Environmental Assessment

I-85 /I-385 Interchange Improvements
Greenville County, South Carolina

SCDOT

U.S. Department of Transportation
Federal Highway Administration

May 18, 2012

I-85 and I-385 Interchange Improvement Project
Greenville, South Carolina

RECEIVED
Federal Highway Administration

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DIVISION OFFICE
COLUMBIA S.C.

ENVIRONMENTAL ASSESSMENT

SCDOT

Submitted Pursuant to 42 U.S.C 4332 (2) (c) by the
U.S. Department of Transportation, Federal Highway Administration
and
S.C. Department of Transportation, Environmental Management Office

9/13/2012
Date of Approval

Heather M. Robbi
S.C. Department of Transportation

9-18-12
Date of Approval

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Federal Highway Administration

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Constr. PIN No. 38111_RD01
File No. 23.03811
Project No. IM23(009))

I ENVIRONMENTAL COMMITMENTS

The proposed Interstate 85 (I-85) and Interstate 385 (I-385) interchange improvement project requires important commitments from the South Carolina Department of Transportation (SCDOT; Department) to minimize potential impacts to the human and natural environments. The following is a list of the environmental commitments required from the Department and documented in the following Environmental Assessment (EA).

1. Input received during the public hearing process and during the environmental document availability period will be carefully evaluated in the future project development. Modifications will be made where appropriate (p. 28).

2. The final drainage system will be designed to accommodate the volume of stormwater associated with the preferred alternative. Stormwater control measures, both during construction and post-construction, are required for SCDOT projects constructed in the vicinity of 303(d), total maximum daily load (TMDL), outstanding resource waters (ORW), tidal, and other sensitive waters in accordance with the SCDOT's MS4 Permit (p. 63).

3. To minimize impacts to water quality, the contractor will be required to minimize potential impacts through implementation of construction best management practices, reflecting policies contained in 23 CFR 650 B and SCDOT's Supplemental Specifications on Seeding and Erosion Control Measures (January 12, 2009) (p. 64).

4. The Department will coordinate and acquire all necessary environmental permits required for the construction of the proposed project, which assumes: a U.S. Army Corps of Engineers (USACE) permit, under Section 404 of the Clean Water Act; a 401 Water Quality Certification from the South Carolina Department of Health and Environmental Control (SCDHEC); a Land Disturbance permit under the SCDHEC National Pollutant Discharge Elimination System (NPDES) Stormwater Program for a construction site exceeding 1.0 acre. These efforts will require evaluation and implementation of various strategies to avoid, minimize, and mitigate the impacts to jurisdictional waters of the U.S. Potential measures would include adjusting fill slopes and implementing erosion control measures, which include seeding of slopes, hay bay emplacement, silt fences, and sediment basins as appropriate, to minimize impact on adjacent wetlands (p. 70).

5. At the appropriate stage of project development, a complete hydraulic study performed to SCDOT guidelines for Hydraulic Design Studies would be conducted to more precisely

determine the effects of the project on the base floodplains. If after the completion of the studies it is determined that a conditional letter of map revision (CLOMR) is needed, appropriate coordination with the Federal Emergency Management Agency (FEMA) would take place (p. 74).

6. To the extent possible, construction activities will be confined to daylight working hours and noise controlled equipment will be utilized to minimize potential noise impact during construction (p. 80).

7. The determination of areas that warrant Phase II Assessment will be conducted upon final right-of-way acquisitions. Any Phase II Assessment will be site specific, based on hydrogeologic conditions, distance from specific environmental concerns, and other relative factors. If avoidance of the contamination area is not a viable alternative, tanks and other hazardous materials would be tested and removed and/or treated in accordance with the U.S. Environmental Protection Agency (USEPA) and SCDHEC requirements (p. 87).

8. The Department will have an archaeologist on-site to monitor the ground disturbance activities in the vicinity of the Walker Cemetery (p. 89).

9. The Department will acquire all new right-of-way and process these relocations in compliance with the Uniform Relocation Assistance and Real Property Acquisition policies Act of 1970, as amended (42 U.S. C. 4601 *et seq.)* (p. 89).

10. Upon approval of the EA, the Department will conduct a Public Hearing to provide an opportunity to review and comment on the project. The Public Hearing would be appropriately advertised, along with notification of availability of the approved EA, which will be made available for review prior to the Public Hearing at the appropriate Department's Central and District office (p. 110).

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1.0 INTRODUCTION

The South Carolina Department of Transportation proposes to improve the existing I-85 and I-385 interchange located in Greenville County. The project, as proposed, would result in certain modifications to the human and natural environment. However, the Department has not identified any significant impacts that would occur based on the data collected; therefore the project meets the criteria under 23 CFR 771.115(c) for processing as an Environmental Assessment. Specific environmental studies were conducted in the early stages of project development and understandings of the scope of work to be performed were utilized in making this decision. These environmental studies are appended and/or incorporated by reference to this document.

2.0 PURPOSE AND NEED OF THE PROJECT

2.1 Existing Facilities

The project corridor is located along the southern limits of the City of Greenville, and includes various urbanized land uses including transportation, commercial development, industrial, and residential land uses as illustrated in Figures 1 and 2. The project corridor also includes the existing I-85 freeway, I-385 freeway, I-85/I-385 interchange, and adjacent interchanges in each direction along I-85 and I-385.

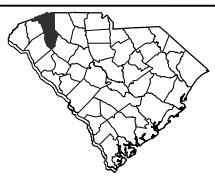
I-85 Freeway

I-85 is a north-south interstate route traveling along the southern limits of the City of Greenville and provides ultimate connection between Atlanta, Georgia and Charlotte, North Carolina. I-85 is a six-lane median divided freeway with a speed limit of 60 miles per hour (mph). I-85 has grade separated interchanges at Laurens Road (US 276 – Exit 48); Woodruff Road (SC-146 – Exit 50); I-385 (Exit 51); and Pelham Road (S-492 – Exit 54). There are also existing structures carrying Salters Road Traffic over I-85 and carrying Roper Mountain Road (S-548) traffic over I-85, along with a double box culvert carrying two-lanes of traffic along Muddy Ford Road under I-85 near milepost 53.[1] As summarized in Table 1, the existing year (2010) average daily traffic (ADT) volumes along mainline I-85 vary from 87,600 to 107,200 within the project area.

I-85 Looking North

[1] *Preliminary Inventory of Existing Infrastructure Memorandum for the Reconfiguration of the I-85/I-385 Interchange*. Prepared by Hussey, Gay Bell, & DeYoung for SCDOT. July 2009.

Shaded Area Indicates
County Location in SC



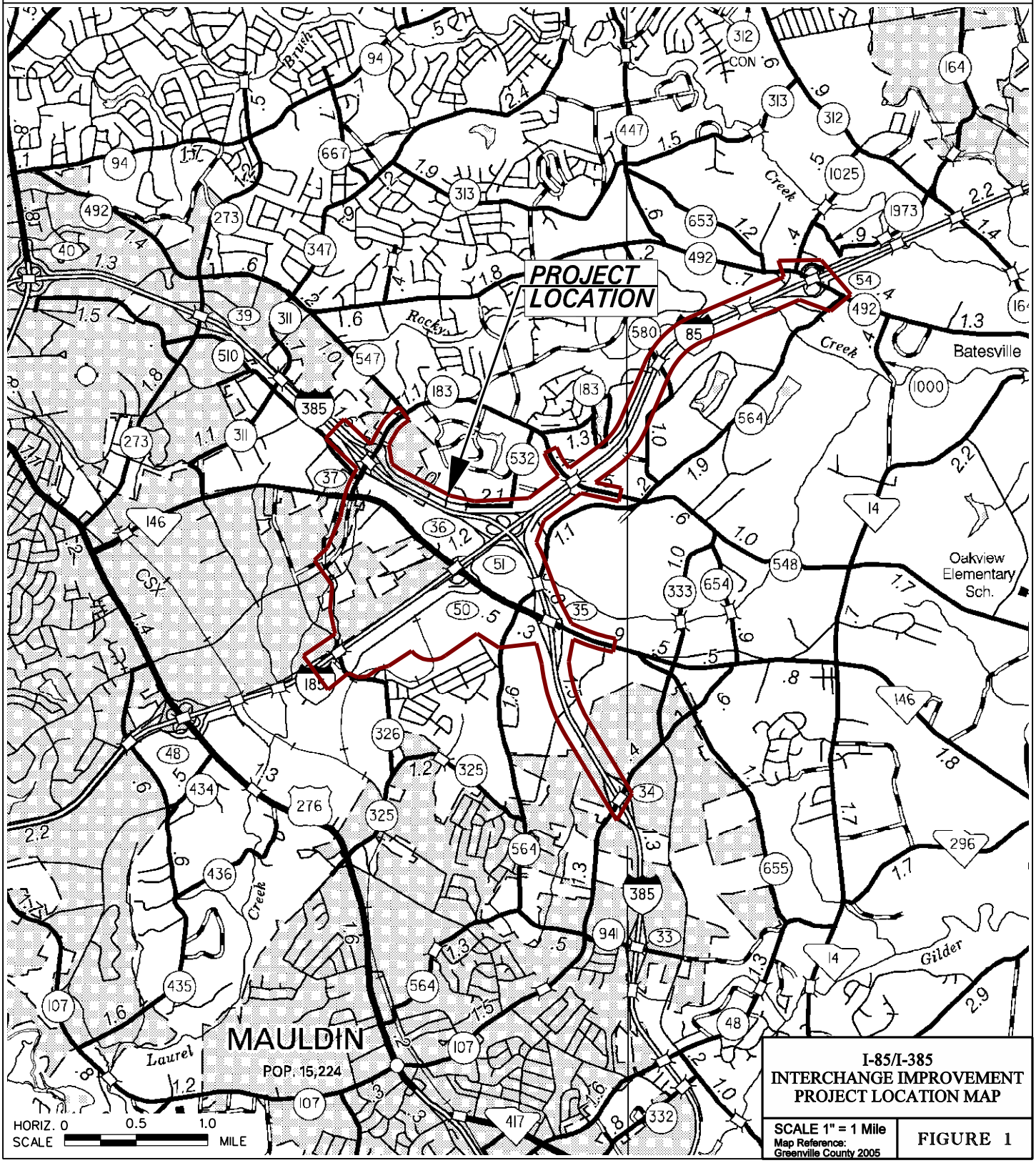
VICINITY MAP

Greenville County, S.C.

Approximate Location of Project is:

Longitude 82° 17' 49"

Latitude 34° 49' 58"



I-85/I-385
INTERCHANGE IMPROVEMENT
PROJECT LOCATION MAP

SCALE 1" = 1 Mile
Map Reference:
Greenville County 2005

FIGURE 1

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I-85/I-385 Interchange
Improvement Project
Greenville County, S.C.
Environmental Assessment

1—I-385 Widening and Rehabilitation Project; Project No. IM23(019)
2—Salters Road Widening from Millennium Blvd. to Verdae Blvd; Project No. GPATS (010)
3—I-85 NB Exit Ramp at SC 146 (Woodruff Road) - Ramp Modification; Project No. GPATS (005)
4—SC 146 (Woodruff Road) at S-564 (Miller Road/Garlington Road) - Project No. GPATS (004)
5—S-545 (Roper Mountain Road) Widening from Garlington Road to Feaster Road

Legend

Project Study Area

I-85/I-385
INTERCHANGE IMPROVEMENT
PROJECT BOUNDARY
DRAWING

SCALE 1" = 2000'
Aerial Photography 2010

FIGURE 2

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I-385 Freeway

I-385 is a north-south interstate route that provides a direct connection from Interstate 26 (I-26) near Clinton, SC to Greenville, SC. South of I-85, I-385 is a four-lane divided freeway with a grassed median and cable median barrier. North of I-85, I-385 is an eight-lane (including auxiliary lanes) freeway with concrete median barrier up to the Roper Mountain Road interchange. I-385 has a posted speed limit of 55 mph within the project area. I-385 has grade separated interchanges at Woodruff Road (S-146 – Exit 35); I-85 (Exit 36); and Roper Mountain Road (S-183 – Exit 37). There are also existing northbound and southbound parallel structures carrying I-385 traffic over Garlington Road (S-564) and Seaboard Coastline Railroad (SCL RR) just north of the Woodruff Road Interchange. As summarized in Table 1, the existing year (2010) ADT along I-385 varies from 78,300 to 95,100.

Table 1. Existing Interstate Freeway Volumes

Roadway Segment	2010 Average Daily Traffic Volumes (ADT)	2035 Average Daily Traffic Volumes (ADT)
I-85 between Laurens Rd. and Woodruff Rd.	91,500	141,500
I-85 between Woodruff Rd. and I-385	87,600	139,000
I-85 between I-385 and Pelham Rd.	107,200	174,700
I-385 between Butler Rd. and Woodruff Rd.	78,300	141,000
I-385 between Woodruff Rd. and I-85	89,500	161,500
I-385 between I-85 and Roper Mountain Rd.	95,100	172,500

I-85/I-385 Interchange

The existing I-85/I-385 interchange configuration consists of multiple directional movements and loops. Specifically, it is a three level interchange with I-85 mainline at grade and the I-385 mainline elevated with dual southbound/northbound structures. There are direct-connect ramps from I-85 northbound to I-385 northbound and from I-

385 southbound to I-85 northbound. There are loop ramps from I-85 southbound to I-385 southbound and from I-385 northbound to I-85 southbound. There are also two-lane Collector-Distributor (C-D) roadways on both sides of I-85 between Woodruff Road and I-385 that accommodate various movements within the I-85/I-385 and the I-85/Woodruff Road (Exit 50) interchanges (i.e. I-85 southbound to Woodruff Road).

Collector-Distributor = A roadway provided to eliminate weaving and reduce the number of ingress and egress points along the through roadways while satisfying the demand for access to and from the freeway.

Adjacent Facilities

The project corridor also includes the following facilities and interchanges:

I-85/Woodruff Road (Exit 51A) and I-385/Woodruff Road (Exit 35): Woodruff Road (SC 146) is a five-lane undivided roadway with a center turn lane and has a general east-west orientation with a posted speed limit varying between 35 and 45 mph within the project area.


I-385 SB to I-85 NB

I-85/Pelham Road (Exit 54): Pelham Road (S-492) is a five-lane undivided roadway with a center turn lane and has a general east-west orientation with a posted speed limit of 40 mph in the study area.

I-385/Roper Mountain Road (Exit 37): Roper Mountain Road (S-548)/Verdae Boulevard is a continuous roadway and has a general north-south orientation with posted speed limits of 40 and 45 mph. The roadway is a five-lane undivided roadway, and is named Roper Mountain Road north of Woodruff Road and Verdae Boulevard south of Woodruff Road.[2]

[2] *Traffic Study for I-85/I-385 Interchange Improvements*. Prepared by Florence & Hutcheson, Inc., for SCDOT. February 2012.

These roadway corridors are heavily developed, dominated by various commercial developments, including retail stores, restaurants, gas stations, industrial facilities, and general offices with sparse residential areas.

2.2 Project Purpose

The primary purpose of the project is to improve operational efficiency of the existing I-85/I-385 interchange to accommodate existing and projected traffic volumes. The secondary purpose of the project is to improve the safety of the interchange.

2.3 Project Need

The project need is based upon the existing and projected operating conditions associated with the current interchange facility. Specifically, the traffic volumes and existing configuration of the interchange result in unacceptable operating conditions and deficiencies along the various ramps and multiple merge and weave movements. These deficiencies create safety concerns due to congestions, undesirable movements and vehicular conflicts.

Merge=point where traffic comes together.
Diverge=point where traffic splits.
Weaving=vehicular maneuvers where the pattern of traffic entering and leaving a highway segment at contiguous points of access result in vehicle paths crossing each other.

2.3.1 Traffic Operating Conditions

Traffic operating conditions at intersections and along roadway segments are evaluated in terms of Levels of Service (LOS). The Levels of Service for an intersection are based on vehicular delay at the intersection, and for a roadway corridor are based on travel speed or density. Generally, in the opening year of a project, Levels of Service A through D are considered to be acceptable peak hour operations. Levels of Service E and F are generally considered to be unacceptable conditions during the peak hour. However, in the design year (20 years after opening year) Levels of Service E are usually considered acceptable.

A detailed traffic study was conducted during early project development, and later updated, to evaluate the existing and future traffic operating conditions for the I-85/I-385 interchange and adjacent facilities, and is appended to this document. Traffic count data was collected at various locations throughout the project corridor and

utilized for the existing year (2010) conditions. The traffic study also developed and analyzed the future years 2015 (opening year) and 2035 (design year) traffic volumes along the project area. Applicable growth rates were developed from historical SCDOT traffic counts along with the Greenville-Pickens Area Transportation Study (GPATS) regional travel demand model, and applied to the existing volumes to develop the projected volumes.[3]

I-85/I-385 Interchange Conditions

Freeway analysis was conducted for the mainline ramps and movements (i.e. merge/diverge; weaves) associated with the I-85/I-385 interchange. The analyses included existing conditions (2010), opening year conditions (2015) and design year (2035) conditions using the appropriate traffic volumes and the existing roadway configuration. A total of 32 merge/diverge and weave areas associated with the existing interchange were analyzed. The findings document that 19 of these movements are currently operating at unacceptable levels (i.e. LOS of E or F) for the 2010 existing conditions. Further 29 of the 32 movements are projected to be operating with unacceptable LOS in the 2035 design year. The deficiencies associated with these movements can be attributed to the existing interchange configuration and high traffic volumes coupled with multiple merge/diverge movements and insufficient weave areas. For example, the existing interchange includes loop ramps from I-385 northbound to I-85 southbound and from I-85 southbound to I-385 southbound. This "partial clover leaf" design results in unacceptable weave movements (LOS F) along the existing I-85 collector-distributor between the vehicles entering/exiting I-85 southbound. It should also be noted that many of these deficiencies, especially the ramp-freeway junction movements, can be contributed to the traffic conditions (i.e. volume, capacity) of the freeway section. The results of the analyses are presented in Tables 2a-b and illustrated in Figures 3 and 4.

[3] *Traffic Study for I-85/I-385 Interchange Improvements*. Prepared by Florence & Hutcheson, Inc., for SCDOT. February 2012.

I-85/I-385 Interchange
Improvement Project
Greenville County, S.C.
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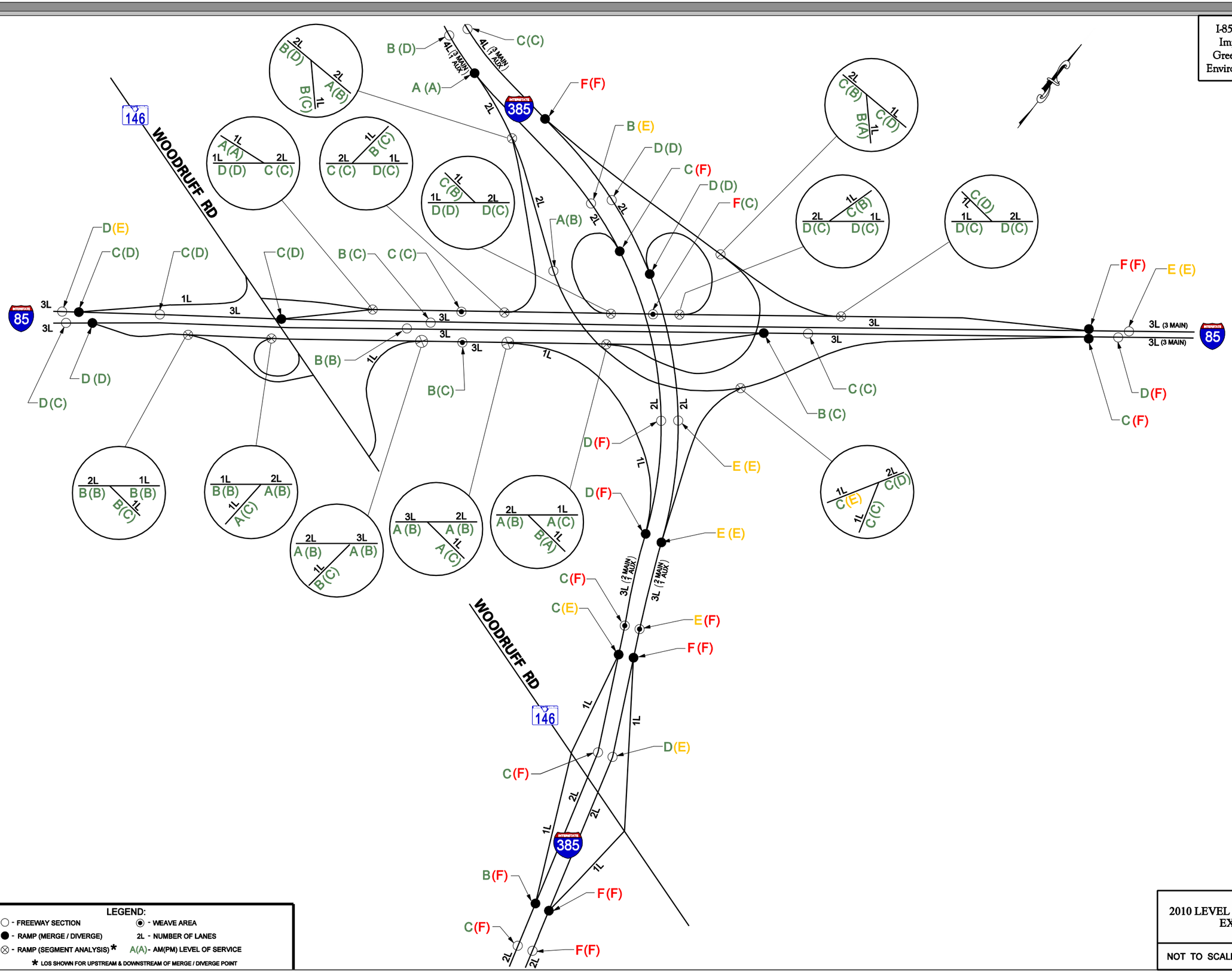

2010 LEVEL OF SERVICE FOR EXISTING

NOT TO SCALE | FIGURE 3

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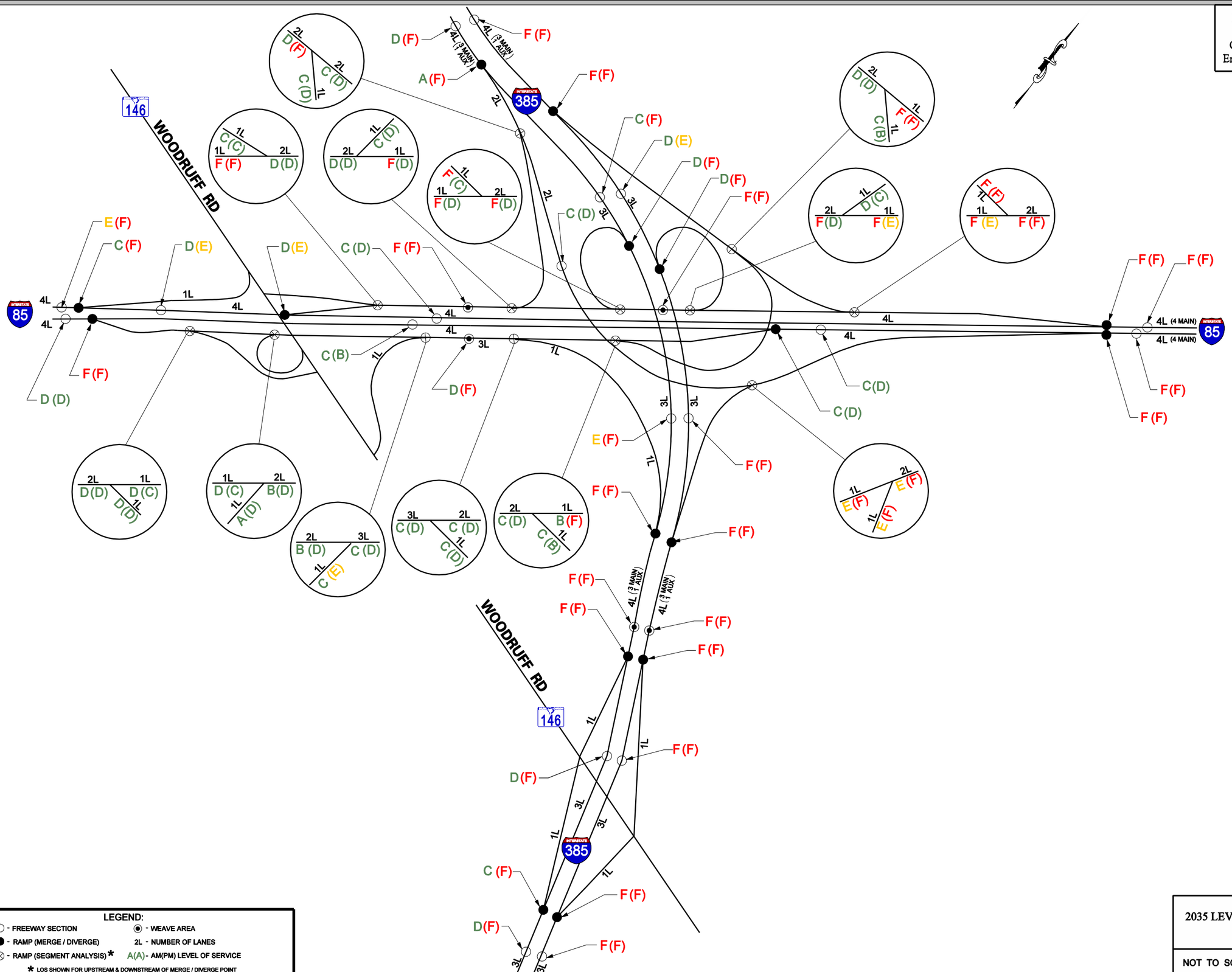
I-85/I-385 Interchange
Improvement Project
Greenville County, S.C.
Environmental Assessment



2035 LEVEL OF SERVICE FOR NO BUILD

NOT TO SCALE | FIGURE 4

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Table 2a. Existing and Design Year Ramp Levels of Service

Freeway Ramp	Merge/ Diverge	2010 LOS		2035 LOS	
		AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
I-85 NB off-ramp to I-385/Woodruff Rd	Diverge	D	D	F*	F*
I-85 NB on-ramp from Woodruff Rd	Merge	B	C	C	D
I-85 NB on-ramp from I-385	Merge	C	F*	F*	F
I-85 SB off-ramp to I-385/Woodruff Rd	Diverge	F*	F*	F	F
I-85 SB on-ramp from I-85/Woodruff Rd	Merge	C	D	D	E
I-385 NB off-ramp to I-85 NB	Diverge	E	E	F	F
I-385 NB off-ramp to I-85 SB/Woodruff Rd	Diverge	D	D	D	F*
I-385 NB on-ramp from I-85 /Woodruff Rd	Merge	F*	F*	F*	F*
I-385 SB off-ramp to I-85 /Woodruff Rd	Diverge	A	A	A	F*
I-385 SB on-ramp from I-85 SB	Merge	C	F*	D	F*
I-385 SB on-ramp from I-85 NB/Woodruff Rd	Merge	D	F*	F	F
I-85 NB on-ramp from Laurens Rd EB	Merge	E	D	D	C
I-85 NB on-ramp from Laurens Rd WB	Merge	E	C	D	D
I-85 SB off-ramp to Laurens Rd WB	Diverge	C	D	D	F*
I-85 SB off-ramp to Laurens Rd EB	Diverge	E	F	F*	F*
I-85 NB off-ramp to Pelham Rd	Diverge	F*	F*	F*	F
I-85 SB on-ramp from Pelham Rd WB	Merge	C	D	F*	F
I-85 SB on-ramp from Pelham Rd EB	Merge	D	D	F*	F*
I-385 NB on-ramp from Butler Rd	Merge	F*	F*	F*	F*
I-385 SB off-ramp to Butler Rd	Diverge	B	F*	C	F
I-385 NB off-ramp to Woodruff Rd	Diverge	F*	F*	F*	F*
I-385 NB on-ramp from Woodruff Rd	Merge	F*	F*	F	F
I-385 SB off-ramp to Woodruff Rd	Diverge	C	E	F	F
I-385 SB on-ramp from Woodruff Rd	Merge	B	F*	C	F*
I-385 NB off-ramp to Roper Mtn Rd	Diverge	A	A	A	F*
I-385 NB on-ramp from Roper Mtn Rd	Merge	B	C	F*	F
I-385 SB off-ramp to Roper Mtn Rd	Diverge	B	C	D	F
I-385 SB on-ramp from Roper Mtn Rd	Merge	B	F*	E	F

