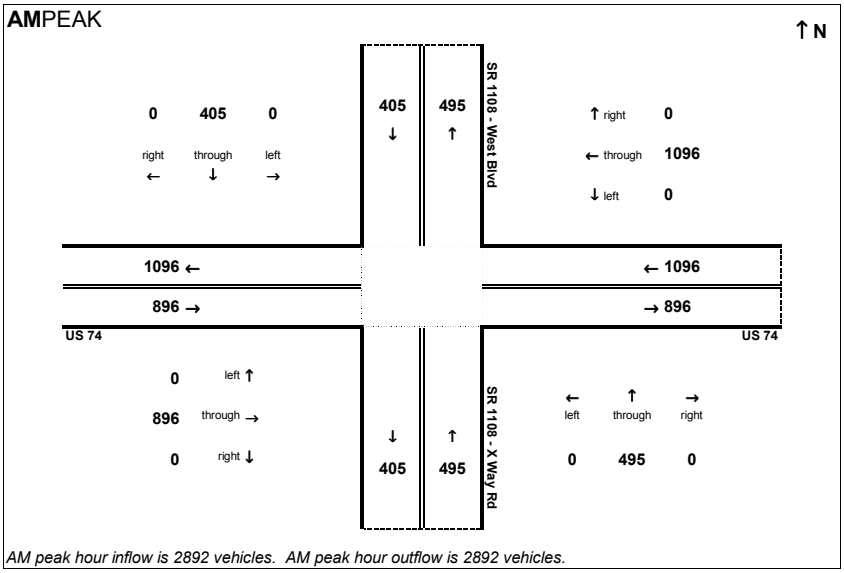


Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1108 (West Blvd/X Way Rd) in Scotland County

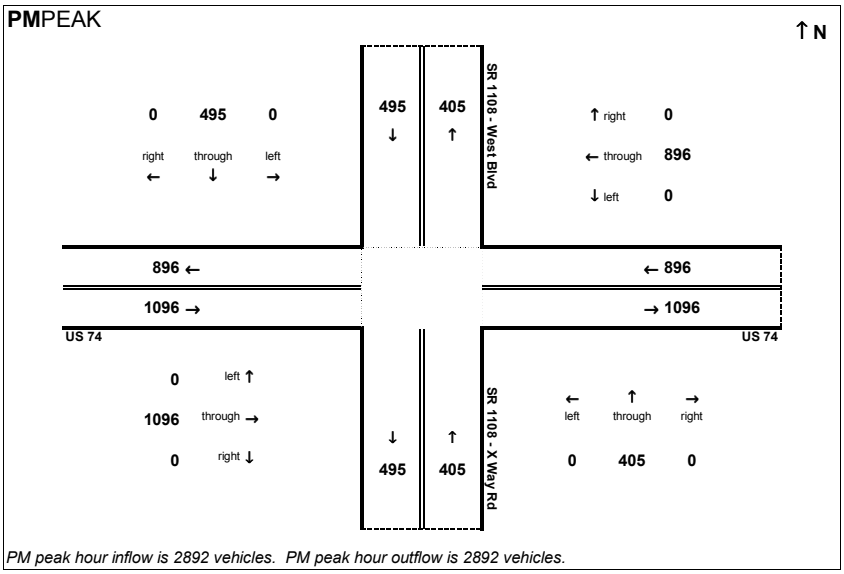
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2045 Build

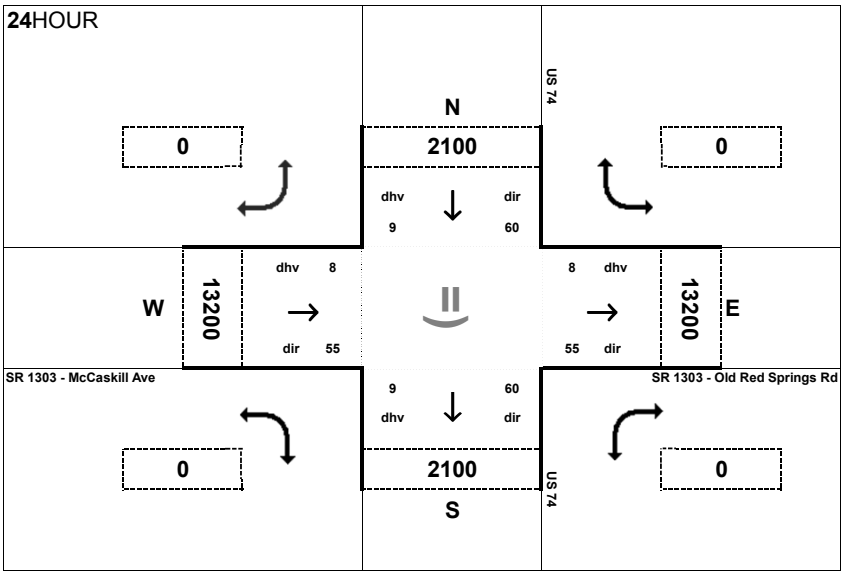
Project:
FS-1508A



AM peak hour inflow is 2892 vehicles. AM peak hour outflow is 2892 vehicles.



PM peak hour inflow is 2892 vehicles. PM peak hour outflow is 2892 vehicles.

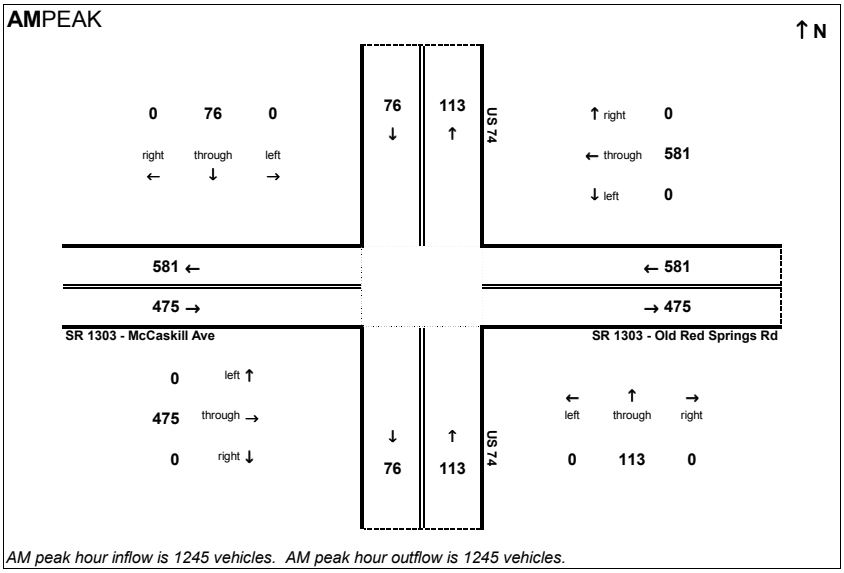


Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1303 (Old Red Springs/McCaskill Ave) in Robeson County

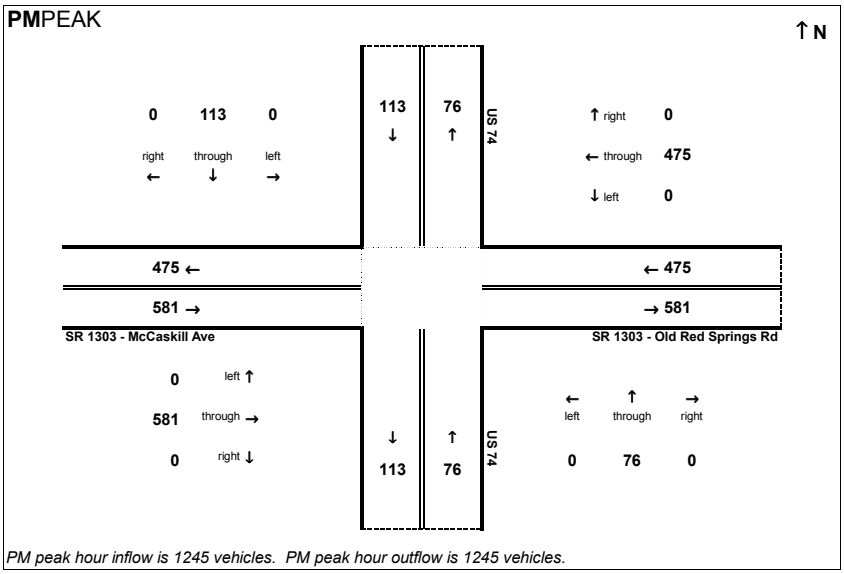
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2015 No-Build

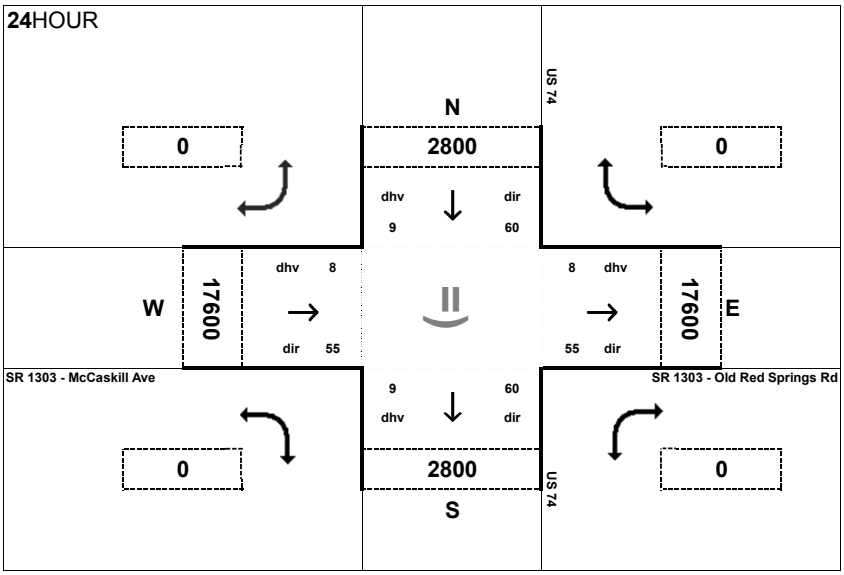
Project:
FS-1508A



AM peak hour inflow is 1245 vehicles. AM peak hour outflow is 1245 vehicles.



PM peak hour inflow is 1245 vehicles. PM peak hour outflow is 1245 vehicles.

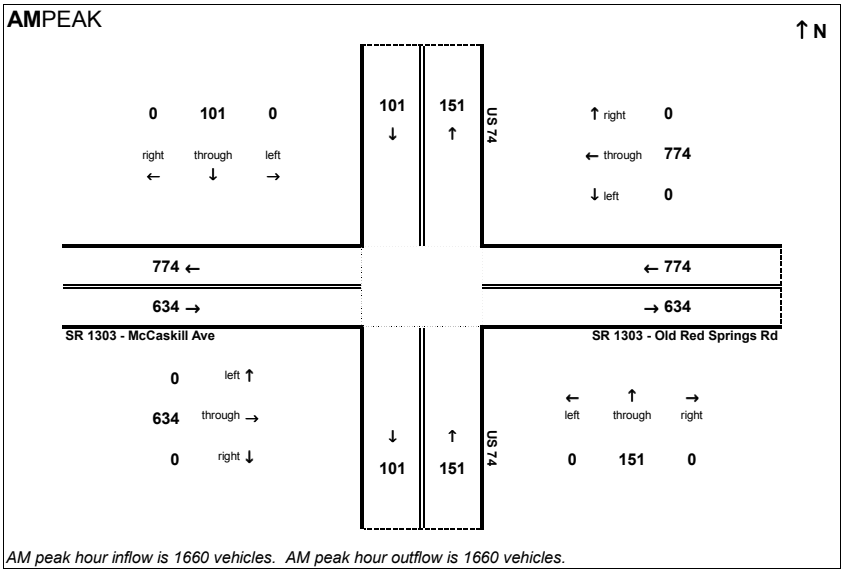


Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1303 (Old Red Springs/McCaskill Ave) in Robeson County

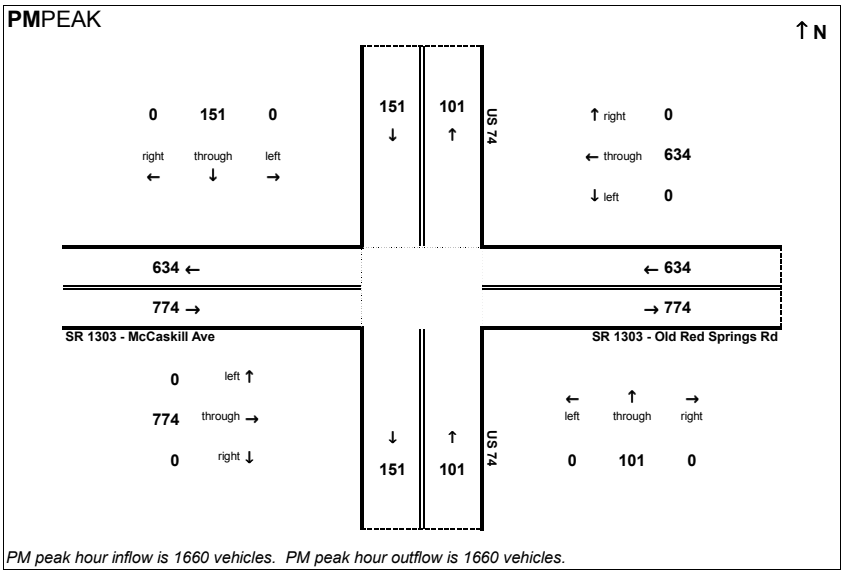
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2045 Build

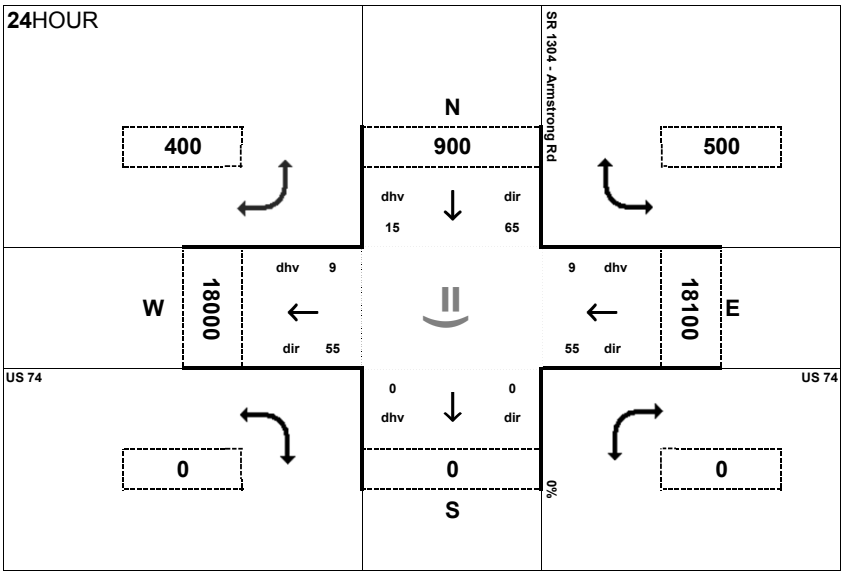
Project:
FS-1508A



AM peak hour inflow is 1660 vehicles. AM peak hour outflow is 1660 vehicles.



PM peak hour inflow is 1660 vehicles. PM peak hour outflow is 1660 vehicles.

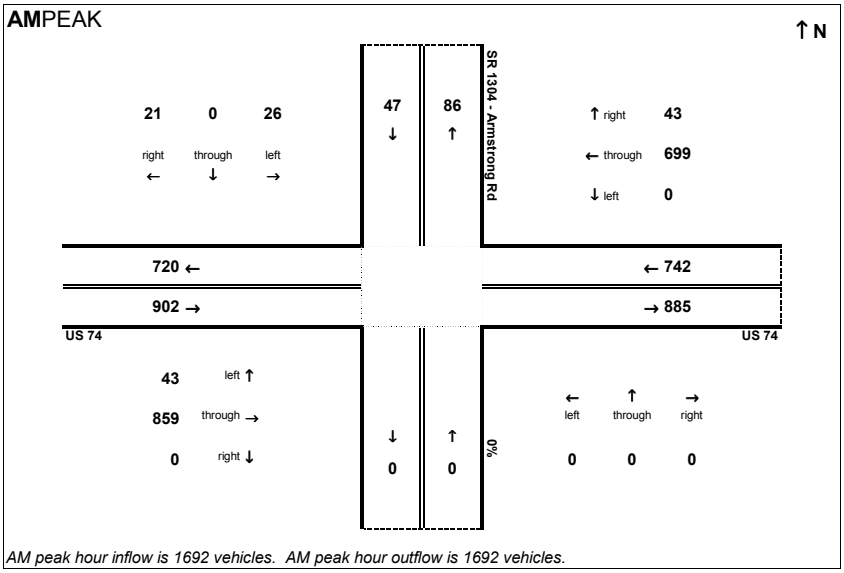


Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1304 (Armstrong Rd) in Scotland County

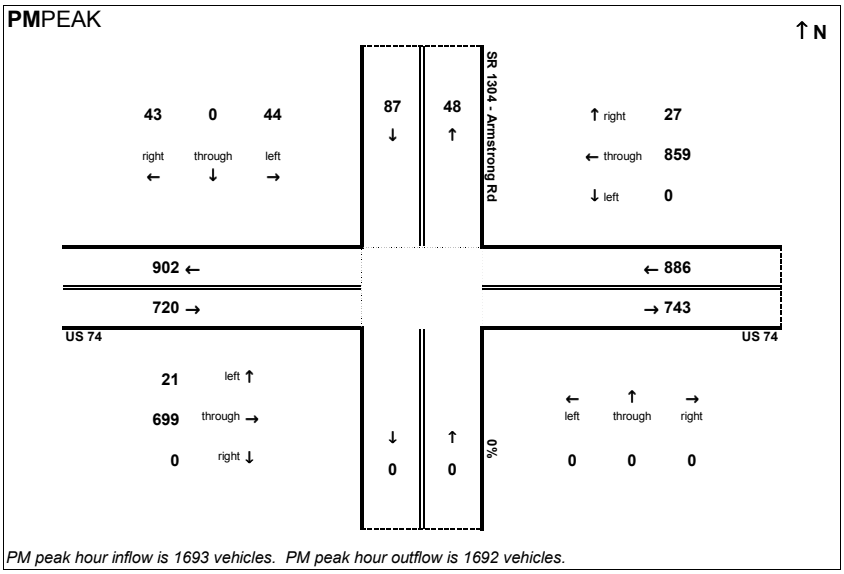
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2015 No-Build

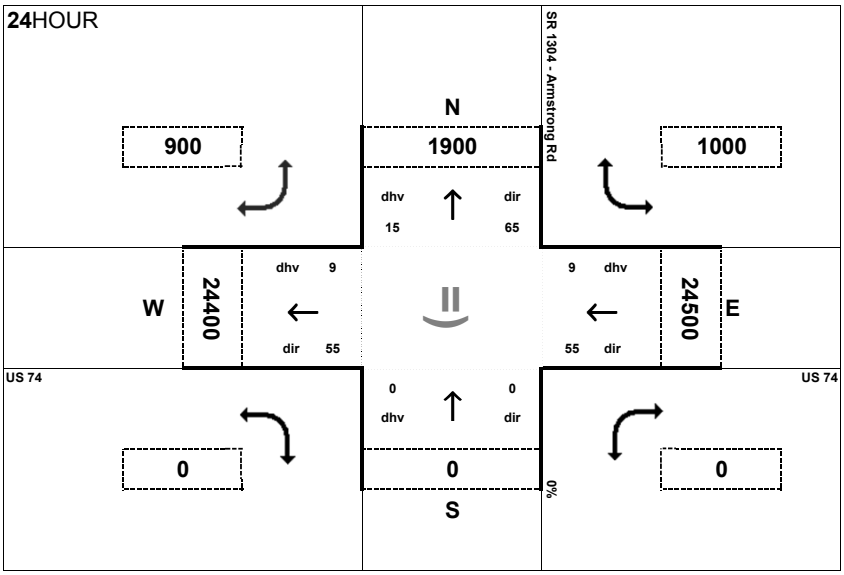
Project:
FS-1508A



AM peak hour inflow is 1692 vehicles. AM peak hour outflow is 1692 vehicles.



PM peak hour inflow is 1693 vehicles. PM peak hour outflow is 1692 vehicles.

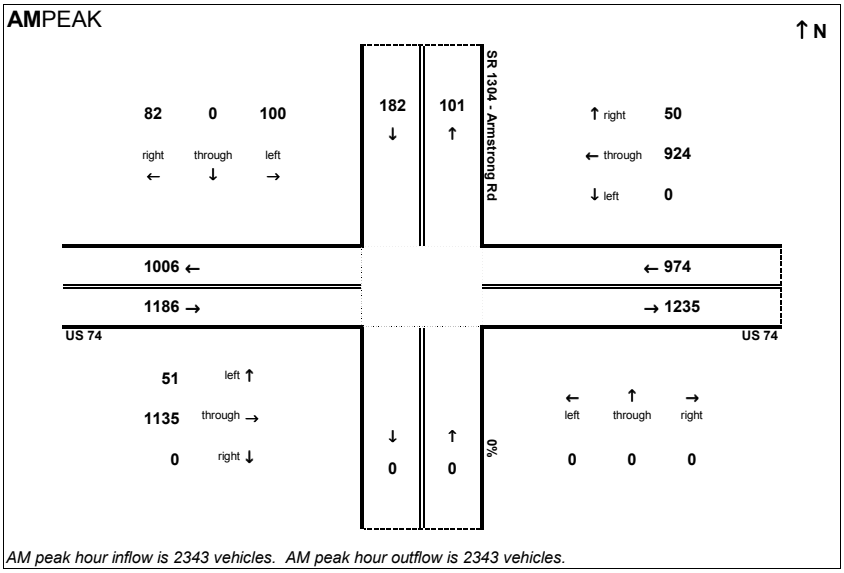


Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1304 (Armstrong Rd) in Scotland County

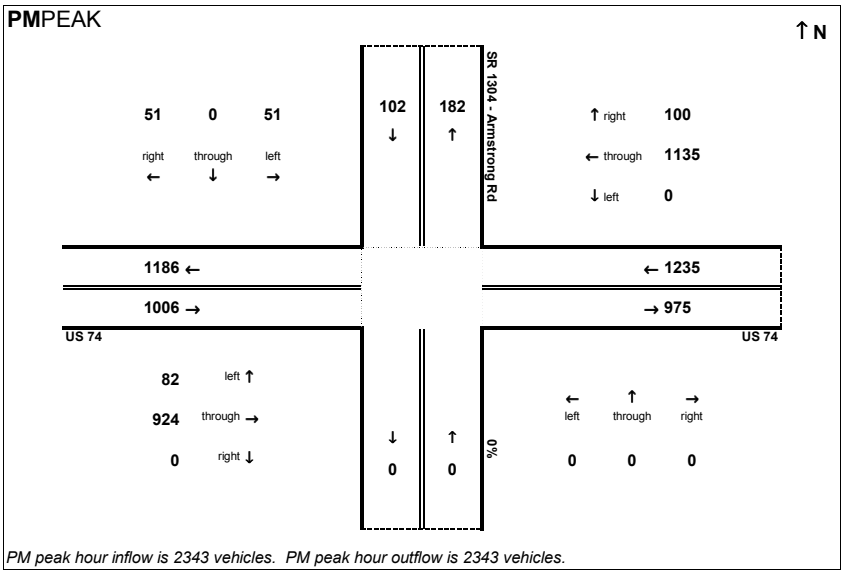
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2045 Build

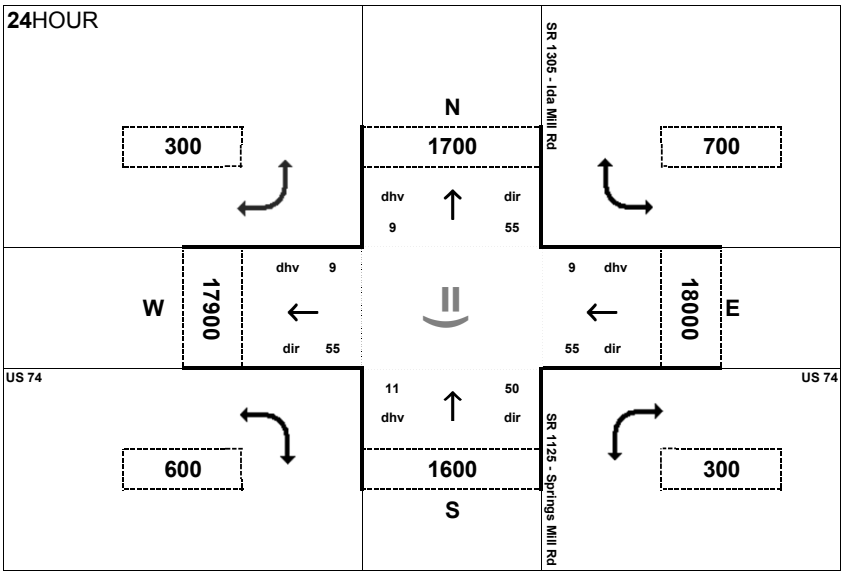
Project:
FS-1508A

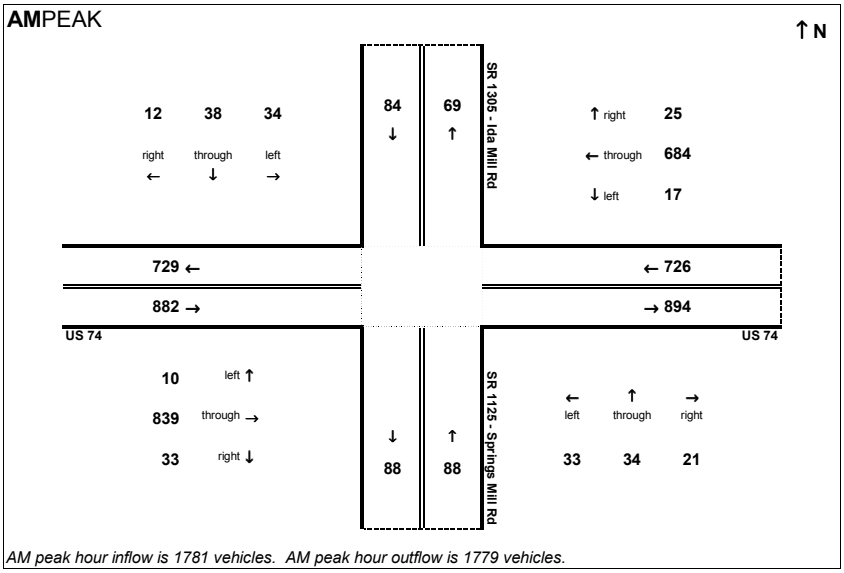


AM peak hour inflow is 2343 vehicles. AM peak hour outflow is 2343 vehicles.

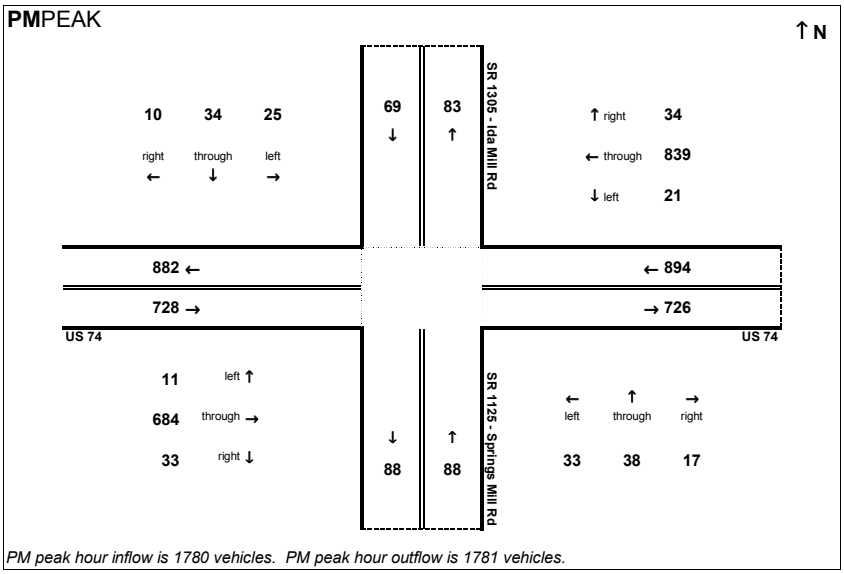


PM peak hour inflow is 2343 vehicles. PM peak hour outflow is 2343 vehicles.





AM peak hour inflow is 1781 vehicles. AM peak hour outflow is 1779 vehicles.



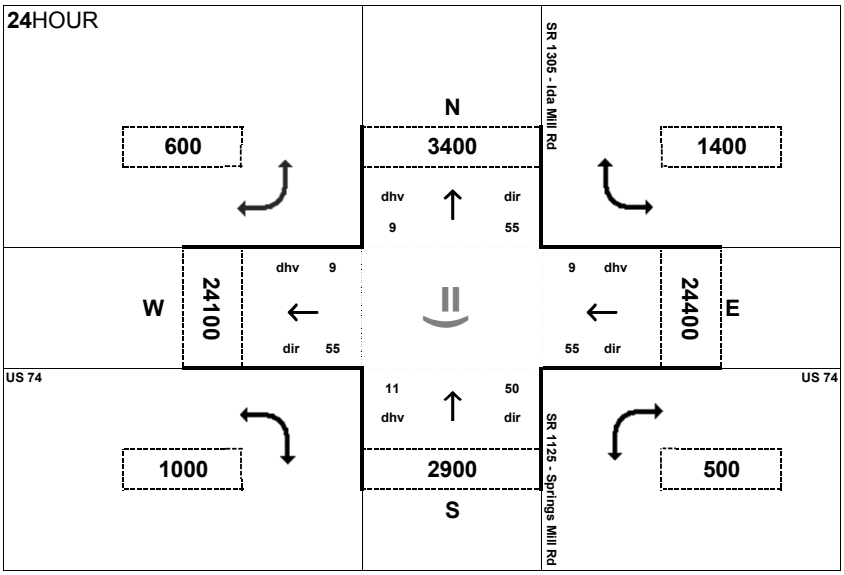
PM peak hour inflow is 1780 vehicles. PM peak hour outflow is 1781 vehicles.

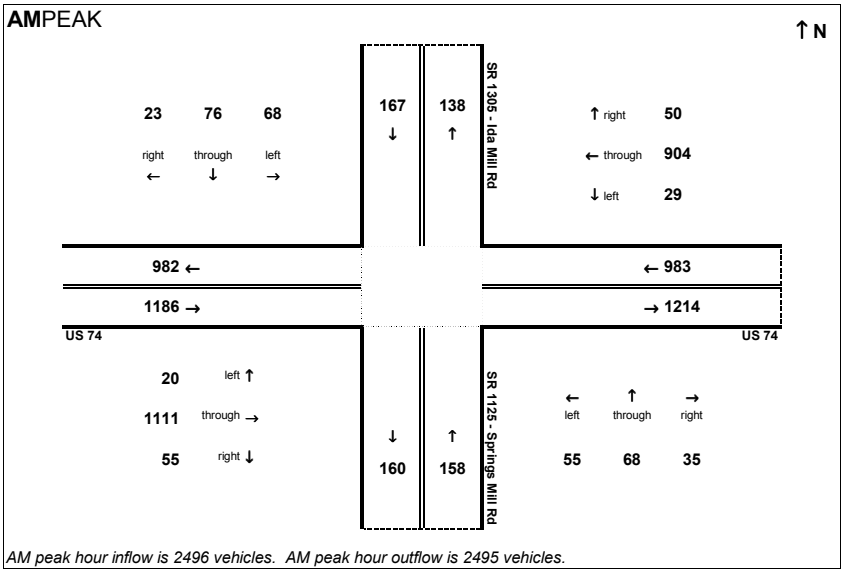
Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1305 (Ida Mill Rd)/SR 1125 (Springs Mill Rd) in Scotland County

Traffic Forecast Release Date:
December-15

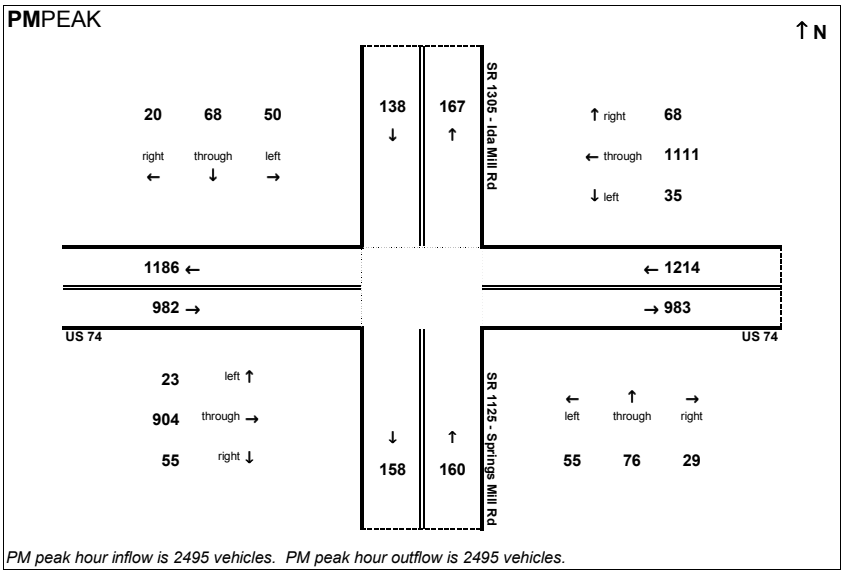
Traffic Data Year:
2015 No-Build

Project:
FS-1508A





AM peak hour inflow is 2496 vehicles. AM peak hour outflow is 2495 vehicles.



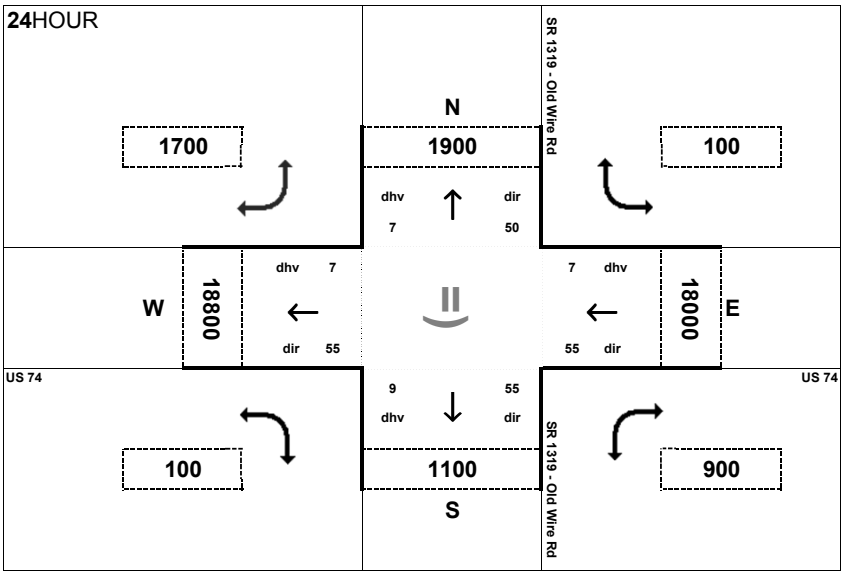
PM peak hour inflow is 2495 vehicles. PM peak hour outflow is 2495 vehicles.

Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1305 (Ida Mill Rd)/SR 1125 (Springs Mill Rd) in Scotland County

Traffic Forecast Release Date:
December-15

Traffic Data Year:
2045 Build

Project:
FS-1508A

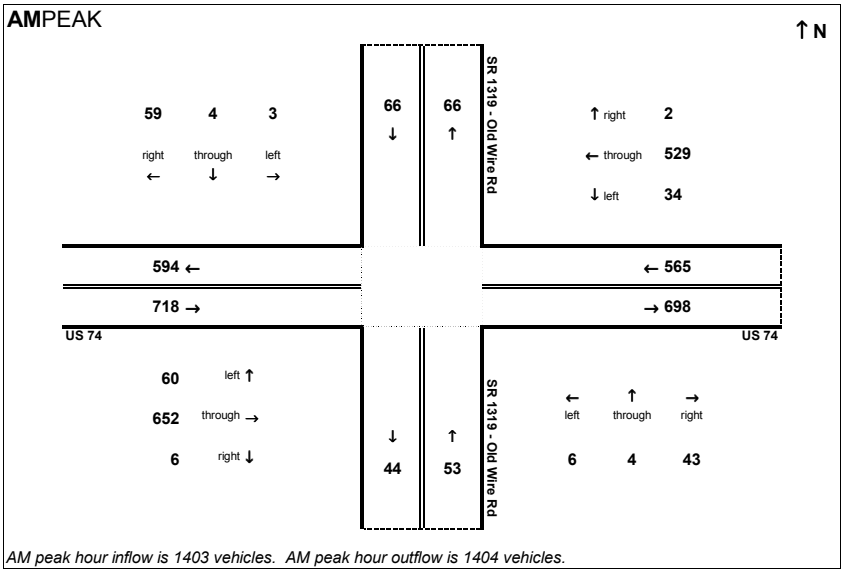


Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1319 (Old Wire Rd) in Scotland County

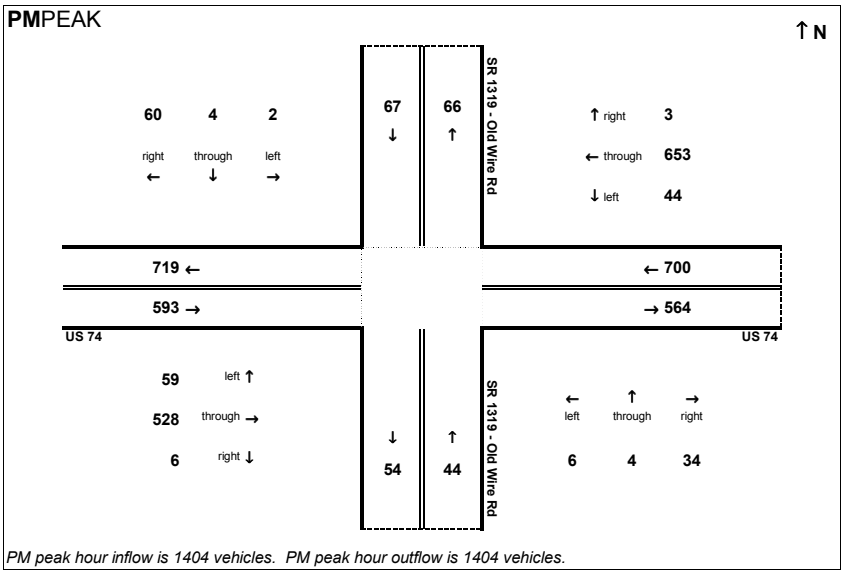
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2015 No-Build

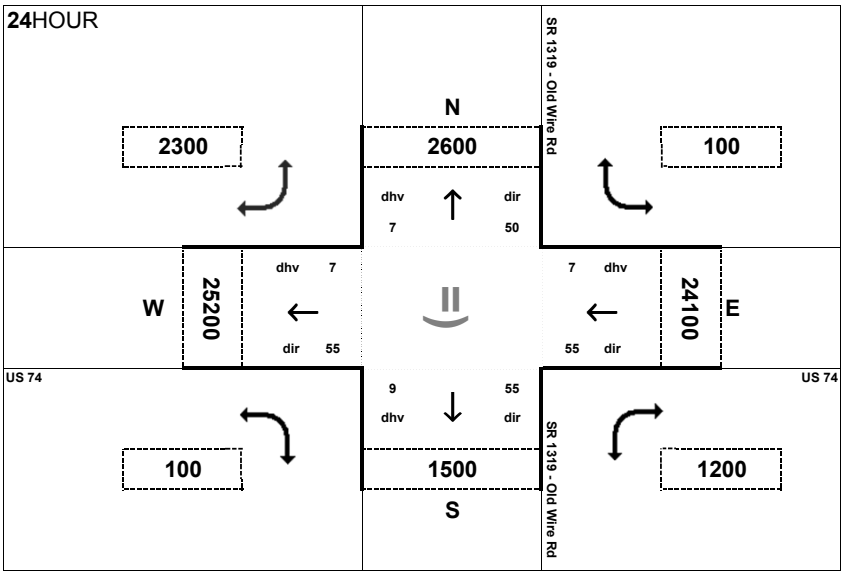
Project:
FS-1508A

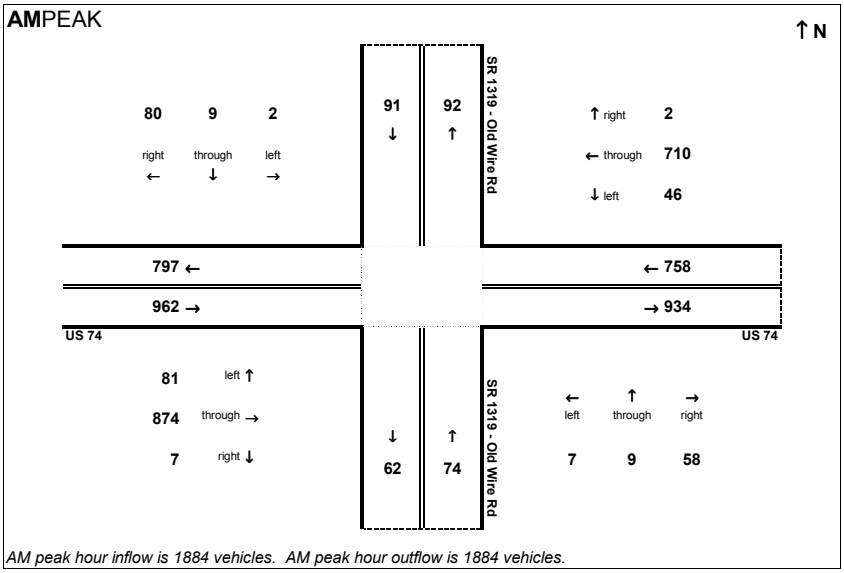


AM peak hour inflow is 1403 vehicles. AM peak hour outflow is 1404 vehicles.

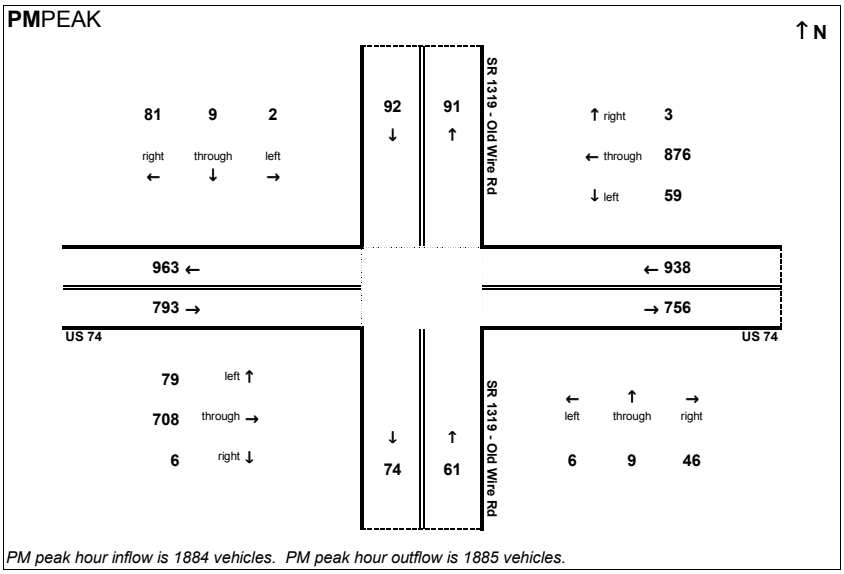


PM peak hour inflow is 1404 vehicles. PM peak hour outflow is 1404 vehicles.





AM peak hour inflow is 1884 vehicles. AM peak hour outflow is 1884 vehicles.



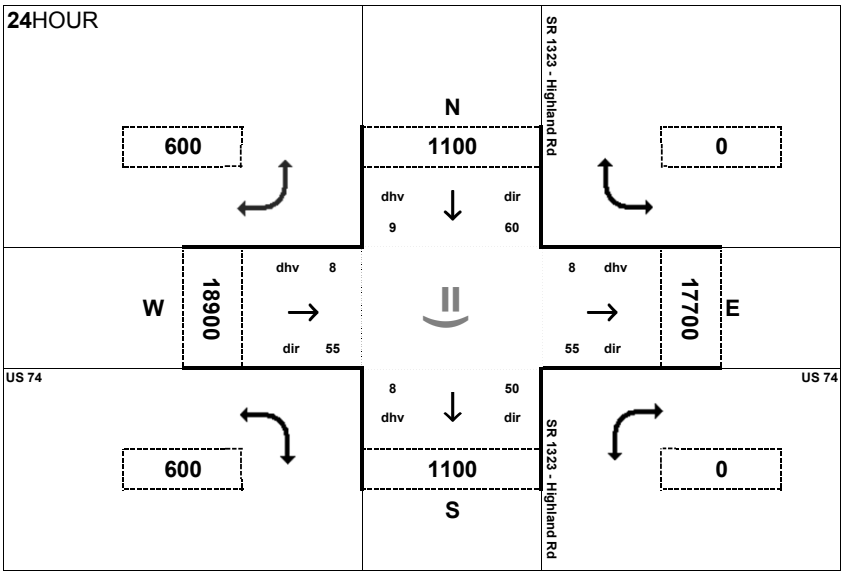
PM peak hour inflow is 1884 vehicles. PM peak hour outflow is 1885 vehicles.

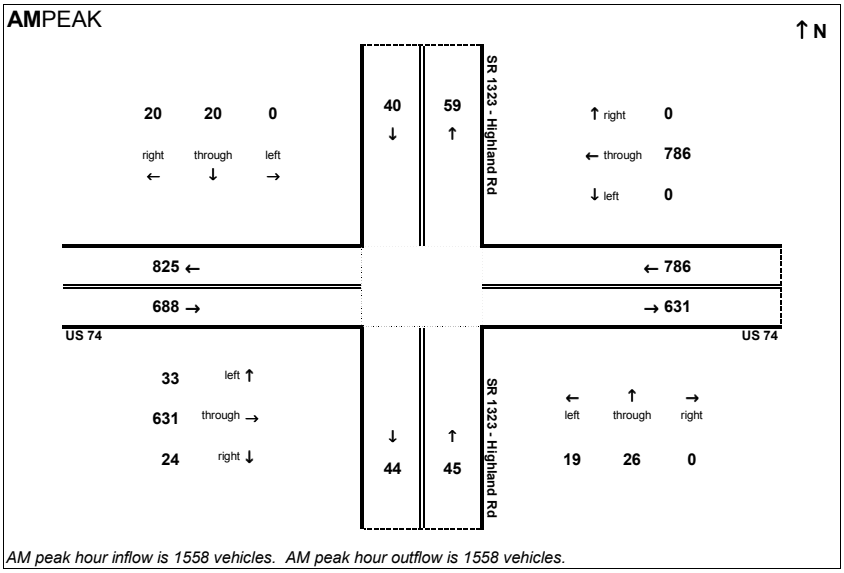
Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1319 (Old Wire Rd) in Scotland County

Traffic Forecast Release Date:
December-15

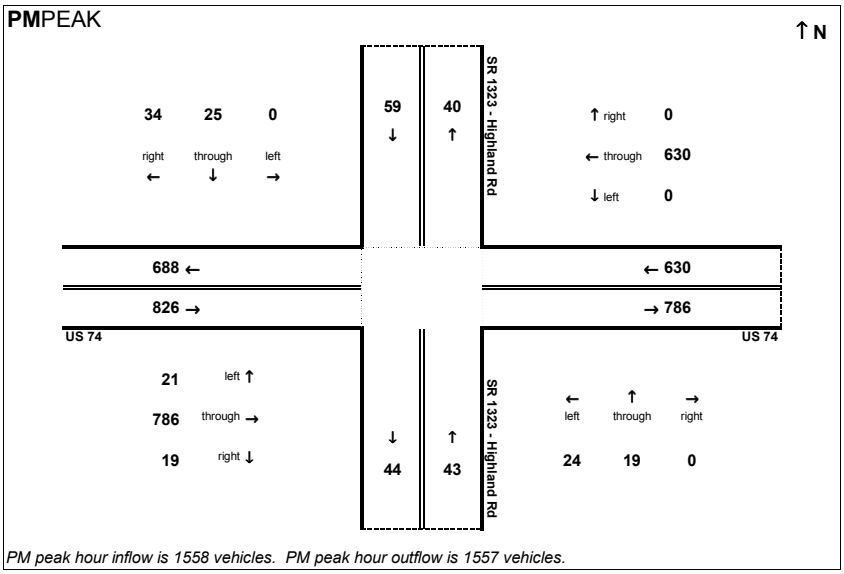
Traffic Data Year:
2045 Build

Project:
FS-1508A





AM peak hour inflow is 1558 vehicles. AM peak hour outflow is 1558 vehicles.



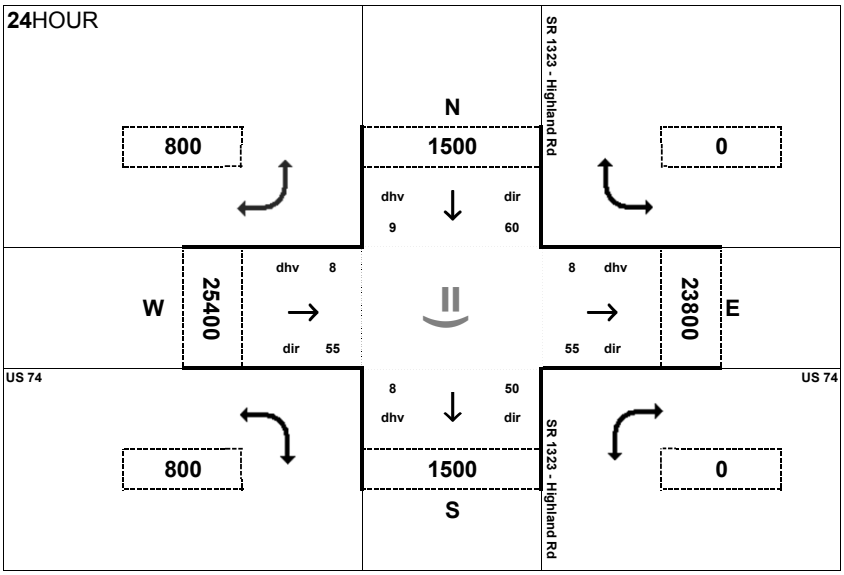
PM peak hour inflow is 1558 vehicles. PM peak hour outflow is 1557 vehicles.

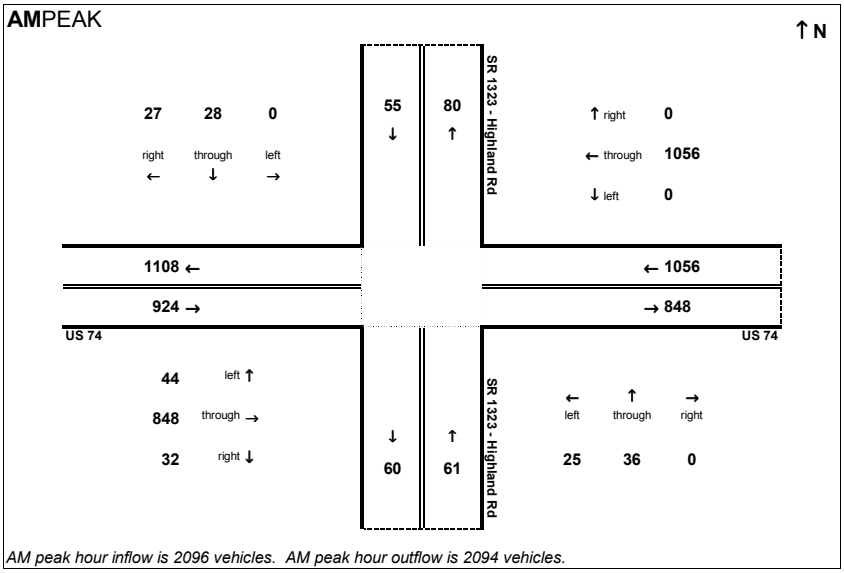
Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1323 (Highland Rd) in Scotland County

Traffic Forecast Release Date:
December-15

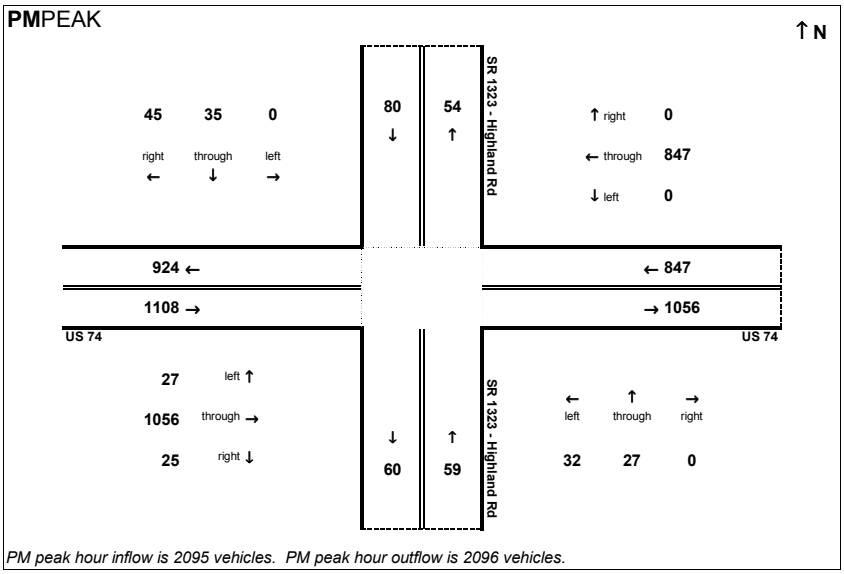
Traffic Data Year:
2015 No-Build

Project:
FS-1508A





AM peak hour inflow is 2096 vehicles. AM peak hour outflow is 2094 vehicles.



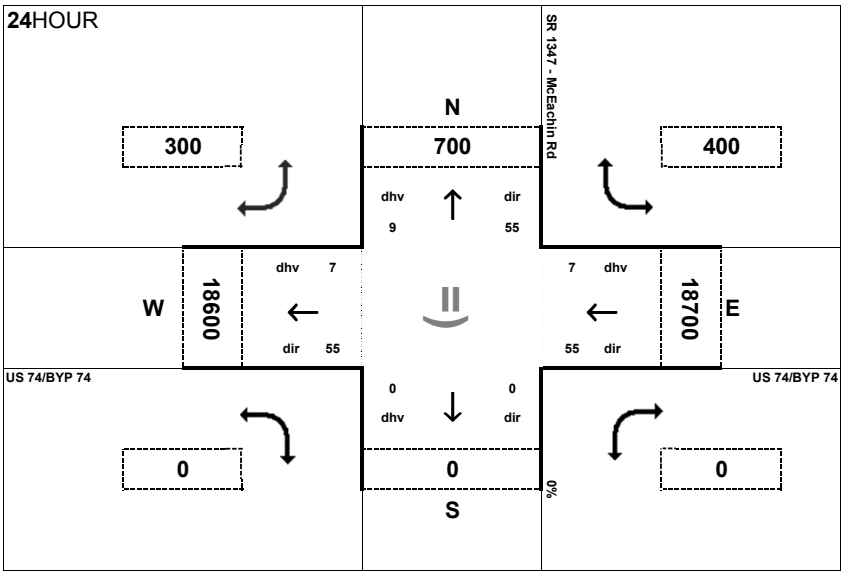
PM peak hour inflow is 2095 vehicles. PM peak hour outflow is 2096 vehicles.

Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1323 (Highland Rd) in Scotland County

Traffic Forecast Release Date:
December-15

Traffic Data Year:
2045 Build

Project:
FS-1508A

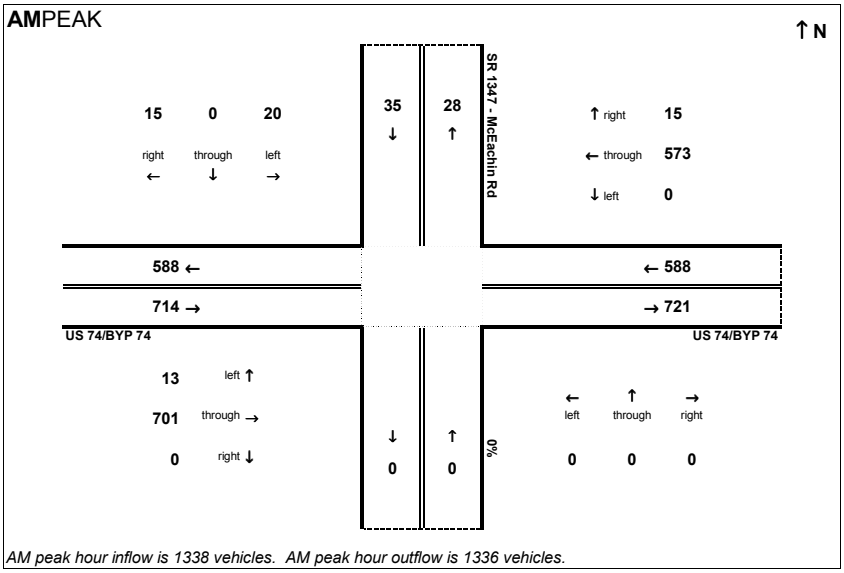


Peak Hour Volume Breakouts Report:
Intersection of US 74/BYP 74 and SR 1347 (McEachin Rd) in Scotland County

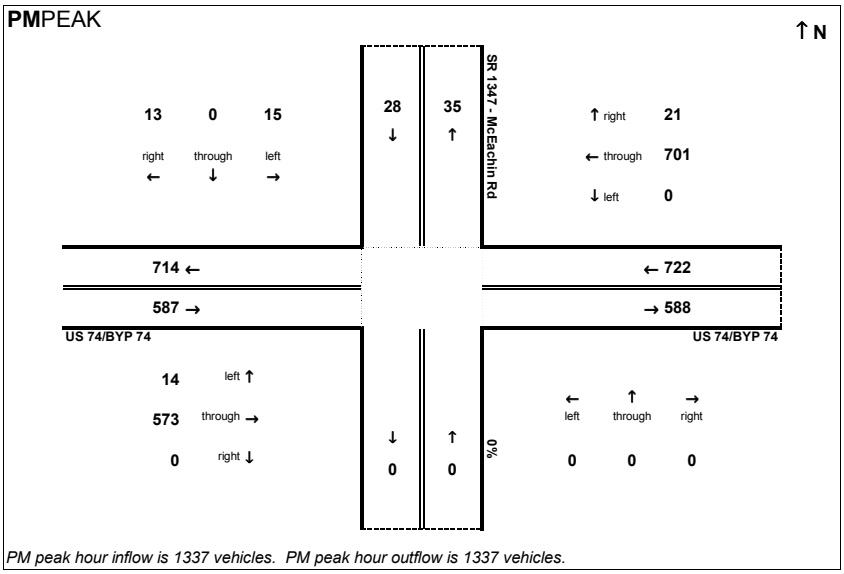
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2015 No-Build

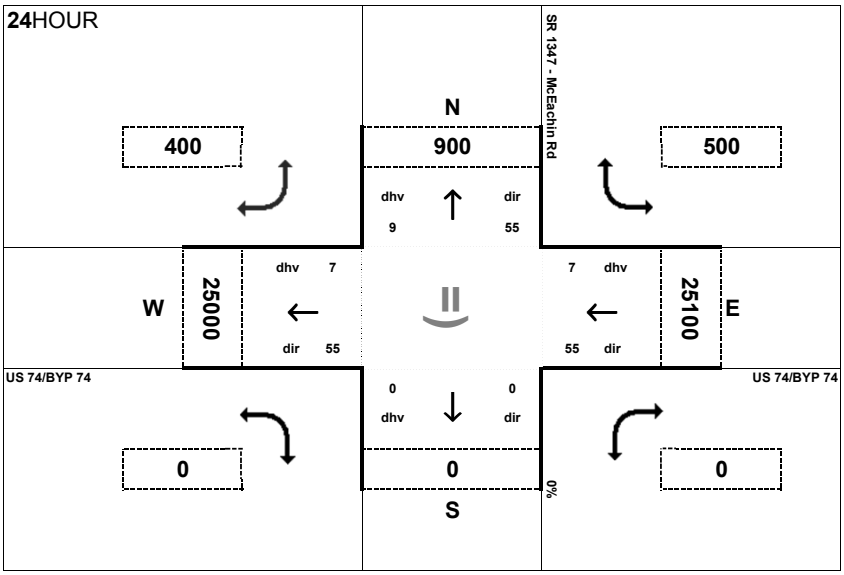
Project:
FS-1508A



AM peak hour inflow is 1338 vehicles. AM peak hour outflow is 1336 vehicles.



PM peak hour inflow is 1337 vehicles. PM peak hour outflow is 1337 vehicles.

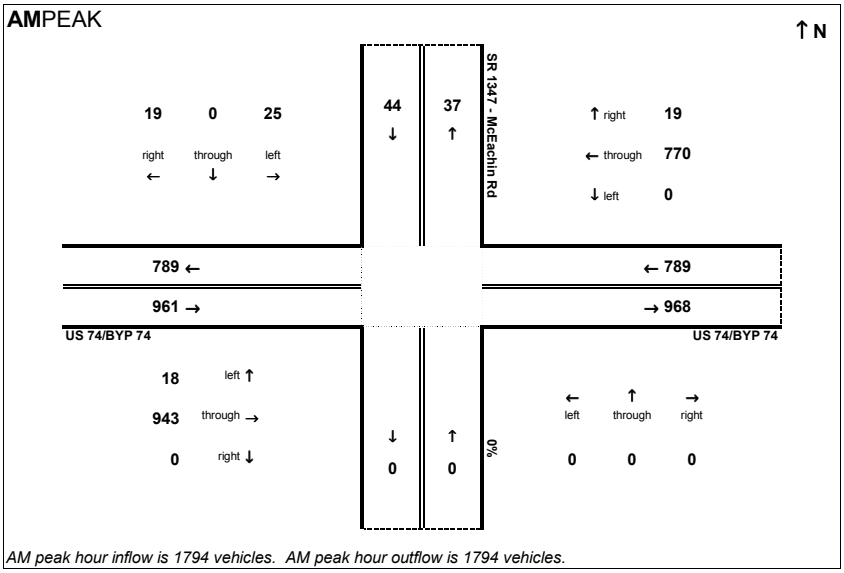


Peak Hour Volume Breakouts Report:
Intersection of US 74/BYP 74 and SR 1347 (McEachin Rd) in Scotland County

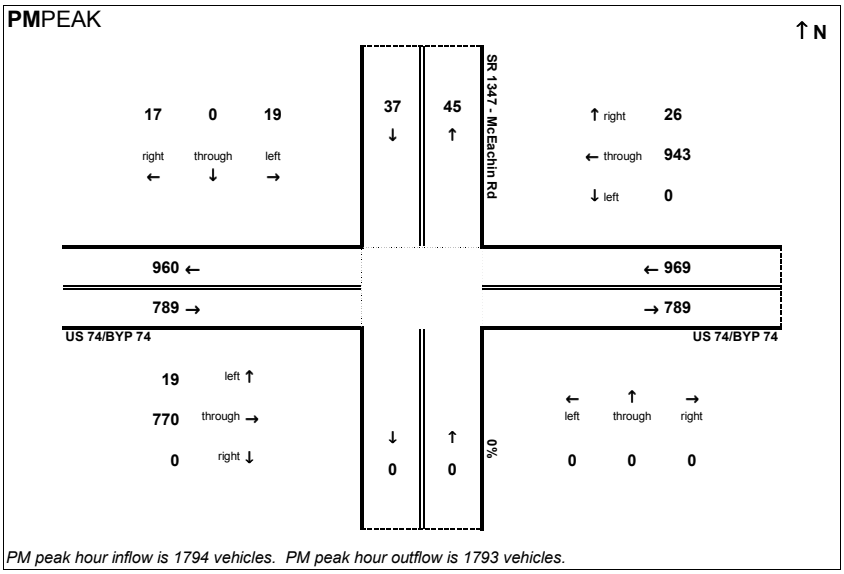
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2045 Build

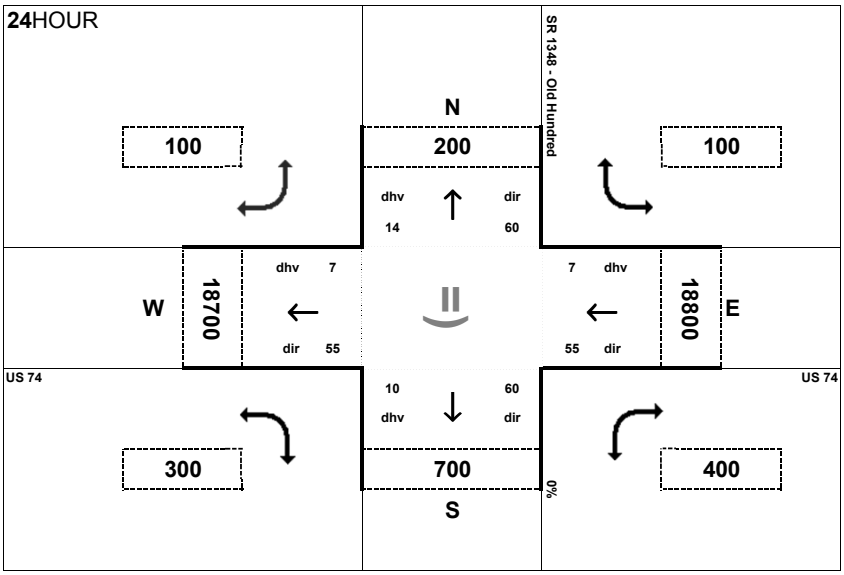
Project:
FS-1508A



AM peak hour inflow is 1794 vehicles. AM peak hour outflow is 1794 vehicles.



PM peak hour inflow is 1794 vehicles. PM peak hour outflow is 1793 vehicles.

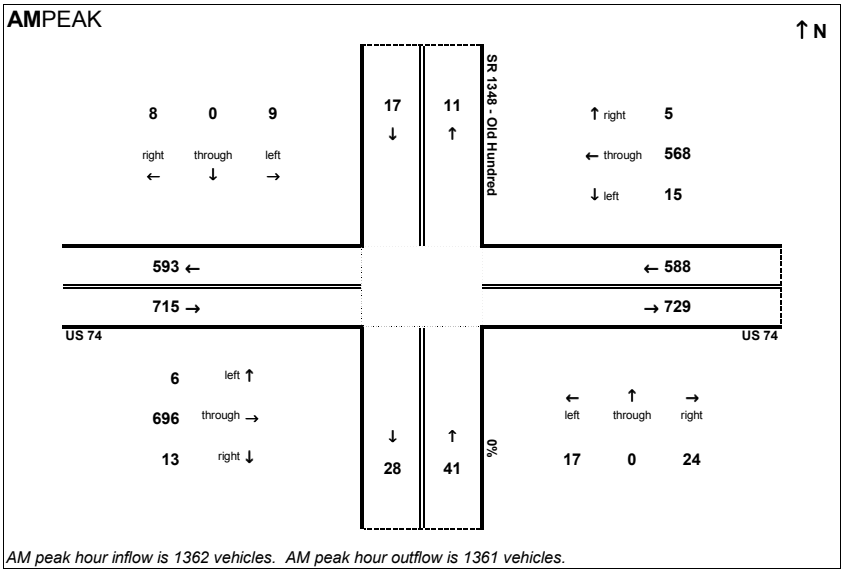


Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1348 (Old Hundred) in Scotland County

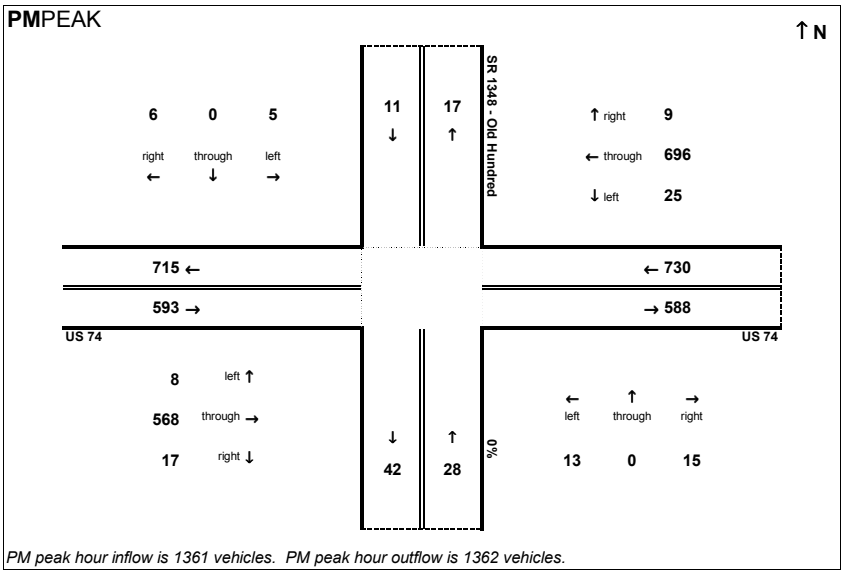
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2015 No-Build

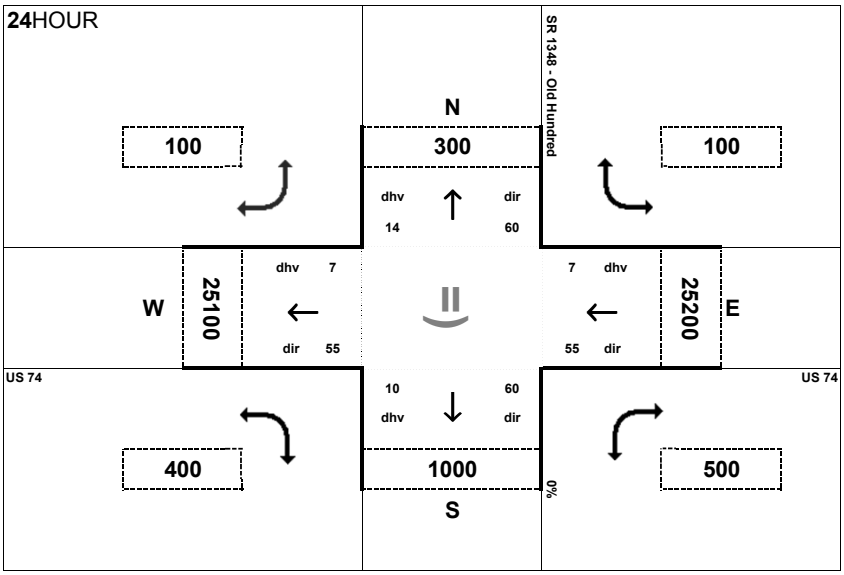
Project:
FS-1508A



AM peak hour inflow is 1362 vehicles. AM peak hour outflow is 1361 vehicles.