*LOS is F for ramp-freeway junction

Table 2b. Existing and Design Year Weave Area Levels of Service

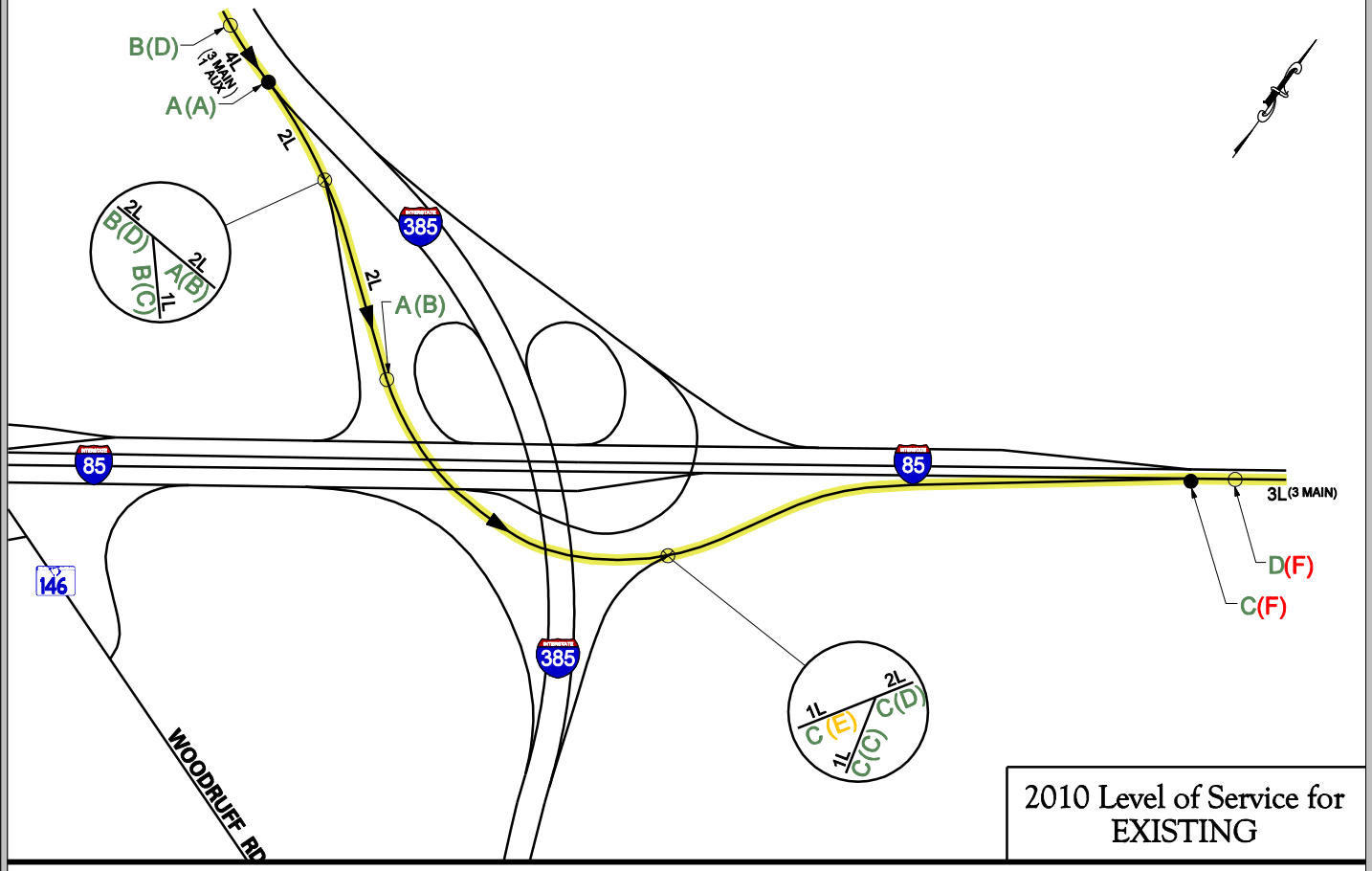
Weave Section	Direction	2010 LOS		2035 LOS	
		AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
I-85 C-D between Woodruff Rd and I-385	NB	B	C	D	F
	SB	C	C	F	F
I-385 between Woodruff Rd and I-85	NB	E	F	F	F
	SB	C	F	F	F

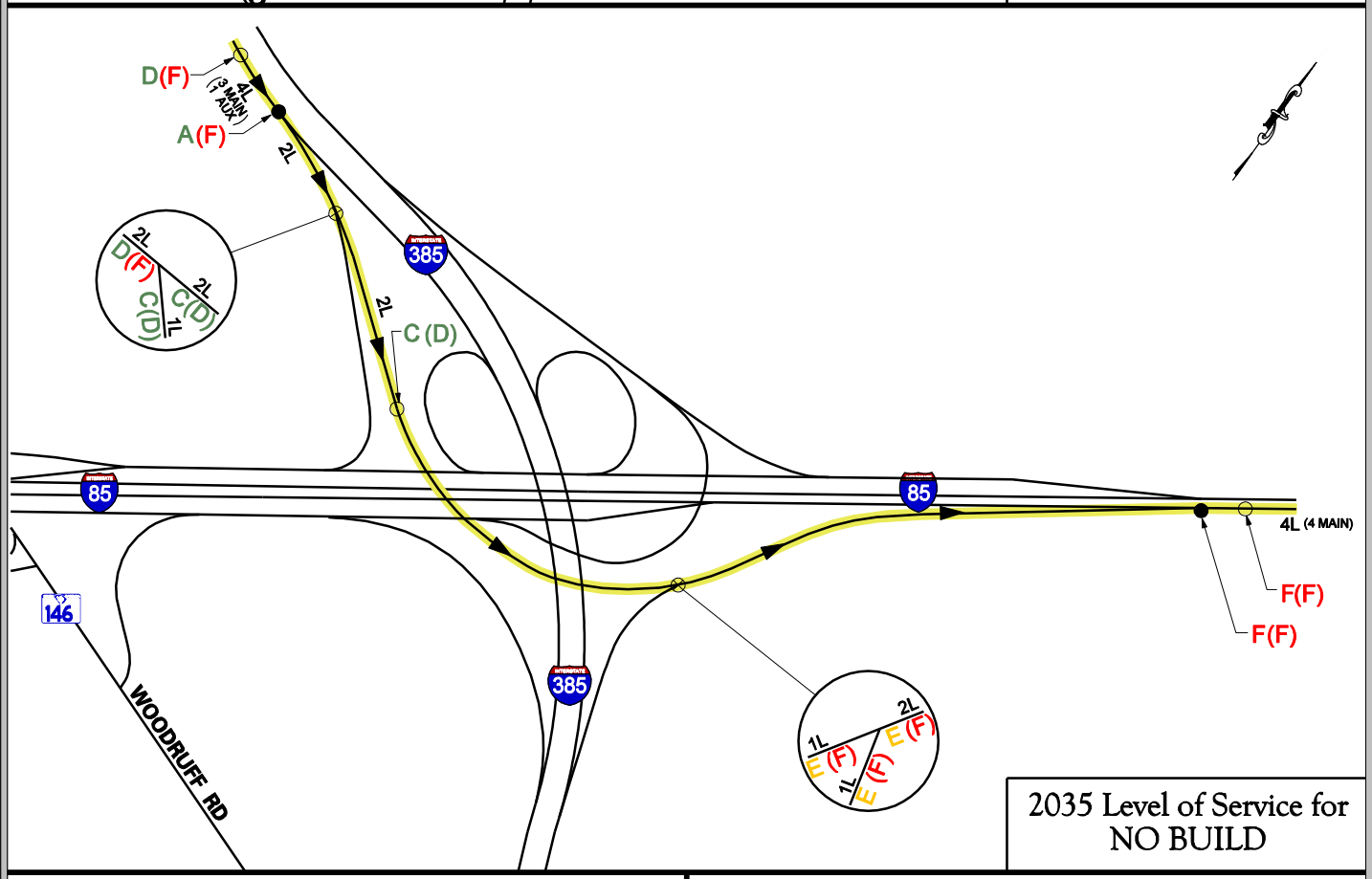
2.3.2 Operational Deficiencies

Field observations of the I-85/I-385 interchange and traffic conditions were taken during the weekday AM (7:00-9:00) and PM (4:00-6:00) peak periods. These observations were conducted during early project development, prior to any detailed traffic analysis, in an effort to identify potential deficiencies associated with the facility. As a result, eight (8) operational deficiencies were identified that would need to be addressed in the development of the proposed improvements. Subsequent traffic analysis validated that seven of the deficiencies are related to the existing operation of the interchange, with one (#8) attributed to an adjacent interchange. Therefore, Deficiency #8 was not carried forward in project development. The remaining seven key deficiencies associated with the I-85/I-385 interchange are described below and illustrated in Figures 5-11.

Deficiency 1:

Deficiency 1 (Figure 5) involves the I-385 southbound to I-85 northbound ramp movement. Specifically, I-385 southbound traffic to I-85 northbound experiences back-up during the PM peak hours, which begins at the merge with I-85 northbound. The I-385 southbound to I-85 northbound traffic merges with I-385 northbound to I-85 traffic prior to merging with I-85 northbound traffic. The merge of I-385 to I-85 northbound is currently operating at LOS F in the PM. In addition, the ramp segment of I-385 southbound and I-385 northbound to I-85 northbound is projected to be operating at LOS F in the 2035 design year. Therefore, the existing interchange does not effectively provide for the I-385 to I-85 northbound movement. The congestion and back-up associated with this movement is attributed to the heavy volumes of vehicles leaving





LEGEND:

- ○ - FREEWAY SECTION
- ◉ - WEAVE AREA
- ● - RAMP (MERGE / DIVERGE)
- 2L - NUMBER OF LANES
- ⊗ - RAMP (SEGMENT ANALYSIS)* A(A)- AM(PM) LEVEL OF SERVICE

* LOS SHOWN FOR UPSTREAM & DOWNSTREAM OF MERGE / DIVERGE POINT

DEFICIENCY 1: I-385 SOUTHBOUND PM PEAK HOUR BACK-UP GOING NORTH TO I-85 NORTHBOUND

FIGURE 5

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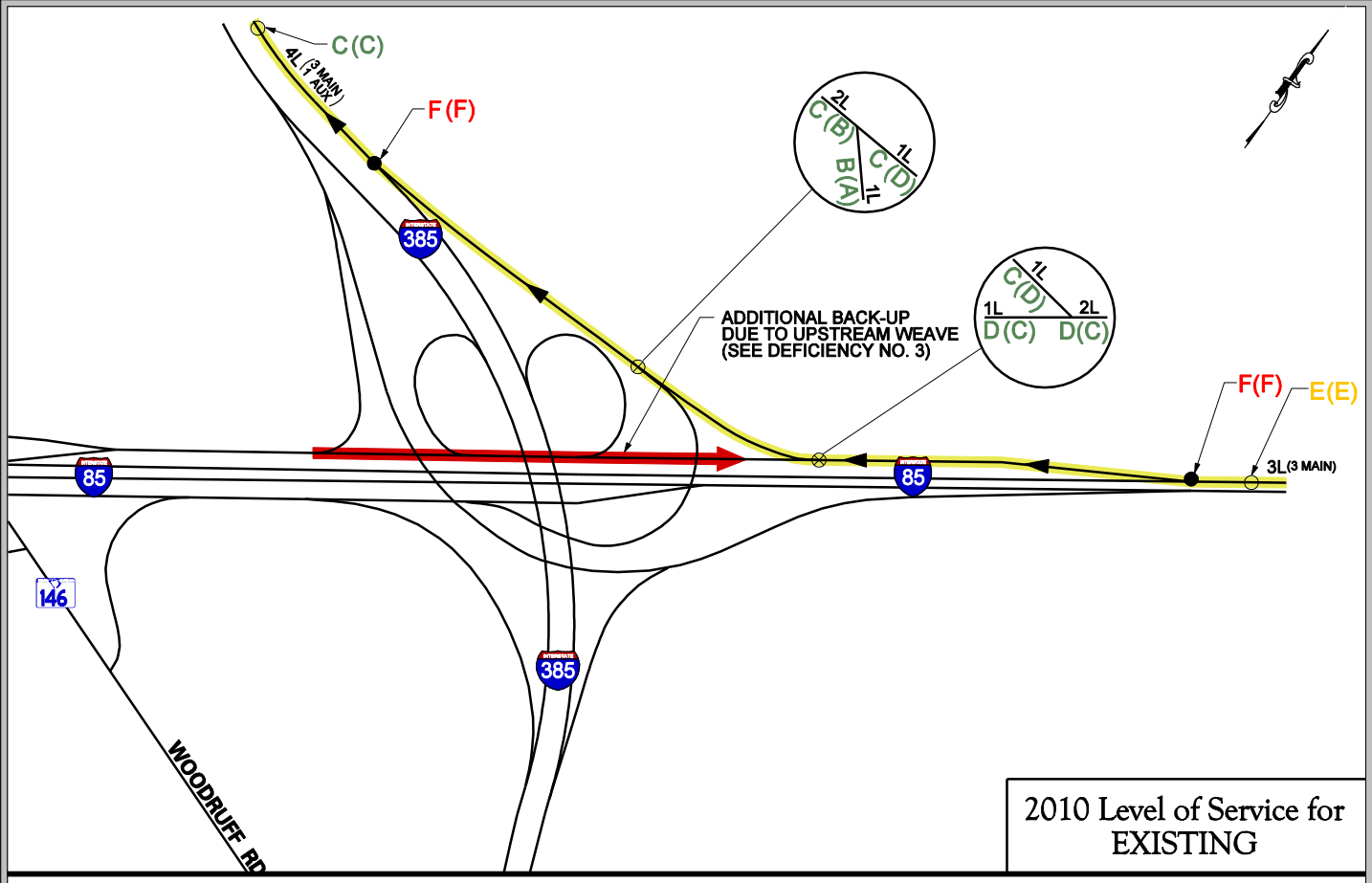
the City of Greenville during the PM hours; the merge movement of this traffic with I-85 northbound; and the lack of capacity along I-85 northbound.

Deficiency 2:

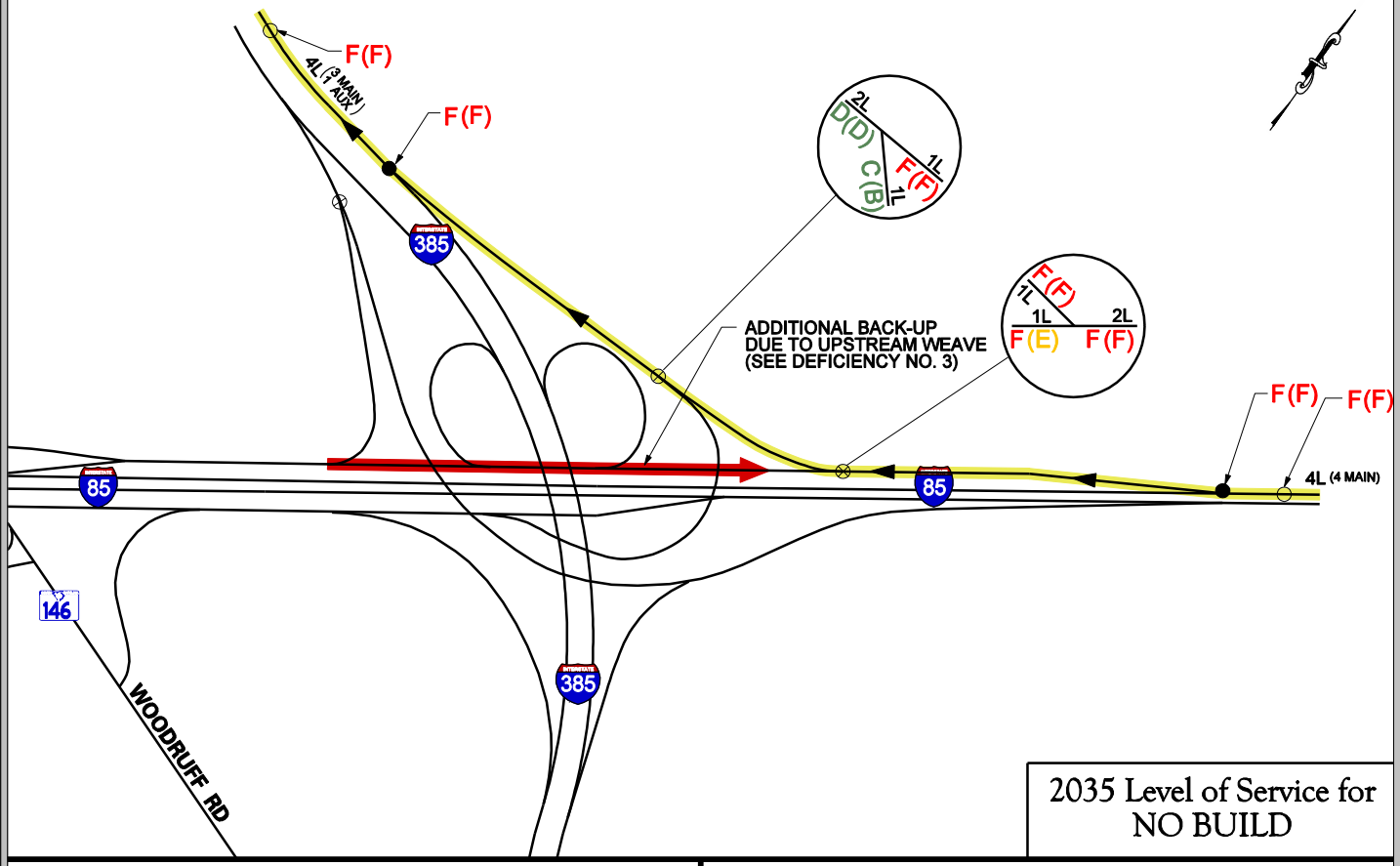
Deficiency 2 (Figure 6) involves the I-85 southbound to I-385 northbound ramp movement. Specifically, I-85 southbound traffic to I-385 northbound experiences back-up along I-85 at the ramp exit during the AM peak hours. The diverge ramp movement at the I-85 southbound to I-385 northbound ramp exit is currently operating at LOS F during both AM and PM peak hours. In addition, the merge movement of the ramp with I-385 northbound is also currently operating at LOS F. Therefore, the existing interchange does not effectively provide for the I-85 southbound to I-385 northbound movement. This deficiency is attributed to the heavy traffic volumes heading to the City of Greenville during the AM hours; current conflicts and deficient diverge movement at the I-85 southbound to I-385 northbound ramp exit; the back-up of traffic due to deficient weaves along the southbound collector-distributor upstream of the split to I-385 northbound (see deficiency #3 below); the lack of capacity along I-85 southbound; and lack of capacity along I-385 northbound.

Deficiency 3:

Deficiency 3 (Figure 7) is associated with the weave area along the I-85 southbound collector-distributor between I-385 and Woodruff Road. As previously documented, the existing interchange configuration includes a "partial clover leaf" design for I-385 northbound to I-85 southbound and for I-85 southbound to I-385 southbound. This configuration results in a deficient weave area for the traffic entering the I-85 southbound collector-distributor from I-385 northbound, and traffic attempting to exit the I-85 southbound collector-distributor. The proximity of the Woodruff Road interchange creates an additional weave area for traffic exiting at Woodruff Road and traffic entering the I-85 southbound collector-distributor from I-385 southbound. The weave area between the loop ramps is currently operating at LOS F during the AM Peak Hour. The weave area associated with the Woodruff Road exit ramp is projected to be operating at LOS F in the 2035 design year. This deficiency is attributed to the existing interchange configuration and proximity with Woodruff Road; and ultimately results in back-up along the loop ramp from I-385 northbound, back-up along the I-85 southbound collector-distributor, and safety issues due to the insufficient distance and vehicular conflicts.



2010 Level of Service for EXISTING



2035 Level of Service for NO BUILD

LEGEND:

- ○ - FREEWAY SECTION
- ◉ - WEAVE AREA
- ● - RAMP (MERGE / DIVERGE)
- 2L - NUMBER OF LANES
- ⊗ - RAMP (SEGMENT ANALYSIS)* A(A) - AM(PM) LEVEL OF SERVICE

* LOS SHOWN FOR UPSTREAM & DOWNSTREAM OF MERGE / DIVERGE POINT

DEFICIENCY 2: I-85 SOUTHBOUND AM PEAK HOUR BACK-UP AT I-385 NORTHBOUND OFF-RAMP

FIGURE 6

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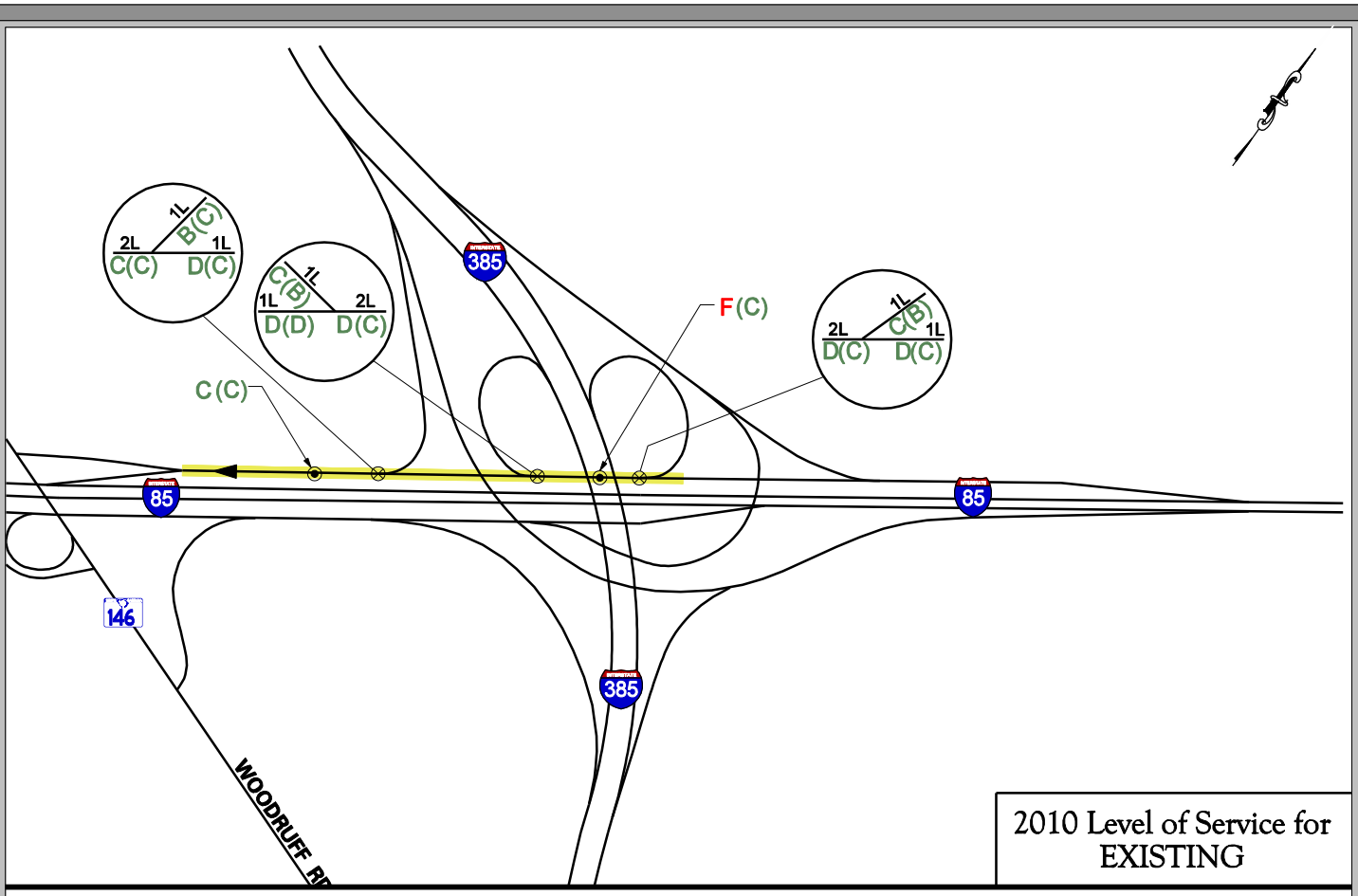
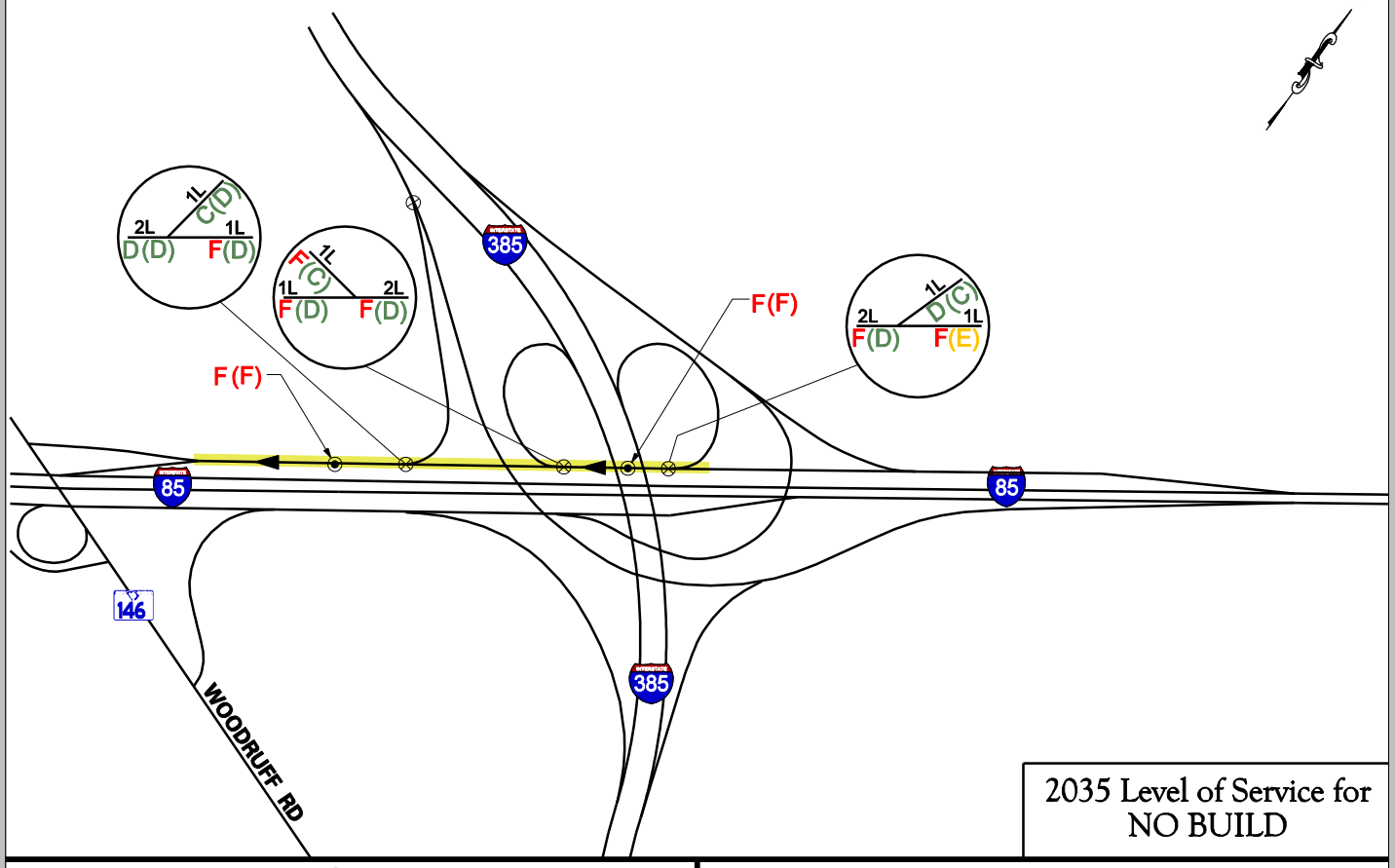


2010 Level of Service for EXISTING



2035 Level of Service for NO BUILD

LEGEND:

- ○ - FREEWAY SECTION
- ◉ - WEAVE AREA
- ● - RAMP (MERGE / DIVERGE)
- 2L - NUMBER OF LANES
- ⊗ - RAMP (SEGMENT ANALYSIS)* A(A)- AM(PM) LEVEL OF SERVICE

* LOS SHOWN FOR UPSTREAM & DOWNSTREAM OF MERGE / DIVERGE POINT

DEFICIENCY 3: WEAVE AREA ALONG I-85 SOUTHBOUND COLLECTOR-DISTRIBUTOR BETWEEN I-385 AND WOODRUFF RD.

FIGURE 7

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Deficiency 4:

Deficiency 4 (Figure 8) is associated with the weave area along I-385 southbound between I-85 and Woodruff Road. Specifically, this weave area is associated with the traffic attempting to enter I-385 southbound from I-85 northbound and traffic exiting I-385 southbound to Woodruff Road. This weave area is currently operating at LOS F during the PM peak hours, with the adjacent merge/diverge movements operating at LOS E and F during the PM hours. This will worsen in the future, with the weave area and adjacent merge/diverge movements operating at LOS F during both AM and PM hours. This deficiency is attributed to the existing interchange configuration and proximity with Woodruff Road; and ultimately results in back-up along the I-85 northbound to I-385 ramp, back-up along I-385 southbound and safety issues due to the insufficient distance and vehicular conflicts.