PM peak hour inflow is 1361 vehicles. PM peak hour outflow is 1362 vehicles.

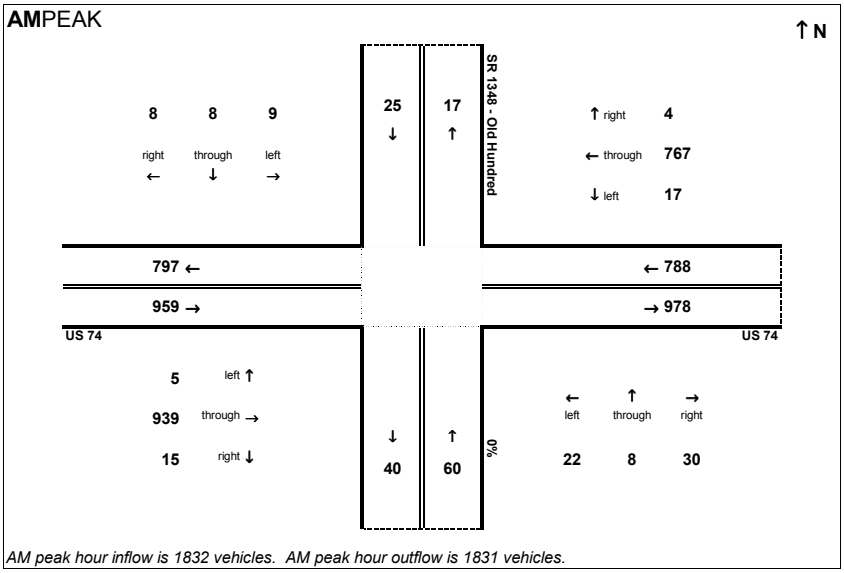


Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1348 (Old Hundred) in Scotland County

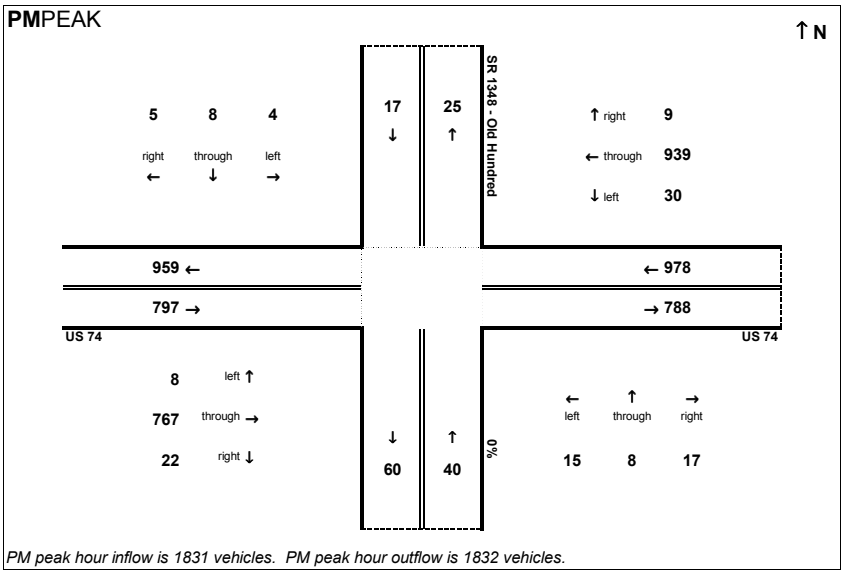
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2045 Build

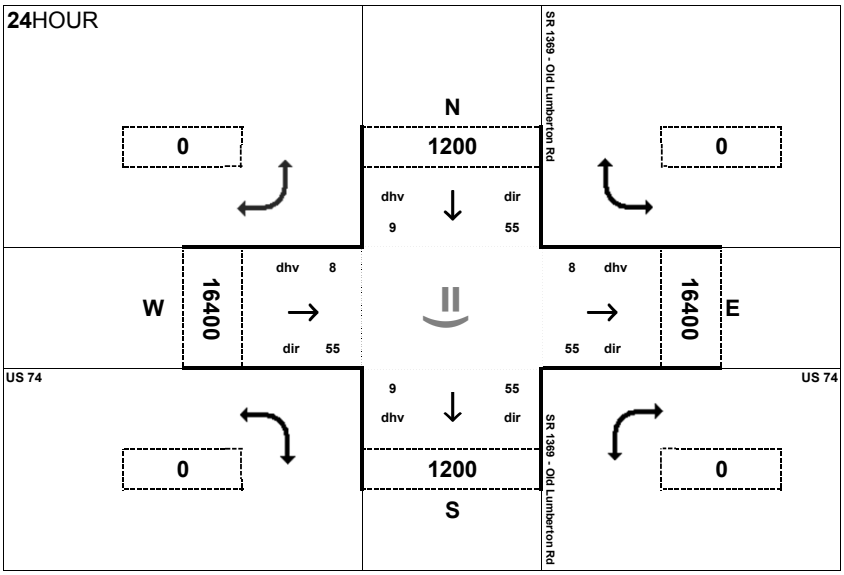
Project:
FS-1508A

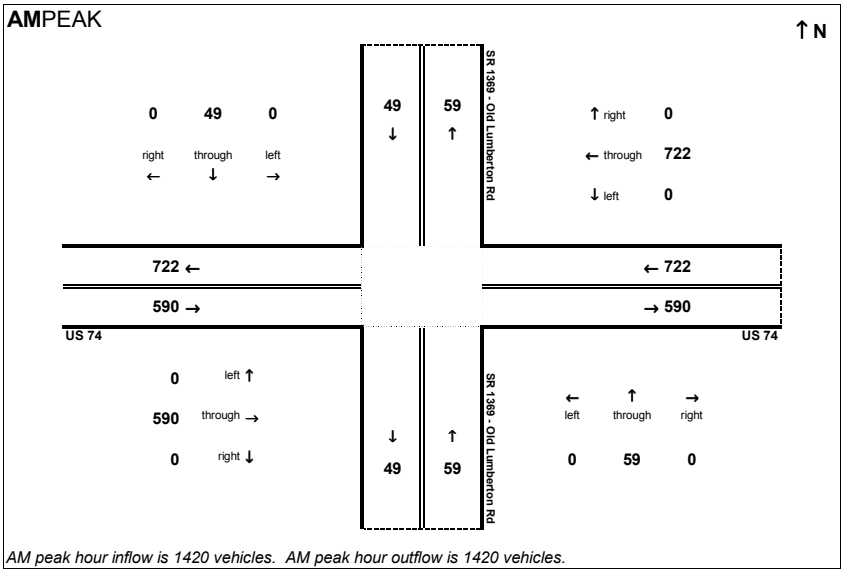


AM peak hour inflow is 1832 vehicles. AM peak hour outflow is 1831 vehicles.

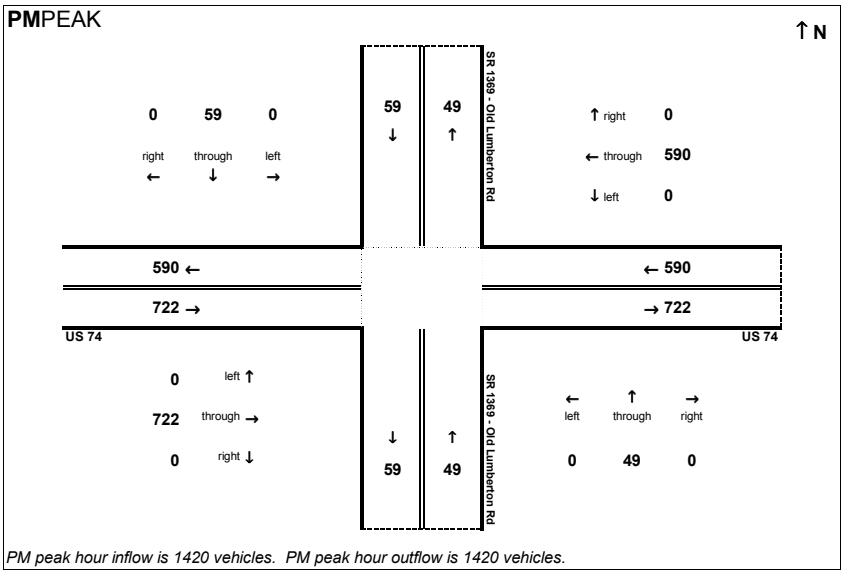


PM peak hour inflow is 1831 vehicles. PM peak hour outflow is 1832 vehicles.





AM peak hour inflow is 1420 vehicles. AM peak hour outflow is 1420 vehicles.



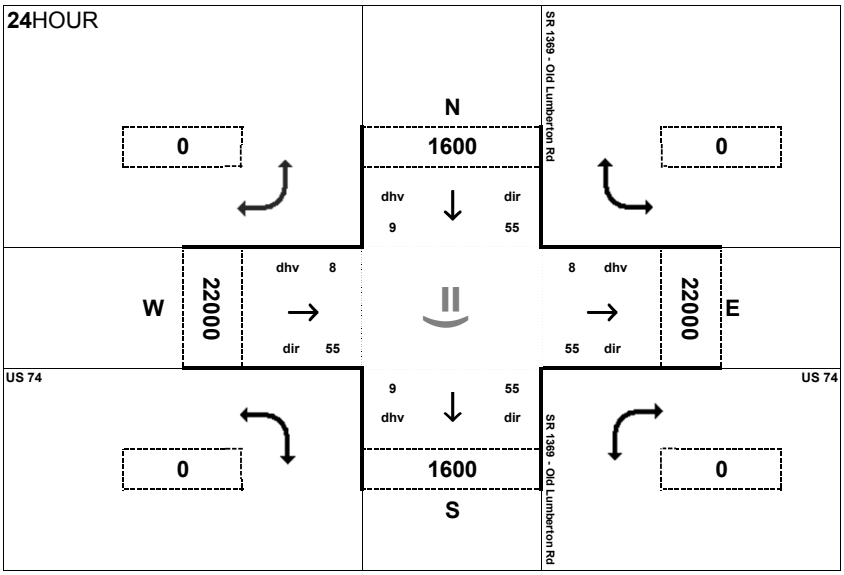
PM peak hour inflow is 1420 vehicles. PM peak hour outflow is 1420 vehicles.

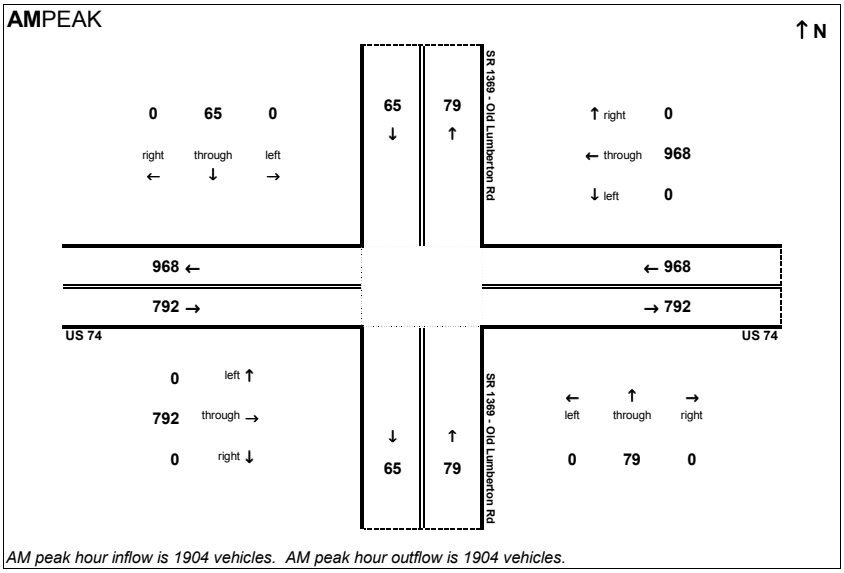
Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1369 (Old Lumberton Rd) in Scotland County

Traffic Forecast Release Date:
December-15

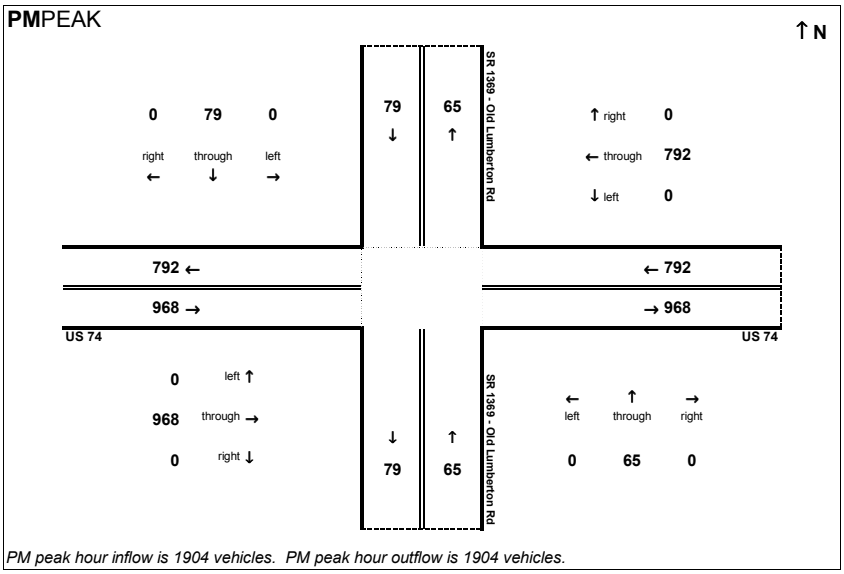
Traffic Data Year:
2015 No-Build

Project:
FS-1508A





AM peak hour inflow is 1904 vehicles. AM peak hour outflow is 1904 vehicles.



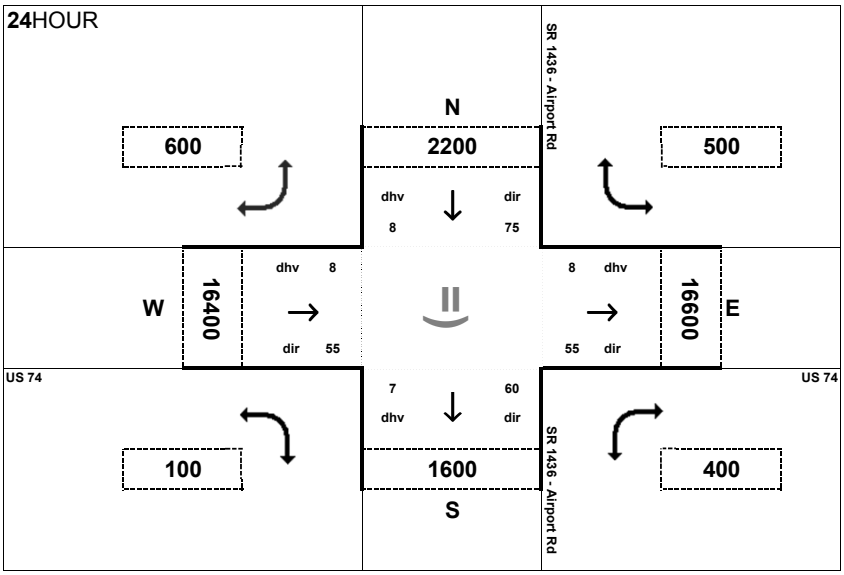
PM peak hour inflow is 1904 vehicles. PM peak hour outflow is 1904 vehicles.

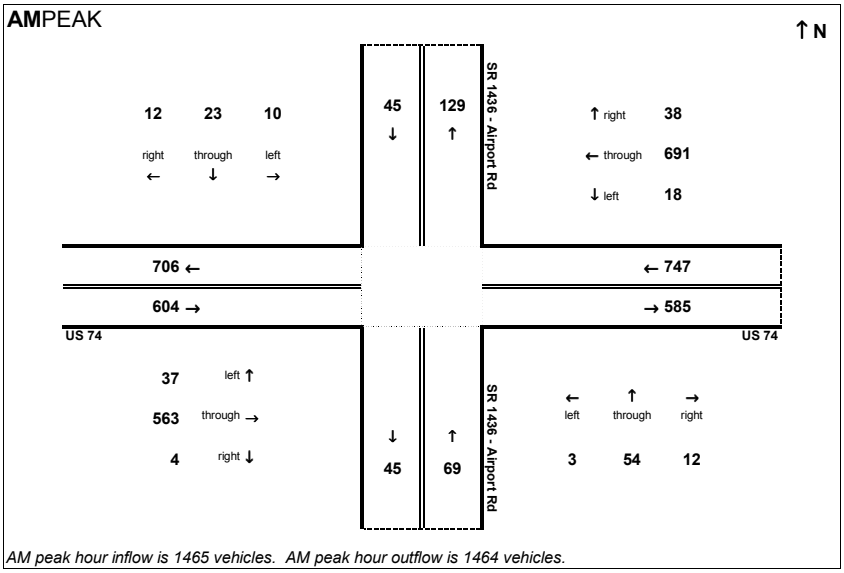
Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1369 (Old Lumberton Rd) in Scotland County

Traffic Forecast Release Date:
December-15

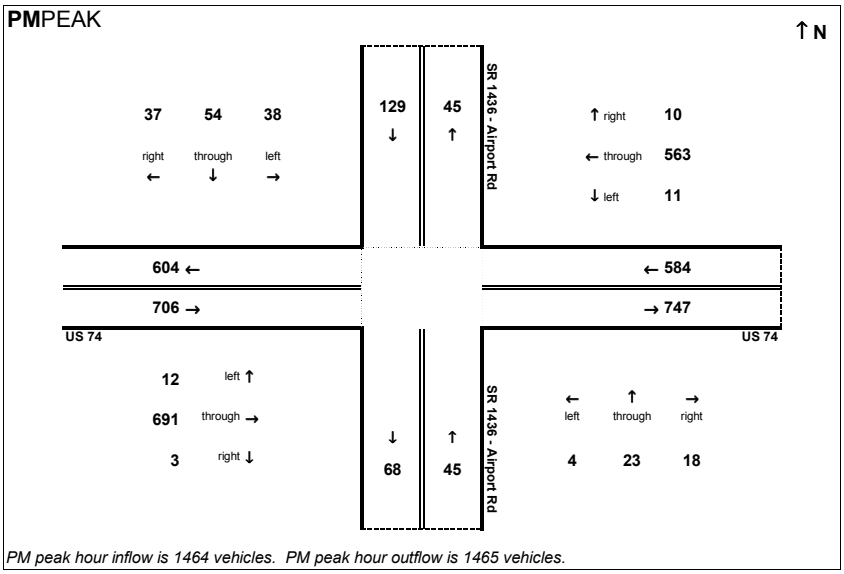
Traffic Data Year:
2015 No-Build

Project:
FS-1508A





AM peak hour inflow is 1465 vehicles. AM peak hour outflow is 1464 vehicles.



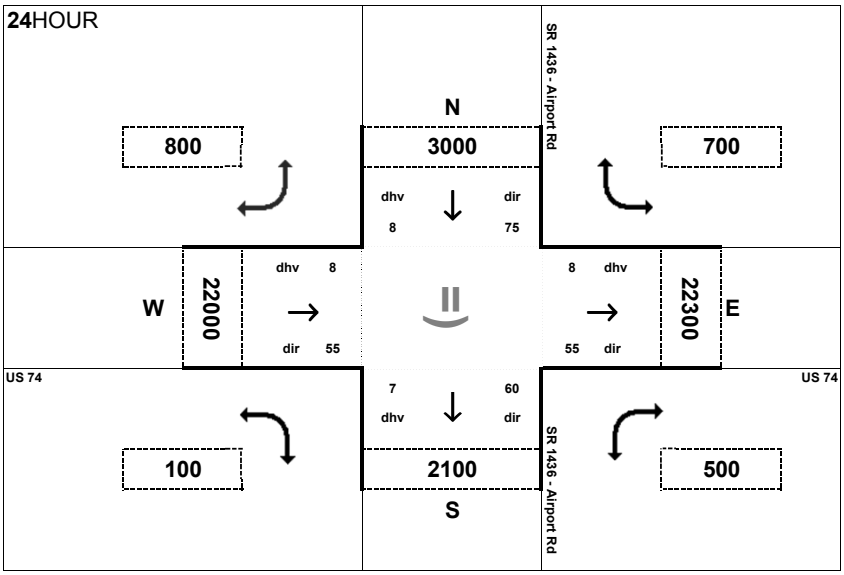
PM peak hour inflow is 1464 vehicles. PM peak hour outflow is 1465 vehicles.

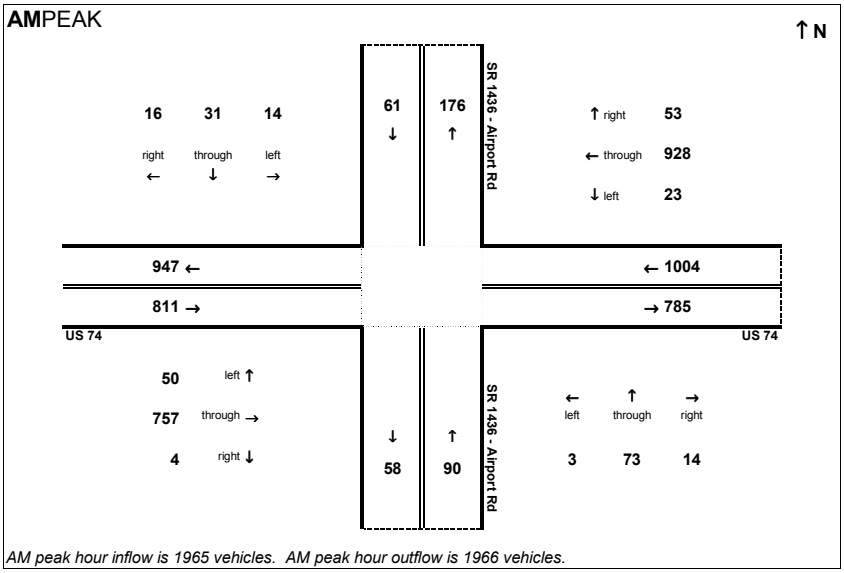
Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1436 (Airport Rd) in Scotland County

Traffic Forecast Release Date:
December-15

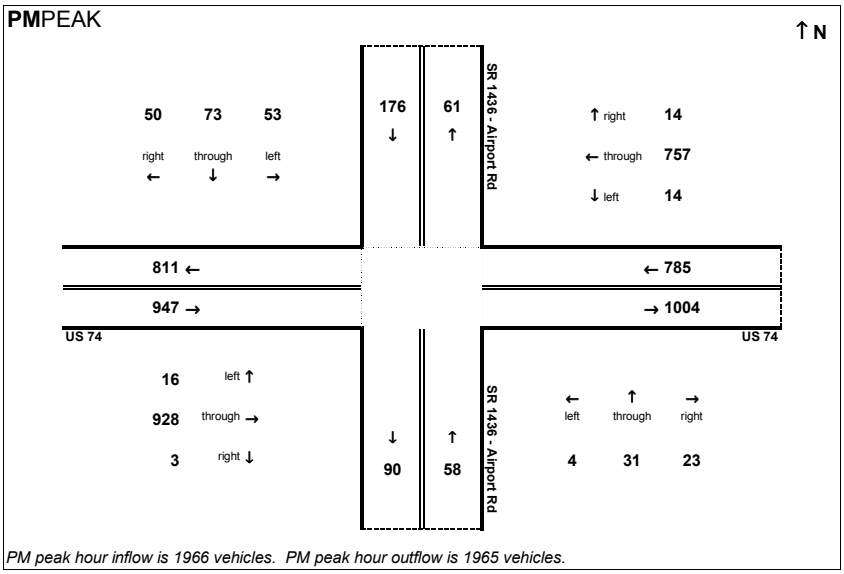
Traffic Data Year:
2015 No-Build

Project:
FS-1508A





AM peak hour inflow is 1965 vehicles. AM peak hour outflow is 1966 vehicles.



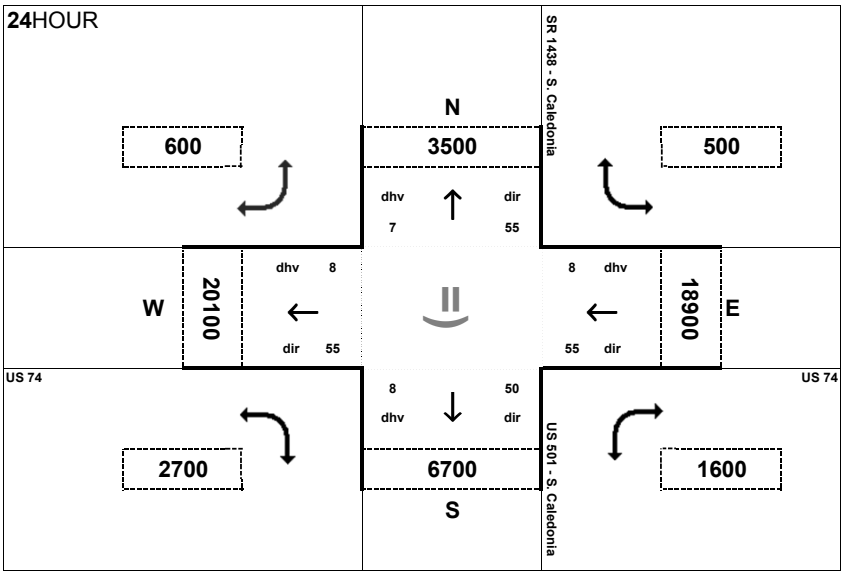
PM peak hour inflow is 1966 vehicles. PM peak hour outflow is 1965 vehicles.

Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1436 (Airport Rd) in Scotland County

Traffic Forecast Release Date:
December-15

Traffic Data Year:
2045 Build

Project:
FS-1508A

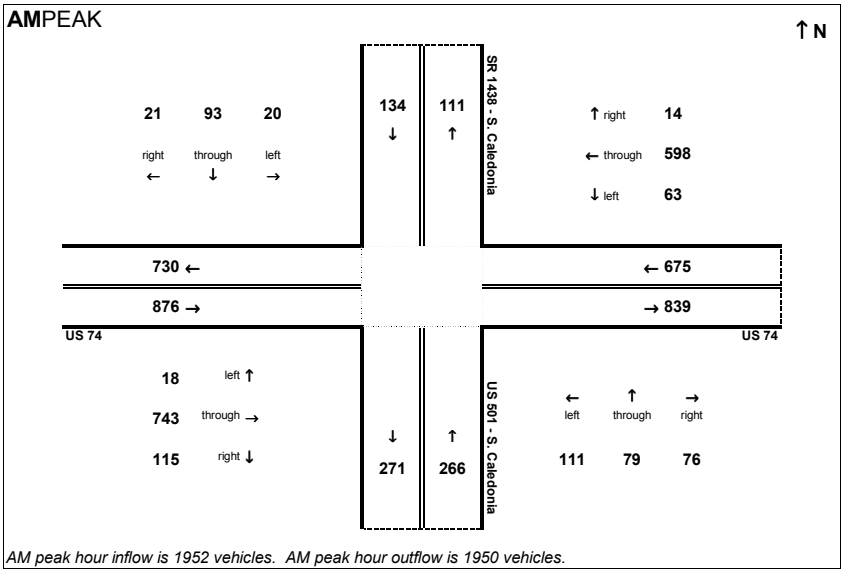


Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1438/US 501 (S. Caledonia Rd) in Scotland County

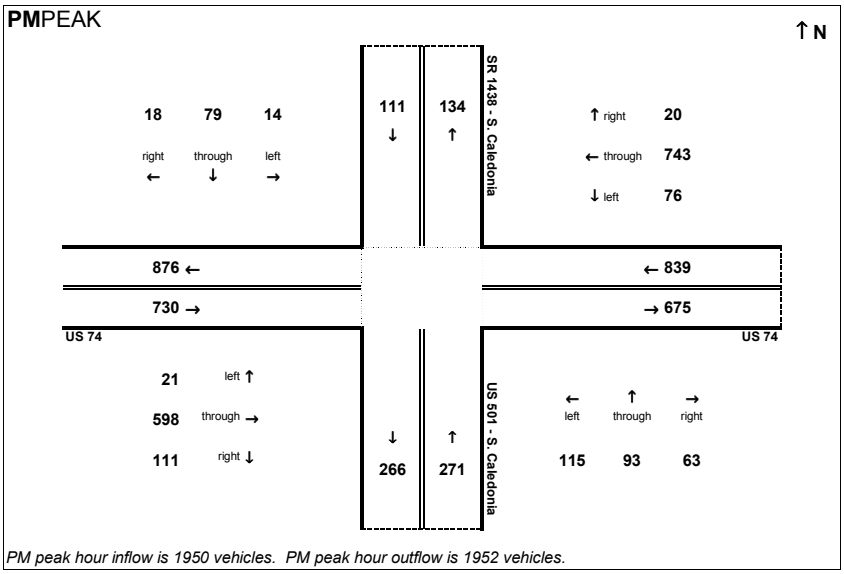
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2015 No-Build

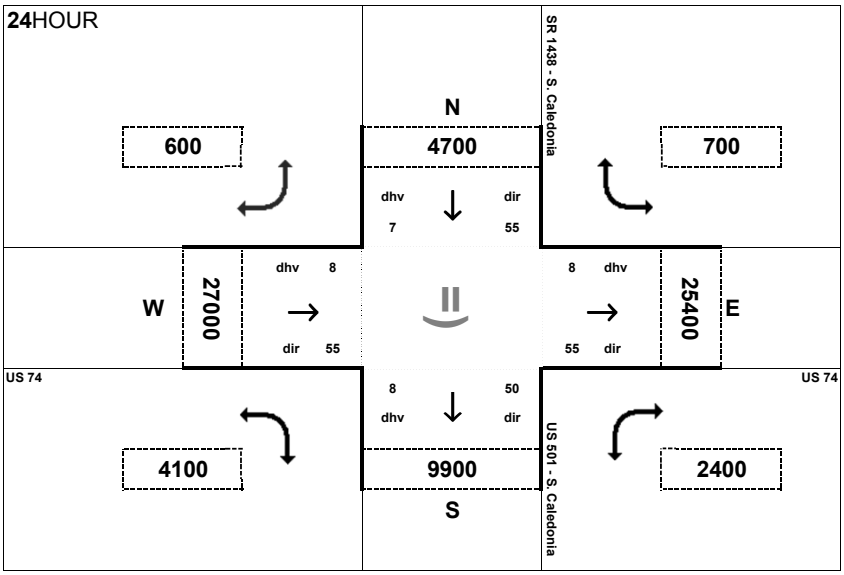
Project:
FS-1508A



AM peak hour inflow is 1952 vehicles. AM peak hour outflow is 1950 vehicles.



PM peak hour inflow is 1950 vehicles. PM peak hour outflow is 1952 vehicles.