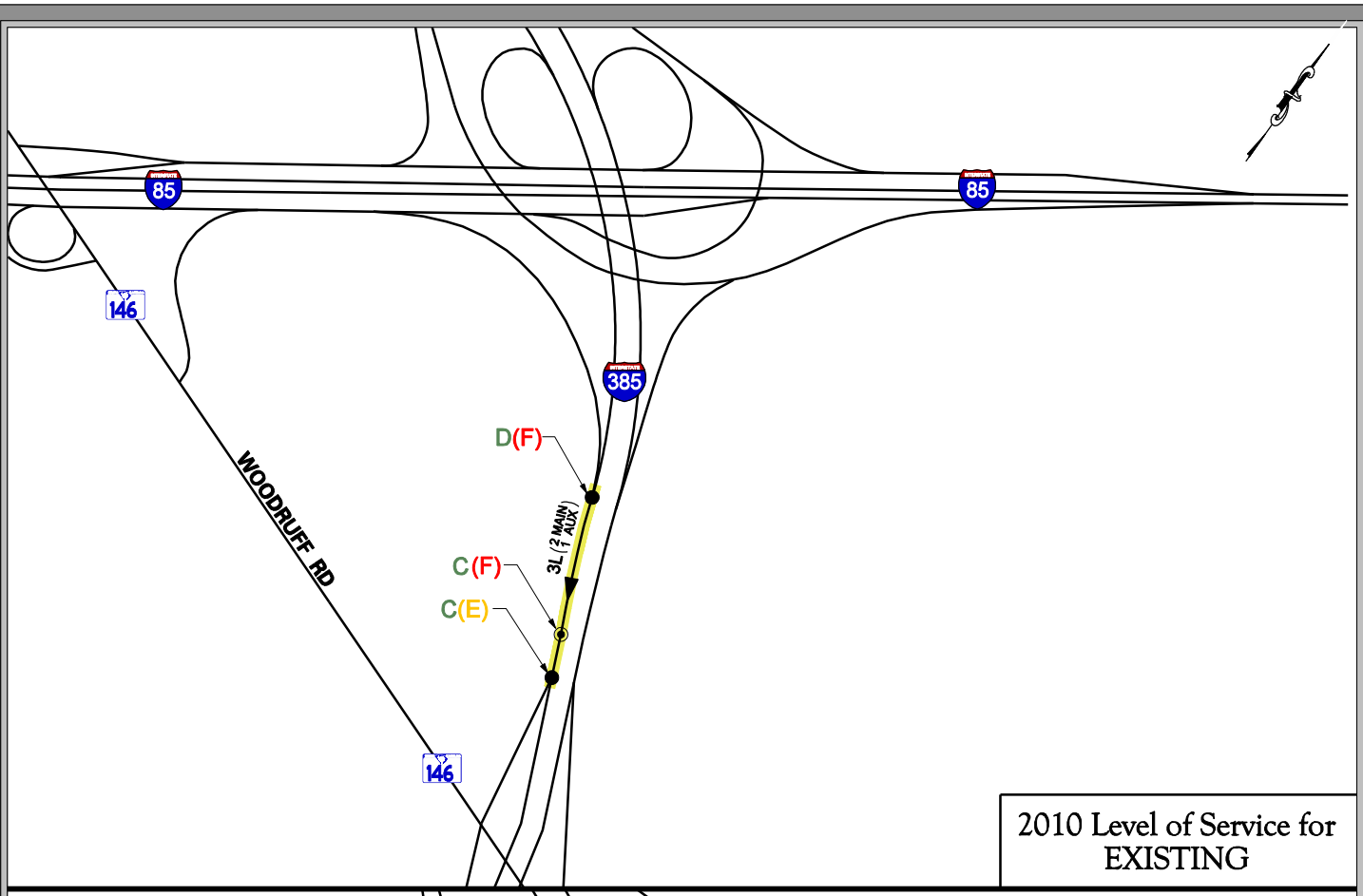
Deficiency 5:

Deficiency 5 (Figure 9) is associated with the weave area along I-385 northbound between Woodruff Road and I-85. Specifically, this weave area is associated with the traffic attempting to enter I-385 northbound from Woodruff Road and traffic exiting I-385 northbound to I-85 northbound. This weave area is currently operating at LOS F during the PM peak hours and LOS E during AM peak hours, with LOS F for AM and PM in the 2035 design year. There are also adjacent merge/diverge movements currently operating at LOS E and F, which are also projected to worsen to LOS F in the 2035 design year. This deficiency is attributed to the existing interchange configuration and proximity with Woodruff Road; and ultimately results in back-up along I-385 northbound and safety issues due to the insufficient distance and vehicular conflicts.

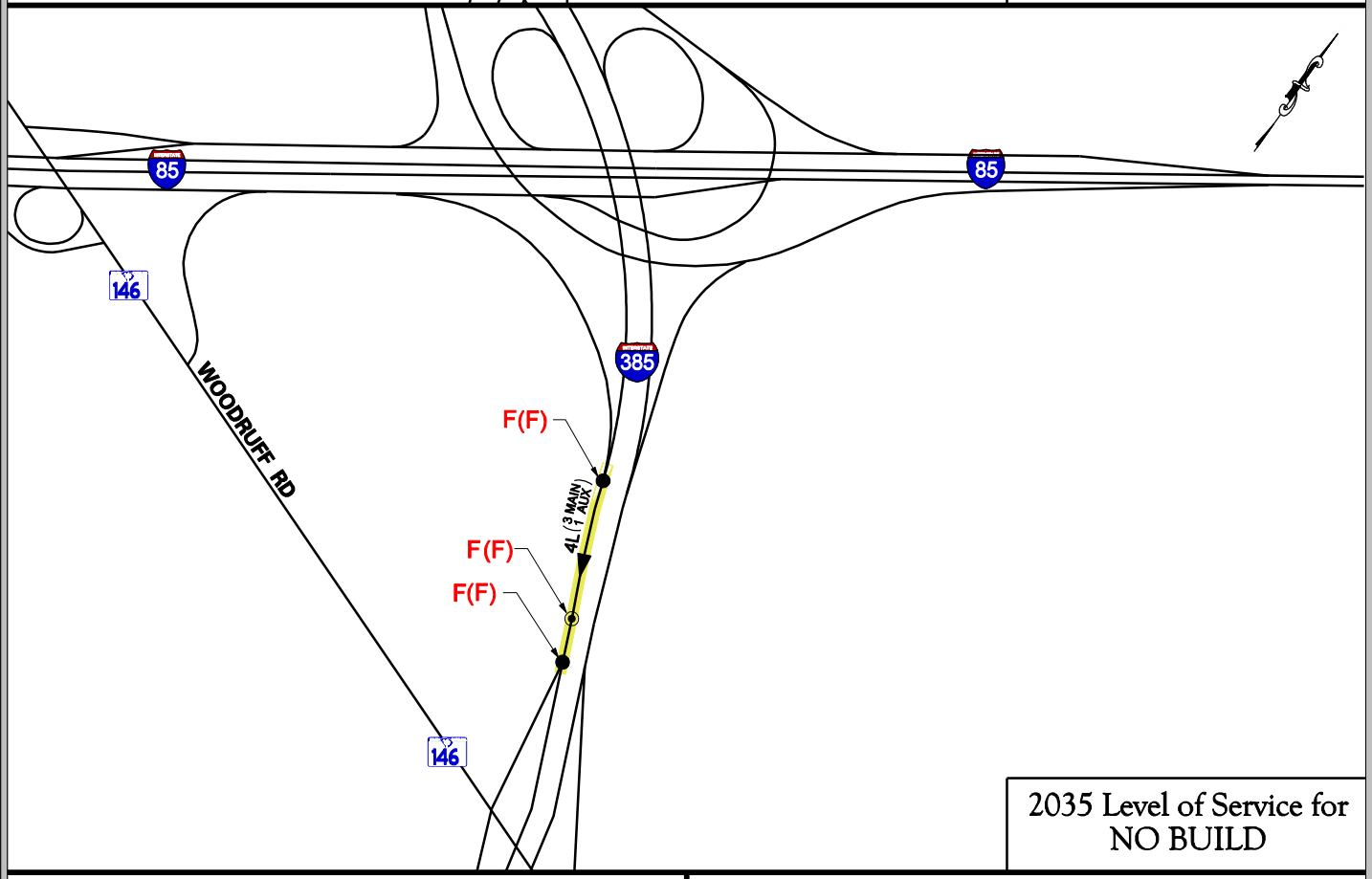
Deficiency 6:

Deficiency 6 (Figure 10) is associated with the I-385 northbound loop off-ramp to I-85 southbound. Specifically, the existing loop ramp has inadequate superelevation development off of I-385 northbound and a loop design speed of 25 mph. This configuration results in the increase potential for crashes, especially truck rollovers. In addition, the inefficient design results in

Superelevation=the amount of cross slope or "bank" provided on an horizontal curve to the counterbalance, in combination with the side friction, the centrifugal force of a vehicle traversing a curve.



2010 Level of Service for EXISTING



2035 Level of Service for NO BUILD

LEGEND:

- ○ - FREEWAY SECTION
- ◉ - WEAVE AREA
- ● - RAMP (MERGE / DIVERGE)
- 2L - NUMBER OF LANES
- ⊗ - RAMP (SEGMENT ANALYSIS)*
- A(A)- AM(PM) LEVEL OF SERVICE

* LOS SHOWN FOR UPSTREAM & DOWNSTREAM OF MERGE / DIVERGE POINT

DEFICIENCY 4: WEAVE AREA ALONG I-385 SOUTHBOUND BETWEEN I-85 AND WOODRUFF RD.

FIGURE 8

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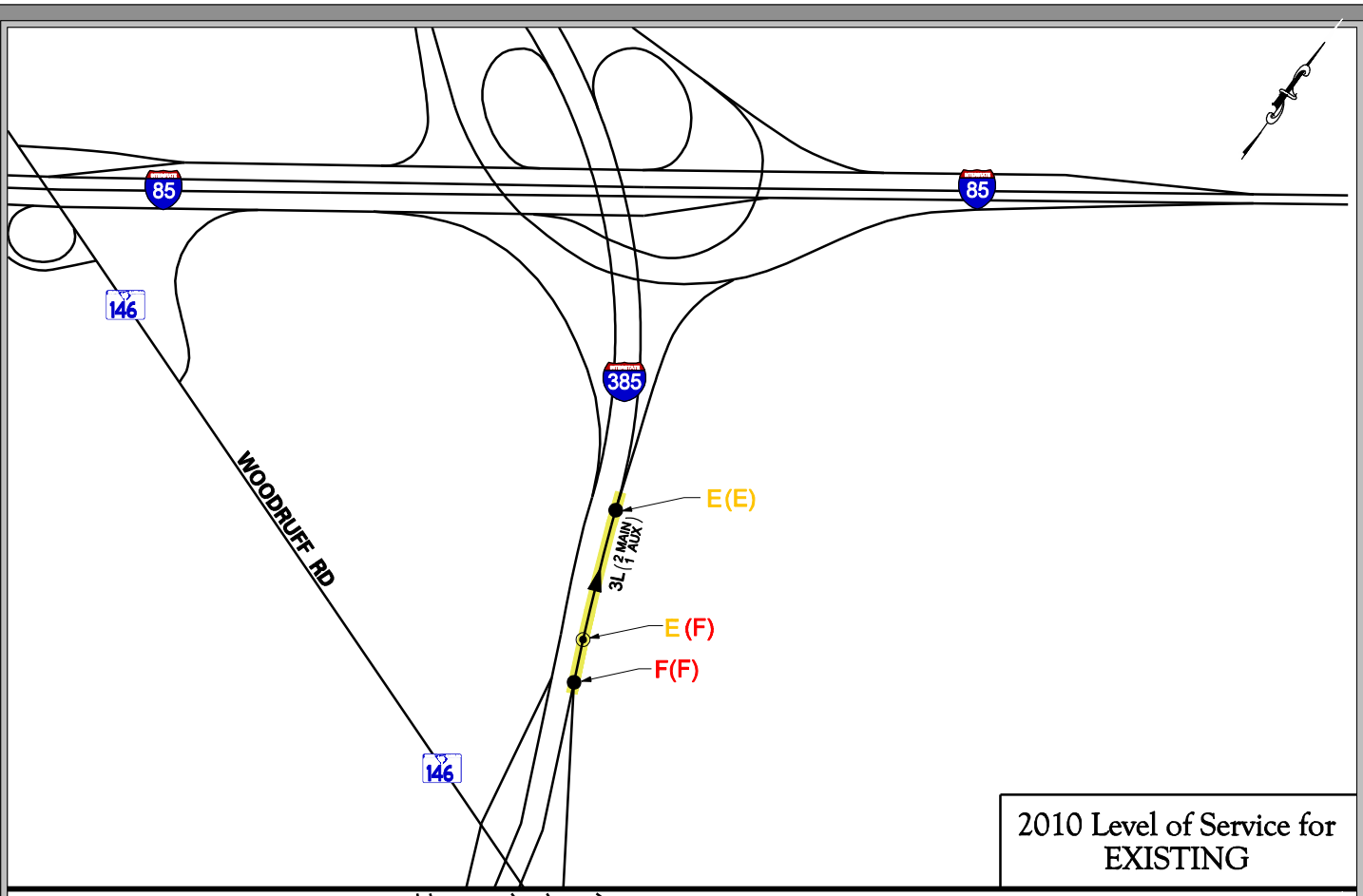
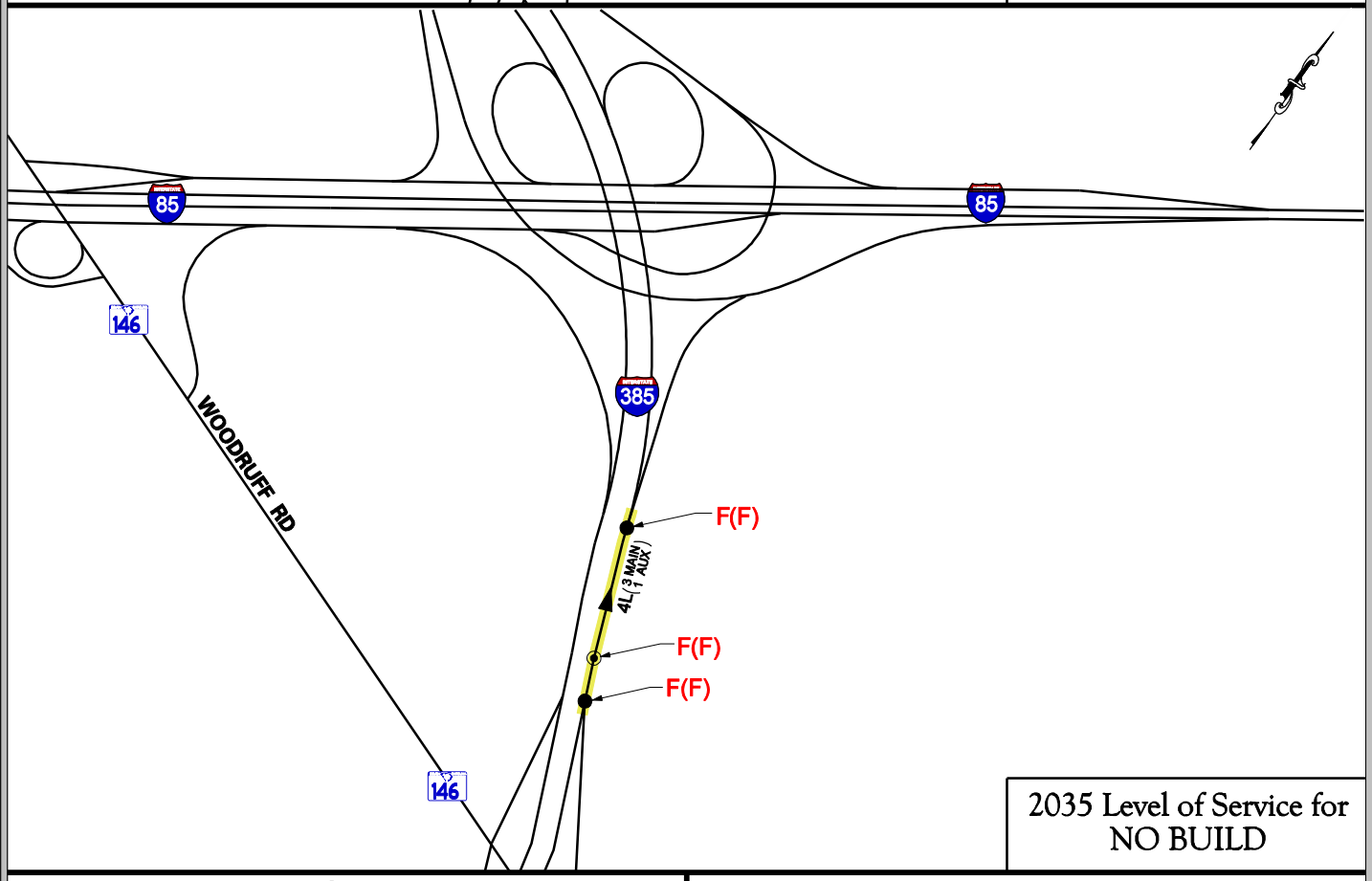


2010 Level of Service for EXISTING



2035 Level of Service for NO BUILD

LEGEND:

- ○ - FREEWAY SECTION
- ◉ - WEAVE AREA
- ● - RAMP (MERGE / DIVERGE)
- 2L - NUMBER OF LANES
- ⊗ - RAMP (SEGMENT ANALYSIS)*
- A(A)- AM(PM) LEVEL OF SERVICE

* LOS SHOWN FOR UPSTREAM & DOWNSTREAM OF MERGE / DIVERGE POINT

DEFICIENCY 5: WEAVE AREA ALONG I-385 NORTHBOUND BETWEEN WOODRUFF RD. AND I-85

FIGURE 9

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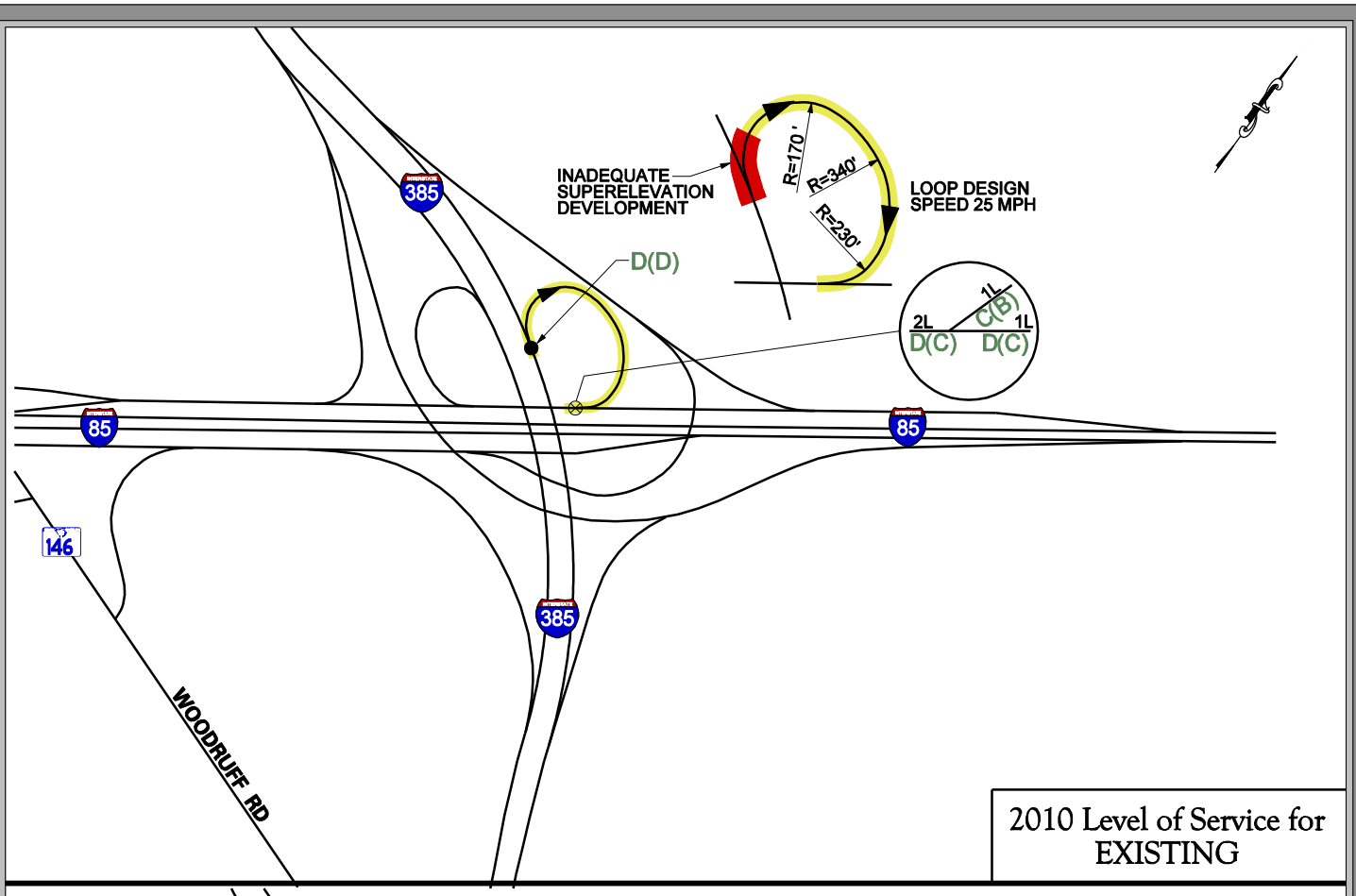
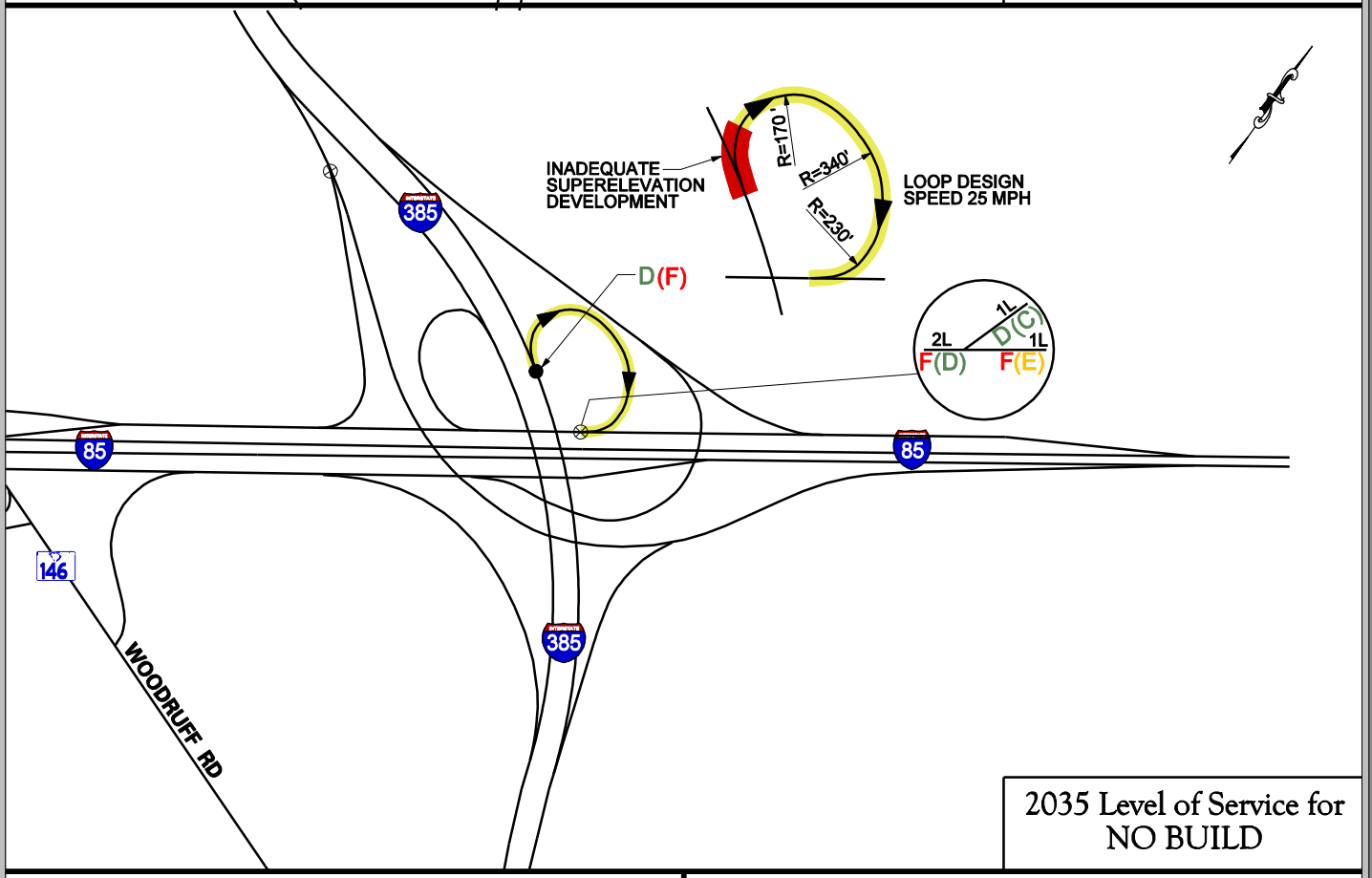


2010 Level of Service for EXISTING



2035 Level of Service for NO BUILD

LEGEND:

- ○ - FREEWAY SECTION
- ◉ - WEAVE AREA
- ● - RAMP (MERGE / DIVERGE)
- 2L - NUMBER OF LANES
- ⊗ - RAMP (SEGMENT ANALYSIS)* A(A)- AM(PM) LEVEL OF SERVICE

* LOS SHOWN FOR UPSTREAM & DOWNSTREAM OF MERGE / DIVERGE POINT

DEFICIENCY 6: SAFETY ISSUE ON I-385 NORTHBOUND LOOP OFF-RAMP TO I-85 SOUTHBOUND

FIGURE 10

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vehicles/trucks reducing speeds along the I-385 northbound mainline, compounding the safety concerns.

Deficiency 7:

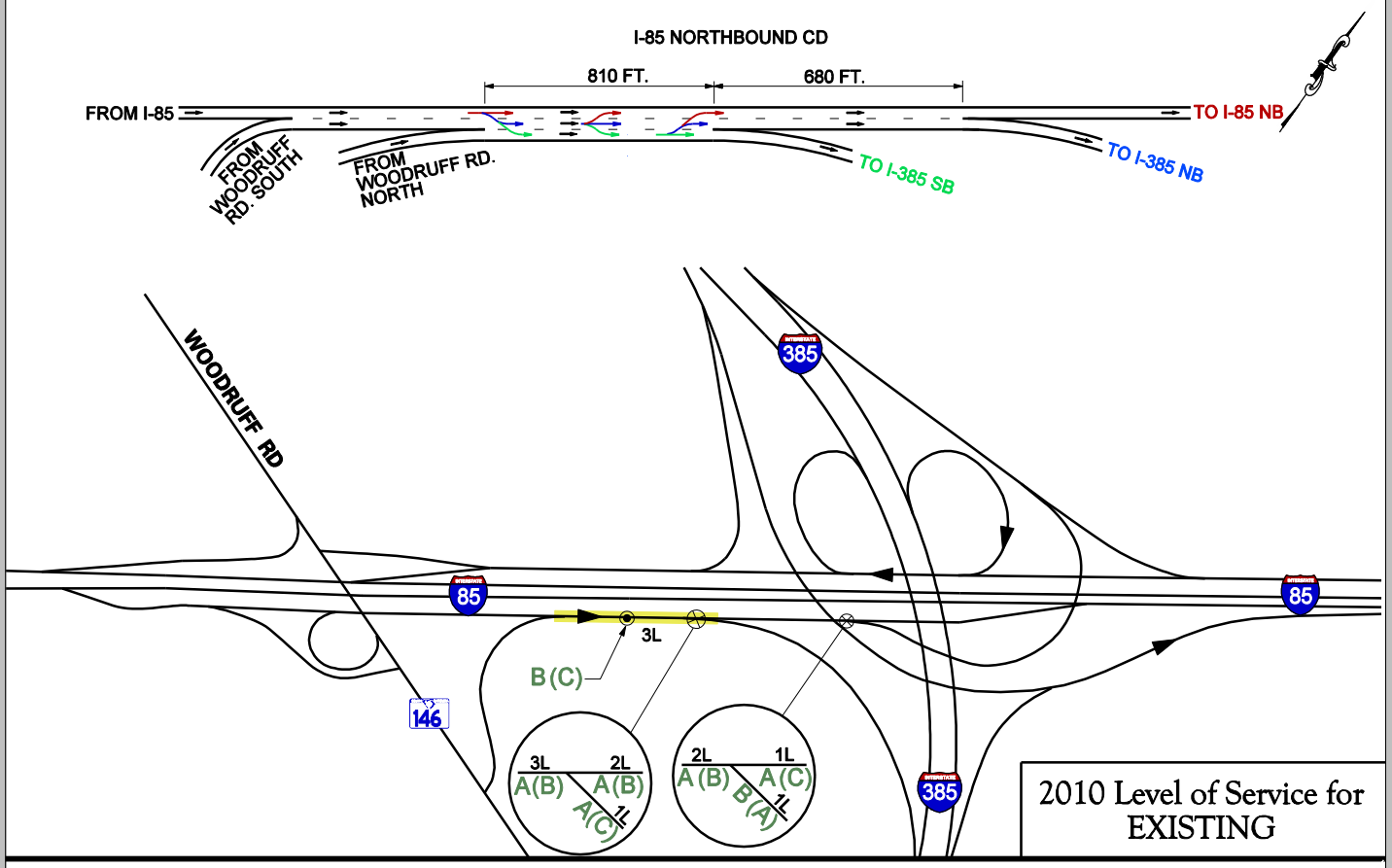
Deficiency 7 (Figure 11) is associated with the weave area along the I-85 northbound collector-distributor between Woodruff Road and I-385. Specifically, this weave area is associated with the traffic attempting to enter the I-85 northbound collector-distributor from Woodruff Road and traffic exiting I-85 northbound to I-385 southbound and northbound. This weave area is projected to be operating at LOS F during the PM peak hours in the 2035 design year. This deficiency is attributed to the existing interchange configuration and proximity with Woodruff Road, specifically with the existing lane configurations and multiple exit points for I-385. This deficiency creates congestion within the interchange along with safety concerns due to the insufficient distance, multiple movements, and increased vehicular conflicts.

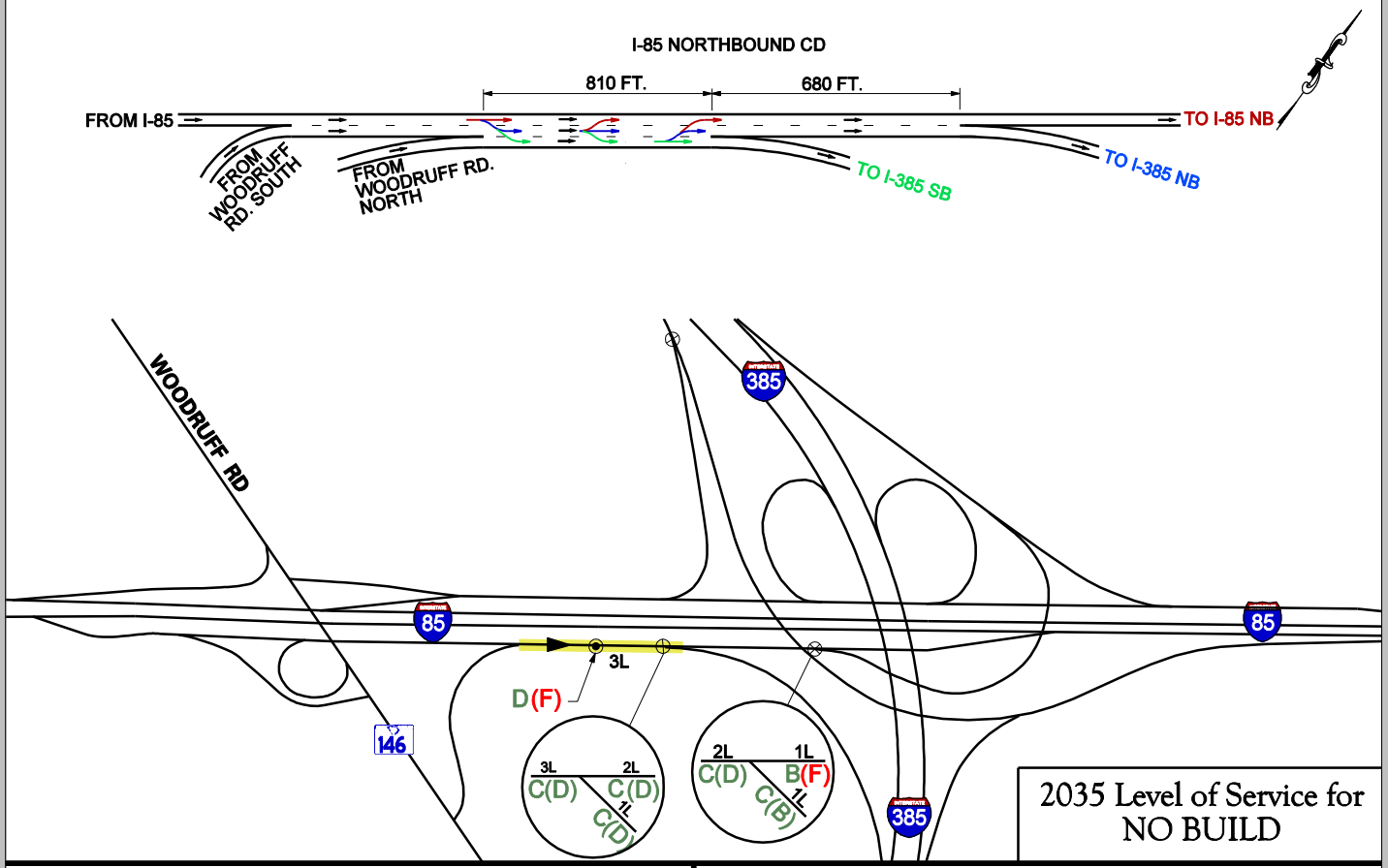
2.3.3 Safety

Historical crash data was analyzed for years 2006-2008 for the study area. Crash data was analyzed for the I-85/I-385 Interchange, and the freeway and roadway segments. In order to gauge the frequency of collisions occurring in the study area, crash rates were calculated for the appropriate facilities, with the findings summarized in Table 3.

Over the 2006-2008 three-year period, 183 crashes occurred at the I-85/I-385 interchange. A more detailed examination of the crash identifies mile posts 50.4 and 50.8 on I-85 and mile post 36.3 on I-385 as peak crash points. The weave area on the collector-distributor roadway between Woodruff Road and I-385 is at mile post 50.4 and the weave area between the I-385 on/off-ramps is at mile post 50.8. On I-385, mile post 36.3 is at the on/off-loop ramps to/from I-85 southbound. At mile posts 50.4 and 50.8, 86 and 79 crashes occurred in the three-year period 2006-2008, respectively. At mile post 36.3, 57 crashes occurred in the three-year period.

It should be noted that mile posts 50.4 and 50.8 approximately correspond to the locations for Deficiencies 3 (weave area along I-85 southbound collector-distributor between I-385 and Woodruff Road) and 7 (weave area along I-85 northbound collector-distributor between Woodruff Road and I-385). Mile post 30.6 corresponds approximately to the location for Deficiency 6 (safety issue on I-385 northbound loop off-ramp to I-85 southbound).





LEGEND:

- ○ - FREEWAY SECTION
- ◉ - WEAVE AREA
- ● - RAMP (MERGE / DIVERGE)
- 2L - NUMBER OF LANES
- ⊗ - RAMP (SEGMENT ANALYSIS)* A(A)- AM(PM) LEVEL OF SERVICE

* LOS SHOWN FOR UPSTREAM & DOWNSTREAM OF MERGE / DIVERGE POINT

DEFICIENCY 7: WEAVE AREA ALONG I-85 NORTHBOUND COLLECTOR-DISTRIBUTOR BETWEEN WOODRUFF RD. AND I-385

FIGURE 11

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Table 3. Crash Rates for Study Area

Location	ADT	Segment Length (miles)	Total		Injury		Fatal	
			No. of Crashes	Crash Rate per MVM	No. of Crashes	Crash Rate per MVM	No. of Crashes	Crash Rate per MVM
I-85 thru I-85/I-385 Int.	87,600	0.60	106	1.64	24	0.37	0	0.00
I-385 thru I-85/I-385 Int.	74,700	0.60	77	1.55	18	0.36	1	0.02
I-85 between Laurens Rd and Pelham Rd (exc I-85/I-385 Int.)	131,700	4.91	662	0.93	104	0.15	0	0.00
I-385 between Woodruff Rd and Roper Mountain Rd (exc I-185/I-385 Int.)	98,900	1.21	181	1.38	19	0.14	1	0.01
Woodruff Rd between Roper Mountain Rd and SC 14	30,200	3.65	877	7.27	152	1.26	1	0.001
Roper Mountain Rd between Frontage Rd and Woodruff Rd	35,400	0.37	59	4.17	6	0.42	0	0.00
Pelham Rd between Garlington Rd and the Pkwy	31,000	0.37	123	9.79	15	1.19	0	0.00
Laurens Rd between Verdae Blvd and Fairforest Way	37,800	0.83	32	0.93	8	0.23	0	0.00

*crash data from 1/1/2006 to 12/31/2008

2.4 Logical Termini

The proposed project limits extends along I-85 from just west of the Salters Road bridge crossing to the Pelham Road interchange, and along I-385 from the Butler Road interchange to the Roper Mountain Road interchange (Figure 2). This includes the interchanges of I-85/Woodruff Road, I-85/I-385, I-85/Pelham Road, I-385/Woodruff Road, and I-385/Roper Mountain Road; along with the overpasses of Salters Road and

Roper Mountain Road over I-85 and the underpasses of Muddy Ford Road under I-85 and Garlington Road under I-385. The proposed project is considered to have logical termini as these endpoints provide a logical connection of adequate length, have independent utility, and do not restrict the consideration of alternatives for other reasonable foreseeable improvements.

The proposed project is considered to have logical endpoints and connections as the improvements would ultimately terminate along I-85 and I-385, and incorporate adjacent facilities as required to address the purpose and need and documented deficiencies of the interchange. The proposed project would maintain similar flow patterns between the facilities, while improving and maintaining the operational efficiency of the I-85/I-385 interchange and adjacent facilities. In addition, the proposed project would include an additional travel lane along I-385 to further improve the proposed interchange design and provide continuity with the existing lane configuration with the current I-385 facility. In addition, the ramps along I-85 from the interchange to the I-85/Pelham Road interchange would be extended to further improve the efficiency of the interchange, specifically in regards to Deficiencies 1 and 2. In conclusion, the termini of the project extend along I-85 and I-385 to the point required to provide improved operational conditions while not impacting adjacent facilities.

The proposed project is also considered to have “independent utility”. To have independent utility, a project must not create a need for improvements on other roadways nor require the improvement of other roadways to be effective for addressing its stated need.

The traffic analysis conducted along the project corridor evaluated the No-build and Build traffic conditions (i.e. LOS, ADT, etc.) on adjoining and intersecting roadways. This data is presented in detail in Sections 3.1 and 3.4, and demonstrates that the proposed project (Build Condition) would result in LOS improvements and address the identified operational deficiencies associated with the interchange as compared to the No-build condition. In addition, this data documents that the Build condition does not worsen the operational efficiency of any adjacent facility, thus not requiring additional improvements. Therefore, the proposed project (Build condition) would not generate traffic increases that degrade LOS and force improvements beyond the project corridor.

The intensive analysis and evaluation of the project study area documents the existing capacity issues and operational deficiencies associated with the I-85 and I-385 corridors. Many of the I-85 and I-385 freeway segments are currently, and/or projected to be,

operating beyond capacity. As such, the SCDOT and the Greenville-Pickens Area Transportation Study (GPATS) have various other active and/or programmed projects within the vicinity of the project area. These projects vary from transportation corridor studies to bridge replacements, as described in the following summary and illustrated in Figure 2.[4]

- **I-385 Widening and Rehabilitation Project; Project No. IM23(019)**: The proposed project will widen approximately 5.5 miles of I-385 to six lanes, extending from near the I-385/West Georgia Road (Exit 29) to SC 146 (Woodruff Road). The project will also rehabilitate existing pavement along portions of the corridor and widen existing bridges. The proposed project is currently being constructed through a "Design-Build" contract.
- **The I-85 Corridor Analysis between US 25 and SC 129**: The SCDOT is currently conducting a Corridor Analysis of I-85 between US 25 (Whitehorse Road, Exit 44) in Greenville County and SC 129 (Fort Prince Blvd., Exit 68) in Spartanburg County. The project will establish congestion improvement strategies to identify alternate approaches to relieve the current and projected congestion issues and improve capacity. The widening of I-85 is included in the SCDOT Long Range Plan for Design Plans only.
- **Salters Road Widening from Millennium Blvd. to Verdae Blvd; Project No. GPATS (010):** Programmed project to widen the existing roadway and replace the existing bridge over I-85. The project is currently in the environmental and preliminary design phase.
- **I-85 NB Exit Ramp at SC 146 (Woodruff Road) – Ramp Modification; Project No. GPATS (005):** The SCDOT proposes to widen the existing exit ramp onto SC 146 to accommodate dual right turn lanes and shift the I-85 NOB entrance ramp/C-D to the west approximately 250 feet. The project is currently in the design phase.
- **SC 146 (Woodruff Road) at S-564 (Miller Road/Garlington Road) – Project No. GPATS (004):** The SCDOT proposes to provide dual left turn lanes and at all four legs at the intersection of Woodruff Road at Miller Road/Garlington Road along with constructing an auxiliary lane from ramp terminal to intersection.
- **S-545 (Roper Mountain Rd) Widening from Garlington Road to Feaster Road:** The SCDOT proposes to widen Roper Mountain Road to three lanes with median, bike lanes and sidewalk. The proposed project shares terminus with the

[4] State Transportation Improvement Program - District 3-Greenville. SCDOT. http://www.scdot.org/inside/stip.shtml. Accessed March 7, 2012.

replacement of the Roper Mountain Road Bridge over I-85 as part of the purposed I-85/I-385 Interchange project.

The proposed I-85/I-385 Interchange project has been developed in coordination with these projects to ensure that the proposed project does not worsen these conditions, nor restrict the consideration of alternatives for other reasonably foreseeable transportation improvements. Specifically, extensive coordination with the I-85 Corridor Analysis study has been required to ensure the proposed interchange accommodates the required typical section of I-85. The findings of the Corridor Analysis study documents the ultimate need for a total of eight-travel lanes (four in each direction) along I-85 within the project area. Therefore, the No Build Alternative included these improvements. In addition, the proposed bridges, ramps, etc. associated with the I-85/I-385 interchange improvement project have been designed to accommodate the potential future widening of I-85, and would not preclude the consideration of alternatives for these improvements.

2.5 Reasonable Availability of Funding

The proposed reconfiguration of the I-85/I-385 interchange is currently included in the Greenville-Pickens Area Transportation Study (GPATS), Fiscal Year 2012-2017 Transportation Improvement Program (TIP). The proposed project is listed under the Interstate Upgrade Program, with current funding provided through the Interstate Maintenance Program (IM) and the National Highway System (NHS). The GPATS TIP currently documents an estimated funding cost of approximately $221 Million.[5]

The proposed project is also listed in the current South Carolina State Transportation Improvement Program (STIP), which includes information about federally funded projects for the 2010-2015 timeframe. The STIP currently documents an estimated funding cost of approximately $245 Million.[6]

The total cost of the preferred alternative is estimated at $245 Million. Therefore, it has been determined that there is a reasonable availability of funding to construct the proposed project. It is anticipated that the project will be developed and constructed through a “Design-Build” process.

[5] *GPATS Fiscal Year 2012-2017 TIP, Final Report*. Prepared by Greenville County Planning Department. 2011.

[6] *STIP Fiscal Year 2010-2015 TIP*. http://www.scdot.org/inside/stip/shtml. Assessed December 14, 2011.

3.0 ALTERNATIVES

The Department has considered various location and design alternatives in the process of developing the currently proposed "build" alternative. The proposed project has been developed in multiple phases of work due to the unknown and potentially widespread impacts associated with improving the existing I-85/I-385 interchange. The initial phase of work included extensive traffic analysis along with preliminary alternative development and environmental screening of the preliminary alternatives. As such, these studies documented the existing conditions of the facility; identified operational and safety deficiencies; developed potential alternatives; identified initial environmental constraints; identified potential environmental impacts; and local stakeholder coordination. The results and findings of these analyses are documented in the *I-85/I-385 Interchange Improvements – Concept Summary Report*[7], the *I-85/I-385 Interchange Improvement Project – Environmental Planning Document*[8] and *Traffic Study for I-85/I-385 Interchange Improvements.*[9]

The initial studies identified seven potential alternatives (1, 1A, 1B, 2, 2A, 3, and 4) for improving the interchange facility. These alternatives were evaluated and scrutinized during the early phases of project development. As a result, Alternatives 1, 1A, 2, and 4 were initially identified as potential reasonable alternatives largely due to satisfying the purpose and need of the project. These alternatives have been further evaluated with development of additional alternatives (1B, 2B, 2C, 2D, and 4A). As a result of the continued progression and development of these alternatives, Alternative 2 and Alternative 4 were determined to be reasonable build alternatives, with Alternative 1 and Alternative 3 eliminated from further consideration. As fully discussed below, while the preferred location and design of the project represents the best "build"

> **Reasonable Alternative**=those which are practical and feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant (CEQ, "Forty Most Asked Questions Concerning CEQ NEPA Regulations, 1981).

[7] *I-85/I-385 Interchange Improvements – Concept Summary Report.* Prepared by Florence & Hutcheson, Inc. for SCDOT. November 2009.

[8] *I-85/I-385 Interchange Improvement Project – Environmental Planning Document*. Prepared by Florence& Hutcheson, Inc. for SCDOT. November 2009.

[9] *Traffic Study for I-85/I-385 Interchange Improvements*. Prepared by Florence & Hutcheson, Inc., for SCDOT. February 2012.

alternative for improving the existing interchange, input received during the public hearing process and during the environmental document availability period will be carefully evaluated in the future project development. Modifications will be made where appropriate.

3.1 No Build Alternative

The No Build Alternative, which consists of the Department making no improvements to the existing I-85/I-385 interchange, was considered a baseline for comparison. This alternative would not improve the existing operational conditions of the interchange, thus the facility would continue to operate at unacceptable levels of service within the next 20 years. The No Build Alternative does assume the future widening of the I-85 (i.e. eight-lane total) and I-385 (six-lane total) corridor due to these improvements being completed in the foreseeable future. As demonstrated in Table 2, these improvements alone would not improve the operational efficiency of the interchange. Therefore, the No Build alternative would not satisfy the purpose and need for the project and is not considered an acceptable alternative. As a result, the No Build Alternative would result in continued operational deficiencies, unacceptable levels of surface, congestions, and safety concerns.

3.2 Alternatives Considered, but Eliminated from Further Analysis

There were various alternatives developed and considered during the initial development of the project. Through further evaluation of these alternatives, including public involvement and stakeholder coordination, Alternative 1 and Alternative 3, including subsequent variations, were eliminated from further analysis.

3.2.1 Alternative 1

Alternative 1 would reconfigure the existing interchange and provide new direct-connect movements; construct new collector-distributor (C-D) facilities, and modify existing access locations to improve the facility. Specifically, this would include new direct-connect ramps from I-85 southbound to I-385 southbound and I-385 northbound to I-85 southbound; new C-D on I-385 between Woodruff Road and I-85; and relocation of the I-85/Woodruff Road interchange approximately one half-mile farther south to new Verdae Connector roadway across I-85 (Figure 12). Two additional variations (1A and 1B) of this alternative were also developed and examined. Alternative 1A includes

I-85/I-385 Interchange Improvement Project
Greenville County, S.C.
Environmental Assessment

TO GREENVILLE
TO SPARTANBURG
Roper Mountain Rd.
Woodruff Rd.
Verdae Blvd.
Garlington Rd.
Old Sulfur Springs Rd.
Verdae Connector
Sellers Rd.
TO ATLANTA
TO COLUMBIA
385
85
146

Legend

- Jurisdictional Waters of U.S.
- Wetlands
- Open Waters / Ponds
- 100 Year Floodplain
- Potential Hazardous Material Sites
- Proposed New Right-of-Way
- New Pavement
- New Bridge
- Pavement Removal
- Cemetery

I-85/I-385
INTERCHANGE IMPROVEMENT
CONCEPT PLANS
ALTERNATIVE 1

SCALE 1" = 900'
Aerial Photography 2010

FIGURE 12

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the same features as Alternative 1, but includes a north facing half diamond interchange on I-85 at Roper Mountain Road. Alternative 1B was also a derivative of Alternative 1, but includes improved design speed ramps in all direct connect movements. This would be accomplished through the use of a traditional four-level interstate-to-interstate fully directional interchange.

These alternatives would improve the operation and functionality of the interchange by eliminating the weaving on I-85 and moving the weaves along I-385 onto a C-D roadway. However, these alternatives would relocate the existing I-85/Woodruff Road interchange and require new roadways for access to Woodruff Road. As such, these alternatives would impact access to existing and planned businesses along Woodruff Road, especially those located in the vicinity of the existing interchange (i.e. *Shoppes at Greenridge*, *Carolina Point*, etc.). This alternative would require a total of fifteen (15) new bridges, including the reconfiguration of the I-385/Woodruff Road interchange. As such, Alternative 1 would require extensive new right-of-way for the new interchange and connection roads; would impact current travel patterns and trends; and was determined to be cost prohibitive. A partial interchange as proposed for 1A was determined not to be a viable design alternative for this facility as this would not comply with current FHWA Policy.[10] In addition, various local stakeholders and business owners were opposed to Alternative 1 due to the change in access along I-85 at Woodruff Road. There was also opposition to the location of the potential connection roads due to the proximity with existing development, mainly the *Cascades Community,* as documented in the appended public information meeting summary.[11] Therefore, Alternative 1, and subsequent variations, were not considered for further evaluation.

3.2.2 Alternative 3

Alternative 3 would reconfigure the existing interchange and provide new direct-connect movements, new C-D facilities, and modify existing access locations to improve the facility. Specifically, this would include new direct-connect ramps from I-85 southbound to I-385 southbound and I-385 northbound to I-85 southbound; a new C-D roadway along I-385 between Woodruff Road and I-85; closure of the I-85/Woodruff Road interchange; and new northbound and southbound ramps to/from I-85 to Garlington Road and Miller Road (Figure 13).

[10] FHWA. *Access to the Interstate System*. Federal Register, Volume 74, Number 165. August 27, 2009.

[11] *Proposed I-85/I-385 Interchange Improvement Project – Public Comment Summary for Public Information Meeting January 27, 2011.* March 2011.

I-85/I-385 Interchange
Improvement Project
Greenville County, S.C.
Environmental Assessment

TO GREENVILLE
TO SPARTANBURG
TO ATLANTA
TO COLUMBIA
Roper Mountain Rd.
Woodruff Rd.
Verdae Blvd.
Old Sulfur Springs Rd.
Sellers Rd.
Garlington Rd.
385
85
146

Legend

- Jurisdictional Waters of U.S.
- Wetlands
- Open Waters / Ponds
- 100 Year Floodplain
- Potential Hazardous Material Sites
- Proposed New Right-of-Way
- New Pavement
- New Bridge
- Pavement Removal
- Cemetery

I-85/I-385
INTERCHANGE IMPROVEMENT
CONCEPT PLANS
ALTERNATIVE 3

SCALE 1" = 900'
Aerial Photography 2010

FIGURE 13

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5/11/2012

This alternative would require a total of 19 bridges, including new structures along Woodruff Road at I-85 and I-385. This alternative would also impact the existing travel patterns and business along Woodruff Road, as the existing access of Woodruff Road from I-85 would be closed. A review of the impact of this alternative on the intersection of Woodruff Road at Garlington Road showed unacceptable Levels of Service in both peak hours with overall delays in excess of 460 seconds in year 2035. Improvements were considered to mitigate the impact on the intersection, but it was concluded that this intersection would need to be grade separated. Alternative 3 would require extensive new right-of-way for the new ramps; would impact current travel patterns and trends; and was determined to be cost prohibitive. In addition, various local stakeholders and business owners were opposed to closing access along I-85 at Woodruff Road as documented in the appended public information meeting summary. Therefore, Alternative 3 was not considered for further evaluation.

3.3 Build Alternatives

Various interchange alternatives have been developed that would address the key deficiencies and improve the overall operation and safety along the current facility while minimizing impacts to the human and natural environment. These alternatives were derived from the originally developed Alternative 2 and Alternative 4. The following provides further documentation and analysis of each alternative, including a description and summary of potential impacts.

3.3.1 Alternative 2

Alternative 2 would provide a new direct-connect ramp from I-85 southbound to I-385 southbound; improve the radius of the loop off-ramp from I-385 northbound to I-85 southbound; provide a new collector-distributor along each side of I-385 between Woodruff Road and I-85; retain the I-85 southbound C-D roadway between I-385 and Woodruff Road; eliminate the I-85 northbound C-D roadway; improve the I-85/Woodruff Road interchange by replacing the bridge and modifying the I-85 northbound exit ramp; and maintain existing access to the I-85/Woodruff Road interchange. This alternative has continued to evolve with the ultimate development of Alternative 2D. All derivatives of this alternative would also extend the I-85 ramps to the Pelham Road interchange to further improve and facilitate the operation of the interchange and proposed improvements. The following is a summary of this progression:

Alternative 2A: New direct-connect ramps from I-85 southbound to I-385 southbound and I-385 northbound to I-85 southbound, which removed the loop ramp from I-385 northbound to I-85 southbound. Upon further evaluation of Alternative 2A, it was determined that this alternative was fundamentally different from the original intent (i.e. maintain access to the I-85/Woodruff Road interchange from I-385 northbound) of Alternative 2. As such, this alternative ultimately evolved into Alternative 4.

Alternative 2B: Similar to Alternative 2 but removes access from I-385 southbound to the I-85/Woodruff Road interchange. This alternative eventually evolved into Alternative 2C through minor modifications to the movements along the I-385/Woodruff Road and I-85/Woodruff Road interchanges.

Alternative 2C: Similar to Alternative 2B but modifies the braid along the I-385 C-D roadway and entrance ramp from the I-385/Woodruff Road Interchange. This alternative also removes the I-85 southbound C-D roadway, with access maintained for the I-85/Woodruff Road interchange by a new ramp, which eliminates undesirable weave movements. This alternative ultimately evolved into Alternative 2D.

Alternative 2D: Similar to Alternative 2C but eliminates improvements to the I-85/Woodruff Road interchange (i.e. bridge replacement) and retains the I-85 northbound C-D roadway.

In summary, Alternative 2D (Figures 14a and 14b) would construct a new direct-connect ramp from I-85 southbound to I-385 southbound; improve the radius on the loop from I-385 northbound to I-85 southbound; construct a new C-D roadway in both directions along I-385 between Woodruff Road and I-85; eliminate the I-85 southbound C-D roadway between I-385 and Woodruff Road; and remove access from the I-385 southbound to the I-85/Woodruff Road interchange. Alternative 2D would improve the existing facility and address six of the seven deficiencies as summarized in Table 4, with the operational improvements illustrated in Figure 15. The key improvements include the direct-connect ramps from I-85 southbound to I-385 southbound which results in a LOS improvement. However, this alternative requires replacement of the I-385 bridges over I-85, a new bridge structure for I-85 northbound to I-385 northbound, and a new structure from I-85 southbound to the I-85/Woodruff Road interchange.

I-85/I-385 Interchange Improvement Project
Greenville County, S.C.
Environmental Assessment

385
TO GREENVILLE
Roper Mountain Rd.
146
Woodruff Rd.
Verdae Blvd.
MATCH LINE A
85
PARTANBURG
Roper Mountain Rd.
Garlington Rd.
MATCH LINE FOR INSET
146
Woodruff Rd.
Old Sulfur Springs Rd.
Sellers Rd.
TO ATLANTA
85
146
Woodruff Rd.
TO COLUMBIA
385
MATCH LINE FOR INSET

Legend

- Jurisdictional Waters of U.S.
- Wetlands
- Open Waters / Ponds
- 100 Year Floodplain
- Potential Hazardous Material Sites
- Proposed New Right-of-Way
- New Pavement
- New Bridge
- Pavement Removal
- Present Right-Of-Way
- Cemetery

I-85/I-385
INTERCHANGE IMPROVEMENT
ALTERNATIVE 2D

SCALE 1" = 900'
Aerial Photography 2010

FIGURE 14A

\\scfs1\projects\08195\Environmental\EA Figures\EA_Ma_Alt_2D_Base_11x17_port 1.dgn
5/11/2012

I-85/I-385 Interchange Improvement Project
Greenville County, S.C.
Environmental Assessment

Pelham Rd.

85

TO SPARTANBURG

Pelham Rd.

Rocky Creek

Rocky Creek

Middy Ford Rd.

Whispering Hollow Rd.

TO GREENVILLE

85

MATCH LINE A

Legend

- Jurisdictional Waters of U.S.
- Wetlands
- Open Waters / Ponds
- 100 Year Floodplain
- Potential Hazardous Material Sites
- Proposed New Right-of-Way
- New Pavement
- New Bridge
- Pavement Removal
- Present Right-Of-Way

I-85/I-385
INTERCHANGE IMPROVEMENT
ALTERNATIVE 2D

SCALE 1" = 900'
Aerial Photography 2010

FIGURE 14B

\\sc1fs1\projects\08195\Environmental\EA Figures\EA_14b_Alt_2D Base_11x17_port 2.dgn
5/11/2012

I-85/I-385 Interchange
Improvement Project
Greenville County, S.C.
Environmental Assessment

WOODRUFF RD

146

INTERSTATE 85

INTERSTATE 385

LEGEND:

- ○ - FREEWAY SECTION
- ● - RAMP (MERGE / DIVERGE)
- ⊗ - RAMP (SEGMENT ANALYSIS) *
- ◉ - WEAVE AREA
- 2L - NUMBER OF LANES
- A(A)- AM(PM) LEVEL OF SERVICE

* LOS SHOWN FOR UPSTREAM & DOWNSTREAM OF MERGE / DIVERGE POINT

2035 LEVEL OF SERVICE FOR ALTERNATIVE 2D

NOT TO SCALE | FIGURE 15

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5/11/2012

Alternative 2D would cost approximately $292 million, require approximately 19 acres of new right-of-way, and would relocate four adjacent commercial businesses. In addition, this alternative is expected to impact up to 2,130 LF of streams and other linear conveyances. Preliminary noise analysis determined that Alternative 2D is not expected to differentiate from the No-Build conditions as this alternative would not impact the traffic volumes nor significantly alter the horizontal or vertical alignment of the facility. These findings, along with other potential environmental impacts, are summarized and compared with Alternative 4A in Table 5.

3.3.2 Alternative 4

Alternative 4 would provide new direct-connect ramps from I-85 southbound to I-385 southbound and from I-385 northbound to I-85 southbound; a new C-D roadway in both directions along I-385 between Woodruff Road and I-85; improvement of the I-85/Woodruff Road interchange by replacing the bridge and modifying the I-85 northbound exit ramp; elimination of the I-385 north- and southbound C-D roadway between I-385 and Woodruff Road; and elimination of the access from I-385 northbound and southbound to I-85/Woodruff Road interchange. This alternative would also extend the I-85 ramps to the Pelham Road interchange to further improve and facilitate the operation of the interchange and proposed improvements.

Alternative 4A (Figures 16a and 16b) was derived from Alternative 4 and includes similar features such as the direct-connect ramps from I-85 southbound to I-385 southbound and from I-385 northbound to I-85 southbound. Alternative 4A differs from Alternative 4 by modifying the configuration of the northbound I-385 C-D roadway and entrance ramp from the I-385/Woodruff Road interchange; maintaining the existing I-85 northbound C-D roadway; eliminating improvements to the I-85/Woodruff Road interchange (i.e. bridge replacement); and retaining various existing structures as cost saving measures, including the I-385 bridges over I-85 and the I-85 northbound to I-385 northbound ramp bridge.

Alternative 4A also addresses six of the seven deficiencies as summarized in Table 4 and illustrated in Figure 17, with the key difference from Alternative 2D being the replacement of the I-385 northbound loop off-ramp to I-85 with a direct-connect ramp.