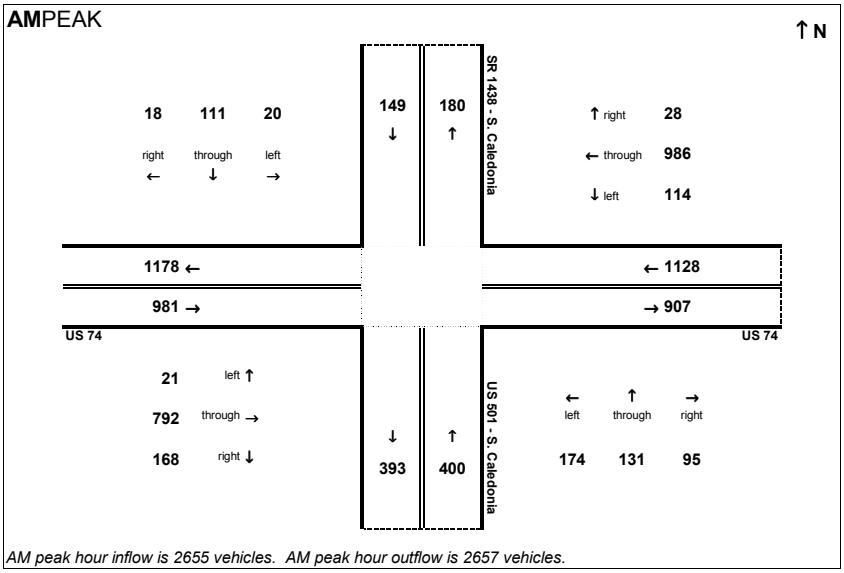


Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1438/US 501 (S. Caledonia Rd) in Scotland County

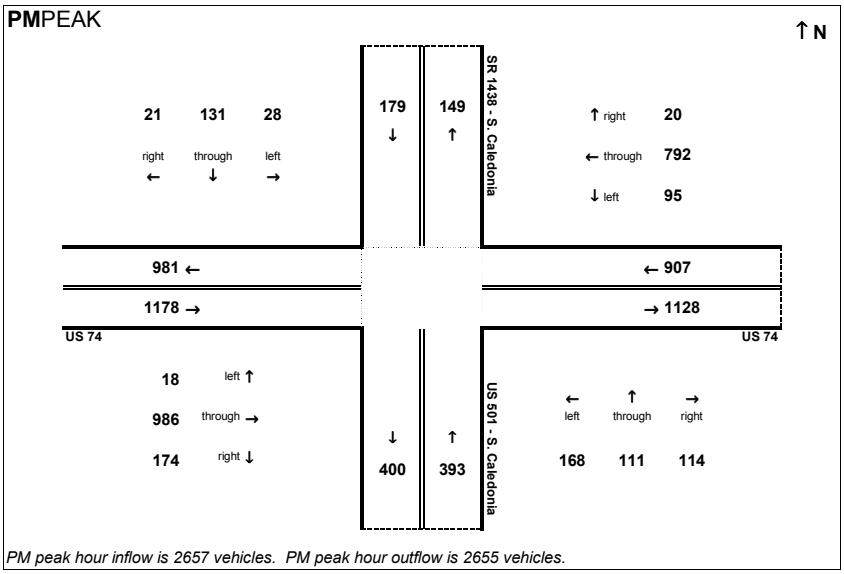
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2045 Build

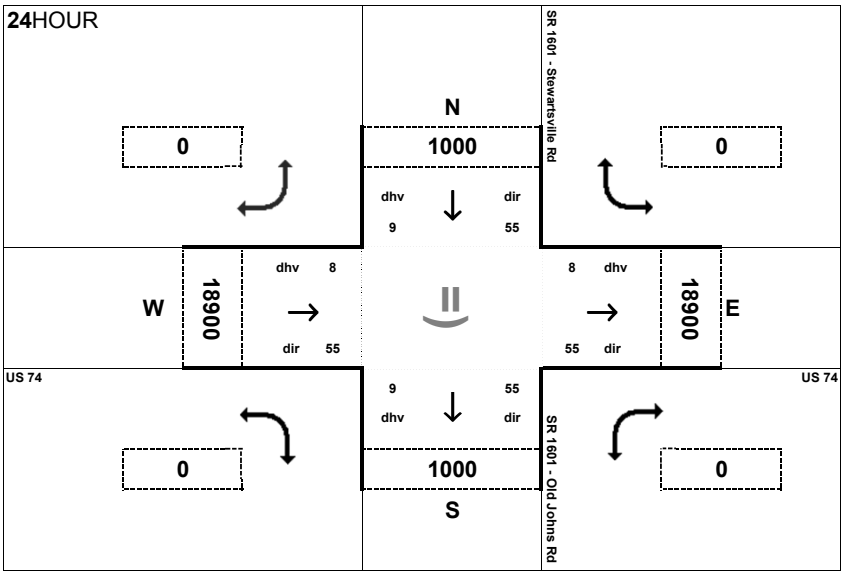
Project:
FS-1508A



AM peak hour inflow is 2655 vehicles. AM peak hour outflow is 2657 vehicles.



PM peak hour inflow is 2657 vehicles. PM peak hour outflow is 2655 vehicles.

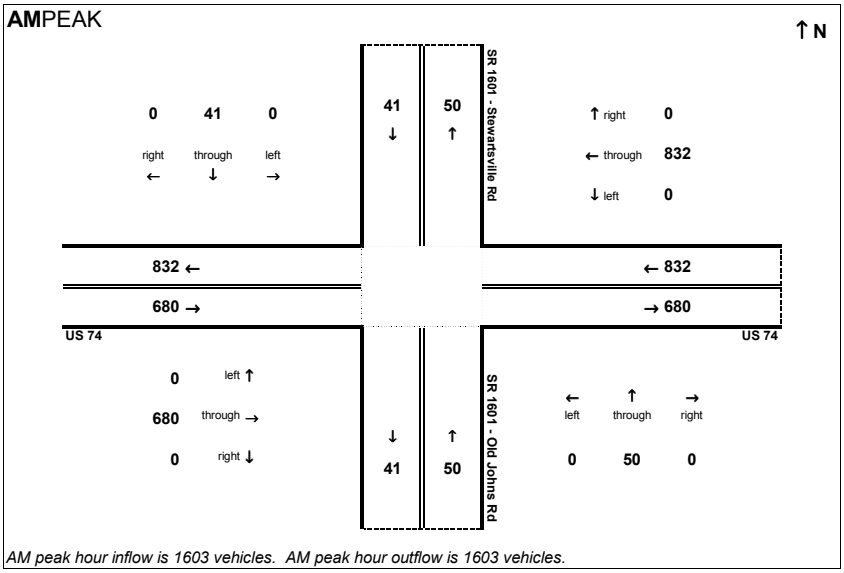


Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1601 (Stewartsville Rd/Old Johns Rd) in Scotland County

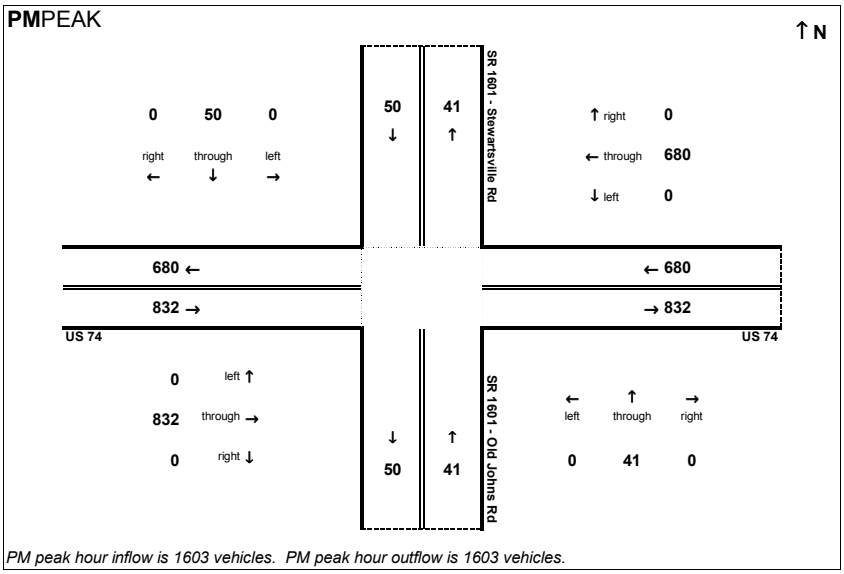
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2015 No-Build

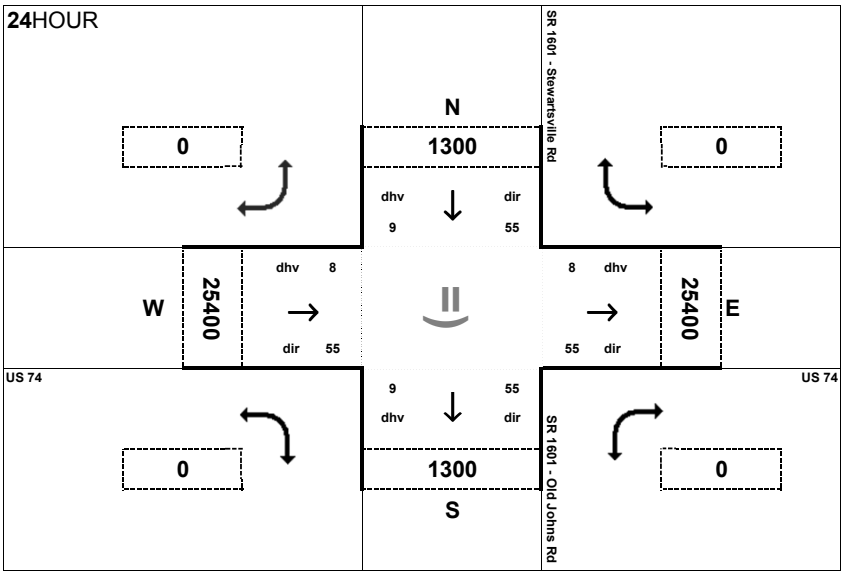
Project:
FS-1508A



AM peak hour inflow is 1603 vehicles. AM peak hour outflow is 1603 vehicles.



PM peak hour inflow is 1603 vehicles. PM peak hour outflow is 1603 vehicles.

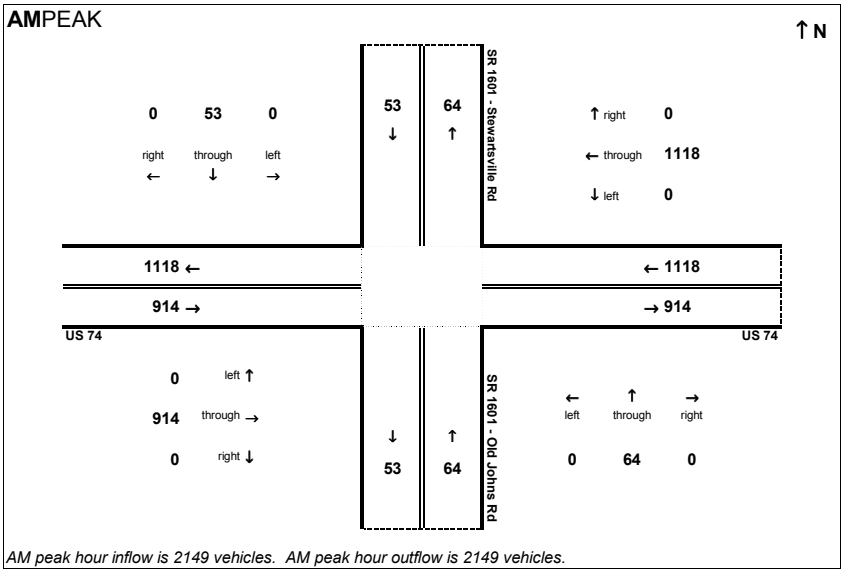


Peak Hour Volume Breakouts Report:
Intersection of US 74 and SR 1601 (Stewartsville Rd/Old Johns Rd) in Scotland County

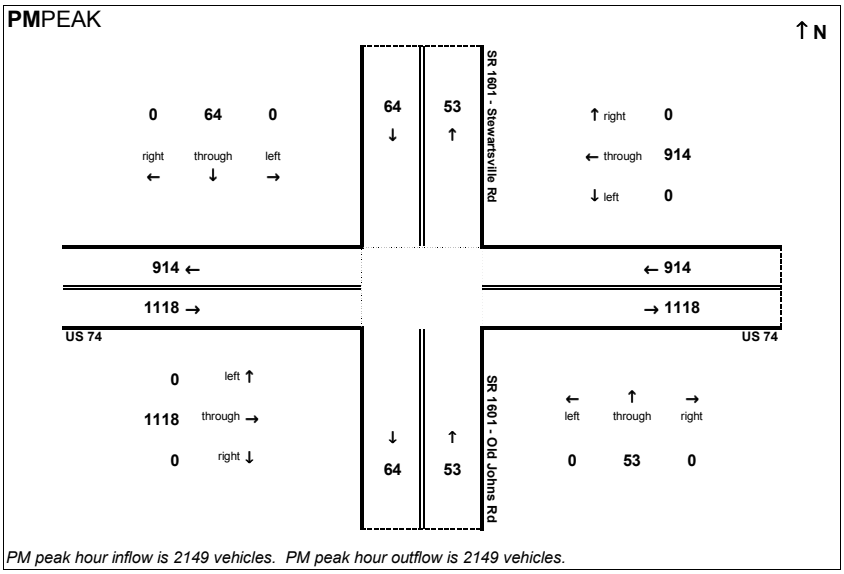
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2045 Build

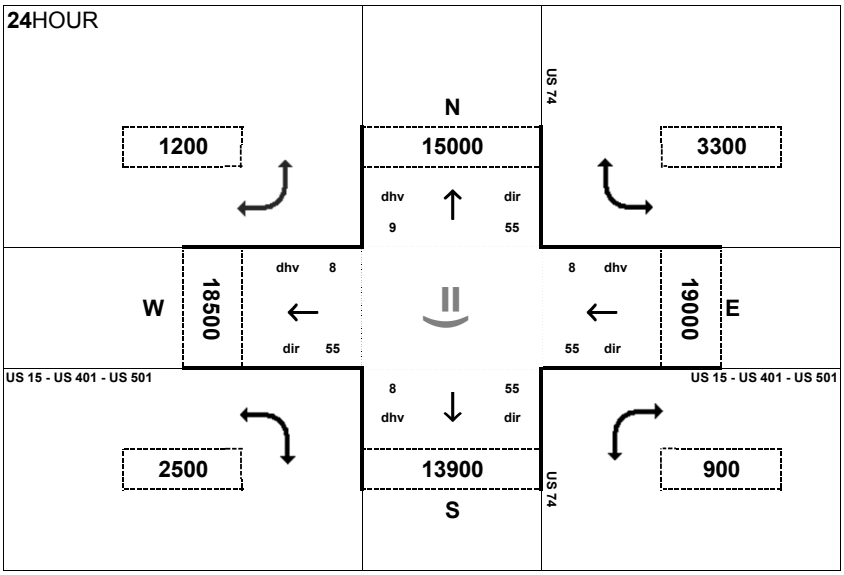
Project:
FS-1508A



AM peak hour inflow is 2149 vehicles. AM peak hour outflow is 2149 vehicles.



PM peak hour inflow is 2149 vehicles. PM peak hour outflow is 2149 vehicles.

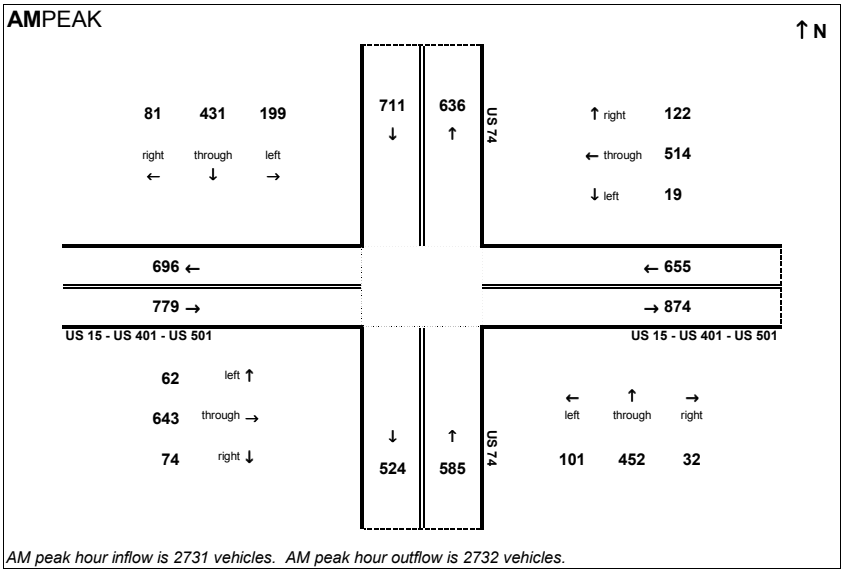


Peak Hour Volume Breakouts Report:
Intersection of US 74 and US 15/US 401/US 501 (McColl Rd) in Scotland County

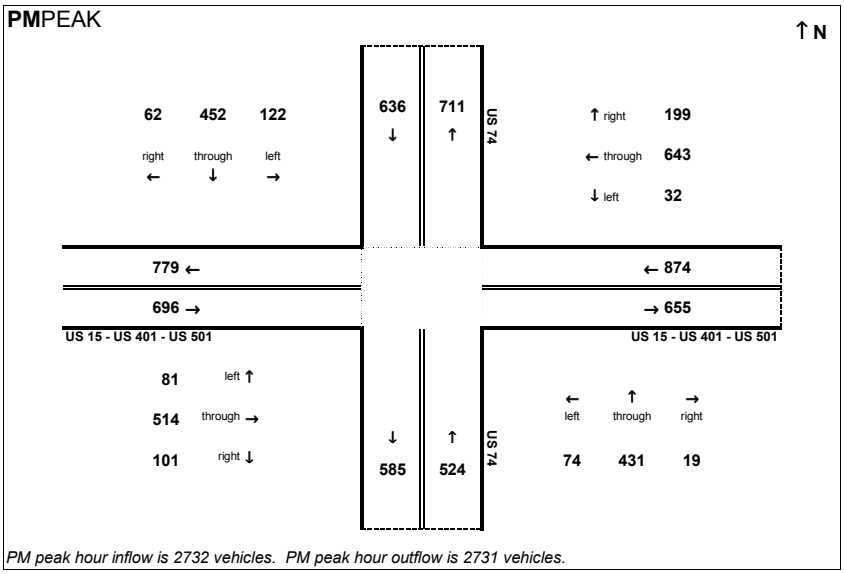
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2015 No-Build

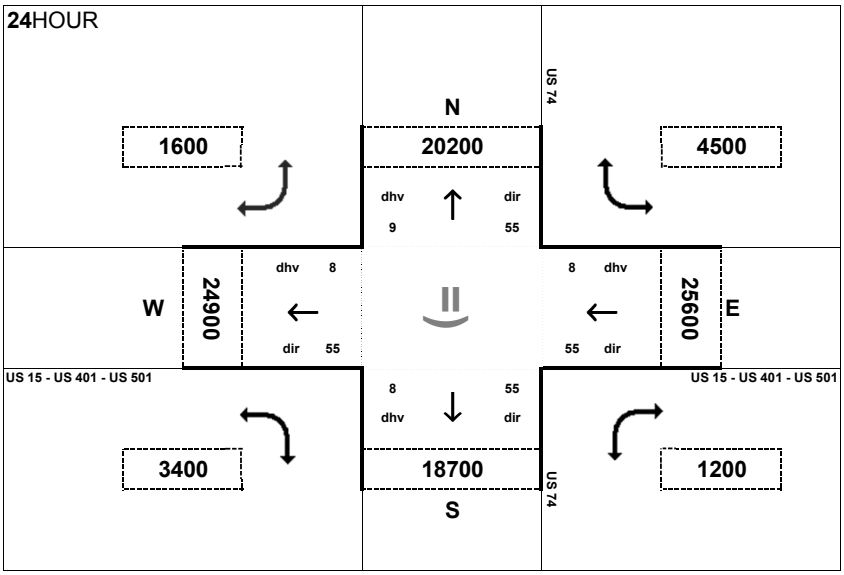
Project:
FS-1508A



AM peak hour inflow is 2731 vehicles. AM peak hour outflow is 2732 vehicles.



PM peak hour inflow is 2732 vehicles. PM peak hour outflow is 2731 vehicles.

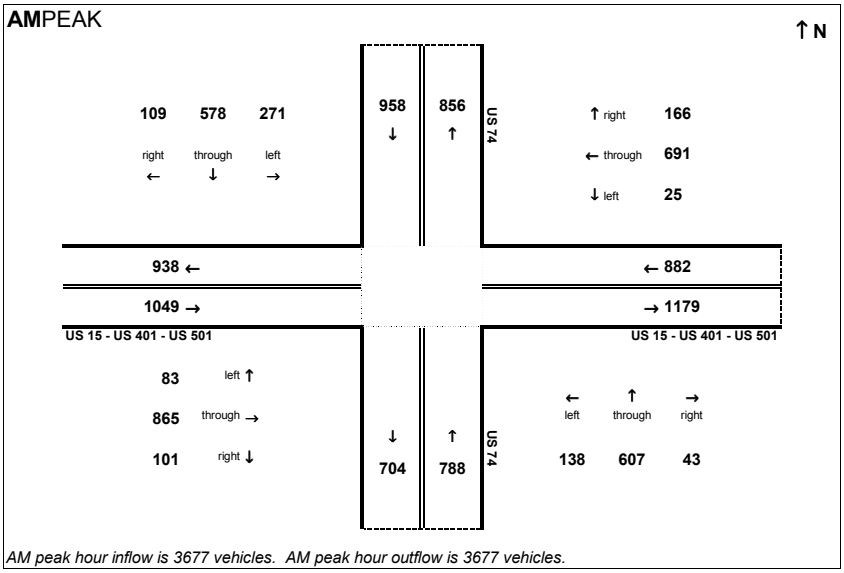


Peak Hour Volume Breakouts Report:
Intersection of US 74 and US 15/US 401/US 501 (McColl Rd) in Scotland County

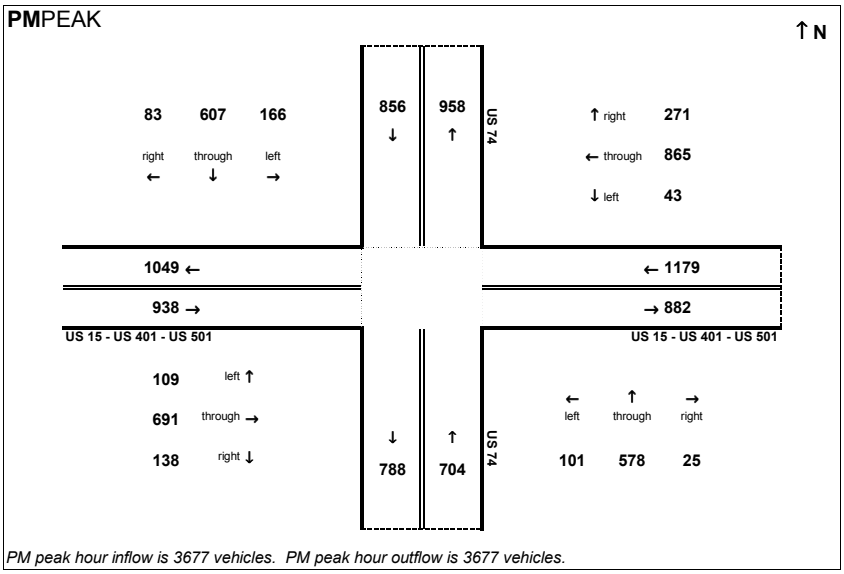
Traffic Forecast Release Date:
December-15

Traffic Data Year:
2045 Build

Project:
FS-1508A



AM peak hour inflow is 3677 vehicles. AM peak hour outflow is 3677 vehicles.



PM peak hour inflow is 3677 vehicles. PM peak hour outflow is 3677 vehicles.

Attachment C

HCS Results

Freeway Description				2015 Existing		2045 Alternate 1		2045 Alternate 2		2045 Alternate 3	
Seg #	From	To	Type	Volume	LOS	Volume	LOS	Volume	LOS	Volume	LOS
1	I-74/Proj West End	I-74/US 74 Bus	Basic Segment	757	A	676	A	676	A	676	A
2	US 74 Bus (En 170)		On Ramp	986	A	982	A	982	A	982	A
3	I-74/US 74 Bus	I-74/SR 1145	Basic Segment	986	A	982	A	982	A	982	A
4	SR 1145 (Ex 174)		Off Ramp	n/a	n/a	982	A	982	A	982	A
5	SR 1145 (Ex 174)	SR 1145 (En 174)	Basic Segment	n/a	n/a	945	A	945	A	945	A
6	SR 1145 (En 174)		On Ramp	n/a	n/a	1010	A	1010	A	1010	A
7	I-74/SR 1145	I-74/SR 1148	Basic Segment	n/a	n/a	1010	A	1010	A	1010	A
8	SR 1148 (Ex 176)		Off Ramp	n/a	n/a	1010	A	1010	A	1010	A
9	SR 1148 (Ex 176)	SR 1148 (En 176)	Basic Segment	n/a	n/a	790	A	790	A	865	A
10	SR 1148 (En 176)		On Ramp	n/a	n/a	1109	A	1109	A	1081	A
11	I-74/SR 1148		Basic Segment	n/a	n/a	1109	A	1109	A	1081	A
12	SR 1304 (Ex 178)		Off Ramp	n/a	n/a	1109	A	1109	A	1081	A
13	SR 1304 (Ex 178)	SR 1304 (En 178)	Basic Segment	n/a	n/a	1055	A	1055	A	912	A
14	SR 1304 (En 178)		On Ramp	n/a	n/a	1149	A	1149	A	1069	A
15	I-74/SR 1148	I-74/US 74 BUS	Basic Segment	n/a	n/a	1149	A	1149	A	1069	A
16	US 74 Bus (Ex 181)		Off Ramp	986	A	1149	B	1149	B	1069	A
17	I-74/US 74 BUS	I-74/NC 79	Basic Segment	773	A	863	A	863	A	783	A
18	NC 79 (Ex 182)		Off Ramp	773	A	863	A	863	A	783	A
19	NC 79 (Ex 182)	NC 79 (En 182)	Basic Segment	773	A	820	A	820	A	740	A
20	NC 79 (En 182)		On Ramp	866	A	943	A	943	A	863	A
21	I-74/NC 79	I-74/US 15/401/501	Basic Segment	866	A	943	A	943	A	863	A
22	US 15/401/501(Ex183)		Off Ramp	866	A	943	A	943	A	863	A
23	US 15/401/501(Ex183)	US 15/401/501(En183)	Basic Segment	669	A	555	A	555	A	598	A
24	US 15/401/501(En183)	US 501 BUS (Ex184)	Weaving	811	A	555	A	555	A	791	A
25	US 501 BUS (Ex 184)	US 501 BUS (En 184)	Basic Segment	720	A	555	A	555	A	668	A
26	US 501 BUS (En 184)		On Ramp	795	A	847	A	847	A	767	A
27	I-74/US 501 BUS	I-74/SR 1438	Basic Segment	795	A	847	A	847	A	767	A
28	SR 1438 (Ex 185)		Off Ramp	795	A	847	A	847	A	767	A
29	SR 1438 (Ex 185)	SR 1438 (En 185)	Basic Segment	663	A	658	A	658	A	578	A
30	SR 1438 (En 185)		On Ramp	740	A	773	A	773	A	693	A
31	I-74/SR 1438	I-74/SR 1323	Basic Segment	740	A	773	A	773	A	693	A
32	SR 1323 (Ex 186)		Off Ramp	740	A	773	A	773	A	693	A
33	SR 1323 (Ex 186)	SR 1323 (En 186)	Basic Segment	740	A	773	A	773	A	693	A
34	SR 1323 (En 186)		On Ramp	798	A	773	A	773	A	693	A
35	I-74/SR 1323	I-74/US 74 BUS	Basic Segment	798	A	773	A	773	A	693	A
36	US 74 BUS (Ex 187)		Off Ramp	798	A	773	A	773	A	693	A
37	US 74 BUS (Ex 187)	US 74 BUS (En 187)	Basic Segment	683	A	539	A	539	A	459	A
38	US 74 BUS(En 187)		On Ramp	733	A	607	A	607	A	527	A
39	I-74/US 74 BUS	I-74/SR 1436	Basic Segment	733	A	607	A	607	A	527	A

40	SR 1436 (Ex 190)		Off Ramp	733	A	607	A	607	A	527	A
41	SR 1436 (Ex 190)	SR 1436 (En 190)	Basic Segment	692	A	553	A	553	A	473	A
42	SR 1436 (En 190)		On Ramp	713	A	581	A	581	A	501	A
43	I-74/SR 1436	I-74/NC 71/130	Basic Segment	713	A	581	A	581	A	501	A
44	NC 71/130 (Ex 191)		Off Ramp	713	A	581	A	581	A	501	A
45	NC 71/130 (Ex 191)	NC 71/130 (En 191)	Basic Segment	518	A	314	A	314	A	234	A
46	NC 71/130 (En 191)		On Ramp	562	A	372	A	372	A	292	A
47	I-74/NC 71/130	I-74/US 74 Alt	Basic Segment	562	A	372	A	372	A	292	A
48	US 74 Alt (Ex 194A)		Off Ramp	562	A	372	A	372	A	292	A
49	US 74 Alt (Ex 194B)		Off Ramp	558	A	367	A	367	A	287	A
50	US 74 Alt (Ex 194A)	US 74 Alt (En 194A)	Basic Segment	407	A	161	A	161	A	81	A
51	US 74 Alt (En 194A)		On Ramp	437	A	197	A	197	A	117	A
52	US 74 Alt (En 194A)	I-74/Proj East End	Basic Segment	437	A	197	A	197	A	117	A

Attachment D

Synchro Results

Intersection	2015	2045			
	No Build	No Build	Alt 1	Alt 2	Alt 3
	LOS/Delay (sec.)	LOS/Delay (sec.)	LOS/Delay (sec.)	LOS/Delay (sec.)	LOS/Delay (sec.)
US 74 & SR 1347 & SR 1145/SR 1348					
Existing US 74 & SR 1347	*/0.6 SB/C/19.5	*/0.9 SB/D/33.4	n/a	n/a	n/a
Proposed US 74 WB Ramps/Service Rd & SR 1347/SR 1348	n/a	n/a	*/4.3 EB/A/9.4	*/4.3 EB/A/9.4	*/4.3 EB/A/9.4
Proposed US 74 EB Ramps/Marsh Rd & SR 1145/SR 1348	n/a	n/a	*/4.1 WB/A/9.1	*/4.1 WB/A/9.1	*/4.1 WB/A/9.1
Existing US 74 & SR 1145/1348	*/1.0 SB/C/20.9	*/2.8 SB/F/66.3	n/a	n/a	n/a
US 74 & SR 1319					
Existing US 74 & SR 1319	*/1.6 SB/B/11.7	*/1.8 BB/B/13.9	Proposed Grade Separation		
US 74 & SR 1148/NC 144					
Existing US 74 & SR 1148/NC 144	B/18.0 WB/C/27.6	C/20.3 WB/C/31.2	n/a	n/a	n/a
Proposed US 74 WB Ramps & NC 144	n/a	n/a	*/5.0 WB/B/13.9	*/3.4 WB/B/11.6	*/3.4 WB/B/11.6
Proposed US 74 EB Ramps & SR 1448/NC 144	n/a	n/a	*/9.3 EB/D/26.9	*/6.4 EB/C/17.6	*/6.4 EB/C/17.6
US 74 & SR 1305 & SR 1304					
Existing US 74 & SR 1305	B/11.6 WB/C/25.6	B/14.3 WB/C/28.7	n/a	n/a	n/a
Existing US 74 & SR 1304	*/2.1 SB/E/39.1	*/47.2 SB/F/603.8	n/a	n/a	n/a
Proposed SR 1304/SR 1305 Interchange	n/a	n/a	*/2.9 WB/A/9.3	n/a	n/a
Proposed US 74 WB Ramps & SR 1304/SR 1305	n/a	n/a	n/a	*/3.6 WB/B/11.8	*/3.6 WB/B/11.8
Proposed US 74 EB Ramps & SR 1304/SR 1305	n/a	n/a	n/a	*/4.1 EB/B/11.9	*/4.1 EB/B/11.9
US 74 & NC 79 (Exit 182)					
Existing US 74 WB Exit Ramp & NC 79	*/3.5 NB/B/10.0	*/3.7 NB/B/10.8	n/a	n/a	n/a
Proposed US 74 EB Ramps & NC 79	n/a	n/a	*/1.4 NB/B/11.1	*/1.4 NB/B/11.1	*/1.4 NB/B/11.1
Proposed US 74 WB Ramps & NC 79	n/a	n/a	*/4.1 NB/B/11.6	*/4.1 NB/B/11.6	*/4.1 NB/B/11.6

US 74 & US 15/401 (Exit 183)					
Existing US 74 WB Ramps & US 15/401	C/29.5 SB/D/36.6	F/205.3 SB/F/718.0	n/a	n/a	n/a
Existing US 74 EB Ramps & US 15/401	*/7.7 EB/F/68.7	*/74.4 EB/F/867.6	n/a	n/a	n/a
Proposed US 74 WB Ramps & US 15/401	n/a	n/a	D/52.4 EB/F/82.9	D/43.6 EB/F/87.2	D/46.1 EB/F/87.2
Proposed US 74 EB Ramps & US 15/401	n/a	n/a	B/15.5 NB/D/51.8	B/15.2 NB/D/50.1	A/9.6 EB/D/45.0
US 74 & US 15/401 BUS (Exit 184)					
Existing US 74 WB Ramps & US 15/401 Bus	*/4.5 EB/D/34.9	*/30.3 EB/F/243.9	n/a	n/a	n/a
Existing US 74 EB Ramps & US 15/401 Bus	*/2.7 WB/B/14.6	*/1.8 WB/C/21.8	n/a	n/a	n/a
Proposed US 74 WB Ramps & US 15/401 Bus	n/a	n/a	Proposed Grade Separation	*/24.0 EB/F/176.0	*/5.8 WB/E/44.1
Proposed US 74 EB Ramps & US 15/401 Bus	n/a	n/a		n/a	*/1.8 WB/C/18.8
US 74 & US 501/SR 1438 (Exit 185)					
Existing US 74 WB Ramps & US 501/SR 1438	*/4.9 WB/B/13.2	*/6.8 WB/C/19.9	*/6.8 WB/C/19.9	*/6.8 WB/C/19.9	*/6.8 WB/C/19.9
Existing US 74 EB Ramps & US 501/SR 1438	*/2.7 EB/B/10.3	*/2.9 EB/B/11.6	*/2.9 EB/B/11.6	*/2.9 EB/B/11.6	*/2.9 EB/B/11.6
US 74 & SR 1323 (Exit 186)					
Existing US 74 EB Ramps & SR 1323	*/4.3 EB/A/9.0	*/4.3 EB/A/9.1	Proposed Grade Separation		
US 74 & US 74BUS (Exit 187)					
Existing US 74 WB Ramps & US 74 BUS	*/4.0 NB/B/12.8	*/4.5 NB/C/15.9	*/4.4 NB/C/18.3	*/4.4 NB/C/18.3	*/4.4 NB/C/18.3
Existing US 74 EB Ramps & US 74 BUS	*/2.7 NB/A/9.6	*/2.9 NB/B/10.2	*/3.8 NB/B/10.9	*/3.8 NB/B/10.9	*/3.8 NB/B/10.9
US 74 & SR 1436 (Exit 190)					
Existing US 74 WB Ramps & SR 1436	*/3.2 WB/A/9.5	*/3.3 WB/A/9.8	*/3.3 WB/A/9.8	*/3.3 WB/A/9.8	*/3.3 WB/A/9.8
Existing US 74 EB Ramps & SR 1436	*/2.8 WB/A.9.0	*/2.8 WB/A/9.1	*/2.8 WB/A/9.1	*/2.8 WB/A/9.1	*/2.8 WB/A/9.1
US 74 & NC 71 (Exit 191)					
Existing US 74 WB Ramps & NC 71	*/1.7 EB/B/13.3	*/2.0 EB/B/17.1	*/2.0 EB/C/17.1	*/2.0 EB/C/17.1	*/2.0 EB/C/17.1
Existing US 74 EB Ramps & NC 71	*/4.3 EB/B/13.3	*/6.2 EB/C/19.0	*/6.2 EB/C/19.0	*/6.2 EB/C/19.0	*/6.2 EB/C/19.0

US 74 & US 74ALT (Exit 194)					
Existing US 74 EB Ramps & US 74ALT/SR 1302 (Exit 194A)	*/0.9 SB/A/8.9	*/0.8 SB/A/9.1	*/0.8 SB/A/9.1	*/0.8 SB/A/9.1	*/0.8 SB/A/9.1
Existing US 74 WB Ramps & US 74ALT (Exit 194)	A/8.3 EB/B/15.8	A/9.0 EB/B/15.9	A/9.0 EB/B/15.9	A/9.0 EB/B/15.9	A/9.0 EB/B/15.9

Note: LOS/Delay data in this table represents the more conservative of the AM and PM Peak Hour data. Delay is in seconds.
n/a=not applicable
* indicates no letter value is assigned by Synchro. X/X indicates LOS/Delay for the entire intersection; X/X/X indicates worst approach/worst approach LOS/worst approach delay.