Alternative 4A would cost approximately $245 million, require approximately 20 acres of new right-of-way, and would potentially relocate two adjacent commercial businesses. In addition, this alternative is expected to impact up to 2,370 LF of streams and other linear conveyances. Preliminary noise analysis determined that Alternative

I-85/I-385 Interchange Improvement Project
Greenville County, S.C.
Environmental Assessment

385
TO GREENVILLE
Roper Mountain Rd.
146
Woodruff Rd.
Verdae Blvd.
MATCH LINE A
85
SPARTANBURG
Roper Mountain Rd.
Garlington Rd.
MATCH LINE FOR INSET
Old Sulfur Springs Rd.
Sellers Rd.
TO ATLANTA
85
146
Woodruff Rd.
TO COLUMBIA
385
MATCH LINE FOR INSET

Legend

- Jurisdictional Waters of U.S.
- Wetlands
- Open Waters / Ponds
- 100 Year Floodplain
- Potential Hazardous Material Sites
- Proposed New Right-of-Way
- New Pavement
- New Bridge
- Pavement Removal
- Present Right-Of-Way
- Cemetery

I-85/I-385
INTERCHANGE IMPROVEMENT
ALTERNATIVE 4A

SCALE 1" = 900'
Aerial Photography 2010

FIGURE 16A

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5/11/2012

I-85/I-385 Interchange
Improvement Project
Greenville County, S.C.
Environmental Assessment

Pelham Rd.

85

TO SPARTANBURG

Pelham Rd.

Rocky Creek

Rocky Creek

Middy Ford Rd.

Whispering Hollow Rd.

TO GREENVILLE

85

MATCH LINE A

Legend

- Jurisdictional Waters of U.S.
- Wetlands
- Open Waters / Ponds
- 100 Year Floodplain
- Potential Hazardous Material Sites
- Proposed New Right-of-Way
- New Pavement
- New Bridge
- Pavement Removal
- Present Right-Of-Way

I-85/I-385
INTERCHANGE IMPROVEMENT
ALTERNATIVE 4A

SCALE 1" = 900'
Aerial Photography 2010

FIGURE 16B

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5/11/2012

I-85/I-385 Interchange
Improvement Project
Greenville County, S.C.
Environmental Assessment

WOODRUFF RD

WOODRUFF RD

146

146

INTERSTATE 85

INTERSTATE 385

LEGEND:

- ○ - FREEWAY SECTION
- ◉ - WEAVE AREA
- ● - RAMP (MERGE / DIVERGE)
- 2L - NUMBER OF LANES
- ⊗ - RAMP (SEGMENT ANALYSIS)* A(A)- AM(PM) LEVEL OF SERVICE

* LOS SHOWN FOR UPSTREAM & DOWNSTREAM OF MERGE / DIVERGE POINT

2035 LEVEL OF SERVICE FOR ALTERNATIVE 4A

NOT TO SCALE | FIGURE 17

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5/11/2012

4A is not expected to differentiate from the No-Build conditions as this alternative would not impact the traffic volumes nor significantly alter the horizontal or vertical alignment of the facility. These findings, along with other potential environmental impacts are summarized and compared with Alternative 2D in Table 5.

Table 4. Deficiency Comparison and Improvement

Deficiency Number	Alternative 2D	Alternative 4A
#1: I-385 southbound to I-85 northbound ramp movement	Improves internal ramp movements/merges to LOS D or better	Improves internal ramp movements/merges to LOS D or better
#2: I-85 southbound to I-385 northbound ramp movement	Provides additional capacity; improves ramp movements to LOS D or better	Provides additional capacity; improves merge movements at I-385 northbound; improves ramp movements to LOS D or better
#3: The weave area along the I-85 southbound collector-distributor between I-385 and Woodruff Road	Weave movement eliminated	Weave movement eliminated
#4: The weave area along I-385 southbound between I-85 and Woodruff Road	Weave area removed from I-385 to C-D; improved to LOS E or better	Weave area removed from I-385 to C-D; improved to LOS E or better
#5: The weave area along I-385 northbound between Woodruff Road and I-85	Weave area improved to LOS C or better	Weave area improved to LOS E or better
#6: The I-385 northbound loop off-ramp to I-85 southbound	Loop ramp remains; improves design speed and function	Loop ramp eliminated; replaced with direct-connect ramp
#7: The weave area along the I-85 northbound collector-distributor between Woodruff Road and I-385	Weave remains LOS F in PM, but improves distance and conflicts	Weave remains LOS F in PM, but improves distance and conflicts

Table 5. Environmental Matrix

Impact Category	Impacts by Alternatives	
	Alternative 2D	Alternative 4A (Preferred)
Residential relocations	0	0
Commercial relocations	4	2
Farmland (acres)	0	0
Floodplains (acres)	2.0	2.1

Impact Category	Impacts by Alternatives	
	Alternative 2D	Alternative 4A (Preferred)
Wetlands (acres)	<0.10	<0.10
Streams/Linear Conveyances (linear feet)	2,130	2,370
Permits	Individual USACE Permit	Individual USACE Permit
Threatened/Endangered Species	None	None
State listed species	None	None
Cultural Resources		
Architectural	0	0
Archaeological	0	0
Section 4(f) Resource (parks, wildlife refuges, etc.)	0	0
Traffic Noise[1]	85	86
Potential Hazardous Material Sites[2]	9	8
Right-of-Way (acres)	19	20
Project Cost	$292 Million	$245 Million

[1]Number of impacted Dwelling Units; based on Preliminary Noise Analysis
[2] Includes any potential contamination site in which additional ROW may be required

3.4 Preferred Alternative (Alternative 4A)

The preferred alternative, Alternative 4A, would construct a new C-D roadway along I-385 northbound beginning at the I-385/Woodruff Road interchange. This facility would collect I-385 northbound traffic destined for Woodruff Road at I-385, I-85 northbound or I-85 southbound. In addition, exiting traffic from Woodruff Road destined for I-85 would be collected by this facility. A separate ramp movement would be provided for exiting Woodruff Road traffic to I-385 northbound and braid under the ramp to I-85. The I-385 northbound C-D would provide a direct connect ramp to I-85 southbound. A two lane exit ramp to I-85 northbound would also be provided, which would merge with the direct-connect ramp from I-385 southbound, providing a four-lane ramp section prior to merging with I-85 northbound. Due to the close proximity with the I-85/Pelham Road interchange, an additional lane from the northbound ramp would be provided on I-85 to the Pelham Road exit ramp.

I-385 southbound traffic would continue to access I-85 northbound by a new direct-connect ramp movement at an acceptable LOS. I-385 southbound to I-85 southbound

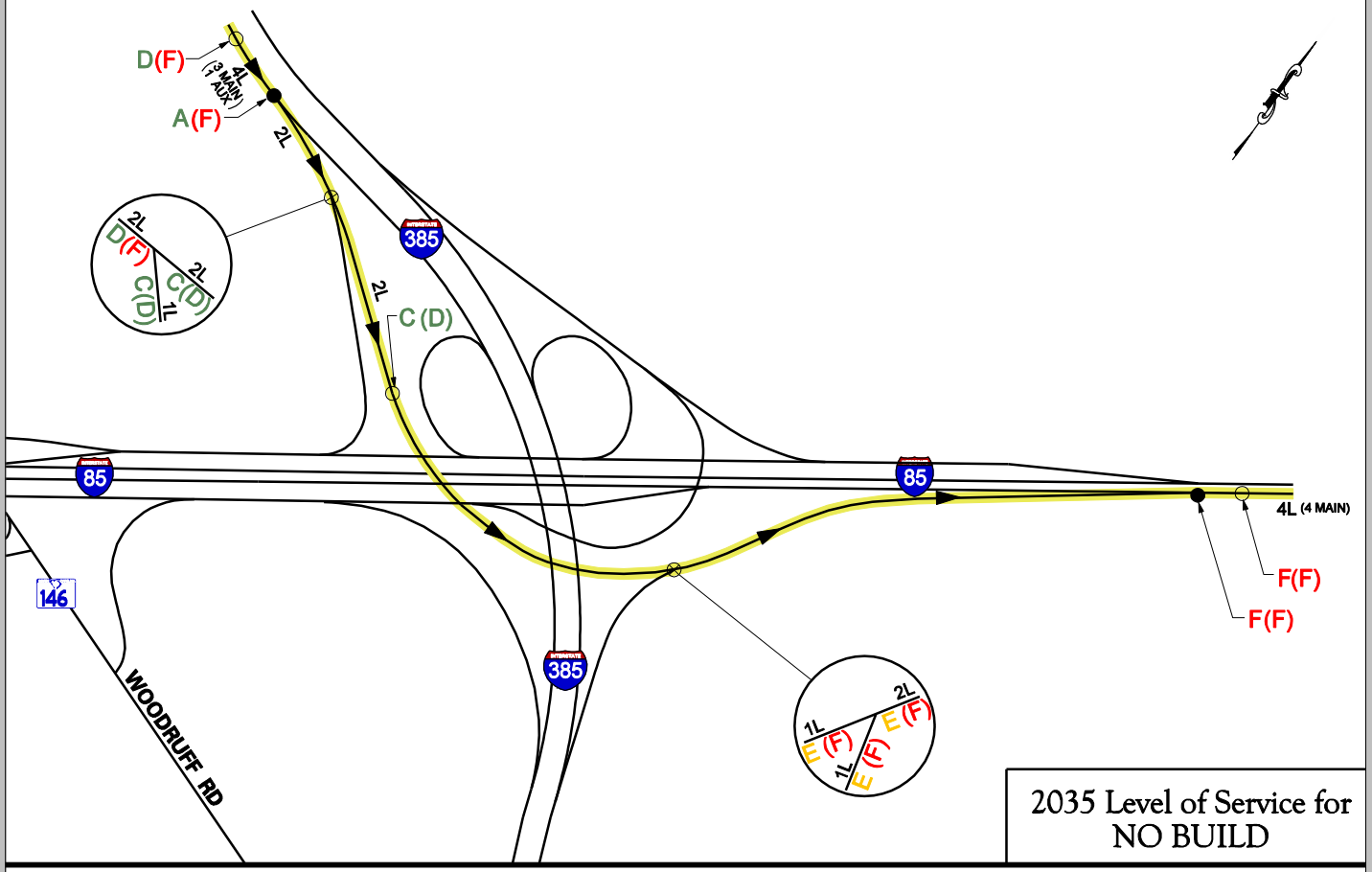
would exit and merge with traffic from the I-385 northbound ramp prior to merging with I-85 southbound traffic.

I-85 southbound traffic to I-385 would exit onto a three-lane ramp which would provide ultimate access to I-385 northbound and southbound along with Woodruff Road. The proposed configuration would include multiple elevated ramps to minimize vehicular conflicts. This would include a two lane ramp that ultimately merges with I-385 northbound. An elevated, two-lane ramp structure would be provided to I-385 southbound, along with a one-lane elevated ramp to Woodruff Road. Traffic exiting to Woodruff Road would utilize the existing C-D roadway adjacent to the I-85 southbound mainline.

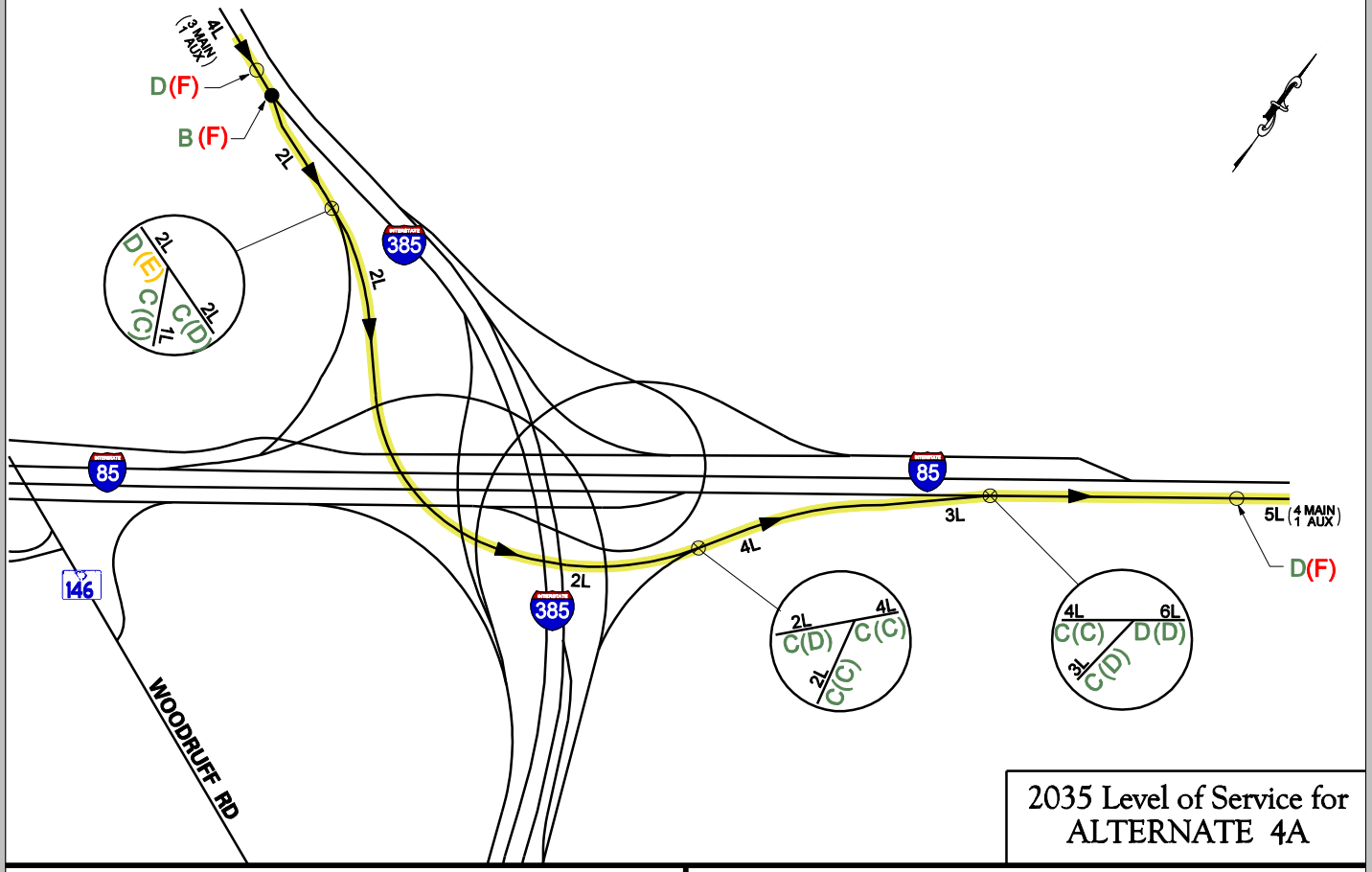
I-85 northbound traffic to I-385 would exit onto the existing C-D facility and utilize the existing ramp structure to I-385 northbound. A new ramp would be provided from the I-85 C-D roadway to the I-385 southbound C-D roadway. The I-385 southbound C-D facility would collect traffic from I-85 north- and southbound, I-385 southbound, and Woodruff Road, and distribute along The I-385/Woodruff Road interchange and I-385 southbound. This C-D facility would provide increased spacing and more desirable merge points for the various movements.

The preferred alternative incorporates numerous improvements over the No-build condition by addressing six of the seven deficiencies as illustrated in detail in Figures 18-24. The following are the key components and improvements associated with the preferred alternative:

- The existing loop ramps are replaced with direct-connect ramps eliminating undesirable movements and conflicts.
- A new C-D roadway is provided along I-385 which removes merge points off of I-385, and provides greater weave distances which improves LOS.
- The I-85 southbound C-D roadway is eliminated which eliminates undesirable weave movements and conflicts.
- Merge points are isolated and strategically located (an example is the I-85 southbound movement to I-385 northbound, which merges to I-385 prior to the merge of I-85 northbound to I-385 northbound traffic).
- Maintains existing structures, including the I-385 bridges over I-85, which offers potential cost saving measures over the other alternatives.



2035 Level of Service for NO BUILD



2035 Level of Service for ALTERNATE 4A

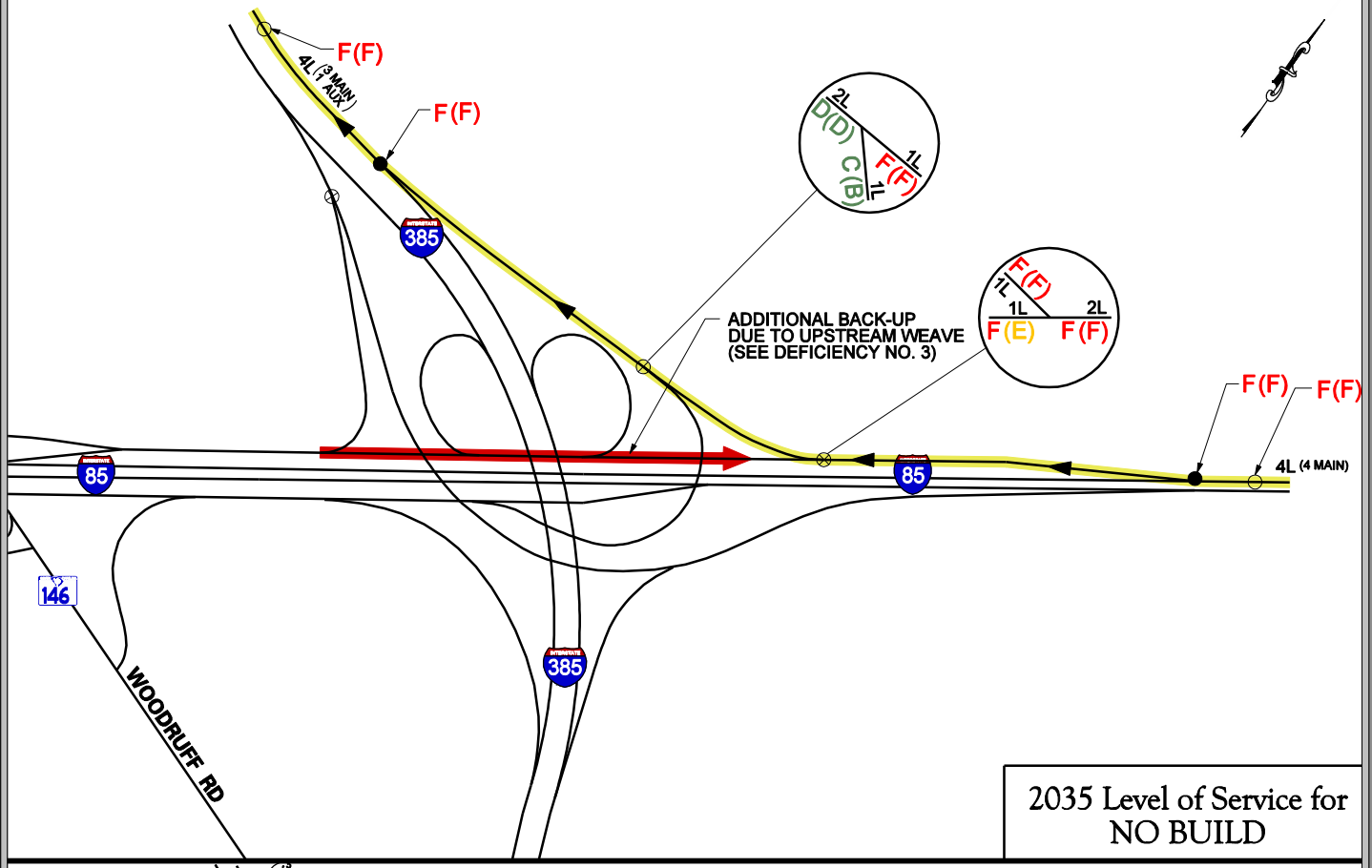
LEGEND:

- ○ - FREEWAY SECTION
- ◉ - WEAVE AREA
- ● - RAMP (MERGE / DIVERGE)
- 2L - NUMBER OF LANES
- ⊗ - RAMP (SEGMENT ANALYSIS)* A(A)- AM(PM) LEVEL OF SERVICE

* LOS SHOWN FOR UPSTREAM & DOWNSTREAM OF MERGE / DIVERGE POINT

DEFICIENCY 1: I-385 SOUTHBOUND PM PEAK HOUR BACK-UP GOING NORTH TO I-85 NORTHBOUND

FIGURE 18



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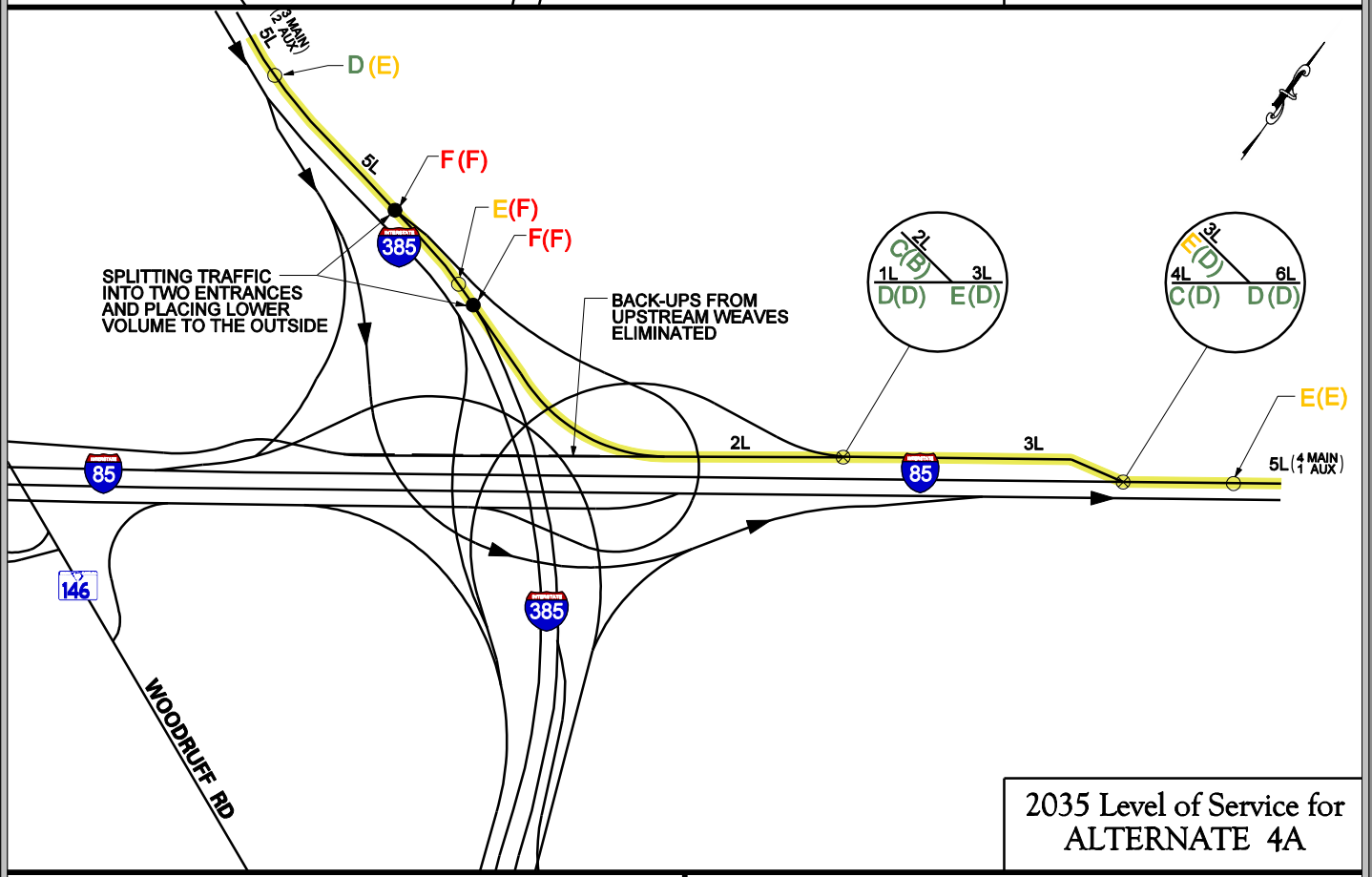
NO BUILD



2035 Level of Service for
ALTERNATE 4A

LEGEND:

- ○ - FREEWAY SECTION
- ◉ - WEAVE AREA
- ● - RAMP (MERGE / DIVERGE)
- 2L - NUMBER OF LANES
- ⊗ - RAMP (SEGMENT ANALYSIS)* A(A)- AM(PM) LEVEL OF SERVICE

* LOS SHOWN FOR UPSTREAM & DOWNSTREAM OF MERGE / DIVERGE POINT

DEFICIENCY 2: I-85 SOUTHBOUND AM PEAK HOUR BACK-UP AT I-385 NORTHBOUND OFF-RAMP

FIGURE 19

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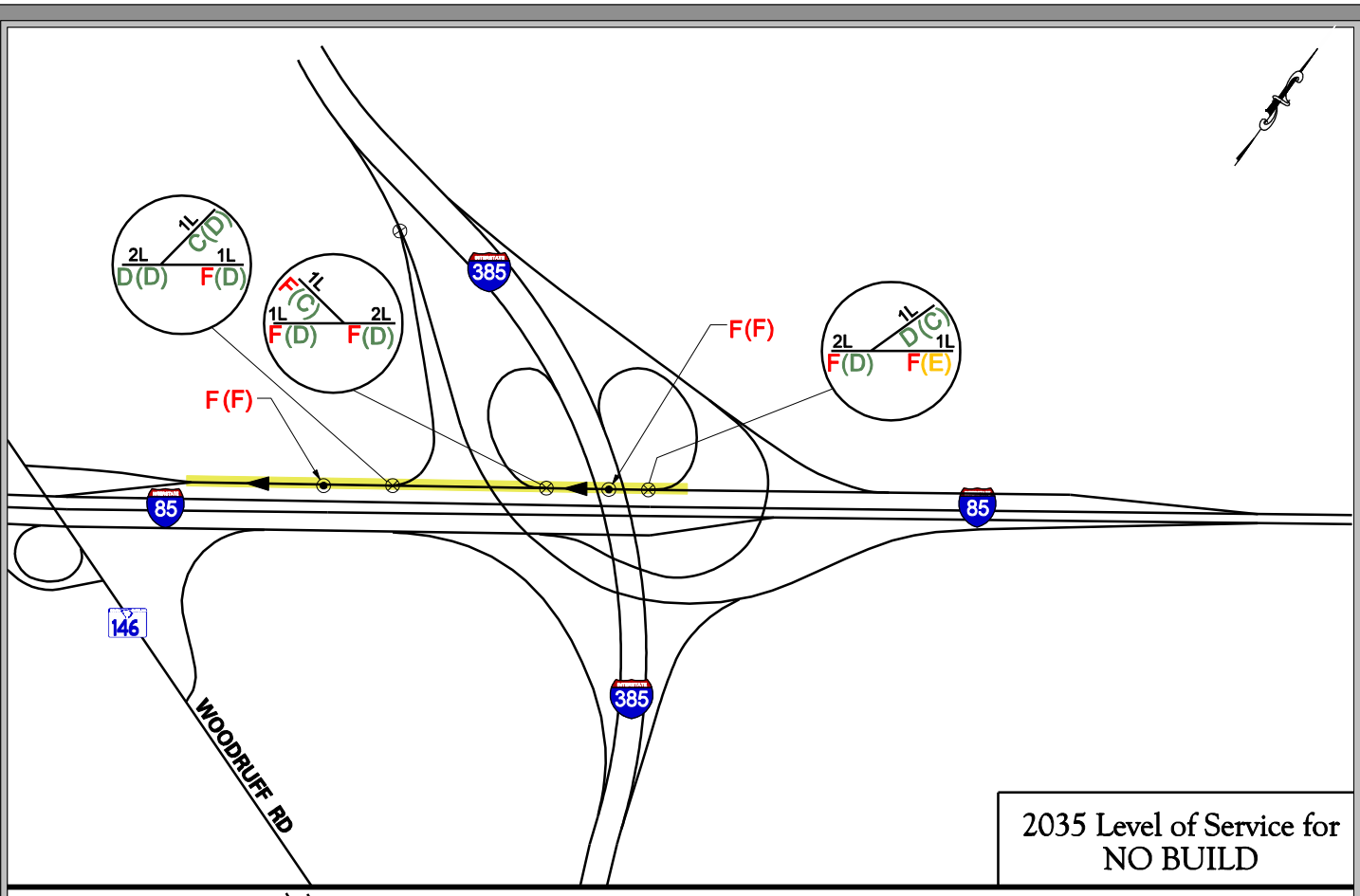

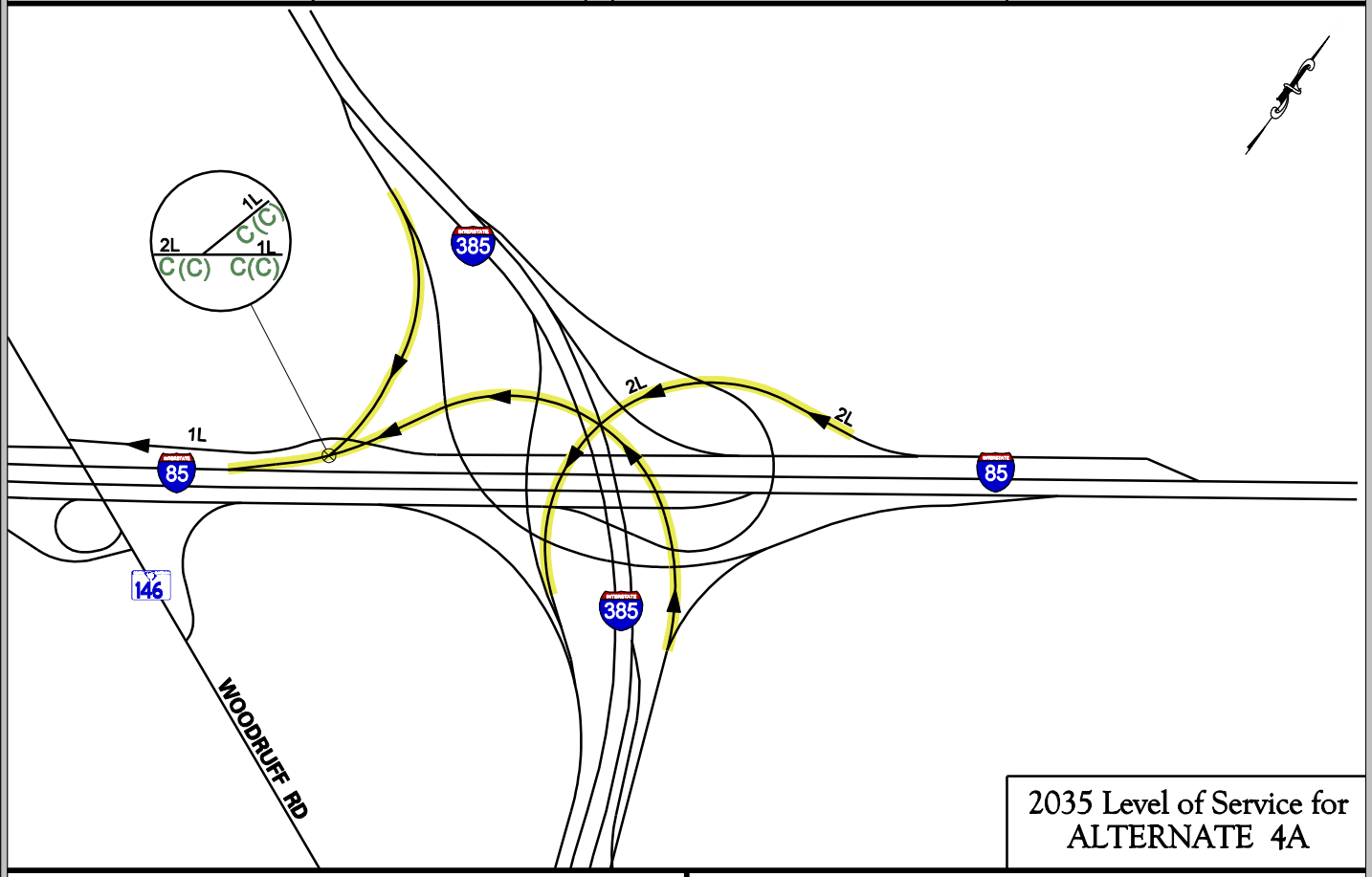

LEGEND:

- ○ - FREEWAY SECTION
- ◉ - WEAVE AREA
- ● - RAMP (MERGE / DIVERGE)
- 2L - NUMBER OF LANES
- ⊗ - RAMP (SEGMENT ANALYSIS)*
- A(A)- AM(PM) LEVEL OF SERVICE

* LOS SHOWN FOR UPSTREAM & DOWNSTREAM OF MERGE / DIVERGE POINT

DEFICIENCY 3: WEAVE AREA ALONG I-85 SOUTHBOUND COLLECTOR-DISTRIBUTOR BETWEEN I-385 AND WOODRUFF RD.

FIGURE 20

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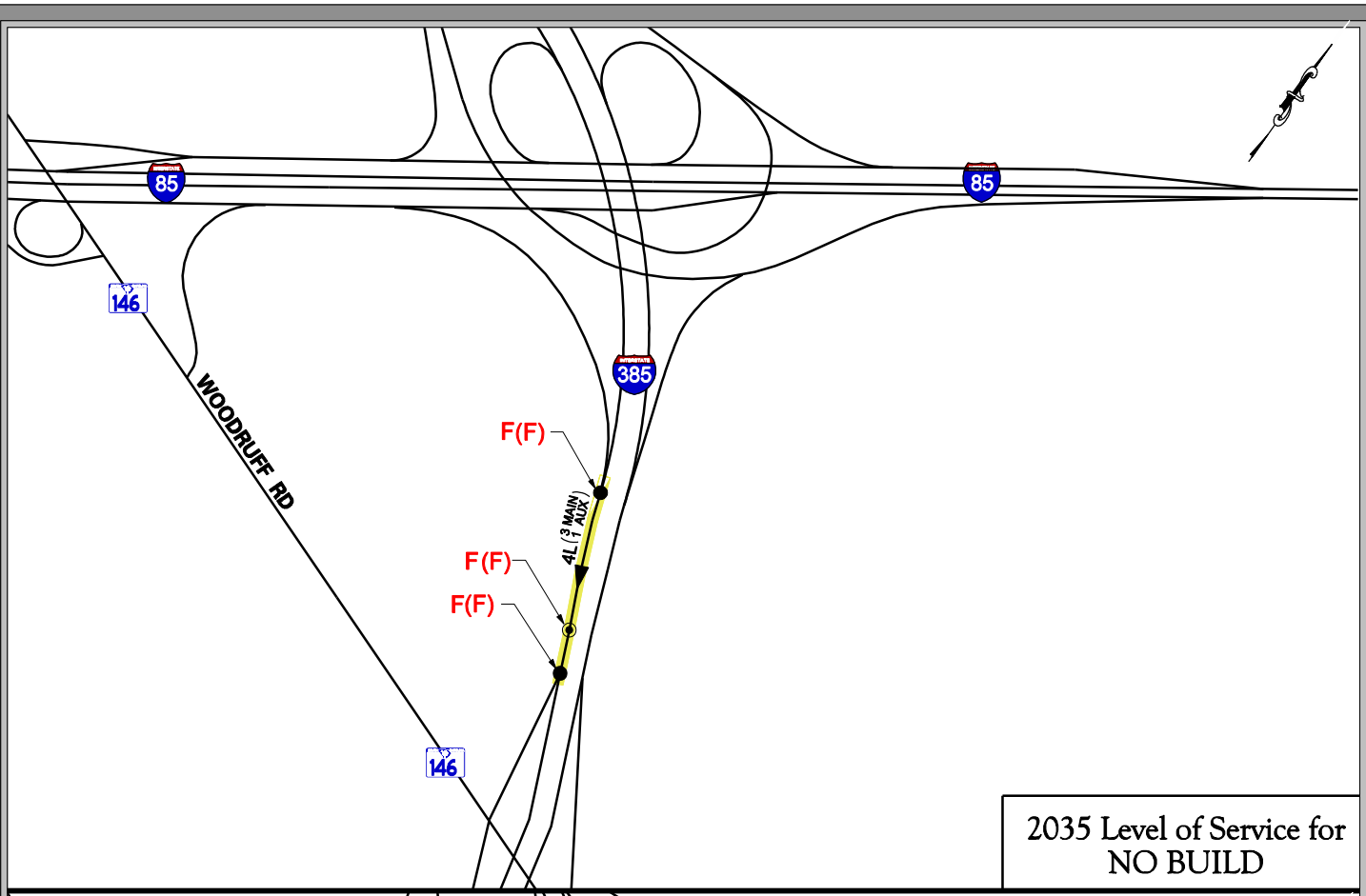

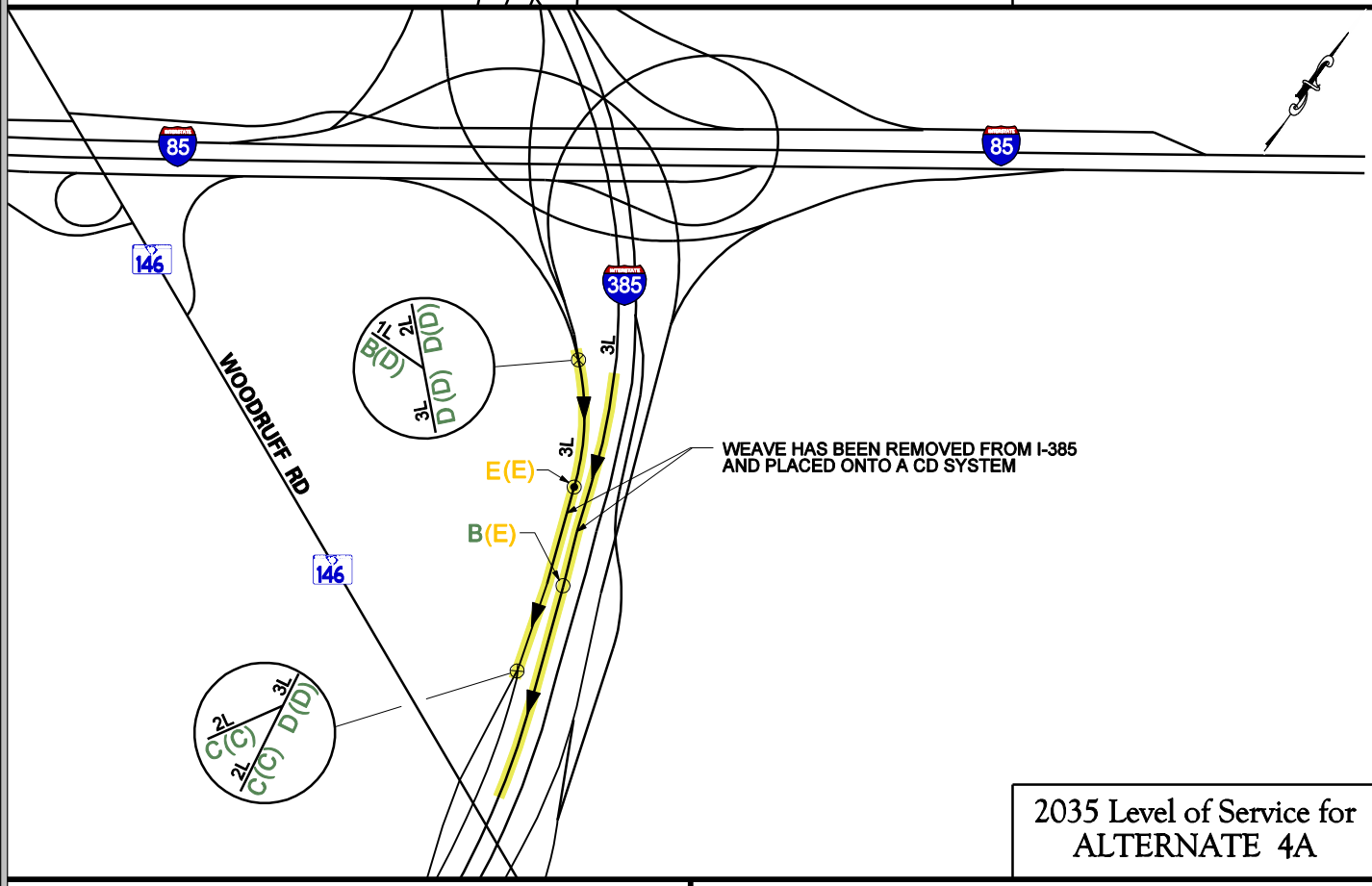

LEGEND:

- ○ - FREEWAY SECTION
- ◉ - WEAVE AREA
- ● - RAMP (MERGE / DIVERGE)
- 2L - NUMBER OF LANES
- ⊗ - RAMP (SEGMENT ANALYSIS)*
- A(A)- AM(PM) LEVEL OF SERVICE

* LOS SHOWN FOR UPSTREAM & DOWNSTREAM OF MERGE / DIVERGE POINT

DEFICIENCY 4: WEAVE AREA ALONG I-385 SOUTHBOUND BETWEEN I-85 AND WOODRUFF RD.

FIGURE 21

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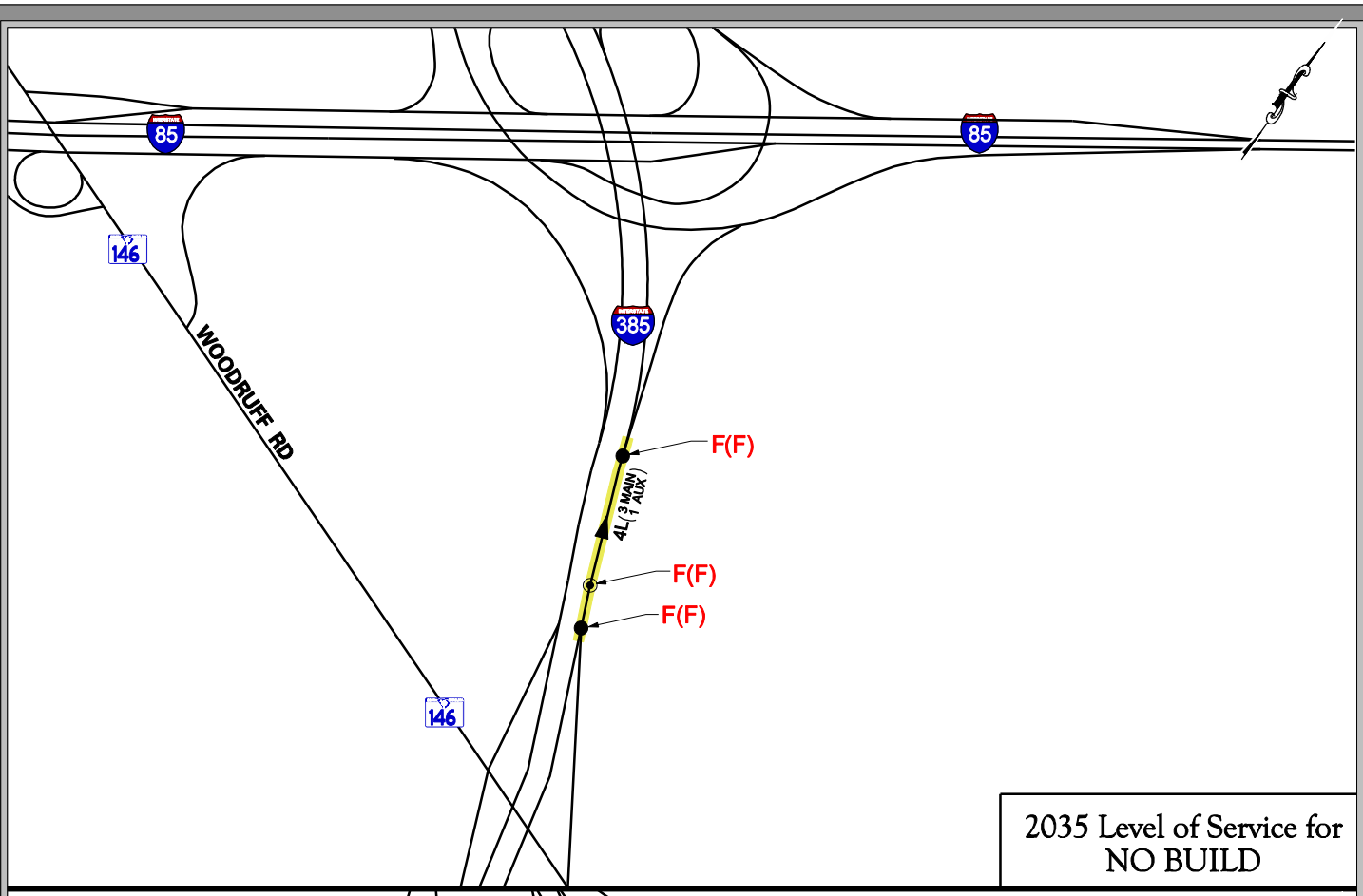
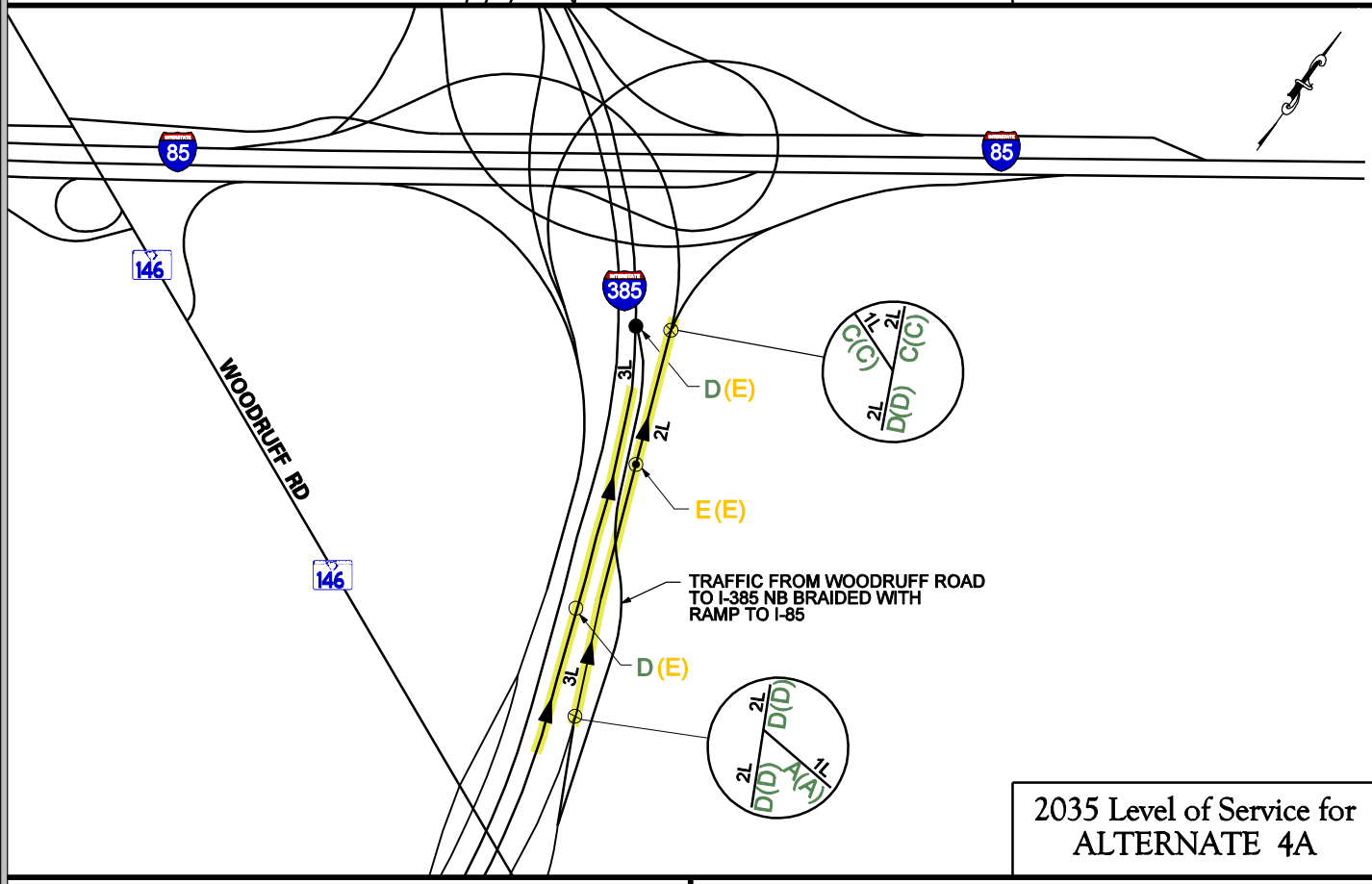


2035 Level of Service for
NO BUILD



2035 Level of Service for
ALTERNATE 4A

LEGEND:

- ○ - FREEWAY SECTION
- ◉ - WEAVE AREA
- ● - RAMP (MERGE / DIVERGE)
- 2L - NUMBER OF LANES
- ⊗ - RAMP (SEGMENT ANALYSIS)* A(A)- AM(PM) LEVEL OF SERVICE

* LOS SHOWN FOR UPSTREAM & DOWNSTREAM OF MERGE / DIVERGE POINT

DEFICIENCY 5: WEAVE AREA ALONG I-385
NORTHBOUND BETWEEN
WOODRUFF RD. AND I-85

FIGURE 22

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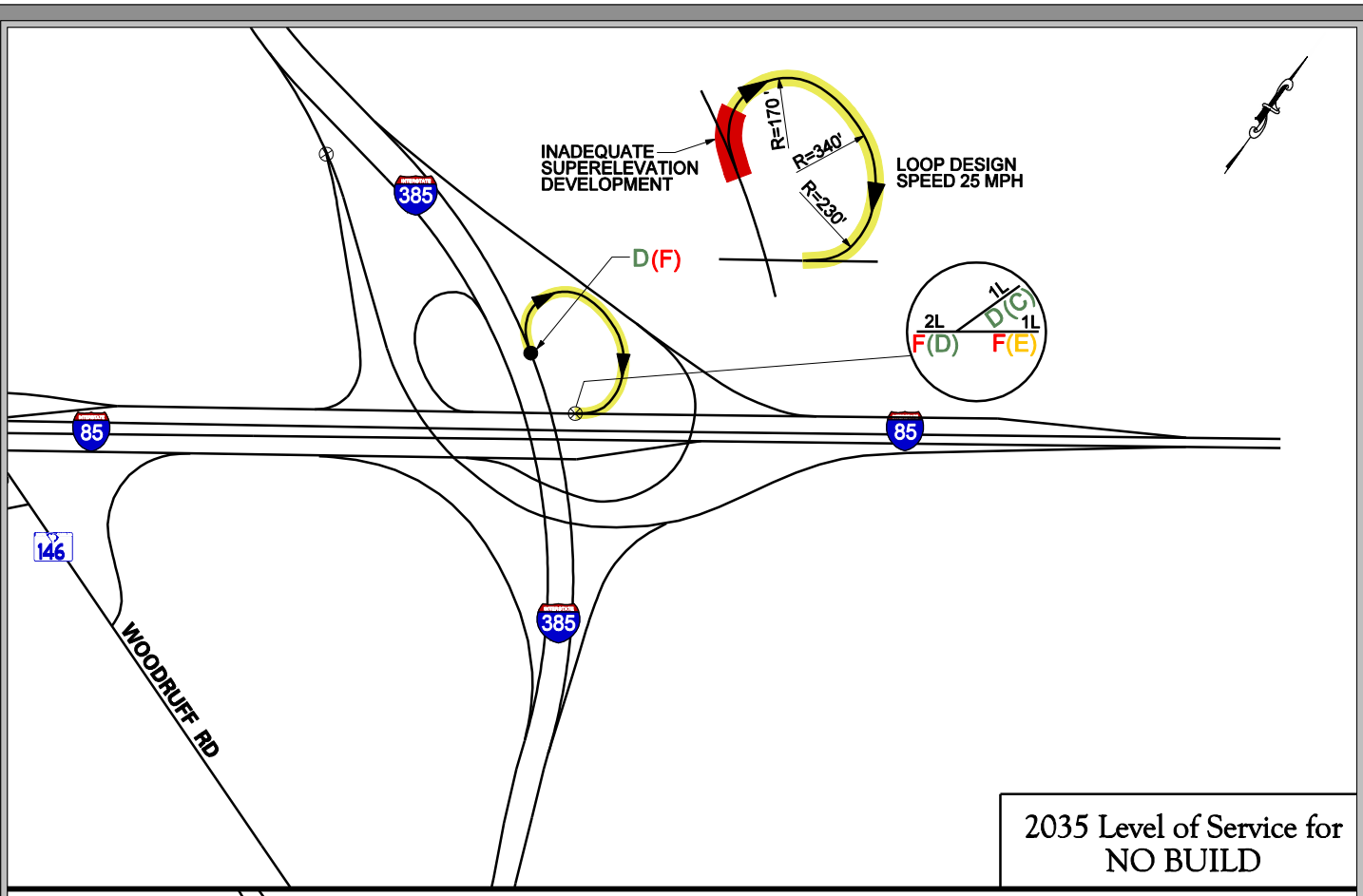
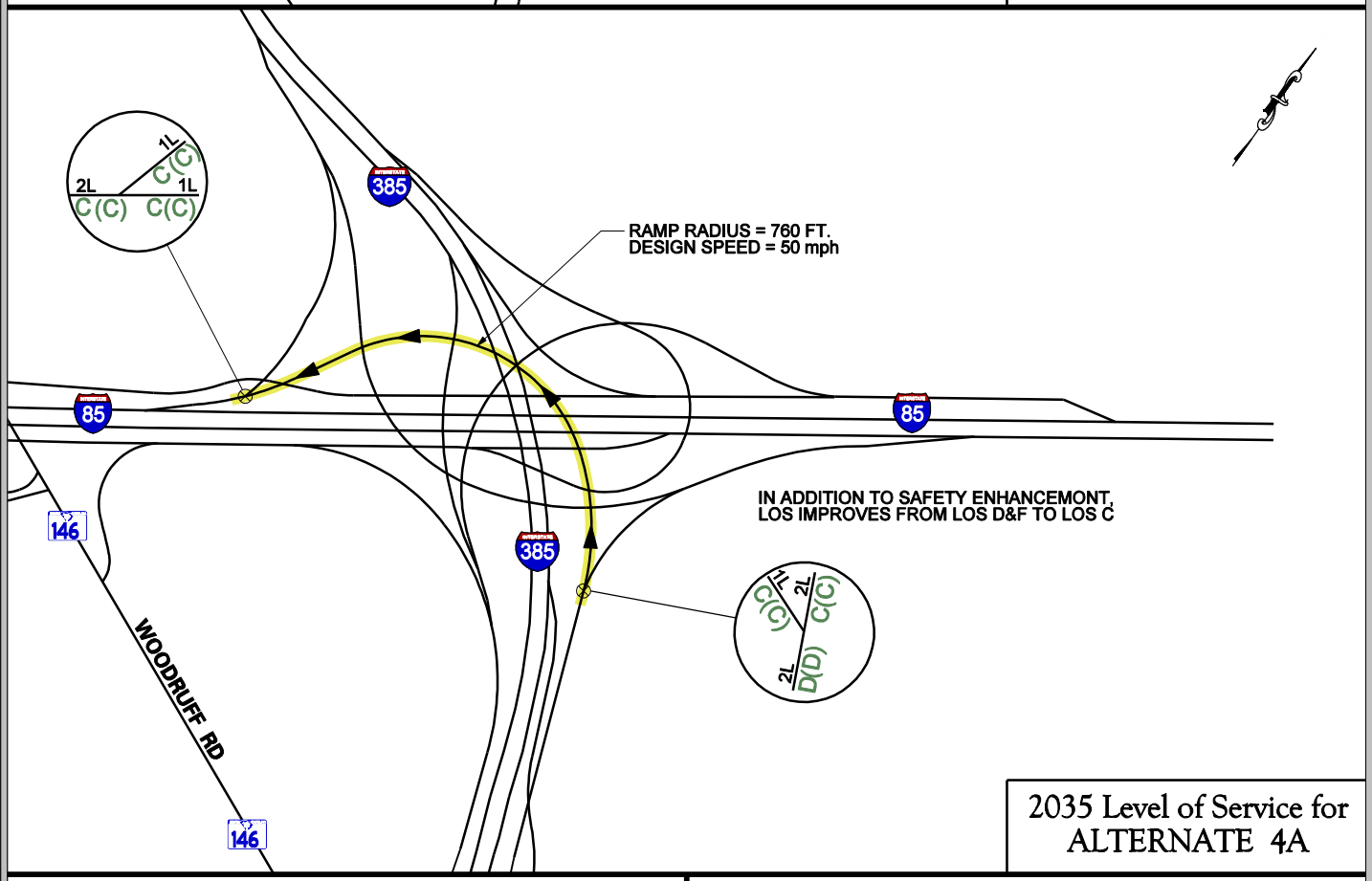


2035 Level of Service for NO BUILD



2035 Level of Service for ALTERNATE 4A

LEGEND:

- ○ - FREEWAY SECTION
- ◉ - WEAVE AREA
- ● - RAMP (MERGE / DIVERGE)
- 2L - NUMBER OF LANES
- ⊗ - RAMP (SEGMENT ANALYSIS)* A(A)- AM(PM) LEVEL OF SERVICE