5/14/99

Option 1: Flip the eastbound on-ramp at US 15/401 Bypass and the westbound ramps at US 15 / US 401 Business to increase weaving distances.

Option 2: Eliminate two ramps from US 15/ US 401 Business interchange to eliminate short weaves.

Option 3: Close one interchange completely: US 15 / US 401 Business.

Legend

- Area to be Removed
- New Construction
- Existing EOP

PRELIMINARY PLANS
SUBJECT TO CHANGE WITHOUT NOTICE

THESE PLANS ARE PRELIMINARY AND SUBJECT TO CHANGE WITHOUT NOTICE. THIS STUDY IS NOT THE PRODUCT OF EXTENSIVE DESIGN AND ENVIRONMENTAL ANALYSIS

0 400′ 800′ 1600′

DEPARTMENT OF TRANSPORTATION
PROGRAM DEVELOPMENT BRANCH
FEASIBILITY STUDIES UNIT

Figure 5 - Laurinburg Interchanges Options
FS-1508A

US 74 Upgrade to Interstate Standards
Richmond, Scotland and Robeson Counties

Project Length: *23.4 miles*

Project:	FS-1508A
Description:	US 74 (Upgrade to Interstate): East of Rockingham-Hamlet Bypass in Richmond County to existing I-74 east of Maxton in Robeson County
Subject:	Start of Study Comments
Date:	10/16/2015
Div #	6 and 8

Received	From	Comments	Response
5/15/2015	Division 8 and the ITS Section (Elizabeth Honeycutt)	Division 8 and the ITS Section would like to include $350,000 for ITS in the cost estimate for FS-1507A [US 74, Upgrade Interstate: East of Rockingham-Hamlet Bypass to existing I-74 East of Maxton - Richmond/Scotland & Robeson Counties]. (Estimate Attached)	
5/20/2015	NCDOT Rail Division (Andrew R. Thomas)	I notice no mention of the US 74 bridge over the Campbell's Soup lead, just east of the interchange with NC 71 north of Maxton. It is not circled or otherwise marked on the vicinity map.	
5/22/2015	State Railroad Coordination Engineer (James B Harris)	See Comment Attached	
5/28/2015	Division of Bicycle and Pedestrian Transportation (Kendra Bridges)	In response to your request for information on FS-1508A, upgrade US 74 to Interstate from East of Rockingham-Hamlet Bypass in Richmond County to existing I-74 East of Maxon in Robeson County, the Division of Bicycle and Pedestrian Transportation has the following comments. A state bicycle routes and local pedestrian/bicycle connections may be impacted by this project. US 1 (Carolina Connector), a multi-state bicycle route, crosses US 74 at-grade east of Laurinburg on SR 1321 (Laurel Hill Church Road), and crosses over US 74 in Laurinburg at SR 1105 (Turnpike Road). For Pedestrians, the Laurinburg Pedestrian Plan (http://www.walklaurinburg.org/the-plan.html) identifies a planned greenway, the Laurinburg Cross City Trail, crossing US 74 in two places via overpass. The western overcrossing at West Boulevard is proposed as a new pedestrian and bicycle bridge, and the eastern overcrossing is via an existing overpass with paved shoulder at Caledonia Road. Accordingly, the Division of Bicycle and Pedestrian Transportation recommends that consideration of these important multi-modal connections be made in this feasibility study, and that appropriate crossing treatments be identified and included in the project plan as needed. We recommend coordinating with the City of Laurinburg and Scotland County to ensure that the needs of bicyclists and pedestrians are considered in the feasibility study and resulting project plan. The Division of Bicycle and Pedestrian Transportation appreciates the opportunity to comment. Please contact us if there is a need for additional information.	
6/29/2015	Town of Maxton (Angela Pitchford)	The Town of Maxton elected officials are excited and eager to support the Department of Transportation in upgrading the Maxton US 74 bypass into Interstate 74. We believe that this project will assist in helping the Town of Maxton to move forward with positive growth. Upgrading to an interstate will provide opportunity for others to view the great potential here in the Town of Maxton. This opportunity can bring potential businesses, possible new residents and promote economic growth in the town. We look forward to exciting new prospects with project FS-1508A.	

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PAT MCCRORY
GOVERNOR

ANTHONY J. TATA
SECRETARY

May 22, 2015

REVISED

MEMORANDUM

To:	Sonya Avant Tankersley, PE Program Development Branch Feasibility Studies Unit
From:	James B. Harris, PE State Railroad Coordination Engineer NCDOT Rail Division
State Project:	FS-1508A
County:	Richmond, Scotland and Robeson (Divisions 6 & 8)
Description:	US 74 (Upgrade to Interstate): East of Rockingham-Hamlet Bypass in Richmond County to existing I-74 east of Maxton in Robeson County
Subject:	Feasibility Study in Progress

The NCDOT Rail Division is in receipt of your scoping letter on the above subject feasibility study. After review of the location map and the project in relation to nearby railroad tracks, it has been determined that rail interaction is anticipated on this project. The rail lines that could be impacted belong to CSX Transportation (CSX) and the Laurinburg and Southern Railroad Company (LRS).

The CSX line known as the SE-line runs from Hamlet to Wilmington and is considered oriented west/east with mileposts increasing from west to east. US 74 generally parallels and crisscrosses this rail line from milepost SE 256.5 (Begin Project FS-1508A) to milepost SE 279.0 (End Project FS-1508A). The right-of-way (R/W) is 200 feet wide (100' each side of the center line of track). The SE-line carries up to 20 freight trains per day at a maximum speed of 49 mph and no passenger trains.

The LRS line is known as its mainline and connects with the CSX SE-line in Laurinburg and runs southward to Johns. US 74 only crosses this rail line at one location by way of a highway bridge over the track. R/W width is unknown. The LRS carries 2-4 freight trains per day at maximum speed of 10 mph and no passenger trains.

It is not known at this time what specific impacts could occur from the US 74 upgrade along the CSX SE-line and LRS mainline. However, impacts could include:

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
RAIL DIVISION
1553 MSC
RALEIGH NC 27699-1553

TELEPHONE: 919-707-4707
FAX: 919-715-6580

WEBSITE: WWW.BYTRAIN.ORG

LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH NC 27601

- Parallel encroachment on CSX's SE-line R/W
- Modifications or replacement of the existing highway bridges over CSX and LRS
- Existing at-grade crossing upgrades (changes to roadway profile, widened crossing surfaces, relocation/addition of crossing signals/gates, etc.) on -Y- lines that connect to US 74
- Possibly grade separation of existing at-grade crossings on -Y- lines where there is only a short distance from a proposed/necessary grade separation of an existing US 74/-Y-line intersection to meet interstate standards.

The project areas that could be affected by the aforementioned impacts are:

- Highway overpasses on US 74 over CSX and LRS (see attachment):
  1. Location 1, CSX milepost SE 260.5 (NCDOT Bridges 9 & 16 – Scotland Co.)
  2. Location 2, LRS mainline (no milepost available) (NCDOT Bridges 57 & 60 – Scotland Co.)
  3. Location 3, CSX milepost SE 271.95 (NCDOT Bridges 73 & 94 – Scotland Co.)
  4. Location 4, CSX McNair Wye Spur (NCDOT Bridges 97 & 98 – Scotland Co.)
  5. Location 5, CSX Campbell Soup Spur (NCDOT Bridges 454 & 455 – Robeson Co.)
  6. Location 6, CSX milepost SE 278.1 (NCDOT Bridges 456 & 457 – Robeson Co.)
- Encroachment on parallel CSX R/W from CSX milepost SE 261.0 to SE 266.0 (Laurel Hill area)
- Numerous -Y- lines to US 74 for the length of the improvement project (CSX milepost SE 256.5 to SE 279.0) that have existing at-grade highway/railroad crossings with CSX.
- In the Laurel Hill area (CSX mileposts SE 262.5 to SE 264.0), the best alternative may be to place US 74 on new location to the south due to development, the close proximity of the parallel US 74 to CSX's track, and the short -Y- lines from US 74 to the railroad crossings. This would eliminate encroachment on CSX's R/W, difficulty that would be experienced grade separating US 74/-Y- line intersections (and most likely at-grade railroad crossings as well), and impacts in developed areas.

Modifications or replacement of existing highway bridges over CSX or LRS would require coordination, review, and approval with the affected railroad. For assistance in that regard, Kevin Fischer, PE of NCDOT Structures Management Unit should be contacted. He may be contacted at 919-707-6514.

If an off-site detour route is required to make any crossing improvements or bridge modifications/replacements, it is recommended that a detour route with grade separation be used if possible. In general, if an off-site detour is necessary, selection and preference should be given to detour routes that provide grade separation of the highway and railroad tracks if possible. If a grade-separated route is not available, traffic should be detoured over a route that avoids rail interaction. However, if no other alternative is available the route should provide at-grade signalized crossing.

The existing roadway profile on any at-grade railroad crossings that may be located on a detour route must also be considered when selecting the detour route. Detour routes should be chosen that offer the railroad crossing with the best profile rather than a route that would require traffic to use a "humped" crossing. Flatbed trailers or other low riding vehicles may get stuck on such a crossing.

If any changes are made to the crossing surface or parallel encroachments on CSX R/W, Surface & Encroachment Manager, David Hinnant would be involved. He can be contacted at 919-715-8804. For new, modified, or relocation of signals, Rail Signals Manager, Richard Mullinax, PE would be involved. He can be contacted at 919-733-8015. To gain information regarding the type of protection at any existing at-grade crossings or upgrades that may be required to existing crossing protection for design or detour routes, please contact the Inventory & Data Analysis Manager, Mr. A. R. (Drew) Thomas, PE at (919)733-5564.

Thank you for keeping the Rail Division involved in the early project planning stages. If you have any questions or need additional information please contact Jim Harris or Cheryl Collins at 919-707-4704 (jbharris@ncdot.gov) or 919-707-4723 (cjcollins@ncdot.gov), respectively. *The data provided in this letter is for information only and should be verified. Any additional information obtained during the preliminary design process should also be verified.*

JBH/CJC

Cc: file
A. R. (Drew) Thomas, PE
David Hinnant
Richard Mullinax, PE
Tom Koch, PE
Brian Hanks, PE,
Attn: Kevin Fischer, PE

Memorandum

To: *Sonya Tankersley, PE, NCDOT Feasibility Studies Unit*

From: *Mark Pierce, PE, CDM Smith*

Date: *November 2, 2015*

Subject: *FS-1508A US 74 Upgrade to Interstate Standards 4-Lane vs 6-Lane Evaluation*

CDM Smith, Inc. (CDM Smith) is preparing a Feasibility Study (FS-1508A) for the North Carolina Department of Transportation (NCDOT). The NCDOT STIP Project FS-1508A, US 74 Upgrade to Interstate Standards in Richmond, Scotland, and Robeson Counties, includes the development and evaluation of improvements needed to upgrade a 23.4-mile portion of US 74, starting from the US 74 Rockingham-Hamlet Bypass in Richmond County and ending at Existing I-74 in Robeson County, across two NCDOT Highway Divisions (Divisions 6 and 8). This memo provides a summary of the Traffic Capacity Analysis – 4-Lane vs. 6-Lane Evaluation as a preliminary analysis for this feasibility study.

Traffic Demand Projections

The study segment of US 74 is a portion of NCDOT Strategic Transportation Corridor H (I-74/ Future I-74) and Corridor U (US 74W/US 74E). Based on traffic surveys conducted by NCDOT, the 2014 Annual Average Daily Traffic (AADT) along I-74/US 74 increases from 11,000 Vehicles per Day (VPD) at the project's west end in Richmond County to 18,000 VPD at Laurel Hill, peaks at 20,000 VPD west of Laurinburg, then starts decreasing from 19,000 VPD between US 15/US 401 and US 501 Business to 15,000 VPD east of US 74 Business in Scotland County, and bottoms at 12,000 VPD east of Maxton in Robeson County. Previous year traffic data between 2002 and 2013 (as shown in Attachment A) indicate a flat or relatively mild traffic growth along I-74/US 74 and its crossing roadways.

The future analysis year for this project is 2040. Future traffic patterns can be partially determined by reviewing historical data. In addition, future traffic demand also depends on changes in many other future social economic factors such as population growth, employment, land uses, etc. The final traffic forecast is still under development, and won't be available until early 2016. In this preliminary analysis, a trend line analysis method is employed by applying an annual growth rate to historical AADT data. Based on previous year data and future traffic forecasts on US 74 adjacent to this project, a test range of 1% to 5% is applied for an initial screening analysis, and an annual growth rate of three percent (3%) is used for subsequent freeway segment and interchange operations analysis to provide conservative estimates under the future year (2040) conditions.

Freeway Segment and Interchange Assumptions

Under the existing conditions, the US 74 study corridor includes a 4-lane, median-divided highway segment from east of the US 74 Business merge/diverge in Richmond County to just east of the SR 1321 (Laurel Hill Church Road) median cross-over intersection in Scotland County, and a 4-lane freeway segment from the US 74 Business merge/diverge in west Laurinburg in Scotland County to the project's east end at the US 74 Alternate interchange in Robeson County. The entire corridor includes 2 merge/splits, 7 full interchanges, 2 half interchanges, 2 signalized intersections, 7 unsignalized intersections, 2 directional cross-over intersections, and 6 full-movement median openings. It also includes 11 grade separations (overpass/underpass) along its entire length.

NCDOT has requested traffic forecasts under base year and future year conditions at 23 intersections, interchanges, and grade separations within the project limits. An itemized intersection list is shown in Attachment B. A tentative list of roadway improvements are developed based on this intersection list. In this preliminary analysis, constructing 2 new interchanges and upgrading the two existing half interchanges to full interchanges are assumed to occur under the 2040 Build conditions. As a result, I-74 under the 2040 Build conditions will be evaluated as a 4-lane or 6-lane freeway facility with 13 full interchanges and 2 merge/split within the project limits.

Traffic Capacity Analysis

Traffic capacity analysis consists of two levels in this project. First, a planning-level screening analysis was developed using spreadsheets to carry out a sensitivity test under different traffic growth scenarios. Based on historical traffic data and experience with similar types of projects, a test range from 1% to 5% is conducted on the annual traffic growth rate. The resulting traffic volume projections are examined against common engineering thresholds for 4-lane freeway capacity volumes to decide if a 4-lane freeway can provide adequate capacity for future traffic demand under certain traffic growth conditions. The results of screening analysis are illustrated in Attachment C.

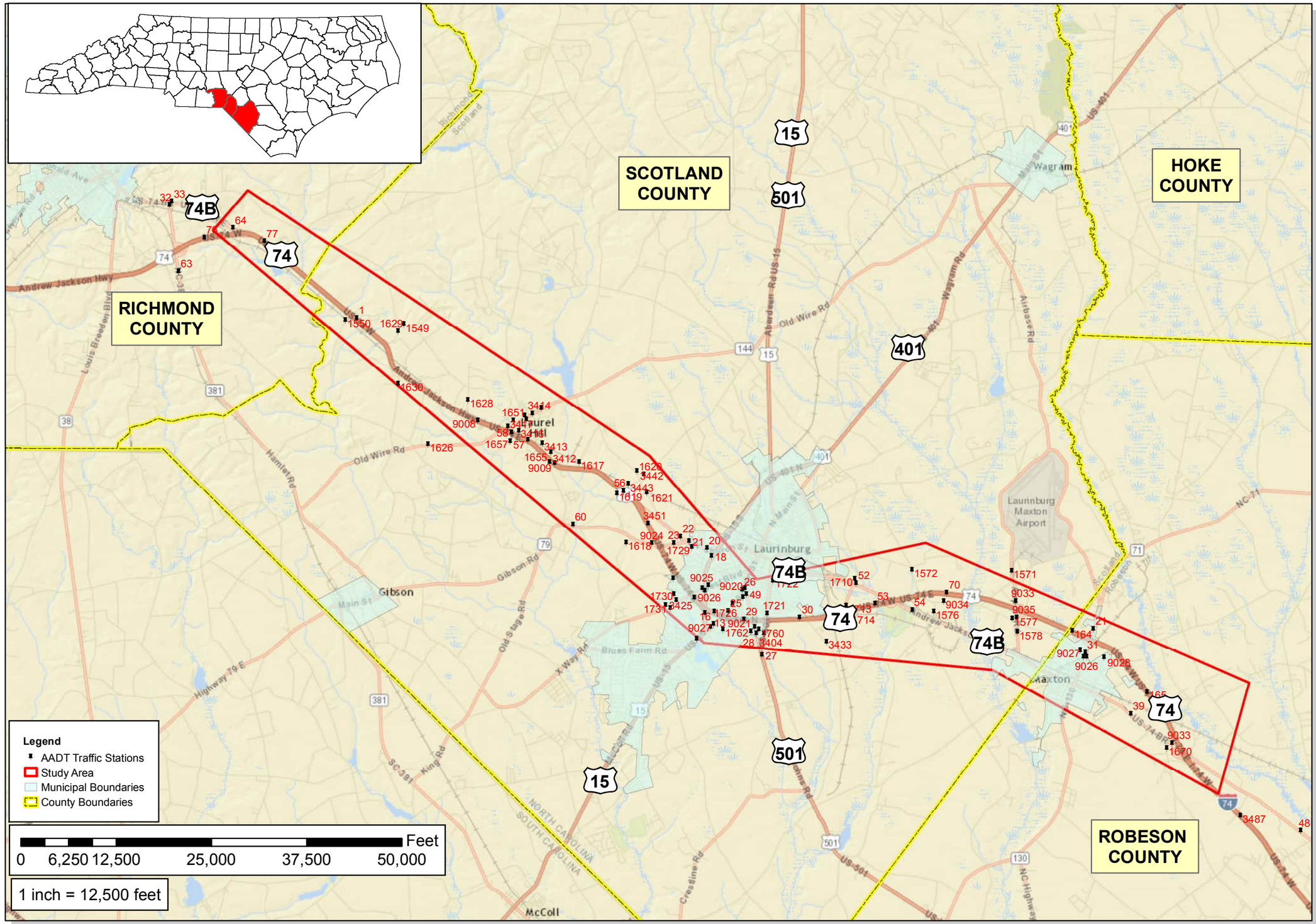
A traffic operations analysis was conducted using Highway Capacity Software (HCS) 2010, Freeway Facilities module. The HCS 2010 is developed and maintained as a faithful implementation of the procedures included in Highway Capacity Manual (HCM) 2010, which is a national standard for the traffic operations analysis and evaluation of transportation facilities. The HCS 2010 Freeway Facility module performs level of service (LOS) analysis for freeway facilities including freeway segments, on-ramps, off-ramps, and weaving areas. This freeway and interchange traffic operations analysis enables identifying capacity deficiencies at specific locations and evaluates the needs of auxiliary lanes at bottleneck segments if a six-lane cross-section is not needed along the entire length. For simplicity, only the peak hour directions (eastbound in the AM and westbound in the PM) representing the worst-case traffic conditions are modeled. The traffic operations analysis results from HCS 2010 are shown in Attachment D.

Results Summary and Tentative Conclusions

A 4-lane versus 6-lane traffic capacity evaluation was conducted for the FS-1508A Project. As indicated in the planning-level screening analysis, a 4-lane freeway facility along future I-74 within the project limits should provide sufficient capacity for the 2040 Build conditions under a typical annual growth rate (1% or 2%) or a conservative rate (3%) conditions. An in-depth freeway and interchange traffic operations analysis indicates that that the segment of I-74/US 74 between NC 79 (Gibson Rd) and SR 1438 (S Caledonia Rd) in south Laurinburg, Scotland County, will become the critical segment for future capacity improvements. Further traffic analysis should be conducted with the final traffic forecasts, particularly the weaving traffic demand between the US 15/US 401 and US 501 BUS interchanges, in order to determine if additional improvements are needed along this segment.

At this time, this preliminary analysis is conducted based on NCDOT historical traffic data and currently available information. The analysis should be updated once the final traffic forecasts are released.

cc: Baohong Wan, PhD, PE



A-6

ATTACHMENT A: NCDOT AADT SURVEY STATIONS

US 74 (UPGRADE TO INTERSTATE)
RICHMOND, SCOTLAND, ROBESON COUNTIES

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS UNIT

County: **RICHMOND, SCOTLAND, ROBESON**

Div:	TIP#
6 AND 8	**FS-1508A**

WBS: **To Be Added**

November 2015

Data Sources: NCDOT, NC OneMap

STATION	COUNTY	ROUTE	LOCATION	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002
48	Robeson	US 74	W OF SR 1166		3900	4100	4700	3800	0	0	12000	13000	13000	13000	12000	11000
3451	Scotland	I-74	FROM EXIT 181 TO EXIT 182		17000	19000	0	0	0	0	0	0	0	0	0	0
76	Richmond	I-74	E OF NC 381		13000	11000	10000	11000	11000	11000	12000	11000	11000	11000	11000	9800
3487	Robeson	I-74	FROM EXIT 194 TO EXIT 197		9100	10000	10000	9900	0	0	0	0	0	0	0	0
1	Scotland	US 74	E OF SR 1155		17000	18000	18000	16000	17000	0	17000	0	16000	0	18000	0
56	Scotland	US 74	E OF SR 1321		20000	22000	23000	19000	21000	0	0	19000	22000	20000	22000	21000
70	Scotland	US 74	FROM EXIT 187 TO EXIT 190		13000	14000	14000	15000	16000	15000	0	15000	15000	15000	15000	14000
57	Scotland	US 74	E OF SR 1148		20000	0	20000	19000	19000	18000	19000	19000	21000	21000	19000	21000
58	Scotland	US 74	W OF SR 1148		18000	0	18000	14000	17000	17000	0	17000	17000	17000	16000	16000
77	Richmond	US 74	W OF SR 1846		18000	15000	15000	15000	15000	15000	17000	16000	15000	16000	15000	16000
9008	Scotland	US 74	W OF SR 1319		18000	0	0	0	17200	0	0	0	0	0	0	0
9009	Scotland	US 74	E OF SR 1125		18000	0	0	0	19500	0	0	0	0	0	0	0
164	Robeson	US 74 BYP	W OF NC 71		13000	14000	16000	15000	14000	14000	16000	15000	16000	14000	14000	14000
165	Robeson	US 74 BYP	S OF SR 1303		9100	10000	12000	12000	10000	11000	0	11000	14000	11000	11000	11000
53	Scotland	US 74 BYP	FROM EXIT 186 TO EXIT 187		14000	15000	16000	15000	16000	15000	0	15000	16000	15000	16000	14000
30	Scotland	US 74 BYP	FROM EXIT 185 TO EXIT 186		15000	16000	17000	16000	16000	15000	16000	16000	17000	17000	17000	16000
15	Scotland	US 74 BYP	FROM EXIT 182 TO EXIT 183		19000	21000	19000	18000	18000	17000	19000	17000	18000	16000	17000	17000
16	Scotland	US 74-501 BYP	FROM EXIT 183 TO EXIT 184		19000	21000	20000	18000	18000	17000	19000	17000	15000	0	17000	17000
29	Scotland	US 74-501 BYP	FROM EXIT 184 TO EXIT 185		16000	18000	20000	19000	18000	18000	19000	18000	19000	17000	19000	17000
39	Robeson	US 74 BUS	E OF SR 1302		2700	2800	3400	3400	2900	2800	3000	3100	3400	3100	3100	2700
54	Scotland	US 74 BUS	E OF US 74		4400	4900	5300	4300	4300	4900	10000	4800	5800	5500	5600	5600
22	Scotland	US 74 BUS	W OF NC 79		5000	4900	5400	5100	5600	4700	5000	5300	5700	5900	5900	5400
52	Scotland	US 74 BUS	E OF SR 1323		3700	3300	3700	4000	3800	3700	4700	3800	3800	3800	4200	4400
33	Richmond	US 74 BUS	E OF NC 381		5200	4600	5500	5900	5000	4400	5000	5100	6100	6000	4900	5900
64	Richmond	US 74 BUS	W OF I-74		4600	4300	5000	2700	0	4200	4600	4500	5000	5600	4500	0
9033	Robeson	US 74 BUS	E OF SR 1153		0	0	0	0	2500	0	0	0	0	0	0	0
20	Scotland	US 74 BUS/NC 79	W OF SR 1360		6800	7300	7800	7500	7800	7000	7100	7800	7700	7900	8200	7500
21	Scotland	US 74 BUS/NC 79	W OF SR 1105		6800	6900	7400	7100	7700	6900	7200	7700	7800	8000	8000	7700
1654	Scotland	NC 144	E OF SR 1375		3700	4000	4100	3600	0	3500	0	4100	0	4800	0	3900
3414	Scotland	NC 144	S OF SR 1319		0	2200	0	2000	0	1800	0	1800	0	2300	0	2000
63	Richmond	NC 381	N OF SR 1615		1600	1600	1700	1900	1900	1500	1500	1600	1800	1700	1600	1800
32	Richmond	NC 381	S OF US 74 BUS		1700	1600	1700	1900	1800	1600	1600	1700	1900	1800	1500	2000
31	Robeson	NC 71	N OF SR 1302		4400	5800	6800	6500	6700	6500	7000	7100	7100	7300	6600	6200
21	Robeson	NC 71	N OF SR 1391		0	9300	11000	8100	7500	8000	8400	10000	8500	9000	0	0
9027	Robeson	NC 71	S OF SR 1302		3900	0	0	0	4800	0	0	0	0	0	0	0
60	Scotland	NC 79	W OF SR 1321		4200	4500	4500	4200	4500	4300	5300	5500	4700	4200	4900	4600
23	Scotland	NC 79	S OF US 74 BUS		1900	2100	2100	2200	2200	2000	2300	2400	2300	2200	2300	2400
9024	Scotland	NC 79	W OF US 74		3200	0	0	0	2000	0	0	0	0	0	0	0
3415	Scotland	SR 1001	S OF SR 1319		2000	0	2000	0	1800	0	2100	0	2100	0	2300	0
1653	Scotland	SR 1001	N OF SR 1319		2300	0	2200	0	2000	0	1900	0	2700	0	3200	0
3424	Scotland	SR 1105	S OF SR 1116		0	3200	0	3000	0	2900	0	2700	0	3100	0	2500
1729	Scotland	SR 1105	S OF US 74 BUS/NC 79		2300	0	2700	0	2500	0	2600	0	2600	0	2600	0
1731	Scotland	SR 1105	S OF SR 1108		0	3200	0	3300	0	3000	0	3200	0	3200	0	3000
1726	Scotland	SR 1107	N OF US 15-401 BUS MAIN ST		0	3300	0	0	0	5600	0	4000	0	4200	0	4100
3425	Scotland	SR 1108	W OF SR 1105		0	3700	0	3300	0	3300	0	0	0	4000	0	3900
1730	Scotland	SR 1108	E OF SR 1105		6500	0	6700	0	7200	0	5800	0	6300	0	6700	0
9026	Scotland	SR 1108	W OF US 15-401-501		6900	0	0	0	6800	0	0	0	0	0	0	0
9025	Scotland	SR 1108	E OF US 15-401-501		5400	0	0	0	6100	0	0	0	0	0	0	0
3423	Scotland	SR 1116	W OF SR 1105		0	870	0	820	0	780	0	520	0	570	0	510
1618	Scotland	SR 1118	S OF NC 79		240	0	340	0	270	0	340	0	350	0	280	0
3412	Scotland	SR 1125	S OF US 74		1600	0	1400	0	1400	0	1300	0	0	0	1600	0
1630	Scotland	SR 1145	S OF SR 1154		0	590	0	500	0	220	0	480	0	620	0	560
1657	Scotland	SR 1148	S OF US 74		1300	0	1600	0	1200	0	1300	0	1700	0	1800	0
1626	Scotland	SR 1152	E OF SR 1126		0	1000	0	950	0	930	0	1200	0	1400	0	1300

STATION	COUNTY	ROUTE	LOCATION	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002
1670	Robeson	SR 1153	S OF US 74 BUS		0	0	1800	0	1700	0	1900	0	2200	0	2100	0
1550	Scotland	SR 1155	S OF US 74		0	110	0	90	0	100	0	120	0	120	0	150
1923	Robeson	SR 1302	W of NC 71		3000	0	1800	0	1700	0	1800	0	1600	0	1400	0
9026	Robeson	SR 1302	E OF NC 71		3100	0	0	0	2400	0	0	0	0	0	0	0
3442	Scotland	SR 1303	W OF SR 1321		0	1500	0	1300	0	1400	0	2000	0	2100	0	1700
1621	Scotland	SR 1303	S OF SR 1321		0	1400	0	1100	0	1200	0	1500	0	1600	0	1300
9028	Robeson	SR 1303	S OF SR 1304		1500	0	0	0	1900	0	0	0	0	0	0	0
1617	Scotland	SR 1304	N OF US 74		930	0	830	0	630	0	650	0	680	0	570	0
1655	Scotland	SR 1305	N OF SR 1355		0	1200	0	1000	0	910	0	830	0	1100	0	630
3413	Scotland	SR 1306	E OF SR 1307		460	0	470	0	390	0	280	0	310	0	270	0
1549	Scotland	SR 1314	E OF SR 1384		0	270	0	220	0	250	0	310	0	280	0	360
1651	Scotland	SR 1314	W OF SR 1319		0	570	0	530	0	570	0	670	0	920	0	790
3416	Scotland	SR 1317	N OF SR 1306		0	110	0	0	0	210	0	240	0	270	0	300
3417	Scotland	SR 1319	N OF SR 1306		0	2000	0	1800	0	1800	0	2500	0	2800	0	2800
3443	Scotland	SR 1321	S OF SR 1303		240	0	290	0	400	0	570	0	630	0	520	0
1619	Scotland	SR 1321	S OF US 74		0	200	0	170	0	0	0	300	0	370	0	390
1620	Scotland	SR 1321	E OF SR 1303		300	0	380	0	370	0	540	0	550	0	490	0
1710	Scotland	SR 1323	N OF US 74 BUS		1000	0	1200	0	0	0	1200	0	1400	0	1400	0
1714	Scotland	SR 1323	S OF US 74		1100	0	1400	0	1100	0	1000	0	1400	0	1200	0
1713	Scotland	SR 1323	S OF SR 1645		1100	0	1400	0	1100	0	1100	0	1300	0	1700	0
1629	Scotland	SR 1347	S OF SR 1314		480	0	400	0	410	0	440	0	450	0	580	0
1628	Scotland	SR 1363	N OF US 74		220	0	230	0	230	0	230	0	280	0	420	0
1572	Scotland	SR 1369	S OF SR 1438		1000	0	1100	0	1300	0	1400	0	1400	0	1500	0
1577	Scotland	SR 1369	W OF SR 1436		1500	0	1900	0	1600	0	2400	0	1700	0	2000	0
9034	Scotland	SR 1369	E OF SR 1611		1600	0	0	0	1600	0	0	0	0	0	0	0
1571	Scotland	SR 1434	S OF SR 1479		920	0	1100	0	930	0	970	0	1100	0	1400	0
1578	Scotland	SR 1436	S of SR 1369		990	0	1200	0	1100	0	1700	0	1100	0	1400	0
9035	Scotland	SR 1436	S OF US 74		1600	0	0	0	1790	0	0	0	0	0	0	0
9033	Scotland	SR 1436	N OF US 74		2500	0	0	0	2700	0	0	0	0	0	0	0
1721	Scotland	SR 1438	N OF I- 74		0	3800	0	0	0	3200	0	3700	0	3800	0	3400
3433	Scotland	SR 1601	N OF SR 1609		0	490	0	500	0	530	0	610	0	690	0	710
1722	Scotland	SR 1601	E OF SR 1438		1000	0	1100	0	1200	0	1200	0	1600	0	1700	0
1576	Scotland	SR 1611	S OF SR 1369		0	1400	0	1200	0	1600	0	1500	0	1700	0	1900
1727	Scotland	SR 1641	S OF US 501 BUS		1800	0	1800	0	0	0	2000	0	2000	0	2100	0
1760	Scotland	SR 1674	W OF US 501 BYP		2900	0	3000	0	0	0	2900	0	3100	0	2900	0
1762	Scotland	SR 1674	E OF US 15-401 BUS		7500	0	7200	0	0	0	7900	0	8000	0	8100	0
1761	Scotland	SR 1674	W OF US 501 BUS		0	8200	0	0	0	5100	0	5100	0	5400	0	4800
9027	Scotland	US 15 BUS	N OF SR 1674		15000	0	0	0	12800	0	0	0	0	0	0	0
12	Scotland	US 15-401	S OF SR 1175		18000	20000	20000	18000	18000	17000	19000	18000	20000	21000	21000	19000
13	Scotland	US 15-401 BUS	S OF SR 1674		10000	9700	10000	10000	10000	9200	9900	9300	9600	0	10000	11000
25	Scotland	US 15-401 BUS	S OF SR 1107		14000	14000	15000	15000	15000	14000	15000	14000	16000	16000	16000	18000
26	Scotland	US 15-401-501 BUS	S OF US 501 BUS		11000	12000	12000	11000	10000	11000	12000	11000	12000	11000	0	14000
18	Scotland	US 15-401-501 BYP	S OF US 74 BUS		11000	12000	13000	11000	11000	11000	0	12000	13000	13000	13000	14000
17	Scotland	US 15-401-501 BYP	S OF SR 1108		14000	16000	16000	15000	14000	15000	15000	15000	16000	16000	16000	15000
14	Scotland	US 15-401-501 BYP	N OF SR 1175		12000	14000	14000	13000	13000	12000	12000	13000	15000	13000	14000	13000
27	Scotland	US 501	S OF US 501 BUS		5800	6200	6000	6600	6700	6600	6800	6400	6400	6400	6800	6900
28	Scotland	US 501 BUS	E OF SR 1674		2200	2300	2200	0	0	2700	2900	2600	2700	2700	3000	2700
49	Scotland	US 501 BUS	S OF SR 1641		3100	3400	3000	1800	3500	3200	3000	3000	3200	3300	3600	3500
9021	Scotland	US 501 BUS	N OF SR 1674		2200	0	0	0	2400	0	0	0	0	0	0	0
9020	Scotland	US 501 BUS	N OF SR 1641		2500	0	0	0	2500	0	0	0	0	0	0	0
3404	Scotland	US 501 BYP	N OF SR 1639		3600	3900	4000	6500	4400	4100	4300	3900	3800	3800	4400	4300

Note:

AADT data are provided by NCDOT Traffic Survey Unit. 2014 data are available, but havent been digitized.