* LOS SHOWN FOR UPSTREAM & DOWNSTREAM OF MERGE / DIVERGE POINT

DEFICIENCY 6: SAFETY ISSUE ON I-385 NORTHBOUND LOOP OFF-RAMP TO I-85 SOUTHBOUND

FIGURE 23

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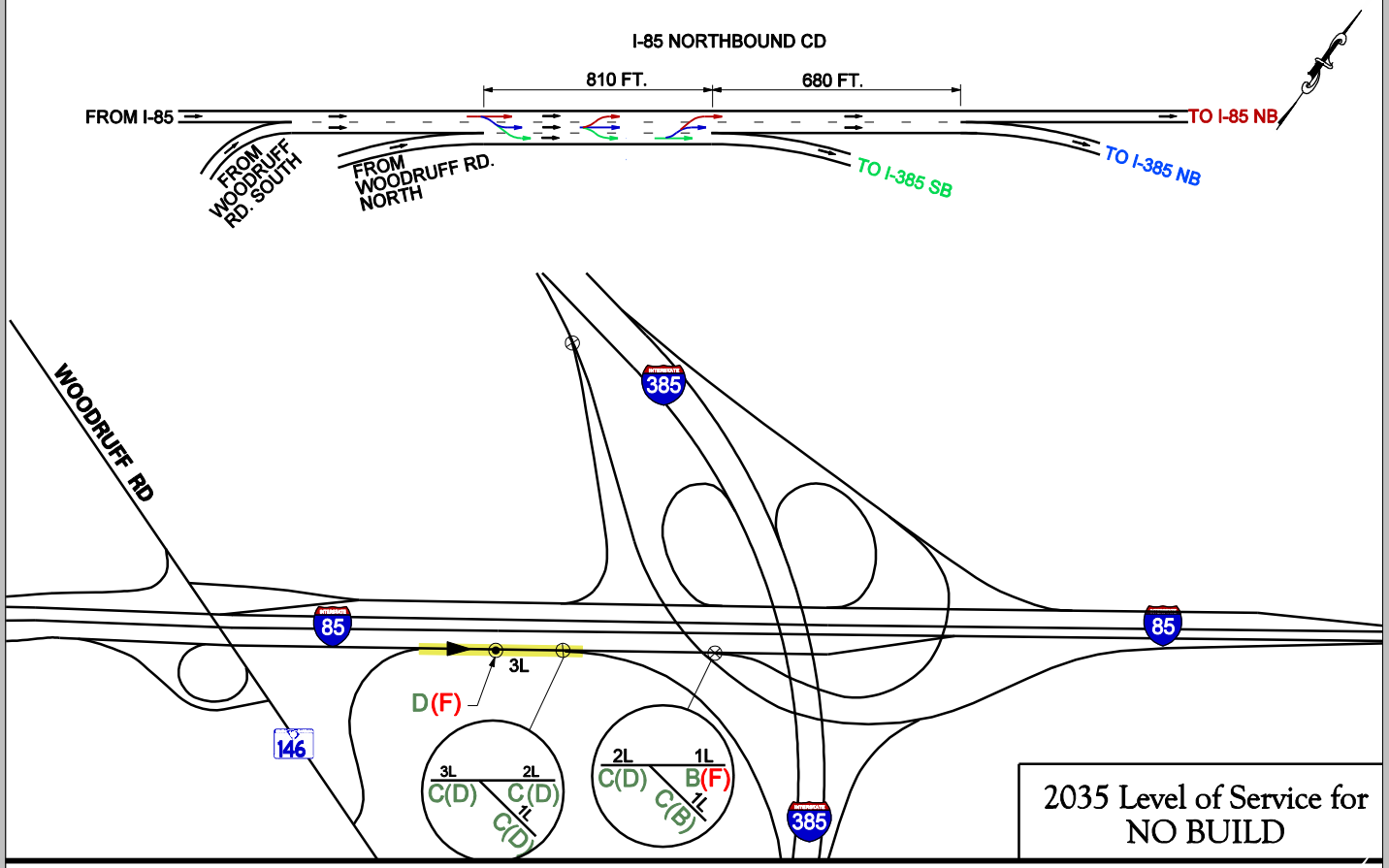
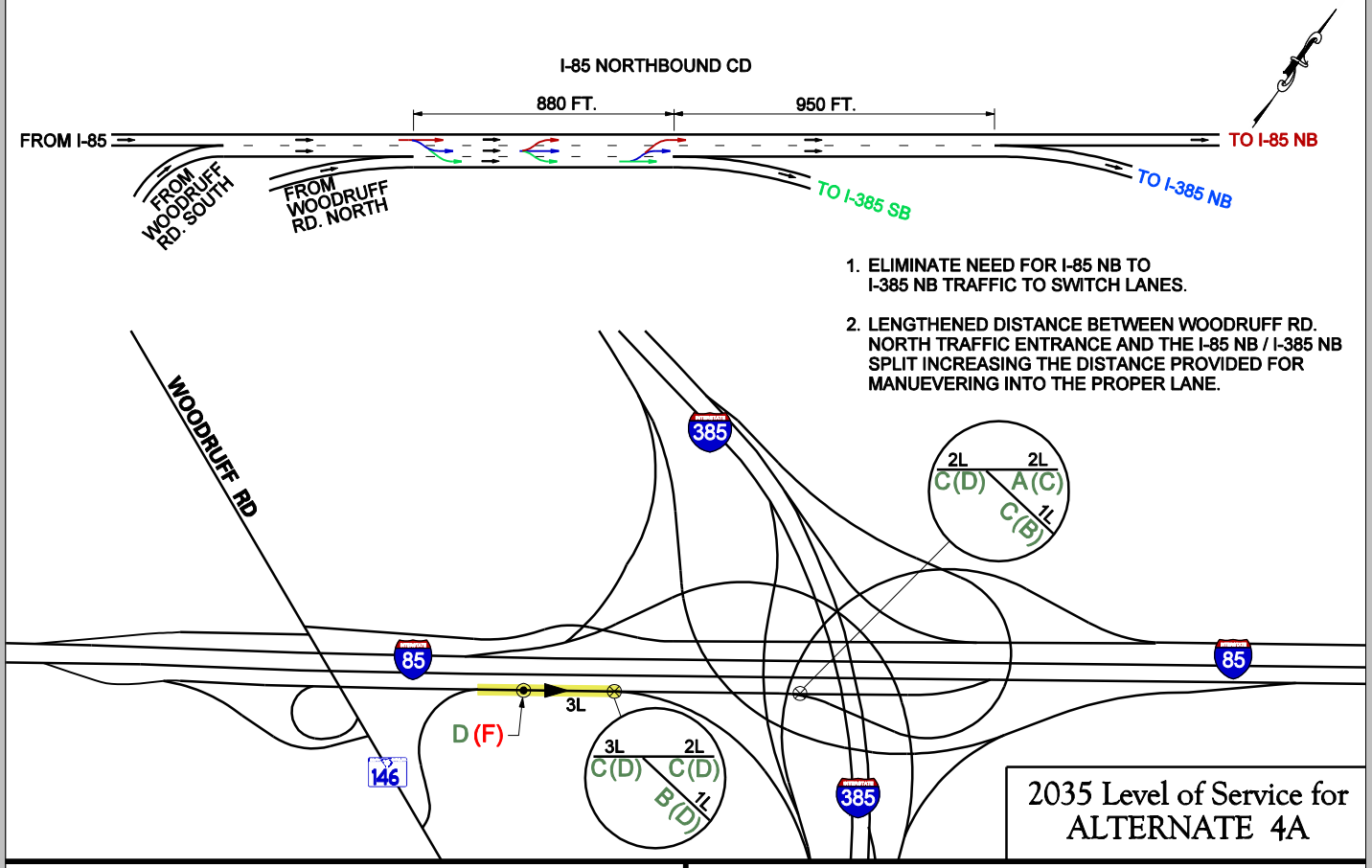


2035 Level of Service for NO BUILD



1. ELIMINATE NEED FOR I-85 NB TO I-385 NB TRAFFIC TO SWITCH LANES.
2. LENGTHENED DISTANCE BETWEEN WOODRUFF RD. NORTH TRAFFIC ENTRANCE AND THE I-85 NB / I-385 NB SPLIT INCREASING THE DISTANCE PROVIDED FOR MANUEVERING INTO THE PROPER LANE.

2035 Level of Service for ALTERNATE 4A

LEGEND:

- ○ - FREEWAY SECTION
- ◉ - WEAVE AREA
- ● - RAMP (MERGE / DIVERGE)
- 2L - NUMBER OF LANES
- ⊗ - RAMP (SEGMENT ANALYSIS)* A(A)- AM(PM) LEVEL OF SERVICE

* LOS SHOWN FOR UPSTREAM & DOWNSTREAM OF MERGE / DIVERGE POINT

DEFICIENCY 7: WEAVE AREA ALONG I-85 NORTHBOUND COLLECTOR-DISTRIBUTOR BETWEEN WOODRUFF RD. AND I-385

FIGURE 24

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- Extends the interchange ramps along I-85 to the I-85/Pelham Road interchange; this allows more efficient access to/from the interchange, preventing potential backup of traffic along the Interstate through lanes.
- Widen I-385 to six-lanes which would provide continuity with the existing facility.

The proposed improvements and configuration of the preferred alternative also results in modification to existing access. Specifically, I-385 northbound to I-85 southbound will not have access to the I-85/Woodruff Road interchange. This is a function of the new direct-connect ramps to I-85 northbound and the need to eliminate multiple conflicts and weaves due to the proximity of Woodruff Road to the I-85/I-385 interchange. In addition, I-385 southbound to I-85 southbound would not have access to the I-85/Woodruff Road interchange. This again is a function of eliminating undesirable movements due to proximity. I-385 northbound and southbound would continue to have access to Woodruff Road at the I-385/Woodruff Road interchange. Traffic destined for Woodruff Road is expected to reassign onto either the I-385/Roper Mountain Road interchange or the I-385/Woodruff Road interchange. In addition, access would continue to be provided to Woodruff Road via Roper Mountain Road at the I-385/Roper Mountain Road interchange.

Additional traffic analysis of reassigned traffic was conducted to confirm that the preferred alternative would not have an adverse effect on the existing roadway network. These analyses included an Origin-Destination Study to identify the volume of traffic originating from I-385 and destined for I-85/Woodruff Road interchange. This study concluded that a total of 181 vehicles were destined for the I-85/Woodruff Road interchange during the PM Peak Hour, which includes 43 from I-385 southbound and 138 from I-385 northbound. These traffic movements are expected to reassign to either the I-385/Roper Mountain Road or the I-385/Woodruff Road interchanges. These volumes are considered minimal in comparison to the overall volumes of the interchange, and are not expected to have an adverse effect on the existing operating conditions along adjacent facilities.

The preferred alternative was selected over Alternative 2D primarily due to cost. The total estimated cost for the preferred is $245 million, compared to the estimated $292 million for Alternative 2D. Therefore, there is not a “reasonable availability of funds” to support the required improvements associated with Alternative 2D. In addition, the preferred alternative includes a direct-connect ramp from I-385 northbound to I-85 southbound as opposed to a loop-ramp proposed for Alternative 2D. The direct-connect ramp is the more desirable movement for traffic operation, and would minimize conflict points and potential safety concerns.

In summary, the preferred alternative addresses six of the seven documented deficiencies, while improving Deficiency #7 over the No-build condition. As demonstrated, the preferred alternative improves numerous ramp movements and segments from LOS F to a more desirable LOS (i.e. LOS D or better). In addition, the preferred results in numerous safety enhancements, including elimination of undesirable weave movements, isolation of merge movements, reduction of vehicular conflicts, and increased capacity.

4.0 ENVIRONMENTAL RESOUCES AND POTENTIAL IMPACTS

This section includes a discussion on the environmental resources and the probable beneficial and adverse social, economic, and environmental effects of the preferred alternative and describes the measures proposed to mitigate any adverse impacts. Environmental studies conducted by various Department representatives indicate the absence of any significant adverse impact on the human and natural environment. These studies are incorporated by reference and used to support this conclusion. Figures 25a-25e illustrates the impacts associated with the preferred alternative. The following paragraphs provide a brief overview of the Department's environmental findings.

4.1 Land Use

A 1,812 acre project study area was originally identified based on initial alternative development. This project area is located within the Piedmont of South Carolina, which is the transitional boundary between the mountainous regions along the Appalachians (northwest) and the coastal plain (southeast). Specifically, the project area is located along the "Southern Outer Piedmont" ecoregion, which is characterized by lower elevation and less relief with expansive areas of pine and mixed oak forests.[12]

Woodruff Road at Garlington Road

The project corridor is located along the southern limits of the City of Greenville, and includes various urbanized land uses including transportation, commercial development, industrial, and residential land uses. According to the City of Greenville Planning Department, the general zoning along the area includes 'regular commercial district', 'planned development district', and 'service district' with future land uses committed to

[12] "Ecoregions of North Carolina and South Carolina (EPA)". Griffith, Glenn; Omernik, James. Encyclopedia of Earth Website, http://www.eoearth.org. Accessed July 15, 2009.

I-85/I-385 Interchange Improvement Project
Greenville County, S.C.
Environmental Assessment

PROJECT AREA

Old Sulfur Spri

Salters Rd.

Tributary #1 Impact Area

TO ATLANTA

INTERSTATE 85

166

(Match to General Impact Figure 25E)

153

Woodruff Rd.

193

146

208

(Match to General Impact Figure 25B)

PROJECT AREA

(Match to General Impact Figure 25D)

Legend

- Jurisdictional Waters of U.S.
- Open Waters / Ponds
- 100 Year Floodplain
- Potential Hazardous Material Sites
- Proposed New Right-of-Way
- New Pavement
- Pavement Removal
- Commercial Displacement
- Present Right-Of-Way
- Noise Wall Assessment

- Category B Impacted Receiver
- Category C Impacted Receiver
- Category E Impacted Receiver
- 123 1st Floor Receiver
- 123 2nd Floor Receiver
- 123 3rd Floor Receiver

I-85/I-385
INTERCHANGE IMPROVEMENT
PREFERRED ALTERNATIVE

SCALE 1" = 500'
Aerial Photography 2010

FIGURE 25A

\\sc1fs1\projects\08195\Environmental\EA Figures\EA_25a_GeneralImpact Fig-1.dgn
5/11/2012

I-85/I-385 Interchange
Improvement Project
Greenville County, S.C.
Environmental Assessment

(Match to General Impact Figure 25E)

(Match to General Impact Figure 25A)

(Match to General Impact Figure 25C)

(Match to General Impact Figure 25D)

PROJECT AREA

PROJECT AREA

Tributary #4 Impact Area

Tributary #3 Impact Area

Tributary #2 Impact Area

Wetland A

Wetland B Impact

Chrome Dr.

Garlington Rd.

Roper Mountain Rd.

Walker Cemetery

INTERSTATE 85

INTERSTATE 385

TO SPARTANBURG

FM2

98 99 100 101 211 216 218 394

58 59 63 64 66 67 68 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95

402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 426 427 428 429 430 431 432 433 434 436 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452

Legend

- Jurisdictional Waters of U.S.
- Wetlands
- Open Waters / Ponds
- 100 Year Floodplain
- Potential Hazardous Material Sites
- Proposed New Right-of-Way
- New Pavement
- New Bridge
- Pavement Removal
- Commercial Displacement
- Present Right-Of-Way
- Noise Wall Assessment
- Cemetery

- Category B Impacted Receiver
- Category C Impacted Receiver
- Category E Impacted Receiver
- 123 1st Floor Receiver
- 123 2nd Floor Receiver
- 123 3rd Floor Receiver
- Field Measurement

I-85/I-385
INTERCHANGE IMPROVEMENT
PREFERRED ALTERNATIVE

SCALE 1" = 500'
Aerial Photography 2010

FIGURE 25B

\\scl1\projects\08195\environmental\ea figures\EA_25b_GeneralImpact Fig 2.dgn
5/11/2012

I-85/I-385 Interchange
Improvement Project
Greenville County, S.C.
Environmental Assessment

(Match to General Impact Figure 25B)

PROJECT AREA

INTERSTATE 85

Wetland C

Floodplain Impact

Floodplain Impact

PROJECT AREA

37 38 30 29 27 25 21 14 12 472 473 45 42 43 40 52 50 53 460

Legend

- Jurisdictional Waters of U.S.
- Wetlands
- Open Waters / Ponds
- 100 Year Floodplain
- Potential Hazardous Material Sites
- New Pavement
- Present Right-Of-Way
- Noise Wall Assessment

- Category B Impacted Receiver
- Category C Impacted Receiver
- Category E Impacted Receiver
- 123 1st Floor Receiver
- 123 2nd Floor Receiver
- 123 3rd Floor Receiver

I-85/I-385
INTERCHANGE IMPROVEMENT
PREFERRED ALTERNATIVE

SCALE 1" = 500'
Aerial Photography 2010

FIGURE 25C

\\sc1fs1\projects\08195\environmental\esa figures\EA_25c_GeneralImpact Fig-3.dgn
5/11/2012

I-85/I-385 Interchange
Improvement Project
Greenville County, S.C.
Environmental Assessment

(Match to General Impact Figure 25A)

(Match to General Impact Figure 25B)

PROJECT AREA

PROJECT AREA

Tributary #6

Floodplain Impact

TO COLUMBIA

Woodruff Rd.

INTERSTATE 385

146

314 310 308 313 309 311 312 299 250 248 249 363 368 370

Legend

- Jurisdictional Waters of U.S.
- Open Waters / Ponds
- 100 Year Floodplain
- Potential Hazardous Material Sites
- New Pavement
- Pavement Removal
- Present Right-Of-Way
- Noise Wall Assessment

- Category B Impacted Receiver
- Category C Impacted Receiver
- Category E Impacted Receiver
- 123 1st Floor Receiver
- 123 2nd Floor Receiver
- 123 3rd Floor Receiver

I-85/I-385
INTERCHANGE IMPROVEMENT
PREFERRED ALTERNATIVE

SCALE 1" = 500'
Aerial Photography 2010

FIGURE 25D

\\sc1s1\projects\08195\environmental\eo figures\EA_25d_GeneralImpact Fig 4.dgn
5/11/2012

I-85/I-385 Interchange
Improvement Project
Greenville County, S.C.
Environmental Assessment

(Match to General Impact Figure 25A)

(Match to General Impact Figure 25B)

Woodruff Rd.

146

151

Woodruff Rd.

146

Verdae Blvd.

Roper Mountain Rd.

PROJECT AREA

PROJECT AREA

INTERSTATE 385

TO GREENVILLE

112 114 116 115 113 117 118

Legend

- Open Waters / Ponds
- Potential Hazardous Material Sites
- New Pavement
- Pavement Removal
- Present Right-Of-Way
- Noise Wall Assessment

- Category B Impacted Receiver
- Category C Impacted Receiver
- Category E Impacted Receiver
- 123 1st Floor Receiver
- 123 2nd Floor Receiver
- 123 3rd Floor Receiver

I-85/I-385
INTERCHANGE IMPROVEMENT
PREFERRED ALTERNATIVE

SCALE 1" = 500'
Aerial Photography 2010

FIGURE 25E

\\sc115\projects\08195\environmental\cad files\figures\EA_25e_GeneralImpact Fig 5.dgn
5/11/2012

I-85/I-385 Interchange Improvement Project
Greenville County, S.C.
Environmental Assessment

Legend

- RESIDENTIAL DISTRICT
- RESIDENTIAL SUBURBAN DISTRICT
- RESIDENTIAL MULTIFAMILY DISTRICT
- SERVICES DISTRICT
- COMMERCIAL DISTRICT
- INDUSTRIAL DISTRICT
- OFFICE DISTRICT
- PLANNED OFFICE DISTRICT
- PLANNED DEVELOPMENT

I-85/I-385
INTERCHANGE IMPROVEMENT
ZONING DISTRICTS

SCALE 1" = 2000'
Aerial Photography 2010

FIGURE 26

L:/0895/Environmental/EA Figures/EA_26_Zoning.dgn
4/4/202

'mixed use regional' as illustrated in Figure 26. As such, the project area consists of little to no natural community habitat and has been heavily disturbed through previous development and urbanization.

The immediate project area consists largely of highway oriented and transient developments including gas stations, hotels, restaurants, general retail, and industrial. Sparse residential areas are located primarily along the northwest quadrant of the project area. Approximately 208 acres of the new right-of-way would be required to accommodate the proposed improvements. The majority of this right-of-way would be acquired from existing commercial developments, or areas that are zoned for commercial land uses. As such, this acquisition and transfer of land use is consistent with the future long range planning and zoning of both the City and County of Greenville.

4.2 Threatened or Endangered Species

Pursuant to Section 7 of the Endangered Species Act of 1973, a field survey of the project area was conducted by Department representative's in June 2011. The following lists of endangered (E) and threatened (T) species for Greenville County were obtained from the U.S. Fish and Wildlife Service (USFWS) (last updated May 2011):

Animals	
Clemmys muhlenbergii (Bog turtle)	Threatened
Plants	
Sagittaria fasciculate (Bunched arrowhead)	Endangered
Sarracenia rubra ssp. *jonesii* (Mountain sweet pitcher-plant)	Endangered
Sisyrinchium dichotomum (White irisette)	Endangered
Gymnoderma lineare (Rock gnome lichen)	Endangered
Helonias bullata (Swamp pink)	Threatened
Hexastylis naniflora (Dwarf-flowered heartleaf)	Threatened
Isotria medeoloides (Small whorled pogonia)	Threatened

A field review of project area failed to identify the presence of any species from the May 2011 list provided by the USFWS. The ecology and life history of the above species were also evaluated to determine the potential presence of species and/or habitat along the study area, which is documented in the *Natural Resources Assessment – I-85 and I-385 Interchange Improvement Project*. This evaluation determined that each species

requires unique habitat requirements in order survive and propagate. These natural communities/habitat requirements include:

- Unique aquatic habitat (seeps, bogs, forested wetlands)
- Deciduous forest, hillsides
- Woodline edges
- Rock faces

The review of available mapping, and subsequent field visits confirmed that the study area consists largely of urbanized landuses, including transportation, commercial, industrial, and residential. As such, the area contains very little natural communities. There are isolated forested areas, including drainage conveyances/streams, dispersed throughout the project area. However, these areas do not include the type or amount of unique habitat required to support any of the listed species. These areas are also severely fragmented, further reducing the potential for available habitat or species. In addition, a review of the South Carolina Rare, Threatened, and Endangered Species Inventory did not identify any records documenting the presence of any protected species within the immediate vicinity of the project area (i.e. *Mauldin* USGS quadrangle).[13]

The findings of the *Natural Resources Assessment* concludes that the proposed action would have no effect on resources under the jurisdiction of the USFWS that are currently protected by the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). For more detailed analysis, please refer to the *Natural Resources Assessment – I-85 and I-385 Interchange Improvement Project* found in Appendix A.[14]

4.3 Farmlands

The proposed study has been evaluated with regard to the Farmland Protection Policy Act (FPPA) of 1981. Appling sandy loam and Cecil sandy loam are identified as "prime farmland" by the NRCS. [15] However, a review of the 2010 U.S. Census Bureau map concludes that the project area is within the limits of an "urban area" (i.e. City of Greenville), and therefore includes land that is already in or committed to future

[13] SCDNR - South Carolina Rare, Threatened, and Endangered Species Inventory. https://www.dnr.sc.gov:4443/pls/heritage/species.login. Accessed August 3, 2009.

[14] Florence & Hutcheson, *Natural Resources Assessment – I-85 and I-385 Interchange Improvement Project, Greenville County, SC.* June 2011.

[15] NRCS. Web Soil Survey 2.2. http://websoilsurvey.nrcs.usda.gov/. Accessed June 17, 2009.

development as defined in CFR 658.2(a). As such, the FPPA does not apply to the proposed project.

4.4 Water Quality

The majority of the project area is located within the "Enoree River Watershed" (03050108-01), with the extreme western/northwestern portion located within the "Reedy River Watershed (03050109-04). The Enoree River watershed drains approximately 167,348 acres, with the majority of the area comprised of forested land (38.7%) or agricultural land (29.1%), and followed by urban land (27.9%).[16] The Reedy River watershed drains approximately 96,591 acres, with the majority of the area comprised of urban land (44.5%) or forested land (30.3%), followed by agricultural land (21.2%).[17] The soils along the project area are largely mapped as Cecil sandy loam and Appling sandy loam.[18]

The *Mauldin* USGS topographic quadrangle (1983) documents various tributaries associated with Rocky Creek, Gilder Creek, and Laurel Creek within the project area. These tributaries consist of first and second order streams with intermittent to perennial flow. In addition there are various linear stormwater conveyances and retention facilities located within the project area.

The S.C. Department of Health and Environmental Control (SCDHEC) is charged with establishing a system and rules for managing and protecting the quality of South Carolina's surface and ground water. This is accomplished through various regulations and programs within SCDHEC which establish official classified water uses for all waters of the State; rules/criteria for protecting classified water uses; and procedures for classifying water uses.

The SCDHEC classifies Rocky Creek, Gilder Creek, and Laurel Creek as "Freshwaters (FW)", which are:

> "suitable for primary and secondary contact recreation and as a source for drinking water supply after conventional treatment in accordance with the

[16] SCDHEC, 2007. *Watershed Water Quality Assessment: Broad River Basin*. Technical Report No. 006-07, Bureau of Water, Columbia, SC.

[17] SCDHEC, 2011. *Watershed Water Quality Assessment: Saluda River Basin*. Technical Report No. 9C21-11, Bureau of Water, Columbia, SC.

[18] Natural Resources Conservation Service (NRCS). Web Soil Survey 2.2. http://websoilsurvey.nrcs.usda.gov/. Accessed June 17, 2009.

requirements of the Department. Suitable for fishing and the survival and propagation of a balanced indigenous aquatic community of flora and fauna."[19]

SCDHEC maintains an aquatic biological monitoring station (BE-007) along Rocky Creek near Batesville, approximately 2.5 miles downstream of the project area. SCDHEC also maintains an aquatic biological monitoring station (S-139) along Laurel Creek approximately 3 miles west of the project area. These stations are listed on the State's *2010 303(d) Listing of Impaired Waters.* Specifically, both systems are listed as impaired for 'Aquatic Life Use' due to deficient biological indicators.[20] Stromwater control measures, both during construction and post-construction, are required for SCDOT projects constructed in the vicinity of 303(d), total maximum daily load (TMDL), outstanding resource waters (ORW), tidal, and other sensitive waters in accordance with the SCDOT's MS4 Permit.

Rocky Creek, looking downstream

Upon completion of construction, the preferred alternative has the potential to impact water quality through both the quantity and quality of stormwater runoff. The proposed project is anticipated to result in an approximate 34% increase in paved areas. This would increase the amount of runoff due to the increase in impervious material, which would be isolated along the existing I-85 and I-385 corridors. The existing drainage system includes various open and closed (i.e. piped) drainage features that effectively convey stormwater offsite. This drainage system would be improved and designed to accommodate the volume of stormwater associated with the preferred alternative.

The proposed project also has the potential to impact the quality of the stormwater runoff through pollutant loading from vehicular traffic. Water quality pollutants commonly associated with vehicular traffic include suspended solids, heavy metals, nutrients, and oil-and-grease. As mentioned, the stormwater would be collected and

[19] SCDHEC, *R.62-68, Water Classifications & Standards. E*ffective April 25, 2008.

[20] SCDHEC, *State's 2010 303(d) Listing of Impaired Waters.* July 23, 2010.

conveyed to the numerous outfalls which ultimately connect to downstream waters. The runoff would sheetflow across grassed areas (i.e. shoulders, medians, etc.) which would assist in infiltration and settlement of potential contaminants. In addition, the closed drainage systems would outfall to open ditches for further conveyance, which would also provide capacity and infiltration/buffering prior to the discharge to surface waters. The proposed project is not expected to impact the existing traffic volumes or vehicle mix, and therefore would result in similar pollutant loading as the no-build condition.

The project would have the potential to temporarily impact water quality during construction through various land-disturbing activities. These activities would increase the potential for sediment loading in runoff by mechanized land clearing, removal of vegetation, and alteration of land contours. As a result of these potential impacts, the Clean Water Act, as amended, regulates stormwater discharges from construction sites greater than 1 acre through the National Pollutant Discharge Elimination System (NPDES) Stormwater Program. In South Carolina, SCDHEC is responsible for administering this program. As such, a NPDES permit for the proposed project would be administered by SCDHEC through the Stormwater, Construction & Agricultural Permitting Division, in conjunction with the State Sediment, Erosion, and Stormwater Management Program. These programs would ensure that the potential impacts would be avoided and minimized through the use of best management practices such as seeding, installation of silt fences, temporary sediment basins, and other similar practices. In addition, the contractor would be required to minimize potential impacts through implementation of construction best management practices, reflecting policies contained in 23 CFR 650 B and SCDOT's *Supplemental Specifications on Seeding and Erosion Control Measures* (January 12, 2009).

The potential impacts (during and upon construction) of the proposed project on the surrounding water quality would also be evaluated through Section 401 of the Clean Water Act, which is administrated through SCDHEC's Section 401 Water Quality Certification Program. The proposed project would likely require a 401 Water Quality Certification from SCDHEC, in conjunction with a Section 404 permit from the U.S. Army Corps of Engineers. As part of the 401 Certification, SCDHEC would assess the potential impacts of the proposed project on water quality, and ensure compliance with water quality standards and classified uses.

4.5 Waters of the U.S.

Waters of the U.S., as it applies to the jurisdictional limits of the authority of the U.S. Army Corp of Engineers, is defined in 33 CFR Part 328, and includes:

- All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
- All interstate waters including interstate wetlands;
- All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds;
- All impoundments, tributaries, and adjacent wetlands to the waters defined above;
- The territorial seas.

Potential waters of the U.S. were identified along the project area, and the proposed project was evaluated to determine the impacts to these areas. The impacts would require the approval from the appropriate regulatory agencies, which ensures that impacts are avoided and minimized where practicable.

The evaluation of potential jurisdictional waters of the U.S. included a review of available mapping, specifically the National Wetland Inventory (NWI) maps, soil surveys, USGS topographic quadrangles (*Greenville, Mauldin*), color aerial photography, GIS data, and 2006 NAPP false-color infrared aerial photography. The review of initial mapping documents that the project area includes waters potential tributaries associated with Rocky Creek, Gilder Creek, and Laurel Creek. In addition, it appears that an unnamed tributary to Rocky Creek historically originated west of the interchange and south of I-385, and ultimately drains eastward. It is assumed that much of this system was impacted by the subsequent construction of I-385 south/east of I-85. Apparent unnamed tributaries to Laurel Creek originate northwest of the existing interchange and drain westward. The location of these areas have been identified through the above mapping and subsequent field survey.

Numerous field visits have been conducted to further evaluate the project area for potential wetlands and other waters of the US. The field visits confirmed the presence of numerous tributary systems, various open waters/ponds, and two individual wetland areas identified within the project boundary, which are described below. Rocky Creek is assumed a 'relatively permanent water' as defined by the US Army Corps of Engineers

(USACE). In addition, various tributary reaches of Rocky Creek, Gilder Creek, and Laurel Creek within the project area are also assumed to be 'relatively permanent waters' due to the following observed characteristics: continuous flow, gravel substrate, obvious/depressed line in bank, scour, and absence of terrestrial vegetation. Rocky Creek and Gilder Creek eventually drain to the Enoree River, and Laurel Creek drains to the Reedy River, both of which are considered a 'traditional navigable water' as defined by the USACE. As such, these systems, along with the abutting wetlands, are considered waters of the U.S. under the direct jurisdiction of the USACE. These findings and determinations will be appropriately coordinated with the USACE for final verification/determination of the jurisdictional status.

4.5.1 Streams and Open Water

As documented, the project area includes various tributaries associated with Rocky Creek, Gilder Creek, and Laurel Creek. These tributaries primarily consist of first and second order streams with perennial flow. The following is a brief description and location of these systems, which are also illustrated in Figures 25a-25e

Tributary 1: A perennial, first order, unnamed tributary that eventually flows to Laurel Creek; originates from upstream stormwater/pond facilities, crosses under I-85 via a 6-foot by 4-foot box culvert approximately 1,900 feet north of the Salters Road bridge crossing.