List of Intersections, Interchanges, and Structures along I-74/US 74 (FS-1508A)

Mile Distance from Project West End	Crossing Feature/Road	Feature/Road Explanation	Traffic Control	Identification in Forecast Request	Assumed Roadway Improvements for Preliminary Evaluation
0.0	West End				
0.0	**US 74 BR**		**Merge/Split**	**1**	**Do Nothing**
0.7	SR 1846	Question	Unsignalized Tee		close, provide service road
1.2	MO	Median Opening #1	Full movement median opening		close
1.5	MO	Median Opening #2	Full movement median opening		close
1.9	MO	Median Opening #3	Full movement median opening		close
2.2	SR 1156/SR 1801	Joes Creek Rd	Unsignalized Tee		close
2.9	SR 1155	Guinns Mill Rd	Unsignalized Cross		grade separation
3.7	**SR 1347**	**McEachin Rd**	**Unsignalized Tee**	**2**	**realign with SR 1145, grade separation over RR**
4.0	Railroad	CSX Railroad	Underpass		
4.4	**SR 1145**	**Corbitt Rd**	**Unsignalized Cross**	**3**	**new interchange**
4.8	Pate		Unsignalized Tee		close
5.1	SR 1153	Butler Rd	Unsignalized Tee		close, provide service road
5.3	MO	Median Opening #4	Full movement median opening, residential access on both sides		close, provide service road
5.7	MO	Median Opening #5	Full movement median opening		close
6.1	SR 1363	Fred Carter Rd	Unsignalized Tee		close
6.4	Whispering Pine		Unsignalized Cross		close, provide service road
6.9	**SR 1152/SR 1319**	**Old Wire Rd**	**Directional Crossover**	**4**	**grade separation**
7.3	**NC 144/SR 1148**	**Morgan Rd/St John's Church Rd**	**Signalized Cross**	**5**	**new interchange at new location**
7.5	SR 1312	Church St	Unsignalized Cross		Do Nothing
8.0	**SR 1125/SR 1305**	**Springs Mill Rd/Ida Mill Rd**	**Signalized Cross**	**6**	**new interchange at new location**
8.3	SR 1267	**Devon Dr**	Unclear (under construction)		Do Nothing
8.4	Structure	Bridge over hydrolic feature	Bridge		
8.6	**SR 1304**	**Armstrong Rd**	**Unsignalized Tee**	**7**	**close**
9.7	MO	Median Opening #6	Full movement median opening, residential/business access on north side		close
10.0	SR 1321	Laurel Hill Church Rd/Elmore Rd	Directional Crossover with U-turns		new interchange/half interchange
10.6	**US 74 Bus**	**Andrew Jackson Highway**	**Merge/Split**	**8**	**Do Nothing**
11.4	**NC 79**	**Gibson Rd**	**Half Diamond**	**9**	**upgrade to full interchange**
12.2	**SR 1105**	**State Rd Turnpike Rd**	**Overpass**	**10**	**Do Nothing**
12.6	**SR 1108**	**X Way Rd**	**Overpass**	**11**	**Do Nothing**
13.0	**US 15/US 401**		**Partial Cloverleaf/Diamond**	**12**	**interchange upgrade**
13.4	**US 15 Bus/US 401 Bus**	**McColl Rd**	**Half Cloverleaf**	**13**	**grade separation/do nothing**
14.1	**US 501 Bus**	**Johns Rd**	**Overpass**	**14**	**grade separation**
14.4	**US 501/SR 1438**	**S Caledonia Rd**	**Diamond**	**15**	**interchange upgrade**
15.7	**SR 1601**	**Stewartsville Rd/Old Johns Rd**	**Overpass**	**16**	**Do Nothing**
16.2	Railroad	Laurinburg & Southern Company	Underpass		
16.5	**SR 1323/SR 1603**	**Highland Rd**	**Half Diamond**	**17**	**upgrade to full interchange**
17.5	**US 74 Bus**		**Half Cloverleaf**	**18**	**Do Nothing**
17.6	Railroad	CSX Railroad	Underpass		
18.1	**SR 1369**	**Old Lumberton Rd**	**Overpass**	**19**	**Do Nothing**
19.2	Structure	Hydraulic structure	Culvert		
20.1	**SR 1436**	**Airport Rd**	**Half Cloverleaf**	**20**	**Do Nothing**
21.8	**NC 71/NC 130**		**Half Cloverleaf**	**21**	**Do Nothing**
21.9	Railroad	CSX Railroad	Underpass		
22.3	**SR 1303**	**McMcaskill Ave/Old Red Springs Rd**	**Overpass**	**22**	**Do Nothing**
24.1	Railroad	CSX Railroad	Underpass		
24.8	**US 74/Alt**	**Andrew Jackson Highway**	**Parclo**	**23**	**Do Nothing**
24.8	East End				

Note:

1. Intersections, interchanges, and features are listed from project west end to east end. These already identified in the traffic forecasts reqeusted are shown in bold.
2. The assumed roadway improvements are for preliminary evaluation only; they are subject to changes with alternative analysis.

FS-1508A 4-Lane versus 6-Lane Evaluation
Screening Analysis

Station ID	2013 AADT	#########	1.00%				2.00%					3.00%					4.00%					5.00%				
		Growth	2040 Build	K	D	DHV	Growth	2040 Build	K	D	DHV	Growth	2040 Build	K	D	DHV	Growth	2040 Build	K	D	DHV	Growth	2040 Build	K	D	DHV
24732	**13000**	**1.0000**	**17000**	**0.09**	**0.55**	**842**	**1.7069**	**22200**	**0.09**	**0.55**	**1099**	**2.2213**	**28900**	**0.09**	**0.55**	**1431**	**2.8834**	**37500**	**0.09**	**0.55**	**1856**	**3.7335**	**48500**	**0.09**	**0.55**	**2401**
24498	4600	1.0000	6000	0.09	0.55	297	1.7069	7900	0.09	0.55	391	2.2213	10200	0.09	0.55	505	2.8834	13300	0.09	0.55	658	3.7335	17200	0.09	0.55	851
24353	**18000**	**1.0000**	**23500**	**0.09**	**0.55**	**1163**	**1.7069**	**30700**	**0.09**	**0.55**	**1520**	**2.2213**	**40000**	**0.09**	**0.55**	**1980**	**2.8834**	**51900**	**0.09**	**0.55**	**2569**	**3.7335**	**67200**	**0.09**	**0.55**	**3326**
14165	**17000**	**1.0000**	**22200**	**0.09**	**0.55**	**1099**	**1.7069**	**29000**	**0.09**	**0.55**	**1436**	**2.2213**	**37800**	**0.09**	**0.55**	**1871**	**2.8834**	**49000**	**0.09**	**0.55**	**2426**	**3.7335**	**63500**	**0.09**	**0.55**	**3143**
15171	0	1.0000	0	0.09	0.55	0	1.7069	0	0.09	0.55	0	2.2213	0	0.09	0.55	0	2.8834	0	0.09	0.55	0	3.7335	0	0.09	0.55	0
15275	480	1.0000	600	0.09	0.55	30	1.7069	800	0.09	0.55	40	2.2213	1100	0.09	0.55	54	2.8834	1400	0.09	0.55	69	3.7335	1800	0.09	0.55	89
15187	0	1.0000	0	0.09	0.55	0	1.7069	0	0.09	0.55	0	2.2213	0	0.09	0.55	0	2.8834	0	0.09	0.55	0	3.7335	0	0.09	0.55	0
15241	220	1.0000	300	0.09	0.55	15	1.7069	400	0.09	0.55	20	2.2213	500	0.09	0.55	25	2.8834	600	0.09	0.55	30	3.7335	800	0.09	0.55	40
42673	**18000**	**1.0000**	**23500**	**0.09**	**0.55**	**1163**	**1.7069**	**30700**	**0.09**	**0.55**	**1520**	**2.2213**	**40000**	**0.09**	**0.55**	**1980**	**2.8834**	**51900**	**0.09**	**0.55**	**2569**	**3.7335**	**67200**	**0.09**	**0.55**	**3326**
13990	0	1.0000	0	0.09	0.55	0	1.7069	0	0.09	0.55	0	2.2213	0	0.09	0.55	0	2.8834	0	0.09	0.55	0	3.7335	0	0.09	0.55	0
14338	**18000**	**1.0000**	**23500**	**0.09**	**0.55**	**1163**	**1.7069**	**30700**	**0.09**	**0.55**	**1520**	**2.2213**	**40000**	**0.09**	**0.55**	**1980**	**2.8834**	**51900**	**0.09**	**0.55**	**2569**	**3.7335**	**67200**	**0.09**	**0.55**	**3326**
15240	1300	1.0000	1700	0.09	0.55	84	1.7069	2200	0.09	0.55	109	2.2213	2900	0.09	0.55	144	2.8834	3700	0.09	0.55	183	3.7335	4900	0.09	0.55	243
14302	**20000**	**1.0000**	**26200**	**0.09**	**0.55**	**1297**	**1.7069**	**34100**	**0.09**	**0.55**	**1688**	**2.2213**	**44400**	**0.09**	**0.55**	**2198**	**2.8834**	**57700**	**0.09**	**0.55**	**2856**	**3.7335**	**74700**	**0.09**	**0.55**	**3698**
14123	1600	1.0000	2100	0.09	0.55	104	1.7069	2700	0.09	0.55	134	2.2213	3600	0.09	0.55	178	2.8834	4600	0.09	0.55	228	3.7335	6000	0.09	0.55	297
15223	0	1.0000	0	0.09	0.55	0	1.7069	0	0.09	0.55	0	2.2213	0	0.09	0.55	0	2.8834	0	0.09	0.55	0	3.7335	0	0.09	0.55	0
42674	**18000**	**1.0000**	**23500**	**0.09**	**0.55**	**1163**	**1.7069**	**30700**	**0.09**	**0.55**	**1520**	**2.2213**	**40000**	**0.09**	**0.55**	**1980**	**2.8834**	**51900**	**0.09**	**0.55**	**2569**	**3.7335**	**67200**	**0.09**	**0.55**	**3326**
15252	930	1.0000	1200	0.09	0.55	59	1.7069	1600	0.09	0.55	79	2.2213	2100	0.09	0.55	104	2.8834	2700	0.09	0.55	134	3.7335	3500	0.09	0.55	173
13989	240	1.0000	300	0.09	0.55	15	1.7069	400	0.09	0.55	20	2.2213	500	0.09	0.55	25	2.8834	700	0.09	0.55	35	3.7335	900	0.09	0.55	45
14252	**20000**	**1.0000**	**26200**	**0.09**	**0.55**	**1297**	**1.7069**	**34100**	**0.09**	**0.55**	**1688**	**2.2213**	**44400**	**0.09**	**0.55**	**2198**	**2.8834**	**57700**	**0.09**	**0.55**	**2856**	**3.7335**	**74700**	**0.09**	**0.55**	**3698**
40669	**17000**	**1.0000**	**22200**	**0.09**	**0.55**	**1099**	**1.7069**	**29000**	**0.09**	**0.55**	**1436**	**2.2213**	**37800**	**0.09**	**0.55**	**1871**	**2.8834**	**49000**	**0.09**	**0.55**	**2426**	**3.7335**	**63500**	**0.09**	**0.55**	**3143**
14236	5000	1.0000	6500	0.09	0.55	322	1.7069	8500	0.09	0.55	421	2.2213	11100	0.09	0.55	549	2.8834	14400	0.09	0.55	713	3.7335	18700	0.09	0.55	926
42675	3200	1.0000	4200	0.09	0.55	208	1.7069	5500	0.09	0.55	272	2.2213	7100	0.09	0.55	351	2.8834	9200	0.09	0.55	455	3.7335	11900	0.09	0.55	589
14263	1900	1.0000	2500	0.09	0.55	124	1.7069	3200	0.09	0.55	158	2.2213	4200	0.09	0.55	208	2.8834	5500	0.09	0.55	272	3.7335	7100	0.09	0.55	351
14112	0	1.0000	0	0.09	0.55	0	1.7069	0	0.09	0.55	0	2.2213	0	0.09	0.55	0	2.8834	0	0.09	0.55	0	3.7335	0	0.09	0.55	0
14250	**19000**	**1.0000**	**24900**	**0.09**	**0.55**	**1233**	**1.7069**	**32400**	**0.09**	**0.55**	**1604**	**2.2213**	**42200**	**0.09**	**0.55**	**2089**	**2.8834**	**54800**	**0.09**	**0.55**	**2713**	**3.7335**	**70900**	**0.09**	**0.55**	**3510**
14343	12000	1.0000	15700	0.09	0.55	777	1.7069	20500	0.09	0.55	1015	2.2213	26700	0.09	0.55	1322	2.8834	34600	0.09	0.55	1713	3.7335	44800	0.09	0.55	2218
14256	14000	1.0000	18300	0.09	0.55	906	1.7069	23900	0.09	0.55	1183	2.2213	31100	0.09	0.55	1539	2.8834	40400	0.09	0.55	2000	3.7335	52300	0.09	0.55	2589
14185	**19000**	**1.0000**	**24900**	**0.09**	**0.55**	**1233**	**1.7069**	**32400**	**0.09**	**0.55**	**1604**	**2.2213**	**42200**	**0.09**	**0.55**	**2089**	**2.8834**	**54800**	**0.09**	**0.55**	**2713**	**3.7335**	**70900**	**0.09**	**0.55**	**3510**
14370	14000	1.0000	18300	0.09	0.55	906	1.7069	23900	0.09	0.55	1183	2.2213	31100	0.09	0.55	1539	2.8834	40400	0.09	0.55	2000	3.7335	52300	0.09	0.55	2589
42685	15000	1.0000	19600	0.09	0.55	970	1.7069	25600	0.09	0.55	1267	2.2213	33300	0.09	0.55	1648	2.8834	43300	0.09	0.55	2143	3.7335	56000	0.09	0.55	2772
14251	**16000**	**1.0000**	**20900**	**0.09**	**0.55**	**1035**	**1.7069**	**27300**	**0.09**	**0.55**	**1351**	**2.2213**	**35500**	**0.09**	**0.55**	**1757**	**2.8834**	**46100**	**0.09**	**0.55**	**2282**	**3.7335**	**59700**	**0.09**	**0.55**	**2955**
14961	1800	1.0000	2400	0.09	0.55	119	1.7069	3100	0.09	0.55	153	2.2213	4000	0.09	0.55	198	2.8834	5200	0.09	0.55	257	3.7335	6700	0.09	0.55	332
42684	2200	1.0000	2900	0.09	0.55	144	1.7069	3800	0.09	0.55	188	2.2213	4900	0.09	0.55	243	2.8834	6300	0.09	0.55	312	3.7335	8200	0.09	0.55	406
14959	0	1.0000	0	0.09	0.55	0	1.7069	0	0.09	0.55	0	2.2213	0	0.09	0.55	0	2.8834	0	0.09	0.55	0	3.7335	0	0.09	0.55	0
14117	3600	1.0000	4700	0.09	0.55	233	1.7069	6100	0.09	0.55	302	2.2213	8000	0.09	0.55	396	2.8834	10400	0.09	0.55	515	3.7335	13400	0.09	0.55	663
14221	**15000**	**1.0000**	**19600**	**0.09**	**0.55**	**970**	**1.7069**	**25600**	**0.09**	**0.55**	**1267**	**2.2213**	**33300**	**0.09**	**0.55**	**1648**	**2.8834**	**43300**	**0.09**	**0.55**	**2143**	**3.7335**	**56000**	**0.09**	**0.55**	**2772**
15215	1100	1.0000	1400	0.09	0.55	69	1.7069	1900	0.09	0.55	94	2.2213	2400	0.09	0.55	119	2.8834	3200	0.09	0.55	158	3.7335	4100	0.09	0.55	203
15207	1100	1.0000	1400	0.09	0.55	69	1.7069	1900	0.09	0.55	94	2.2213	2400	0.09	0.55	119	2.8834	3200	0.09	0.55	158	3.7335	4100	0.09	0.55	203
14220	**14000**	**1.0000**	**18300**	**0.09**	**0.55**	**906**	**1.7069**	**23900**	**0.09**	**0.55**	**1183**	**2.2213**	**31100**	**0.09**	**0.55**	**1539**	**2.8834**	**40400**	**0.09**	**0.55**	**2000**	**3.7335**	**52300**	**0.09**	**0.55**	**2589**
14166	4400	1.0000	5800	0.09	0.55	287	1.7069	7500	0.09	0.55	371	2.2213	9800	0.09	0.55	485	2.8834	12700	0.09	0.55	629	3.7335	16400	0.09	0.55	812
14323	3700	1.0000	4800	0.09	0.55	238	1.7069	6300	0.09	0.55	312	2.2213	8200	0.09	0.55	406	2.8834	10700	0.09	0.55	530	3.7335	13800	0.09	0.55	683
14283	**13000**	**1.0000**	**17000**	**0.09**	**0.55**	**842**	**1.7069**	**22200**	**0.09**	**0.55**	**1099**	**2.2213**	**28900**	**0.09**	**0.55**	**1431**	**2.8834**	**37500**	**0.09**	**0.55**	**1856**	**3.7335**	**48500**	**0.09**	**0.55**	**2401**
42677	2500	1.0000	3300	0.09	0.55	163	1.7069	4300	0.09	0.55	213	2.2213	5600	0.09	0.55	277	2.8834	7200	0.09	0.55	356	3.7335	9300	0.09	0.55	460
42676	1600	1.0000	2100	0.09	0.55	104	1.7069	2700	0.09	0.55	134	2.2213	3600	0.09	0.55	178	2.8834	4600	0.09	0.55	228	3.7335	6000	0.09	0.55	297
12481	4400	1.0000	5800	0.09	0.55	287	1.7069	7500	0.09	0.55	371	2.2213	9800	0.09	0.55	485	2.8834	12700	0.09	0.55	629	3.7335	16400	0.09	0.55	812
12482	0	1.0000	0	0.09	0.55	0	1.7069	0	0.09	0.55	0	2.2213	0	0.09	0.55	0	2.8834	0	0.09	0.55	0	3.7335	0	0.09	0.55	0
13681	**9100**	**1.0000**	**11900**	**0.09**	**0.55**	**589**	**1.7069**	**15500**	**0.09**	**0.55**	**767**	**2.2213**	**20200**	**0.09**	**0.55**	**1000**	**2.8834**	**26200**	**0.09**	**0.55**	**1297**	**3.7335**	**34000**	**0.09**	**0.55**	**1683**
12525	2700	1.0000	3500	0.09	0.55	173	1.7069	4600	0.09	0.55	228	2.2213	6000	0.09	0.55	297	2.8834	7800	0.09	0.55	386	3.7335	10100	0.09	0.55	500
12522	3900	1.0000	5100	0.09	0.55	252	1.7069	6700	0.09	0.55	332	2.2213	8700	0.09	0.55	431	2.8834	11200	0.09	0.55	554	3.7335	14600	0.09	0.55	723
40663	**9100**	**1.0000**	**11900**	**0.09**	**0.55**	**589**	**1.7069**	**15500**	**0.09**	**0.55**	**767**	**2.2213**	**20200**	**0.09**	**0.55**	**1000**	**2.8834**	**26200**	**0.09**	**0.55**	**1297**	**3.7335**	**34000**	**0.09**	**0.55**	**1683**

Note:

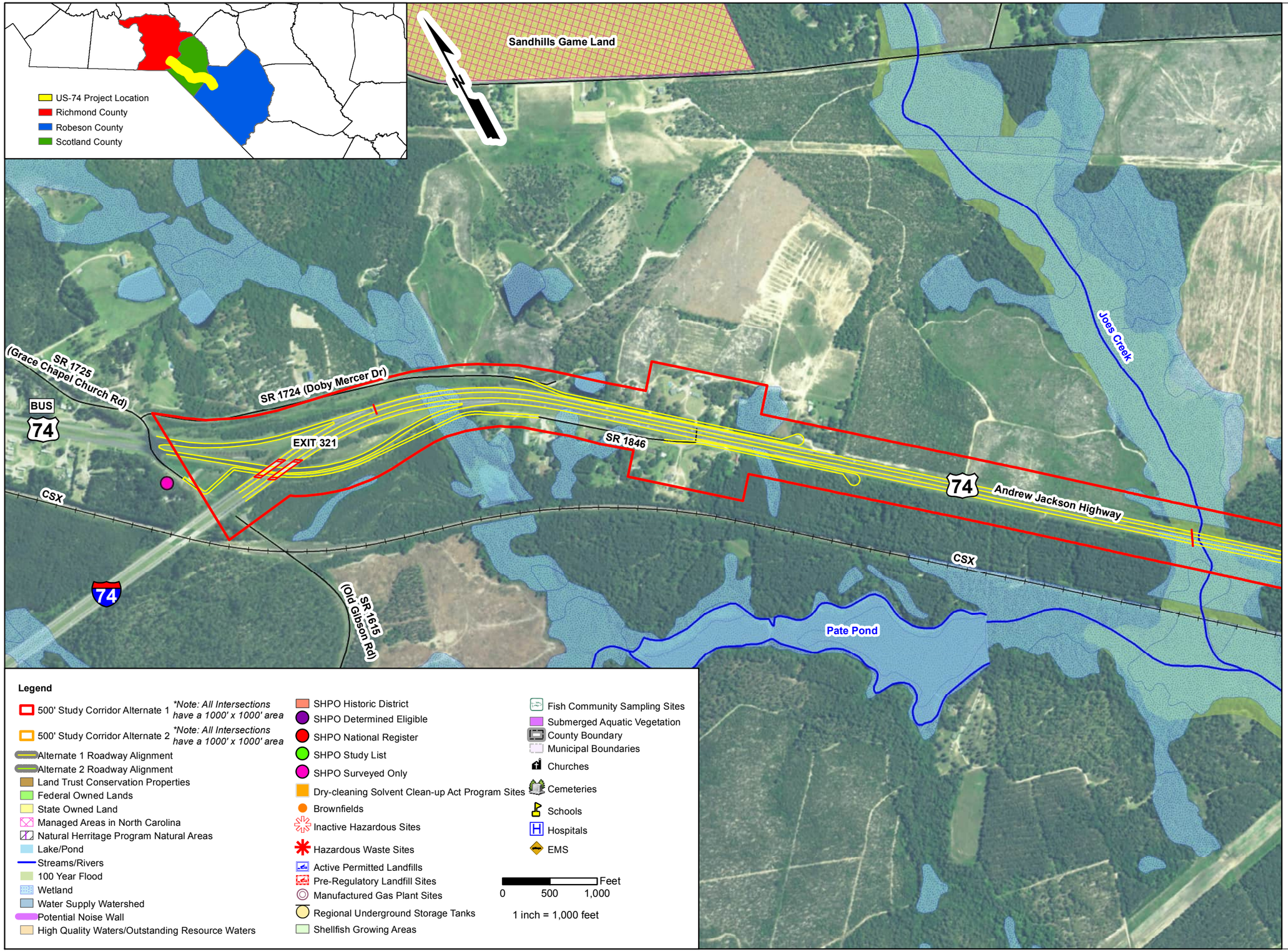
1. Future traffic demand is color coded based on projected future level of congestion, with red color denoting at or over capacity and green denoting under capacity.
2. Traffic data points are listed in the order of from west to east; traffic data along US 74/I-74 are shown in bold.
3. Analysis are conducted based on 2013 AADT data provided by NCDOT. 2014 data are available, but haven't been digitized at this time.

Segment	Segment Type	Maximum d/c Ratio	Avg. Speed (mi/h)	Density (pc/mi/ln)	Density (veh/mi/ln)	Avg. Travel Time (min/veh)	Free-Flow Travel Time (min/veh)	VMT Demand (veh-min)	VMT Volume (veh-min)	VHT (veh-hrs)	VHD (veh-hrs)	Density-based LOS
I-74/Proj West End-I-74/US 74 Bus	Basic	0.32	70	11	10.2	0.49	0.49	0,203.3	0,203.3	2.9	0	B
US 74 Bus (En 321)-	OnRamp	0.43	61.3	16.7	15.7	0.2	0.18	0,100.8	0,100.8	1.65	0.2	B
I-74/US 74 Bus-I-74/SR 1145	Basic	0.43	70	14.8	13.8	3.1	3.1	1,750.80	1,750.80	25.01	0	B
SR 1145 (Ex 324)-	OffRamp	0.43	59.6	17.3	16.2	0.1	0.08	0,045.8	0,045.8	0.77	0.11	B
SR 1145 (Ex 324)-SR 1145 (En 324)	Basic	0.41	67.9	14.4	13.5	0.25	0.24	0,130.4	0,130.4	1.92	0.06	B
SR 1145 (En 324)-	OnRamp	0.45	62.3	17.4	16.3	0.14	0.12	0,072.3	0,072.3	1.16	0.13	B
I-74/SR 1145-I-74/SR 1148	Basic	0.45	70	15.5	14.5	1.99	1.99	1,180.90	1,180.90	16.87	0	B
SR 1148 (Ex 326)-	OffRamp	0.45	59.6	18.2	17.1	0.1	0.08	0,048.2	0,048.2	0.81	0.12	B
SR 1148 (Ex 326)-SR 1148 (En 326)	Basic	0.43	67.9	15.2	14.2	0.25	0.24	0,137.5	0,137.5	2.02	0.06	B
SR 1148 (En 326)-	OnRamp	0.47	62.2	18.2	17.1	0.14	0.12	0,075.9	0,075.9	1.22	0.14	B
I-74/SR 1148-I-74/US 74 BUS	Basic	0.47	70	16.2	15.3	1.92	1.92	1,193.40	1,193.40	17.05	0	B
US 74 Bus (Ex 181)-	OffRamp	0.47	58.4	19.4	18.3	0.1	0.08	0,050.6	0,050.6	0.87	0.14	B
I-74/US 74 BUS-I-74/NC 79	Basic	0.36	69.9	12.2	11.4	0.84	0.84	0,387.0	0,387.0	5.54	0.01	B
NC 79 (Ex 182)-	OffRamp	0.36	59.7	14.3	13.3	0.1	0.08	0,037.6	0,037.6	0.63	0.09	B
NC 79 (Ex 182)-NC 79 (En 182)	Basic	0.34	68	12	11.2	0.25	0.24	0,107.7	0,107.7	1.59	0.05	B
NC 79 (En 182)-	OnRamp	0.44	62.4	16.9	15.8	0.14	0.12	0,070.6	0,070.6	1.13	0.12	B
I-74/NC 79-I-74/US 15/401/501	Basic	0.44	70	15.1	14.2	0.91	0.91	0,526.9	0,526.9	7.53	0	B
US 15/401/501(Ex183)-	OffRamp	0.44	58.8	18	16.9	0.1	0.08	0,047.0	0,047.0	0.8	0.13	B
US 15/401/501(Ex183)-US 15/401/501(En183)	Basic	0.36	67.8	12.6	11.7	0.25	0.24	0,112.7	0,112.7	1.66	0.05	B
US 15/401/501(En183)-US 501 BUS (Ex184)	Weaving	0.57	57.9	19.2	18	0.26	0.22	0,133.4	0,133.4	2.3	0.4	B
US 501 BUS (Ex 184)-US 501 BUS (En 184)	Basic	0.35	68.2	12.4	11.5	0.17	0.16	0,074.2	0,074.2	1.09	0.03	B
US 501 BUS (En 184)-	OnRamp	0.42	62.4	16.1	15	0.09	0.08	0,044.7	0,044.7	0.72	0.08	B
I-74/US 501 BUS-I-74/SR 1438	Basic	0.42	69.1	14.6	13.7	0.35	0.34	0,187.6	0,187.6	2.72	0.04	B
SR 1438 (Ex 185)-	OffRamp	0.42	59.4	17	15.9	0.1	0.08	0,044.7	0,044.7	0.75	0.11	B
SR 1438 (Ex 185)-SR 1438 (En 185)	Basic	0.38	67.9	13.5	12.6	0.25	0.24	0,121.2	0,121.2	1.79	0.05	B
SR 1438 (En 185)-	OnRamp	0.4	62.5	15.3	14.3	0.14	0.12	0,063.5	0,063.5	1.02	0.11	B
I-74/SR 1438-I-74/SR 1323	Basic	0.4	70	13.7	12.8	0.97	0.97	0,503.4	0,503.4	7.2	0	B
SR 1323 (Ex 186)-	OffRamp	0.4	59.6	16.1	15	0.1	0.08	0,042.3	0,042.3	0.71	0.11	B
SR 1323 (Ex 186)-SR 1323 (En 186)	Basic	0.38	67.9	13.3	12.4	0.25	0.24	0,119.8	0,119.8	1.76	0.05	B
SR 1323 (En 186)-	OnRamp	0.39	62.6	14.9	13.9	0.14	0.12	0,061.7	0,061.7	0.99	0.1	B
I-74/SR 1323-I-74/US 74 BUS	Basic	0.39	69.2	13.4	12.6	0.33	0.32	0,164.5	0,164.5	2.38	0.03	B
US 74 BUS (Ex 187)-	OffRamp	0.39	59.1	15.7	14.7	0.1	0.08	0,041.1	0,041.1	0.7	0.11	B
US 74 BUS (Ex 187)-US 74 BUS (En 187)	Basic	0.33	67.3	11.7	10.8	0.2	0.19	0,082.8	0,082.8	1.23	0.05	B
US 74 BUS(En 187)-	OnRamp	0.34	62.7	13.2	12.2	0.27	0.24	0,109.2	0,109.2	1.74	0.18	B
I-74/US 74 BUS-I-74/SR 1436	Basic	0.34	70	11.8	11	1.92	1.92	0,858.7	0,858.7	12.27	0	B
SR 1436 (Ex 190)-	OffRamp	0.34	59.4	13.9	12.9	0.1	0.08	0,036.4	0,036.4	0.61	0.09	B
SR 1436 (Ex 190)-SR 1436 (En 190)	Basic	0.31	67.9	11	10.1	0.25	0.24	0,097.8	0,097.8	1.44	0.04	B
SR 1436 (En 190)-	OnRamp	0.32	62.7	12.4	11.4	0.14	0.12	0,051.0	0,051.0	0.81	0.08	B
I-74/SR 1436-I-74/NC 71/130	Basic	0.32	69.9	11.1	10.3	0.69	0.69	0,289.2	0,289.2	4.14	0.01	B
NC 71/130 (Ex 191)-	OffRamp	0.32	59.1	13.1	12.2	0.1	0.08	0,034.0	0,034.0	0.58	0.09	B
NC 71/130 (Ex 191)-NC 71/130 (En 191)	Basic	0.26	67.2	9.3	8.5	0.2	0.19	0,064.6	0,064.6	0.96	0.04	A
NC 71/130 (En 191)-	OnRamp	0.28	62.8	10.7	9.8	0.27	0.24	0,087.9	0,087.9	1.4	0.14	B
I-74/NC 71/130-I-74/US 74 Alt	Basic	0.28	70	9.6	8.8	2.26	2.26	0,814.1	0,814.1	11.63	0	A
US 74 Alt (Ex 194A)-	OffRamp	0.28	59.3	11.4	10.4	0.1	0.08	0,029.3	0,029.3	0.49	0.08	B
US 74 Alt (Ex 194A)-I-74/Proj East End	Basic	0.24	69.4	8.3	7.5	0.49	0.49	0,148.0	0,148.0	2.13	0.02	A
Freeway			68.4	13.5	12.6	21.54	21.06	10,584.50	10,584.50	0,154.7	0,003.5	B

Segment	Segment Type	Maximum d/c Ratio	Avg. Speed (mi/h)	Density (pc/mi/ln)	Density (veh/mi/ln)	Avg. Travel Time (min/veh)	Free-Flow Travel Time (min/veh)	VMT Demand (veh-min)	VMT Volume (veh-min)	VHT (veh-hrs)	VHD (veh-hrs)	Density-based LOS
I-74/Proj East End-I-74/US 74 Alt	Basic	0.23	70	8	7.4	0.49	0.49	0,148.0	0,148.0	2.11	0	A
US 74 Alt (En 194)-	OnRamp	0.28	61.7	10.7	10	0.2	0.18	0,064.4	0,064.4	1.04	0.12	B
I-74/US 74 Alt-I-74/NC 71/310	Basic	0.28	70	9.5	8.8	2.26	2.26	0,814.1	0,814.1	11.63	0	A
NC 71/130 (Ex 191)-	OffRamp	0.28	59.6	11.1	10.4	0.1	0.08	0,029.3	0,029.3	0.49	0.07	B
NC 71/130 (Ex 191)-NC 71/130 (En 191)	Basic	0.25	67.4	9.1	8.4	0.2	0.19	0,064.6	0,064.6	0.96	0.04	A
NC 71/130 (En 191)-	OnRamp	0.32	62.8	12.1	11.4	0.27	0.24	0,102.1	0,102.1	1.63	0.17	B
I-74/NC 71/130-I-74/SR 1436	Basic	0.32	69.9	11	10.3	0.69	0.69	0,289.2	0,289.2	4.14	0	B
SR 1436 (Ex 190)-	OffRamp	0.32	59.7	12.8	12	0.1	0.08	0,034.0	0,034.0	0.57	0.08	B
SR 1436 (Ex 190)-SR 1436 (En 190)	Basic	0.31	68	10.8	10.1	0.25	0.24	0,097.8	0,097.8	1.44	0.04	A
SR 1436 (En 190)-	OnRamp	0.34	62.7	13	12.2	0.14	0.12	0,054.6	0,054.6	0.87	0.09	B
I-74/SR 1436-I-74/US 74 BUS	Basic	0.34	70	11.7	11	1.92	1.92	0,858.7	0,858.7	12.27	0	B
US 74 Bus (Ex 187)-	OffRamp	0.34	59.6	13.7	12.9	0.1	0.08	0,036.4	0,036.4	0.61	0.09	B
US 74 BUS (Ex 187)-US 74 BUS (En 187)	Basic	0.32	67.4	11.5	10.8	0.2	0.19	0,082.8	0,082.8	1.23	0.05	B
US 74 BUS (En 187)-	OnRamp	0.38	62.6	14.6	13.8	0.27	0.24	0,123.4	0,123.4	1.97	0.21	B
I-74/US 74 BUS-I-74/SR 1323	Basic	0.38	69.6	13.2	12.5	0.33	0.32	0,164.5	0,164.5	2.36	0.01	B
SR 1323 (Ex 186)-	OffRamp	0.38	59.7	15.4	14.5	0.1	0.08	0,041.1	0,041.1	0.69	0.1	B
SR 1323 (Ex 186)-SR 1323 (En 186)	Basic	0.37	68	13.2	12.4	0.25	0.24	0,119.8	0,119.8	1.76	0.05	B
SR 1323 (En 186)-	OnRamp	0.39	62.5	15.1	14.3	0.14	0.12	0,063.5	0,063.5	1.01	0.11	B
I-74/SR 1323-I-74/SR 1438	Basic	0.39	70	13.5	12.8	0.97	0.97	0,503.4	0,503.4	7.2	0	B
SR 1438 (Ex 185)-	OffRamp	0.39	59.6	15.9	15	0.1	0.08	0,042.3	0,042.3	0.71	0.11	B
SR 1438 (Ex 185)-SR 1438 (En 185)	Basic	0.38	67.9	13.3	12.6	0.25	0.24	0,121.2	0,121.2	1.78	0.05	B
SR 1438 (En 185)-	OnRamp	0.42	62.5	15.9	15.1	0.14	0.12	0,067.0	0,067.0	1.07	0.12	B
I-74/SR 1438-I-74/US 501 BUS	Basic	0.42	69.2	14.4	13.6	0.34	0.34	0,187.6	0,187.6	2.71	0.03	B
US 501 BUS (Ex 184)-	OffRamp	0.42	59	16.9	16	0.1	0.08	0,044.7	0,044.7	0.76	0.12	B
US 501 BUS (Ex 184)-US 501 BUS (En 184)	Basic	0.35	66.7	12.5	11.7	0.17	0.16	0,074.2	0,074.2	1.11	0.05	B
US 501 BUS (En184)-US 15/401/501(Ex183)	Weaving	0.56	58	19	18	0.26	0.22	0,133.4	0,133.4	2.3	0.4	B
US 15/401/501(Ex183)-US 15/401/501(En183)	Basic	0.35	68.8	12.3	11.5	0.25	0.24	0,112.7	0,112.7	1.64	0.03	B
US 15/401/501(En183)-	OnRamp	0.44	62.4	16.7	15.8	0.09	0.08	0,047.0	0,047.0	0.75	0.08	B
I-74/US 15/401/501-I-74/NC 79	Basic	0.44	69.9	15	14.2	0.91	0.91	0,526.9	0,526.9	7.53	0.01	B
NC 79 (Ex 182)-	OffRamp	0.44	58.6	17.9	16.9	0.1	0.08	0,047.0	0,047.0	0.8	0.13	B
NC 79 (Ex 182)-NC 79 (En 182)	Basic	0.34	67.7	11.9	11.2	0.25	0.24	0,107.7	0,107.7	1.59	0.05	B
NC 79 (En 182)-	OnRamp	0.35	62.7	13.4	12.6	0.14	0.12	0,056.4	0,056.4	0.9	0.09	B
I-74/NC 79-I-74/US 74 BUS	Basic	0.35	69.9	12.1	11.3	0.84	0.84	0,387.0	0,387.0	5.53	0	B
US 74 BUS (En 181)-	OnRamp	0.47	62.2	18	17	0.09	0.08	0,050.6	0,050.6	0.81	0.09	B
I-74/US 74 BUS-I-74/SR 1148	Basic	0.47	70	16.1	15.3	1.92	1.92	1,193.40	1,193.40	17.05	0	B
SR 1148 (Ex 326)-	OffRamp	0.47	59.3	19	18	0.1	0.08	0,050.6	0,050.6	0.85	0.13	B
SR 1148 (Ex 326)-SR 1148 (En 326)	Basic	0.43	67.9	15.1	14.3	0.25	0.24	0,137.5	0,137.5	2.03	0.06	B
SR 1148 (En 326)-	OnRamp	0.45	62.3	17.2	16.3	0.14	0.12	0,072.3	0,072.3	1.16	0.13	B
I-74/ST 1148-I-74/SR 1145	Basic	0.45	70	15.3	14.5	1.99	1.99	1,180.90	1,180.90	16.87	0	B
SR 1145 (Ex 324)-	OffRamp	0.45	59.3	18.1	17.2	0.1	0.08	0,048.2	0,048.2	0.81	0.12	B
SR 1145 (Ex 324)-SR 1145 (En 324)	Basic	0.4	67.9	14.3	13.5	0.25	0.24	0,130.4	0,130.4	1.92	0.06	B
SR 1145 (En 324)-	OnRamp	0.43	62.4	16.4	15.5	0.14	0.12	0,068.8	0,068.8	1.1	0.12	B
I-74/SR 1145-I-74/US 74 BUS	Basic	0.43	70	14.6	13.8	3.1	3.1	1,750.80	1,750.80	25.01	0	B
US 74 BUS (Ex 321)-	OffRamp	0.43	58.5	17.5	16.5	0.1	0.08	0,045.8	0,045.8	0.78	0.13	B
US 74 BUS (Ex 321)-I-74/Proj West End	Basic	0.32	69.3	11	10.3	0.49	0.49	0,203.3	0,203.3	2.93	0.03	B
Freeway			68.5	13.3	12.6	21.53	21.06	10,579.40	10,579.40	0,154.5	0,003.4	B

Segment	Segment Type	Maximum d/c Ratio	Avg. Speed (mi/h)	Density (pc/mi/ln)	Density (veh/mi/ln)	Avg. Travel Time (min/veh)	Free-Flow Travel Time (min/veh)	VMT Demand (veh-min)	VMT Volume (veh-min)	VHT (veh-hrs)	VHD (veh-hrs)	Density-based LOS
I-74/Proj West End-I-74/US 74 Bus	Basic	0.21	70	7.4	6.8	0.49	0.49	0,203.3	0,203.3	2.9	0	A
US 74 Bus (En 321)-	OnRamp	0.29	63.9	10.7	10	0.2	0.18	0,100.8	0,100.8	1.58	0.14	B
I-74/US 74 Bus-I-74/SR 1145	Basic	0.29	70	9.8	9.2	3.1	3.1	1,750.80	1,750.80	25.01	0	A
SR 1145 (Ex 324)-	OffRamp	0.29	63.6	10.8	10.1	0.09	0.08	0,045.8	0,045.8	0.72	0.07	B
SR 1145 (Ex 324)-SR 1145 (En 324)	Basic	0.27	68.7	9.5	8.9	0.25	0.24	0,130.4	0,130.4	1.9	0.03	A
SR 1145 (En 324)-	OnRamp	0.3	64.9	11.1	10.4	0.13	0.12	0,072.3	0,072.3	1.11	0.08	B
I-74/SR 1145-I-74/SR 1148	Basic	0.3	70	10.3	9.7	1.99	1.99	1,180.90	1,180.90	16.87	0	A
SR 1148 (Ex 326)-	OffRamp	0.3	63.6	11.4	10.7	0.09	0.08	0,048.2	0,048.2	0.76	0.07	B
SR 1148 (Ex 326)-SR 1148 (En 326)	Basic	0.29	68.7	10	9.4	0.25	0.24	0,137.5	0,137.5	2	0.04	A
SR 1148 (En 326)-	OnRamp	0.32	64.8	11.6	11	0.13	0.12	0,075.9	0,075.9	1.17	0.09	B
I-74/SR 1148-I-74/US 74 BUS	Basic	0.32	70	10.8	10.2	1.92	1.92	1,193.40	1,193.40	17.05	0	A
US 74 Bus (Ex 181)-	OffRamp	0.32	62	12.2	11.5	0.09	0.08	0,050.6	0,050.6	0.82	0.09	B
I-74/US 74 BUS-I-74/NC 79	Basic	0.24	69.9	8.1	7.6	0.84	0.84	0,387.0	0,387.0	5.53	0.01	A
NC 79 (Ex 182)-	OffRamp	0.24	63.5	9	8.3	0.09	0.08	0,037.6	0,037.6	0.59	0.05	A
NC 79 (Ex 182)-NC 79 (En 182)	Basic	0.23	68.7	7.9	7.4	0.25	0.24	0,107.7	0,107.7	1.57	0.03	A
NC 79 (En 182)-	OnRamp	0.29	64.7	10.8	10.2	0.13	0.12	0,070.6	0,070.6	1.09	0.08	B
I-74/NC 79-I-74/US 15/401/501	Basic	0.29	70	10.1	9.5	0.91	0.91	0,526.9	0,526.9	7.53	0	A
US 15/401/501(Ex183)-	OffRamp	0.29	62.5	11.3	10.6	0.09	0.08	0,047.0	0,047.0	0.75	0.08	B
US 15/401/501(Ex183)-US 15/401/501(En183)	Basic	0.24	68.5	8.3	7.7	0.25	0.24	0,112.7	0,112.7	1.65	0.03	A
US 15/401/501(En183)-US 501 BUS (Ex184)	Weaving	0.41	59.1	12.5	11.8	0.26	0.22	0,133.4	0,133.4	2.26	0.35	B
US 501 BUS (Ex 184)-US 501 BUS (En 184)	Basic	0.23	68.4	8.2	7.6	0.17	0.16	0,074.2	0,074.2	1.09	0.03	A
US 501 BUS (En 184)-	OnRamp	0.28	64.9	10.3	9.7	0.09	0.08	0,044.7	0,044.7	0.69	0.05	B
I-74/US 501 BUS-I-74/SR 1438	Basic	0.28	69.4	9.7	9.1	0.34	0.34	0,187.6	0,187.6	2.7	0.02	A
SR 1438 (Ex 185)-	OffRamp	0.28	63.2	10.6	9.9	0.09	0.08	0,044.7	0,044.7	0.71	0.07	B
SR 1438 (Ex 185)-SR 1438 (En 185)	Basic	0.25	68.7	8.9	8.3	0.25	0.24	0,121.2	0,121.2	1.77	0.03	A
SR 1438 (En 185)-	OnRamp	0.27	65.1	9.8	9.1	0.13	0.12	0,063.5	0,063.5	0.97	0.07	A
I-74/SR 1438-I-74/SR 1323	Basic	0.27	70	9.1	8.5	0.97	0.97	0,503.4	0,503.4	7.19	0	A
SR 1323 (Ex 186)-	OffRamp	0.27	63.5	10	9.4	0.09	0.08	0,042.3	0,042.3	0.67	0.06	B
SR 1323 (Ex 186)-SR 1323 (En 186)	Basic	0.25	68.7	8.8	8.2	0.25	0.24	0,119.8	0,119.8	1.74	0.03	A
SR 1323 (En 186)-	OnRamp	0.26	65.2	9.5	8.9	0.13	0.12	0,061.7	0,061.7	0.95	0.06	A
I-74/SR 1323-I-74/US 74 BUS	Basic	0.26	69.5	8.9	8.3	0.33	0.32	0,164.5	0,164.5	2.37	0.02	A
US 74 BUS (Ex 187)-	OffRamp	0.26	62.8	9.9	9.2	0.09	0.08	0,041.1	0,041.1	0.66	0.07	A
US 74 BUS (Ex 187)-US 74 BUS (En 187)	Basic	0.22	68.2	7.7	7.1	0.2	0.19	0,082.8	0,082.8	1.21	0.03	A
US 74 BUS(En 187)-	OnRamp	0.23	65.3	8.4	7.8	0.26	0.24	0,109.2	0,109.2	1.67	0.11	A
I-74/US 74 BUS-I-74/SR 1436	Basic	0.23	70	7.9	7.3	1.92	1.92	0,858.7	0,858.7	12.27	0	A
SR 1436 (Ex 190)-	OffRamp	0.23	63.1	8.7	8.1	0.09	0.08	0,036.4	0,036.4	0.58	0.06	A
SR 1436 (Ex 190)-SR 1436 (En 190)	Basic	0.21	68.6	7.2	6.7	0.25	0.24	0,097.8	0,097.8	1.42	0.03	A
SR 1436 (En 190)-	OnRamp	0.22	65.4	7.9	7.3	0.13	0.12	0,051.0	0,051.0	0.78	0.05	A
I-74/SR 1436-I-74/NC 71/130	Basic	0.22	69.9	7.4	6.9	0.69	0.69	0,289.2	0,289.2	4.14	0	A
NC 71/130 (Ex 191)-	OffRamp	0.22	62.4	8.3	7.7	0.09	0.08	0,034.0	0,034.0	0.54	0.06	A
NC 71/130 (Ex 191)-NC 71/130 (En 191)	Basic	0.17	68.1	6.1	5.6	0.2	0.19	0,064.6	0,064.6	0.95	0.03	A
NC 71/130 (En 191)-	OnRamp	0.19	65.4	6.9	6.3	0.26	0.24	0,087.9	0,087.9	1.34	0.09	A
I-74/NC 71/130-I-74/US 74 Alt	Basic	0.19	70	6.4	5.9	2.26	2.26	0,814.1	0,814.1	11.63	0	A
US 74 Alt (Ex 194A)-	OffRamp	0.19	62.8	7.2	6.6	0.09	0.08	0,029.3	0,029.3	0.47	0.05	A
US 74 Alt (Ex 194A)-I-74/Proj East End	Basic	0.16	69.6	5.5	5	0.49	0.49	0,148.0	0,148.0	2.13	0.01	A
Freeway			69	8.9	8.3	21.38	21.06	10,584.50	10,584.50	0,153.5	0,002.3	A

Segment	Segment Type	Maximum d/c Ratio	Avg. Speed (mi/h)	Density (pc/mi/ln)	Density (veh/mi/ln)	Avg. Travel Time (min/veh)	Free-Flow Travel Time (min/veh)	VMT Demand (veh-min)	VMT Volume (veh-min)	VHT (veh-hrs)	VHD (veh-hrs)	Density-based LOS
I-74/Proj East End-I-74/US 74 Alt	Basic	0.16	70	5.4	5	0.49	0.49	0,148.0	0,148.0	2.11	0	A
US 74 Alt (En 194)-	OnRamp	0.18	64.5	6.8	6.4	0.19	0.18	0,064.4	0,064.4	1	0.08	A
I-74/US 74 Alt-I-74/NC 71/310	Basic	0.18	70	6.3	5.9	2.26	2.26	0,814.1	0,814.1	11.63	0	A
NC 71/130 (Ex 191)-	OffRamp	0.18	63.2	7	6.5	0.09	0.08	0,029.3	0,029.3	0.46	0.04	A
NC 71/130 (Ex 191)-NC 71/130 (En 191)	Basic	0.17	68.3	6	5.6	0.2	0.19	0,064.6	0,064.6	0.95	0.02	A
NC 71/130 (En 191)-	OnRamp	0.21	65	7.8	7.3	0.26	0.24	0,102.1	0,102.1	1.57	0.11	A
I-74/NC 71/130-I-74/SR 1436	Basic	0.21	70	7.3	6.8	0.69	0.69	0,289.2	0,289.2	4.13	0	A
SR 1436 (Ex 190)-	OffRamp	0.21	63.5	8	7.5	0.09	0.08	0,034.0	0,034.0	0.54	0.05	A
SR 1436 (Ex 190)-SR 1436 (En 190)	Basic	0.2	68.7	7.1	6.7	0.25	0.24	0,097.8	0,097.8	1.42	0.03	A
SR 1436 (En 190)-	OnRamp	0.23	65.2	8.3	7.8	0.13	0.12	0,054.6	0,054.6	0.84	0.06	A
I-74/SR 1436-I-74/US 74 BUS	Basic	0.23	70	7.8	7.3	1.92	1.92	0,858.7	0,858.7	12.27	0	A
US 74 Bus (Ex 187)-	OffRamp	0.23	63.5	8.6	8.1	0.09	0.08	0,036.4	0,036.4	0.57	0.05	A
US 74 BUS (Ex 187)-US 74 BUS (En 187)	Basic	0.22	68.4	7.6	7.1	0.2	0.19	0,082.8	0,082.8	1.21	0.03	A
US 74 BUS (En 187)-	OnRamp	0.26	65	9.4	8.9	0.26	0.24	0,123.4	0,123.4	1.9	0.14	A
I-74/US 74 BUS-I-74/SR 1323	Basic	0.26	69.7	8.8	8.3	0.33	0.32	0,164.5	0,164.5	2.36	0.01	A
SR 1323 (Ex 186)-	OffRamp	0.26	63.7	9.6	9.1	0.09	0.08	0,041.1	0,041.1	0.65	0.06	A
SR 1323 (Ex 186)-SR 1323 (En 186)	Basic	0.25	68.7	8.7	8.2	0.25	0.24	0,119.8	0,119.8	1.74	0.03	A
SR 1323 (En 186)-	OnRamp	0.26	65.1	9.7	9.1	0.13	0.12	0,063.5	0,063.5	0.97	0.07	A
I-74/SR 1323-I-74/SR 1438	Basic	0.26	70	9	8.5	0.97	0.97	0,503.4	0,503.4	7.19	0	A
SR 1438 (Ex 185)-	OffRamp	0.26	63.6	9.9	9.4	0.09	0.08	0,042.3	0,042.3	0.67	0.06	A
SR 1438 (Ex 185)-SR 1438 (En 185)	Basic	0.25	68.7	8.8	8.3	0.25	0.24	0,121.2	0,121.2	1.76	0.03	A
SR 1438 (En 185)-	OnRamp	0.28	65	10.2	9.7	0.13	0.12	0,067.0	0,067.0	1.03	0.07	B
I-74/SR 1438-I-74/US 501 BUS	Basic	0.28	69.5	9.6	9	0.34	0.34	0,187.6	0,187.6	2.7	0.02	A
US 501 BUS (Ex 184)-	OffRamp	0.28	62.7	10.6	10	0.09	0.08	0,044.7	0,044.7	0.71	0.07	B
US 501 BUS (Ex 184)-US 501 BUS (En 184)	Basic	0.23	67.8	8.2	7.7	0.17	0.16	0,074.2	0,074.2	1.09	0.03	A
US 501 BUS (En184)-US 15/401/501(Ex183)	Weaving	0.41	59.1	12.4	11.8	0.26	0.22	0,133.4	0,133.4	2.26	0.35	B
US 15/401/501(Ex183)-US 15/401/501(En183)	Basic	0.23	68.9	8.2	7.7	0.25	0.24	0,112.7	0,112.7	1.64	0.03	A
US 15/401/501(En183)-	OnRamp	0.29	64.8	10.7	10.2	0.09	0.08	0,047.0	0,047.0	0.73	0.05	B
I-74/US 15/401/501-I-74/NC 79	Basic	0.29	70	10	9.5	0.91	0.91	0,526.9	0,526.9	7.53	0	A
NC 79 (Ex 182)-	OffRamp	0.29	62.2	11.2	10.7	0.09	0.08	0,047.0	0,047.0	0.76	0.08	B
NC 79 (Ex 182)-NC 79 (En 182)	Basic	0.22	68.5	7.9	7.4	0.25	0.24	0,107.7	0,107.7	1.57	0.03	A
NC 79 (En 182)-	OnRamp	0.23	65.3	8.6	8.1	0.13	0.12	0,056.4	0,056.4	0.86	0.06	A
I-74/NC 79-I-74/US 74 BUS	Basic	0.23	70	8	7.6	0.84	0.84	0,387.0	0,387.0	5.53	0	A
US 74 BUS (En 181)-	OnRamp	0.31	64.6	11.5	11	0.09	0.08	0,050.6	0,050.6	0.78	0.06	B
I-74/US 74 BUS-I-74/SR 1148	Basic	0.31	70	10.7	10.2	1.92	1.92	1,193.40	1,193.40	17.05	0	A
SR 1148 (Ex 326)-	OffRamp	0.31	63.3	11.8	11.2	0.09	0.08	0,050.6	0,050.6	0.8	0.08	B
SR 1148 (Ex 326)-SR 1148 (En 326)	Basic	0.28	68.7	9.9	9.4	0.25	0.24	0,137.5	0,137.5	2	0.04	A
SR 1148 (En 326)-	OnRamp	0.3	65	11	10.4	0.13	0.12	0,072.3	0,072.3	1.11	0.08	B
I-74/ST 1148-I-74/SR 1145	Basic	0.3	70	10.2	9.7	1.99	1.99	1,180.90	1,180.90	16.87	0	A
SR 1145 (Ex 324)-	OffRamp	0.3	63.3	11.3	10.7	0.09	0.08	0,048.2	0,048.2	0.76	0.07	B
SR 1145 (Ex 324)-SR 1145 (En 324)	Basic	0.27	68.7	9.4	8.9	0.25	0.24	0,130.4	0,130.4	1.9	0.04	A
SR 1145 (En 324)-	OnRamp	0.28	65	10.5	9.9	0.13	0.12	0,068.8	0,068.8	1.06	0.07	B
I-74/SR 1145-I-74/US 74 BUS	Basic	0.28	70	9.7	9.2	3.1	3.1	1,750.80	1,750.80	25.01	0	A
US 74 BUS (Ex 321)-	OffRamp	0.28	62	11	10.4	0.09	0.08	0,045.8	0,045.8	0.74	0.08	B
US 74 BUS (Ex 321)-I-74/Proj West End	Basic	0.21	69.5	7.3	6.9	0.49	0.49	0,203.3	0,203.3	2.92	0.02	A
Freeway			69	8.8	8.3	21.37	21.06	10,579.40	10,579.40	0,153.4	0,002.2	A



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF PLANNING AND PROGRAMMING

FEASIBILITY STUDIES UNIT

FIGURE 9.1
ALTERNATE 1 & 2 ENVIRONMENTAL FEATURES MAP

US 74 UPGRADE TO INTERSTATE STANDARDS
RICHMOND, SCOTLAND, ROBESON COUNTIES

County: **RICHMOND, SCOTLAND, ROBESON**

Div:	TIP#
6 AND 8	**FS-1508A**

JUNE 2017

Data Sources: NCDOT, NC OneMap, NC FRIS, NC SHPO, NCDENR, USFWS, USGS

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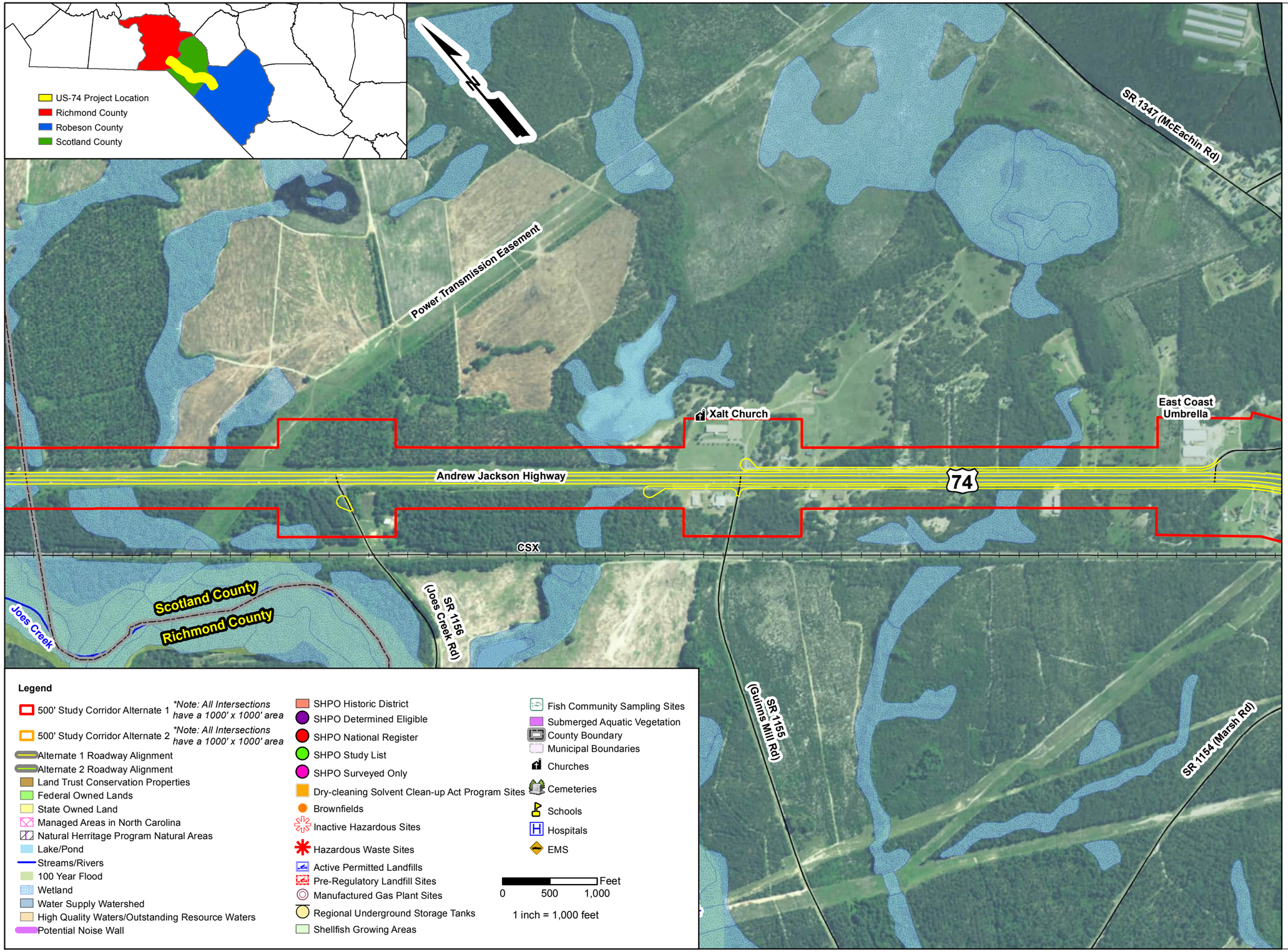

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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FEASIBILITY STUDIES UNIT

FIGURE 9.2
ALTERNATE 1 & 2 ENVIRONMENTAL FEATURES MAP

US 74 UPGRADE TO INTERSTATE STANDARDS
RICHMOND, SCOTLAND, ROBESON COUNTIES

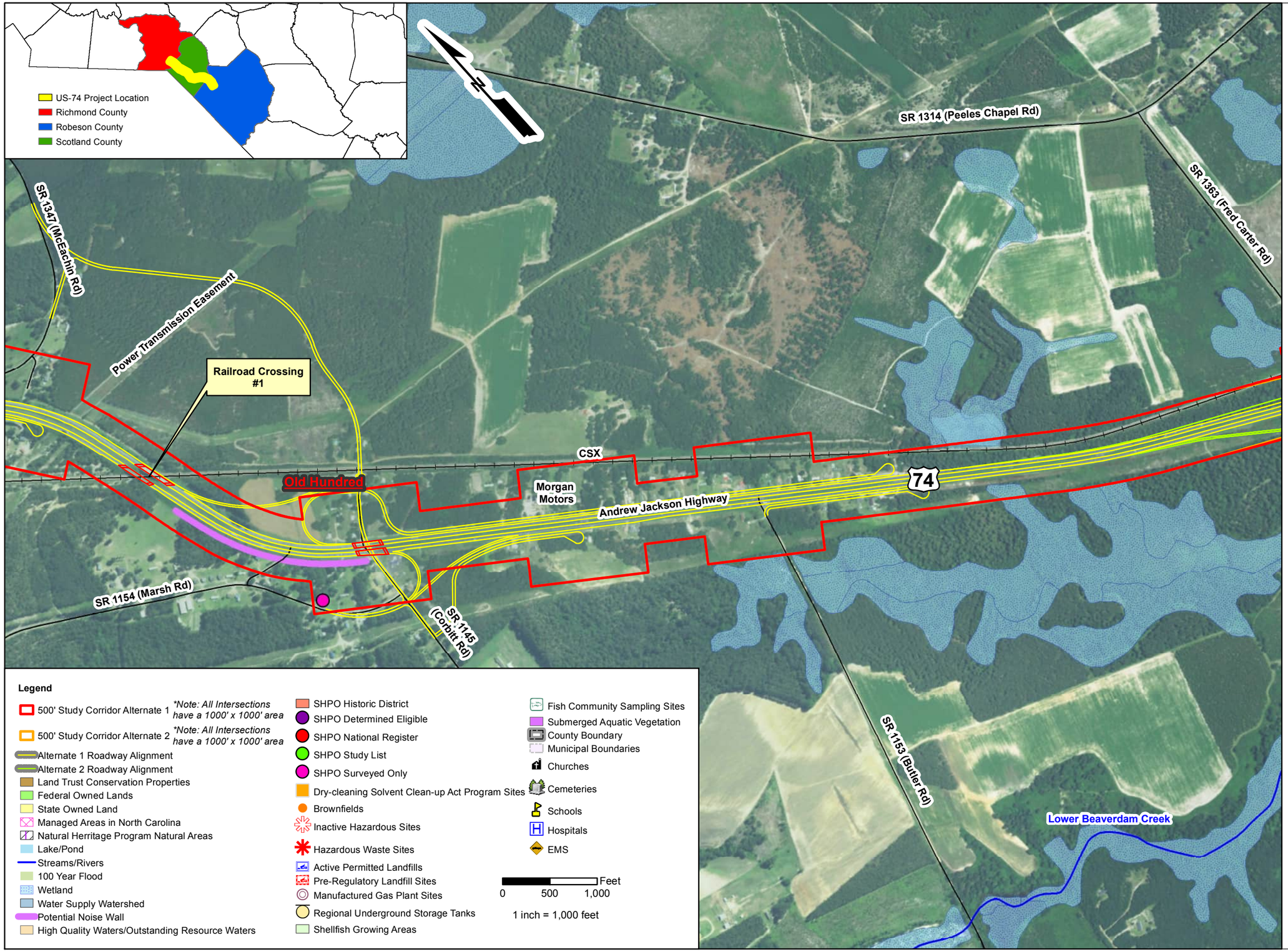
County: **RICHMOND, SCOTLAND, ROBESON**

Div:	TIP#
6 AND 8	**FS-1508A**

JUNE 2017

Data Sources: NCDOT, NC OneMap, NC FRIS, NC SHPO, NCDENR, USFWS, USGS

PAGE: **2 OF 12**



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF PLANNING AND PROGRAMMING

FEASIBILITY STUDIES UNIT

FIGURE 9.3
ALTERNATE 1 & 2
ENVIRONMENTAL FEATURES MAP
US 74 UPGRADE TO INTERSTATE STANDARDS
RICHMOND, SCOTLAND, ROBESON COUNTIES

County: **RICHMOND, SCOTLAND, ROBESON**

Div:	TIP#
6 AND 8	**FS-1508A**

JUNE 2017

Data Sources: NCDOT, NC OneMap, NC FRIS, NC SHPO, NCDENR, USFWS, USGS

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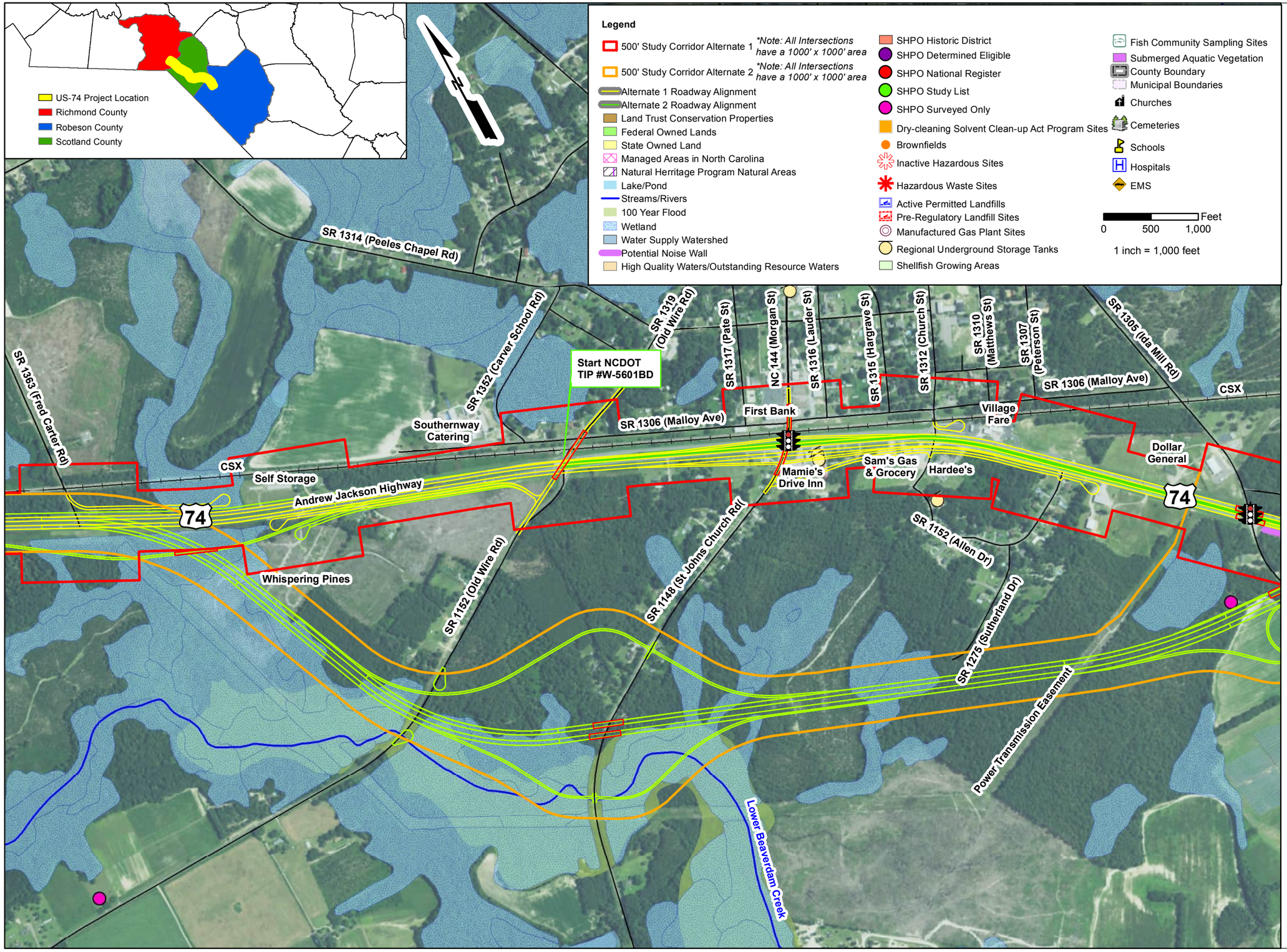

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF PLANNING AND PROGRAMMING

FEASIBILITY STUDIES UNIT

FIGURE 9.4 ALTERNATE 1 & 2 ENVIRONMENTAL FEATURES MAP

US 74 UPGRADE TO INTERSTATE STANDARDS
RICHMOND, SCOTLAND, ROBESON COUNTIES

County: **RICHMOND, SCOTLAND, ROBESON**

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Data Sources: NCDOT, NC OneMap, NC FRIS, NC SHPO, NCDENR, USFWS, USGS

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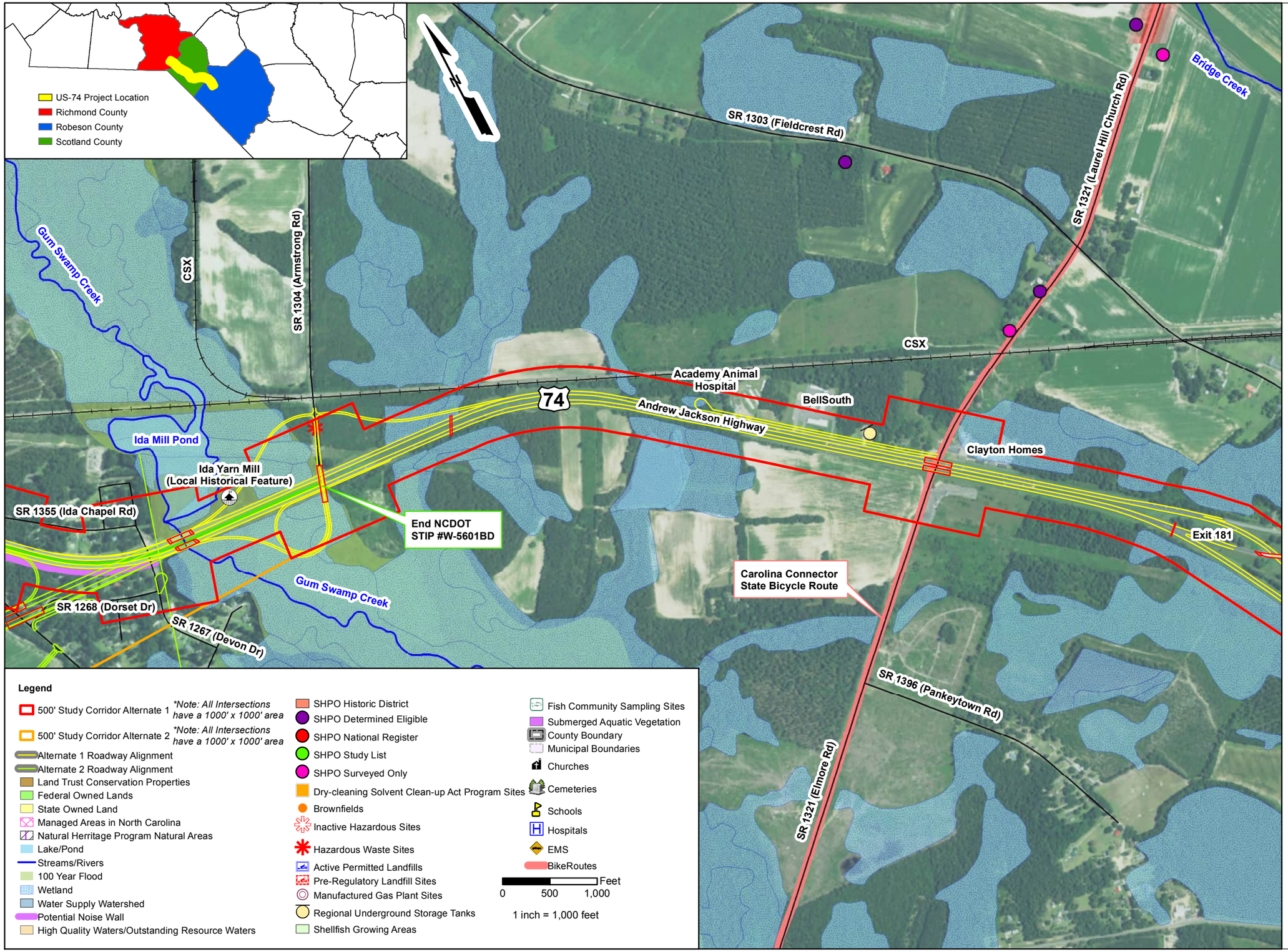

Legend

- 500' Study Corridor Alternate 1 **Note: All Intersections have a 1000' x 1000' area*
- 500' Study Corridor Alternate 2 **Note: All Intersections have a 1000' x 1000' area*
- Alternate 1 Roadway Alignment
- Alternate 2 Roadway Alignment
- Land Trust Conservation Properties
- Federal Owned Lands
- State Owned Land
- Managed Areas in North Carolina
- Natural Herritage Program Natural Areas
- Lake/Pond
- Streams/Rivers
- 100 Year Flood
- Wetland
- Water Supply Watershed
- Potential Noise Wall
- High Quality Waters/Outstanding Resource Waters
- SHPO Historic District
- SHPO Determined Eligible
- SHPO National Register
- SHPO Study List
- SHPO Surveyed Only
- Dry-cleaning Solvent Clean-up Act Program Sites
- Brownfields
- Inactive Hazardous Sites
- Hazardous Waste Sites
- Active Permitted Landfills
- Pre-Regulatory Landfill Sites
- Manufactured Gas Plant Sites
- Regional Underground Storage Tanks
- Shellfish Growing Areas
- Fish Community Sampling Sites
- Submerged Aquatic Vegetation
- County Boundary
- Municipal Boundaries
- Churches
- Cemeteries
- Schools
- Hospitals
- EMS
- BikeRoutes

Feet: 0 500 1,000

1 inch = 1,000 feet

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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FEASIBILITY STUDIES UNIT

FIGURE 9.5
ALTERNATE 1 & 2
ENVIRONMENTAL FEATURES MAP

US 74 UPGRADE TO INTERSTATE STANDARDS
RICHMOND, SCOTLAND, ROBESON COUNTIES

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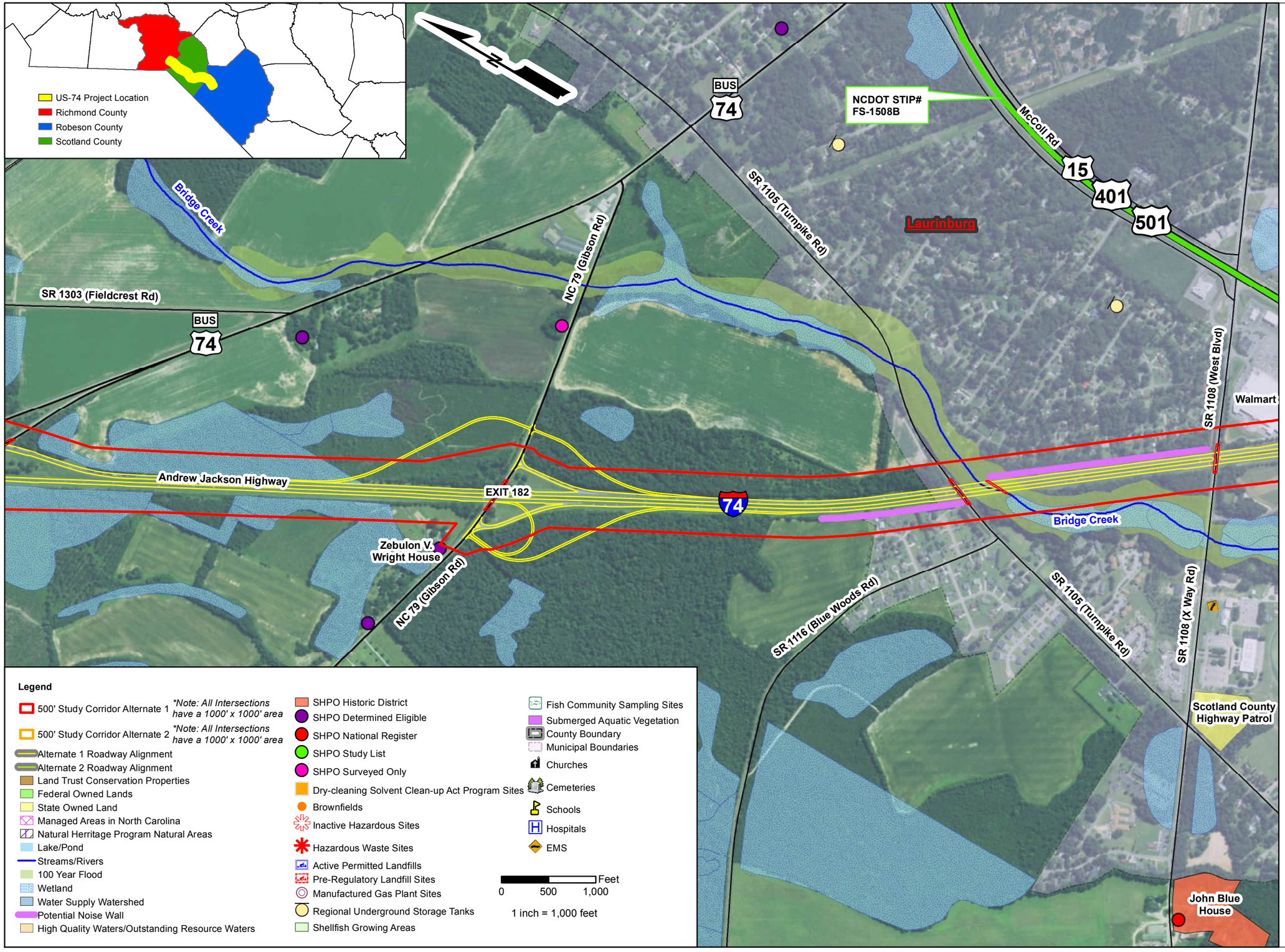

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF PLANNING AND PROGRAMMING

FEASIBILITY STUDIES UNIT

FIGURE 9.6
ALTERNATE 1 & 2
ENVIRONMENTAL FEATURES MAP
US 74 UPGRADE TO INTERSTATE STANDARDS
RICHMOND, SCOTLAND, ROBESON COUNTIES

County: **RICHMOND, SCOTLAND, ROBESON**

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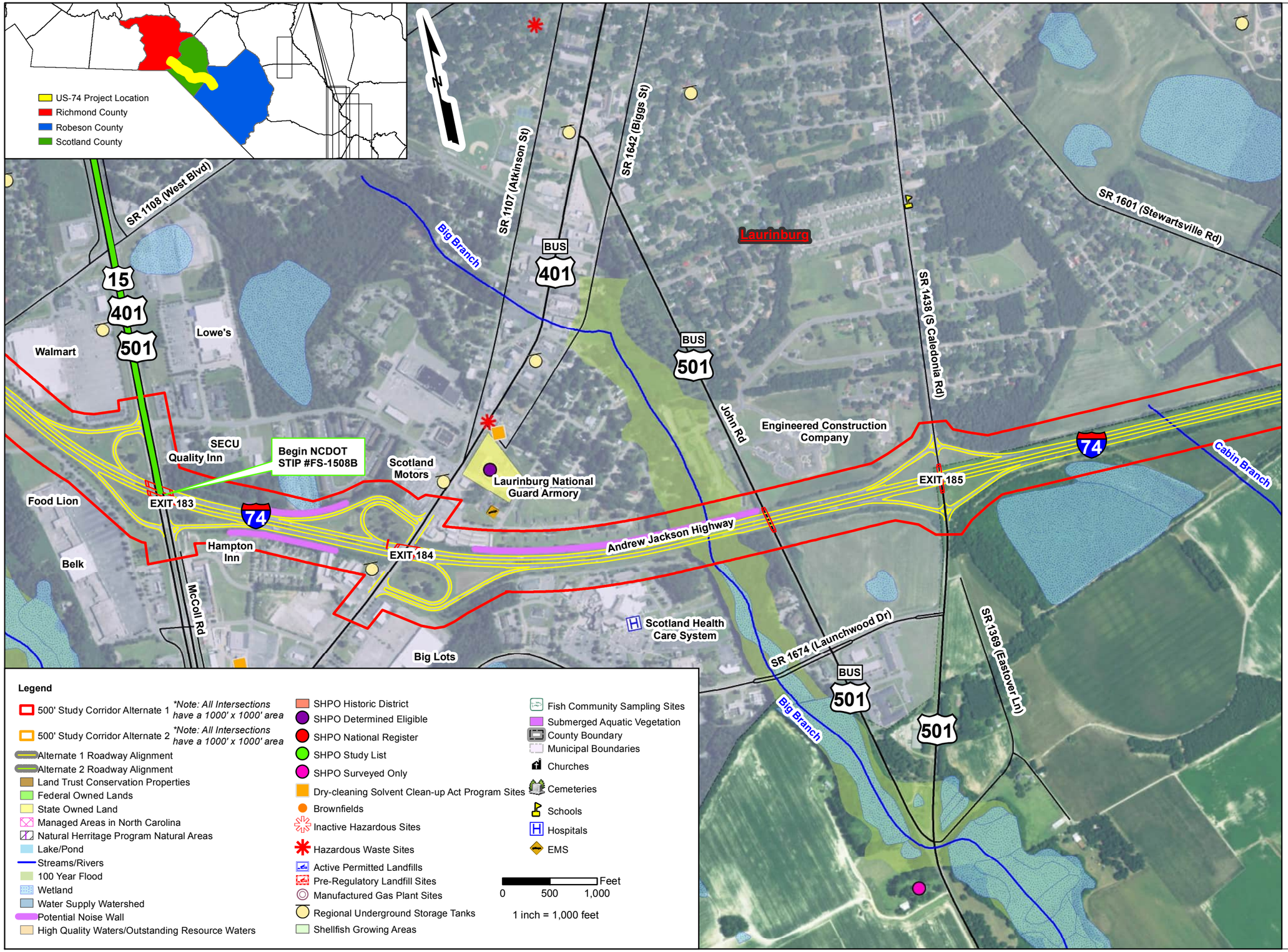

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF PLANNING AND PROGRAMMING

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FIGURE 9.7
ALTERNATE 1 & 2 ENVIRONMENTAL FEATURES MAP

US 74 UPGRADE TO INTERSTATE STANDARDS
RICHMOND, SCOTLAND, ROBESON COUNTIES

County: **RICHMOND, SCOTLAND, ROBESON**

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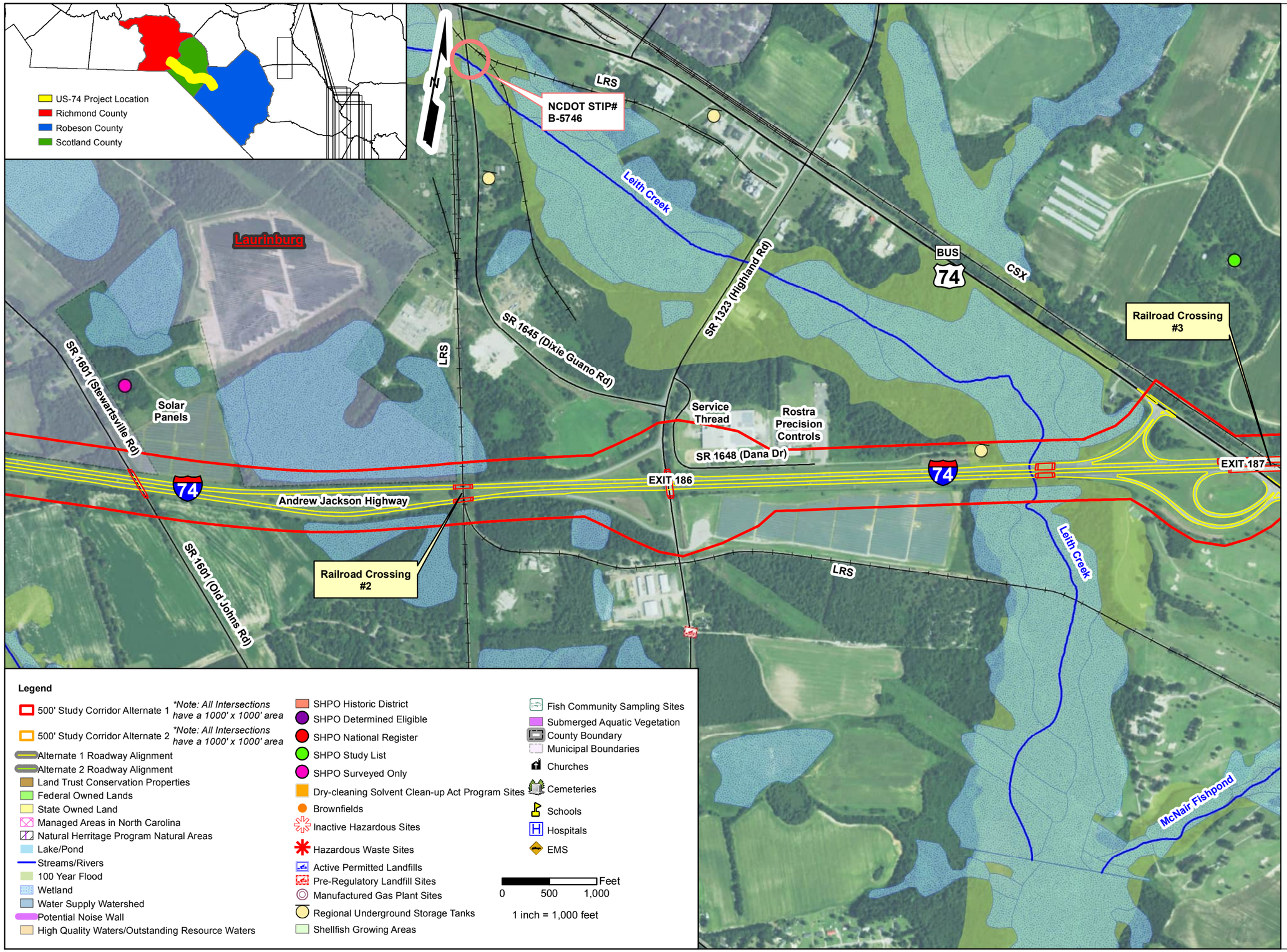

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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FIGURE 9.8 ALTERNATE 1 & 2 ENVIRONMENTAL FEATURES MAP

US 74 UPGRADE TO INTERSTATE STANDARDS
RICHMOND, SCOTLAND, ROBESON COUNTIES

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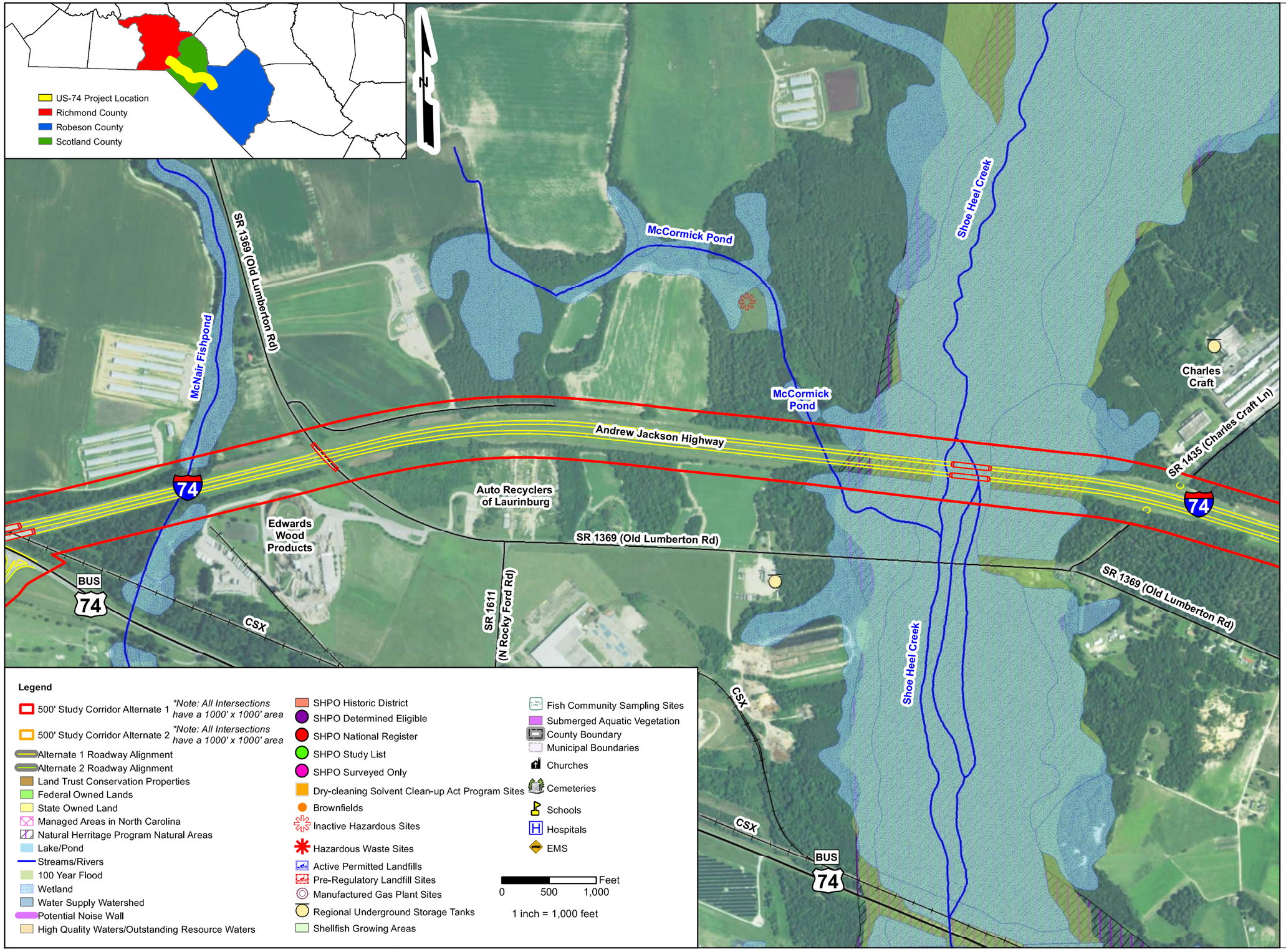

Legend

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- 100 Year Flood
- Wetland
- Water Supply Watershed
- Potential Noise Wall
- High Quality Waters/Outstanding Resource Waters
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- Brownfields
- Inactive Hazardous Sites
- Hazardous Waste Sites
- Active Permitted Landfills
- Pre-Regulatory Landfill Sites
- Manufactured Gas Plant Sites
- Regional Underground Storage Tanks
- Shellfish Growing Areas
- Fish Community Sampling Sites
- Submerged Aquatic Vegetation
- County Boundary
- Municipal Boundaries
- Churches
- Cemeteries
- Schools
- Hospitals
- EMS

Feet
0 500 1,000
1 inch = 1,000 feet

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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FIGURE 9.9
ALTERNATE 1 & 2 ENVIRONMENTAL FEATURES MAP

US 74 UPGRADE TO INTERSTATE STANDARDS
RICHMOND, SCOTLAND, ROBESON COUNTIES

County: **RICHMOND, SCOTLAND, ROBESON**

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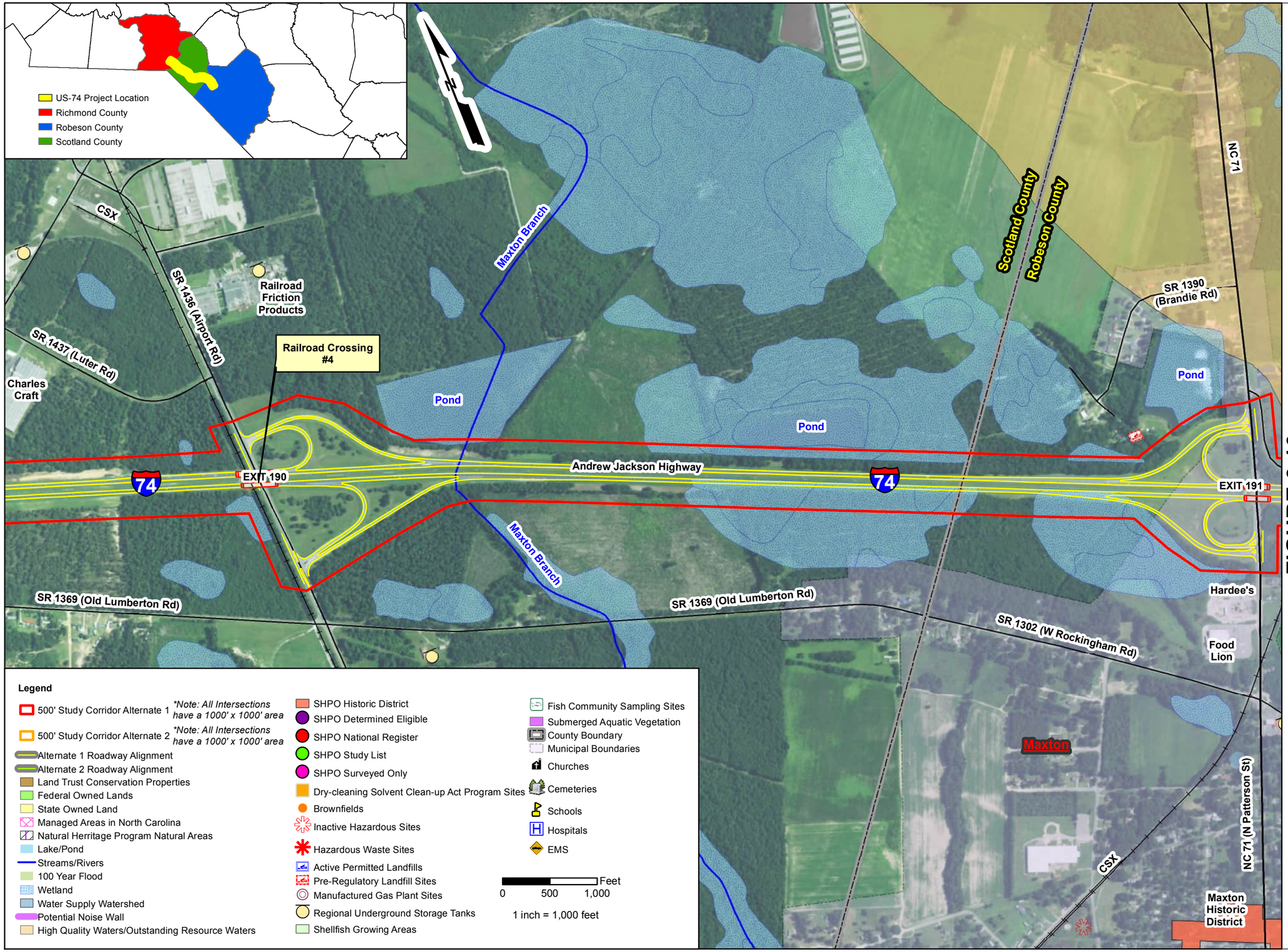

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF PLANNING AND PROGRAMMING

FEASIBILITY STUDIES UNIT

FIGURE 9.10
ALTERNATE 1 & 2
ENVIRONMENTAL FEATURES MAP

US 74 UPGRADE TO INTERSTATE STANDARDS
RICHMOND, SCOTLAND, ROBESON COUNTIES

County: **RICHMOND, SCOTLAND, ROBESON**

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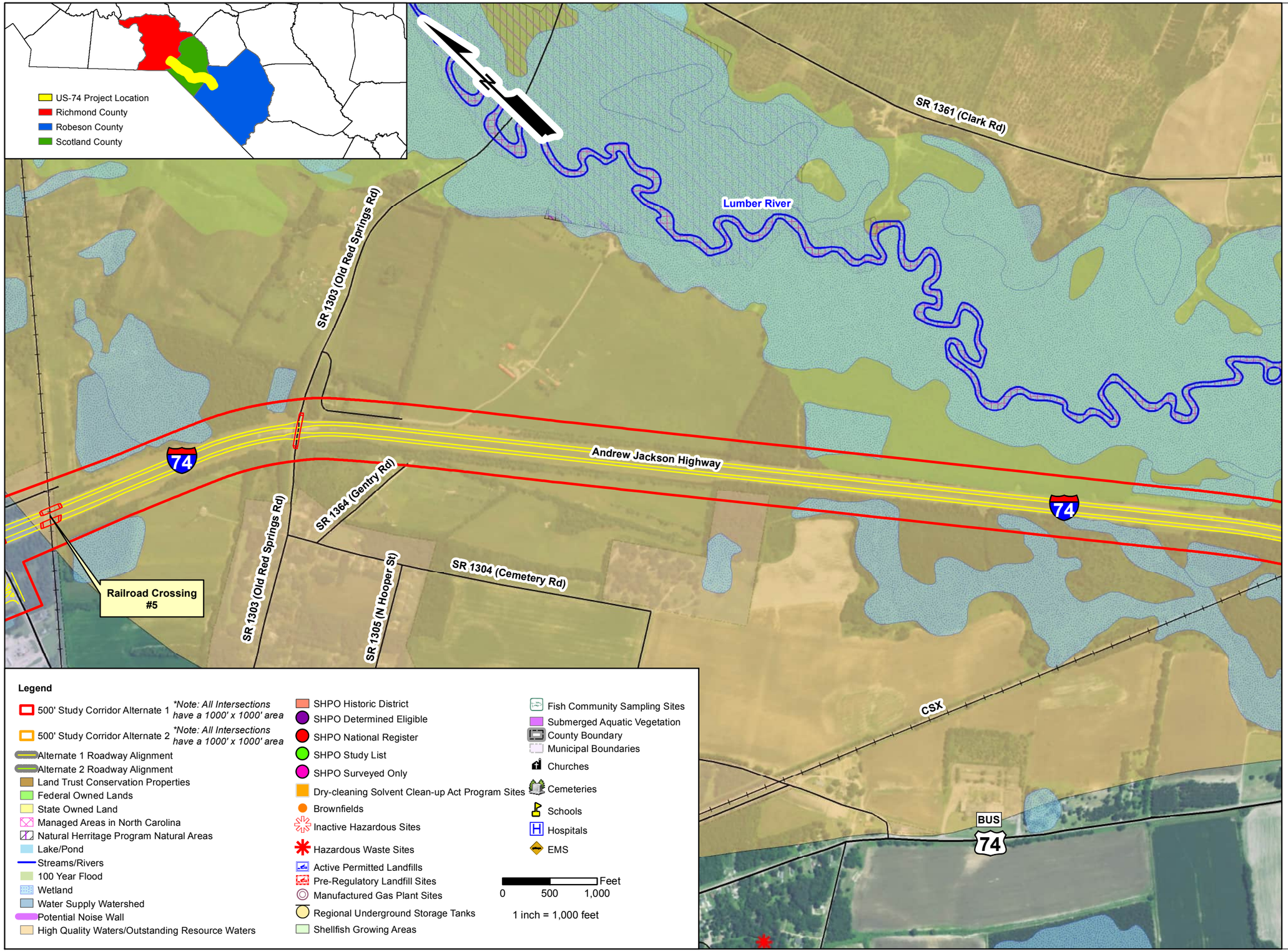

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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FIGURE 9.11
ALTERNATE 1 & 2
ENVIRONMENTAL FEATURES MAP
US 74 UPGRADE TO INTERSTATE STANDARDS
RICHMOND, SCOTLAND, ROBESON COUNTIES

County: **RICHMOND, SCOTLAND, ROBESON**

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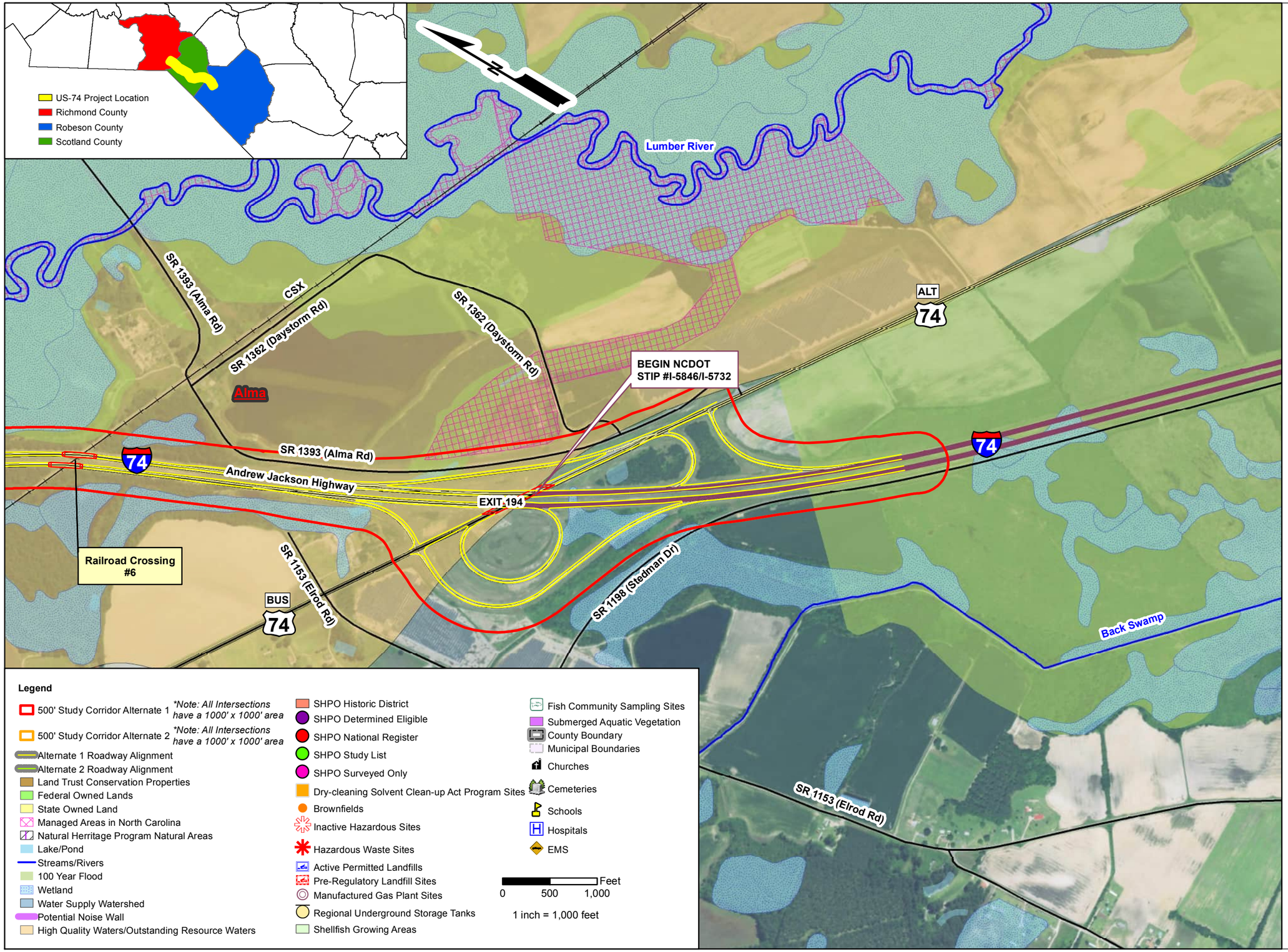

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF PLANNING AND PROGRAMMING

FEASIBILITY STUDIES UNIT

FIGURE 9.12
ALTERNATE 1 & 2
ENVIRONMENTAL FEATURES MAP

US 74 UPGRADE TO INTERSTATE STANDARDS
RICHMOND, SCOTLAND, ROBESON COUNTIES

County: **RICHMOND, SCOTLAND, ROBESON**

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