Tributary 2, looking downstream

Tributary 2: A perennial, first order, unnamed tributary that eventually flows to Rocky Creek; parallels the I-85 northbound ramp to I-385 southbound; crosses under I-385 via a 7-foot by 6-foot box culvert and continues under Garlington Road and eventually drains to Rocky Creek; designated FEMA floodway and 100 year floodplain downstream of Garlington Road; abutting wetland downstream of Garlington Road.

Tributary 3: A perennial, first order, unnamed tributary that eventually drains to Oak Grove Lake and Rocky Creek; crosses under Roper Mountain Road and I-85; abutting wetland just upstream of Roper Mountain Road.

Tributary 4: A perennial, first order, unnamed tributary that drains to Tributary 3 prior to Oak Grove Lake; appears to have been a relocated system as a result of the original construction of I-85.

Tributary 5: Rocky Creek tributary, crosses under I-85 via 4 - 8-foot by 10-foot box culverts approximately 2,500 feet south of the I-85/Pelham Road interchange; designated FEMA floodway and 100 year floodplain.

Tributary 6: A perennial first/second order, unnamed tributary to Gilder Greek, which eventually drains to the Enoree River; parallels I-385 southbound and is located approximately 1,800 feet south of the I-85/Woodruff Road interchange; designated 100 year floodplain.

Tributary 7: A perennial first order, unnamed tributary which flows into Tributary 6, and eventually drains to Gilder Creek and the Enoree River; crosses under I-385 approximately 2,000 feet north of the I-385/Butler Road interchange.

The proposed project is expected to impact a total of approximately 2,370 LF of these tributaries, which is summarized in Table 6.

Table 6. Summary of Stream Impacts.

	Impact Length (Linear Feet)	Type of Impact
Tributary 1	50 LF	Culvert Extension
Tributary 2	1,130 LF	Fill/Relocation
Tributary 3	960 LF	Fill/Relocation/Extension
Tributary 4	230 LF	Fill/Relocation
Tributary 5	0	NA
Tributary 6	0	Fill/Relocation
Tributary 7	0	NA

The project was evaluated for ways to avoid and/or minimize impacts to these waters. These strategies included alignment locations, roadway dimensions, drainage alternatives, embankment slopes, and walls. However, due to the proximity of these systems and the previous incorporation with the surrounding stormwater drainage systems, complete avoidance while meeting the purpose and need of the project is not

feasible or practicable. These unavoidable impacts would require prior authorization by the regulatory agencies including SCDHEC and the USACE. This process will also require appropriate compensatory mitigation per current USACE regulations. Further evaluation has determined that there are available mitigation banks with appropriate mitigation credits servicing the project area. Therefore, the required compensatory mitigation will likely be satisfied through the purchase of credits from an approved mitigation bank.

4.5.2 Wetlands

Wetland habitats are defined as those areas that are inundated by water with sufficient frequency and duration to support vegetation that is tolerant of saturated soil conditions. The U.S. Army Corps of Engineers utilizes specific hydrologic, soil, and vegetation criteria in establishing the boundary of wetlands within their jurisdiction. One method of assessing the value and function of wetlands is in terms of wildlife habitat. The U.S. Fish and Wildlife Service (USFWS) Resource Category criteria are outlined in the USFWS Mitigation Policy, 46 CFR 7644-7663. Resource categories and mitigation planning techniques are assigned based on the following criteria:

Category 1 - Communities of one-of-a-kind high value to wildlife, unique and irreplaceable on a national or eco-regional basis, habitat is not replaceable in kind based on present-day scientific and engineering skills within a reasonable time frame.

Category 2 - Communities of high value to wildlife, which are relatively scarce or are becoming scarce on a national, or eco-regional basis, habitat can be replaced in kind within a reasonable time frame based on present-day scientific and engineering skills.

Category 3 - Community types of high to medium wildlife value which are relatively abundant on a national basis, out-of-kind replacement is allowable if a tradeoff analysis demonstrates equivalency of substituted habitat type and/or habitat values. These sites are often in conjunction with a replenishing source.

Category 4 - Community types of low to medium wildlife value, generally losses would not have a substantial adverse effect on important fish and wildlife resources. These sites have often been affected by the present roadway or human disturbances and are usually isolated.

Potential wetland areas within the project area were initially identified through evaluation of the available mapping resources (National Wetland Inventory, Aerial

Photography, County/City GIS, Soil Survey, etc.). Upon further project development, specific wetland areas and boundaries were identified in the field through a combination of vegetation analysis, hydrological observations, and soil sampling. The field surveys identified two wetland areas within the immediate vicinity of the proposed improvements.

Wetland A is considered a hardwood palustrine wetland that is directly abutting an unnamed tributary to Rocky Creek, just downstream of Garlington Road. This area is characterized by various mature hardwood tree species and understory, including but not limited to sweetgum, red maple, water oak, common briar, and yellow jessamine. This area appears to receive overland flow from the tributary along with groundwater recharge as surface water was present along portions of the area. The soils also exhibited hydric field indicators, along with being mapped as Cartecay/Toccoa soils (partially hydric). This area is considered a resource Category 3 wetland as this area is located within the 100 year floodplain of the unnamed tributary, consists of mature canopy, and is part of a contiguous vegetated buffer for the tributary. The proposed project is anticipated to avoid direct impacts to Wetland A

Wetland B is considered a scrub-shrub wetland that is directly abutting an unnamed tributary to Rocky Creek, just upstream of Roper Mountain Road. This area appears to have been previously dammed with the creation of a pond for assumed stormwater control/retention. Today, the tributary system appears to flow freely under Roper Mountain Road with minimal flooding of the pond. The area is characterized by shallow surface water or saturation at the surface, with vegetation including, but not limited to willow and various rushes. The soils also exhibited hydric field indicators, and the area was noted as a wetland feature by the National Wetland Inventory mapping. This area is considered a resource Category 4 wetland due to the previous damming, excavation, and overall impacts of previous development. The proposed replacement

Wetland B, looking west

and widening of the Roper Mountain Road bridge over I-85 would result in very minor (<0.1 acre) impacts to Wetland B.

Wetland C is considered a hardwood palustrine wetland that eventually drains to Rocky Creek. This area is characterized by various mature hardwood tree species and understory, including but not limited to sweetgum, red maple, water oak, honey suckle, common briar, and yellow jessamine. This area includes various linear and overland drainage features along with apparent groundwater recharge as surface water was observed along portions of the area. The soils exhibited hydric field indicators and are mapped as Cartecay/Toccoa soils (partially hydric). This area is considered a resource Category 3 wetland as this area is located in the vicinity of the 100 year floodplain for Rocky Creek. The proposed project is anticipated to avoid direct impacts to Wetland C.

Executive Order 11990 – Protection of Wetlands was issued, in furtherance of the National Environmental Policy Act, in order to avoid impacts to wetlands wherever there is a feasible alternative. Therefore, Executive Order 11990 requires new construction in wetlands to be avoided unless there are no practicable alternatives to the impacts, and the project incorporates all practicable measures to minimize impacts. The assessment of the applicability of alternatives to wetland impacts and the incorporation of avoidance measures considers economic, environmental, and other pertinent factors. Therefore, wetlands were given special consideration during development and evaluation of the project in an attempt that the preferred design would pose the least disruption to wetlands other than the "no build" alternative, and the project complies with Executive Order 11990.

The proposed roadway would result in <0.1 acres of impacts to jurisdictional wetlands. Specifically, these impacts would be isolated to a scrub-shrub wetland located immediately adjacent to Roper Mountain Road and considered a Category 4 wetland due to past human disturbances, adjacent development, and limited functions. These impacts are not avoidable due to the existing roadway alignment and topography. These unavoidable impacts would also require authorization from the appropriate regulatory agencies, and various strategies would be incorporated to avoid, minimize, and mitigate the impacts to wetland areas. Potential measures to minimize impacts on wetlands would include adjusting fill slopes and implementing erosion control measures, including but not limited to seeding of slopes, hay bay emplacement, silt fences, and sediment basins. Other best management practices would be required of the contractor to ensure compliance with policies reflected in 23 CFR 650B. Unavoidable impacts would be appropriately mitigated according to the USACE

Compensatory Mitigation Standard Operations Procedures manual. Mitigation techniques would likely include the purchase of mitigation credits from an approved mitigation bank.

Based on the above considerations, it appears that there is no practicable alternative to the proposed new construction in these wetland areas; the proposed action would include all practicable measures to minimize harm to wetlands that may result from construction.

4.5.3 Permits

As documented above, the proposed project would result in unavoidable impacts to 2,370 LF of jurisdictional tributaries and <0.1 acres of wetland. As such, a U.S. Army Corps of Engineers permit, under Section 404 of the Clean Water Act, would be required for alteration and placement of fill material within the boundaries of jurisdictional waters along the project corridor. This activity would also require a 401 Water Quality Certification from SCDHEC, which is generally coordinated in conjunction with U.S. Army Corps of Engineers permit. The project would also require prior authorization from the SCDHEC NPDES Stormwater Program for a construction site exceeding 1.0 acre through the State Sediment, Erosion, and Stormwater Management Program.

The permitting processes associated with these programs require extensive documentation in support of these impacts. This includes detailed documentation regarding avoidance and minimization techniques, along with compensatory mitigation to comply with the specific program regulations. As a result, these programs provide additional review and final approval of these impacts with the determination that the preferred alternative is the most practicable, least environmentally damaging alternative.

4.6 Terrestrial and Aquatic Wildlife

The proposed project was evaluated to determine any potential impacts to terrestrial and aquatic wildlife. These impacts are expected to be minimal as much of the project area is heavily disturbed by the existing transportation facilities and commercial development. Although the project area is heavily developed, there is sparse undeveloped land and habitat that provides minimal habitat for aquatic or terrestrial wildlife. This includes the tributary systems and various undeveloped land throughout the project areas. The proposed improvements would be largely constructed within

and/or immediately adjacent to the existing transportation facilities. As such, the project is expected to require approximately 20 acres of new right-of-way. The potential loss of terrestrial habitat would be along the edge of the existing roadways, which would not create further fragmentation of the undeveloped land.

The project would result in the direct loss of approximately 2,370 LF of aquatic habitat through the piping of existing open tributary systems. These systems have been previously altered from their historic state; however, they provide suitable habitat for various aquatic species, including, but not limited to, aquatic macro-invertebrates, amphibians, reptiles, and fish. These impacts would be isolated along portions of the tributaries with additional suitable habitat provided upstream and/or downstream of the impacts. The stream habitat to be impacted is not considered a rare or unique habitat, and there are no listed species dependent upon this habitat. In addition, the species associated with these streams are highly mobile (i.e. fish) and abundant due to the availability of this aquatic habitat.
As documented, the project would not impact any protected species listed for Greenville County.

4.7 Floodplains

Based on a study of the Flood Insurance Rate Maps (FIRM), published by the Federal Emergency Management Agency (FEMA), the proposed project would involve construction within the existing 100-year flood limits of adjacent waters. The FIRMs for the project area, 45045C0404D, 45045C0406D, 45045C0407D, 45045C0408D, and 45045C0409D, all effective December 2, 2004, documents special flood hazard areas associated with Rocky Creek, an unnamed tributary to Rocky Creek, and an unnamed tributary to Gilder Creek. These areas are illustrated on Figures 25a-25e.

Rocky Creek (FIRM 45045C0407D)

Available mapping indicates a “Zone AE” floodplain and floodway associated with the Rocky Creek which parallels I-85 and crosses under I-85 approximately 2,500 feet south of the I-85/Pelham Road interchange. A “Zone AE” floodplain is considered the base 100 year floodplain where base flood elevations are provided from detailed analyses.[21] The proposed project is expected to require the placement of fill material along approximately 1.2 acres of this floodplain. The impacts from the fill are limited to the

[21] FEMA Map Service Center; https://msc.fema.gov . Accessed March 7, 2012.

outside bank areas of the stream cross section. It is anticipated the fill will have minimal impacts on the water surface elevations along Rocky Creek. A detailed study of the stream will be completed with the final roadway design. If the fill impacts result in any change in base flood elevation, a Conditional Letter of Map Revision will be prepared and submitted to FEMA.

Unnamed tributary to Rocky Creek (FIRM 45045C0408D)

Available mapping indicates a "Zone AE" floodplain and floodway associated with the unnamed tributary to Rocky Creek located just south of Garlington Road. The proposed project is not expected to impact this floodplain as an elevated structure is proposed along this facility. The proposed structure would be designed to minimize the placement of structural members within the floodplain area. The bridge will be constructed almost parallel to the stream flow; therefore the placement of structural members within the stream area will result in negligible impact on the conveyance of the stream cross section. The effective hydraulic model will be used for project hydraulic studies, specifically for new hydraulic design features upstream of the effective study limits. It is anticipated, any impacts to the effective floodplain study will be documented with a no-impact study for this area.

Unnamed tributary to Gilder Creek (FIRM 45045C0408D)

Available mapping indicates a "Zone A" floodplain associated with and unnamed tributary to Gilder Creek located just south of the I-385/Woodruff Road interchange, and immediately adjacent to the I-385 southbound roadway. It appears that the limits of the floodplain begin at the existing roadway embankment, and actually extend into the I-385 on-ramp from Woodruff Road. Zone A floodplains are areas within the 100 year floodplain (i.e. have a 1% annual chance of flooding), but without detailed analyses to identify specific depths or base flood elevations associated with these limits.[22] Based on available mapping, it appears that the project would result in approximately 0.9 acres of fill material within this floodplain area. The proposed improvements would require the widening of the existing roadway embankment, resulting in the fill impact. For "Zone A" floodplains, design guidelines allow for an increase in 100-year water surface elevation of 1.0' above natural conditions assuming there are minimal impacts to adjacent property. This project will include a detailed hydraulic design study, completed with final design, of the Unnamed Tributary. The design will be completed to

[22] FEMA Map Service Center. https://msc.fema.gov . Accessed March 7, 2012.

ensure the proposed 100-year water surface elevation is within 1.0' of the natural conditions and to maintain negligible impacts to adjacent property.

At the appropriate stage of project development, a complete hydraulic study performed to SCDOT guidelines for Hydraulic Design Studies would be conducted to more precisely determine the effects of the project on the base floodplains. If after the completion of the studies it is determined that a conditional letter of map revision (CLOMAR) is needed, appropriate coordination with FEMA would take place. However, the project is not expected to be a significant or longitudinal encroachment as defined under 23 CFR 650A, nor is it expected to have an appreciable environmental impact on this base floodplain. In addition, the project would be developed in accordance with Executive Order 11988 (Floodplain Management and 23 CFR 650 subpart A), and roadway/bridge design would comply with all appropriate floodplain regulations and guidelines. The "South Carolina Department of Transportation – Location and Hydraulic Design of Encroachments of Floodplains Checklist" has been completed for the project along with preliminary coordination efforts, which are included in Appendix B.

4.8 Air Quality

The project was evaluated with regard to the Clean Air Act Amendments of 1990. These amendments identify six criteria pollutants (ozone, particulate matter, carbon monoxide, sulfur dioxide, nitrogen oxides, and lead), along with the National Ambient Air Quality Standards (NAAQS) for each pollutant. The Environmental Protection Agency (EPA) designates geographical areas that have pollutant concentrations below the NAAQS as these pollutants vary, but automotive vehicles are considered a source for four (ozone, particulate matter, nitrogen oxides, and carbon monoxide) of the criteria pollutants. A review of current air quality data determined that the EPA has designated Greenville County 'in attainment' for the criteria pollutants, and in compliance with the NAAQS.[23]

The proposed project is not expected to require any additional transportation control strategies to maintain the County's current attainment status, and the project is anticipated to be consistent with the State Air Quality Implementation Plan (SIP). However, the proposed project must be continually evaluated throughout project development to ensure compliance with the most current air quality regulations and attainment status.

[23] U.S. EPA website. http://www.epa.gov/air/oaqps/greenbk/ancl.html. Accessed December 16, 2011.

In addition to the criteria air pollutants for which there are National Ambient Air Quality Standards (NAAQS), EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries).

Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the Clean Air Act. The MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

It is anticipated that the proposed project would have low potential for impacts to MSAT emissions. Due to the limited tools and techniques for assessing project-specific health impacts, the following evaluation includes a discussion of information that is incomplete or unavailable for a project specific assessment of MSAT impacts, along with a qualitative assessment of emission projections associated with the proposed project. The MSAT evaluation is based on recent guidance from FHWA, and includes prototype language described at FHWA's web site and included in Appendix C. [24]

The purpose of the proposed project is to reconfigure the existing deficient I-85/I-385 interchange to accommodate existing and projected traffic volumes.

This project would not result in any meaningful changes in traffic volumes, vehicle mix, location of the existing facility, or any other factor that would cause an increase in emissions impacts relative to the No Build Alternative. As such, the FHWA has determined that this project would generate minimal air quality impacts for Clean Air Act criteria pollutants and has not been linked with any special MSAT concerns. Consequently, this effort is exempt from analysis for MSATs.

Moreover, EPA regulations for vehicle engines and fuels will cause overall MSATs to decline significantly over the next 20 years. The FHWA predicts MSATs will decline in the range of 57 percent to 87 percent, from 2000 to 2020, based on regulations now in effect, even with a projected 64 percent increase in VMT. This will both reduce the

24 http://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/100109guidmem.cfm

background level of MSATs as well as the possibility of even minor MSAT emissions from this project.

4.8.1 Incomplete/Unavailable Information Regarding MSATs

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The U.S. Environmental Protection Agency (EPA) is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA, http://www.epa.gov/ncea/iris/index.html). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). Two HEI studies are summarized in Appendix D of FHWA's *Interim Guidance Update on Mobile source Air Toxic Analysis in NEPA Documents* (this *Guidance* is included in Appendix C of this document). Among the adverse health effects linked to MSAT compounds at high exposures are cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (HEI, http://pubs.healtheffects.org/view.php?id=282) or in the future as vehicle emissions substantially decrease (HEI, http://pubs.healtheffects.org/view.php?id=306).

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts

- each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable. The results produced by the EPA's MOBILE6.2 model, the California EPA's Emfac2007 model, and the EPA's DraftMOVES2009 model in forecasting MSAT emissions are highly inconsistent. Indications from the development of the MOVES model are that MOBILE6.2 significantly underestimates diesel particulate matter (PM) emissions and significantly overestimates benzene emissions.

Regarding air dispersion modeling, an extensive evaluation of EPA's guideline CAL3QHC model was conducted in an NCHRP study (http://www.epa.gov/scram001/dispersion_alt.htm#hyroad), which documents poor model performance at ten sites across the country - three where intensive monitoring was conducted plus an additional seven with less intensive monitoring. The study indicates a bias of the CAL3QHC model to overestimate concentrations near highly congested intersections and underestimate concentrations near uncongested intersections. The consequence of this is a tendency to overstate the air quality benefits of mitigating congestion at intersections. Such poor model performance is less difficult to manage for demonstrating compliance with National Ambient Air Quality Standards for relatively short time frames than it is for forecasting individual exposure over an entire lifetime, especially given that some information needed for estimating 70-year lifetime exposure is unavailable. It is particularly difficult to reliably forecast MSAT exposure near roadways, and to determine the portion of time that people are actually exposed at a specific location.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI (http://pubs.healtheffects.org/view.php?id=282). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA (http://www.epa.gov/risk/basicinformation.htm#g) and the HEI (http://pubs.healtheffects.org/getfile.php?u=395) have not established a basis for quantitative risk assessment of diesel PM in ambient settings.

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine a "safe" or "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than safe or acceptable.

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

4.8.2 Qualitative Analysis

For the preferred alternative in this EA, the amount of MSAT emitted would be proportional to the vehicle miles traveled, or VMT, assuming that other variables such as fleet mix are the same for the build and No Build Alternative. Because the VMT estimated for the no-build alternative are higher than or equal to the preferred alternative, higher levels of MSAT are not expected from the preferred compared to the no-build, as shown in Table 7. In addition, because the estimated VMT under the no-build and preferred alternatives are nearly the same, varying by less than 1.0 percent, it is expected there would be no appreciable difference in overall MSAT emissions among the various alternatives. Also, regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by 72 percent from 1999

to 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in virtually all locations.

Table 7. Vehicle Miles Traveled (VMT)

Roadway Segment	No Build Alternative VMT - 2035	Preferred Alternative VMT - 2035
I-85 Study Area	96,922,000	96,922,000
I-385 Study Area	96,302,000	96,053,000

Under each alternative there may be localized areas where VMT would increase, and other areas where VMT would decrease. Therefore, it is possible that localized increases and decreases in MSAT emissions may occur due to the reconfiguration of the interchange and modification of the ramp movements. However, even if these increases do occur, they too will be substantially reduced in the future due to implementation of EPA's vehicle and fuel regulations.

In sum, under all Build Alternatives in the design year it is expected there would be reduced MSAT emissions in the immediate area of the project, relative to the No Build Alternative, due to the reduced VMT associated with more direct routing, and due to EPA's MSAT reduction programs.

4.9 Noise

As stated in the 23 CFR, Part 772.5(h), a traffic noise analysis is required for proposed Federal-aid highway projects that would construct a highway on new location or physically alter an existing highway, which would significantly change either the horizontal or vertical alignment of the road or increase the number of through-traffic lanes. As such, a detailed Noise Impact Assessment was conducted along the project corridor to identify potential noise impacts associated with the preferred alternative. The noise assessment and subsequent noise abatement evaluation were conducted in accordance with 23 CFR 772 and the SCDOT Noise Abatement Policy.

In addition, temporary noise impacts are expected to occur during construction, and would be isolated within the immediate vicinity of the construction activities. The exact noise levels cannot be predicted because the specific types of construction equipment,

methods and schedule are unknown at this time. To the extent possible, construction activities would be confined to daylight working hours and noise controlled equipment will be utilized to minimize potential noise impact during construction.

4.9.1 Noise Impact Assessment

A preliminary noise review was conducted during early project development to determine the potential impacts associated with each reasonable alternative. This evaluation utilized FHWA Traffic Noise Model (TNM Version 2.5) to calculate existing noise levels and predict future noise levels. This analysis incorporated AM and PM peak hour traffic, modeled various groups of receivers, included preliminary profile elevations, and did not include any field measurements. In summary, this evaluation identified that approximately 65 out of 95 receivers experience traffic noise impacts under the existing conditions. Further, it was predicted that 89 of 95 would be impacted under the No-build conditions, 85 out of 95 would be impacted with Alternative 2D and 86 out of 95 would be impacted with Alternative 4A. Therefore, it was determined that traffic noise impacts are not expected to differ between the alternatives considered.

A detailed Noise Impact Assessment was subsequently prepared to analyze traffic-generated noise which can be expected to occur as a result of the proposed project. This Assessment was conducted in compliance with 23 USC Section 109(h) and (i), the FHWA established guidelines for the assessment of highway traffic-generated noise. These guidelines, published as 23 CFR Part 772, provide procedures to be followed in conducting noise analysis. The Noise Impact Assessment prepared for this project has been prepared in accordance with 23 CFR Part 772 and the SCDOT Noise Abatement Policy.

As described in 23 CFR 772, the FHWA has established Noise Abatement Criteria (NAC) in evaluating traffic noise impacts associated with the existing and predicted noise levels. The NAC are identified and described in Table 8.

Traffic noise impacts are defined in 23 CFR 772.5(g), and occur under the following conditions:

- Predicted noise levels approach or exceed the NAC for the applicable activity code.
- Predicted noise levels substantially exceed the existing noise levels.

Table 8. NAC Categories and Description

Activity Category	Activity Criteria[2]		Evaluation Location	Activity Description
	Leq(h)	L10(h)		
A	**57**	**60**	**Exterior**	Lands on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its purpose.
B[3]	67	70	Exterior	Residential
C[3]	67	70	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E[3]	72	75	Exterior	Motels, hotels, offices, restaurant/bars, and other developed lands, properties or activities not included in A-D or F.
F	--	--	--	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	--	--	--	Undeveloped lands that are not permitted.

Source: 23 CFR 772

[1] Either Leq(h) or L10(h) (but not both) may be used on a project

[2] The Leq(h) and L10(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures

[3] Includes undeveloped lands permitted for this activity category

The SCDOT Traffic Noise Abatement Policy (2011) defines "approaching" as noise levels within 1dBA of the NAC, and a "substantial" increase as 15dBA increase or greater. Therefore, traffic noise impacts occur when a receiver is within 1 dBA of the NAC for the applicable activity code, or when the predicted noise levels are greater than 15 dBA over the existing noise levels.

The FHWA Traffic Noise Model (TNM Version 2.5) was utilized in the Noise Impact Assessment to analyze the existing and predicted noise levels associated with the project. Noise measurements along with the corresponding traffic volumes were taken in the field at two locations along the project area (Figure 25b), with measured noise levels of 70.1 and 67.0 dBA. The model was run utilizing the observed traffic volumes from the field, and the modeled noise levels were compared to the field measurements. The modeled levels (68.4 and 69.4 dBA) were within 3 dBA of the measured values, and therefore were within the thresholds established by the SCDOT. [25]

A total of 490 receivers representing 833 dwelling units were analyzed in the existing and no build condition, and 489 receivers (832 dwelling units) were analyzed in the build condition as a result of a displacement.

The Noise Impact Assessment determined the ambient noise levels for existing conditions, and predicted future traffic noise levels for the 'build' and 'no build' conditions. A summary of the findings is included as Table 9, with complete Assessment and detailed findings including in Appendix D.

Table 9. Summary of Noise Analysis

	Noise Levels (dBA)	Number of Impacted Receivers (dwelling units)
Existing Conditions	52.2-72.7	81 (317)
2035 No-Build Conditions	52.2-72.7	115 (402)
2035 Build Conditions	52.2-72.7	139 (476)

Source: *"Noise Impact Assessment: I-85 at I-385 Proposed Interchange Improvements". March 2012.*

As shown, the existing conditions noise levels range from 52.2-72.7 dBA with 81 receivers (317 dwelling units) impacted. These receivers are impacted due to noise

[25] *"Noise Impact Assessment: I-85 at I-385 Proposed Interchange Improvements".* March 2012. Prepared by Edwards-Pitman Environmental, Inc.

levels exceeding the NAC, and include single family residential, commercial, and an educational facility.

The noise levels calculated for the 2035 No-build conditions range from 52.2-72.7 dBA, with 115 receivers (402 dwelling units) predicted to be impacted. These receivers are impacted due to noise levels exceeding the NAC, and include single family residential, commercial, an educational facility, and community pool.

The noise levels calculated for the 2035 Build conditions range from 52.2-72.7 dBA, with 139 receivers (476 dwelling units) predicted to be impacted. These receivers are impacted due to noise levels exceeding the NAC, with two receives impacted based on both exceeding the NAC and a substantial increase from existing levels. The impacted receivers include single family residential, commercial, churches, and educational facilities and are illustrated in Figures 25a-25e.

Further review of the results concludes that 106 of the 489 receivers are predicted to result in higher noise levels under the No-build conditions versus the Build conditions. This is largely attributed to the redesign of the interchange and ramp movements which results in traffic shifting further away from these receivers.

The implementation of various abatement measures were considered for the impacted receivers. The findings of this evaluation are detailed below.

4.9.2 Noise Abatement Measures

Due to the presence of impacted receivers, noise abatement measures must be considered to eliminate or reduce noise impacts associated with the proposed project. In accordance with 23 CFR 772.13(c), the following abatement measures were considered in the elimination/reduction of noise impacts:

- Traffic management;
- Altering the horizontal and/or vertical alignments;
- Acquisition of property rights for construction of noise barriers;
- Acquisition of real property to serve as a buffer zone to preempt development;
- Construction of noise barriers.

Traffic management techniques such as vehicle restrictions, traffic calming techniques, and change in use patterns were considered, but were found not consistent with the purpose and need of the project.

A change in alignment was also considered as a potential noise abatement measure. The proposed alignment has been developed as the least environmentally damaging alternative while meeting all project purpose and need, design standards, and policies. In addition, a shift in alignment to achieve a reduction in noise along the impacted receivers would result in impacts to other non-impacted receivers and/or other environmental concerns. As a result, alteration of alignments is not a reasonable noise abatement measurement.

Acquisition of property rights and/or real property is not considered a reasonable abatement measure, as this would result in increased right-of-way impacts and displacements. In addition, there is insufficient area to allow for an effective buffer distance between the roadway and receivers.

The use of structural barriers (i.e. noise walls) was considered as an abatement measure for all impacted receivers. Noise barriers are most effective along a dense concentration of impacted receivers that are located adjacent to the roadway. An evaluation of the project corridor identified 19 areas with a dense concentration of impacted receivers. As a result, further analysis along these areas was conducted to determine the feasibility and reasonableness of constructing a noise barrier as a noise abatement measure.

The SCDOT Noise Policy establishes guidelines and criteria for determining the reasonableness and feasibility of a noise barrier. Feasibility is evaluated in terms of "acoustic" feasibility and "engineering" feasibility. A noise abatement measure is considered acoustically feasible when a noise reduction of at least 5 dBA is achieved for 75% of the impacted receivers. The ability to achieve this reduction may not be feasible to engineer based on various conditions, including but not limited to topography, safety, drainage, utilities, maintenance access and height. Analysis of the 19 potential areas for a noise barrier concludes a total of six (6) barrier locations would satisfy the acoustic and engineering feasibility criterion (Table 10). These six locations must then be assessed for reasonableness.

The SCDOT Noise Policy documents Three Mandatory Reasonable Factors that must be collectively achieved for noise abatement measures to be considered reasonable. These factors include property owner/resident viewpoints, cost effectiveness, and noise reduction design goal. Cost effectiveness is determined by the wall cost per benefited receiver. A benefited receiver is defined as the recipient of an abatement measure. The

Table 10. Feasibility Assessment of Wall Locations.

Barrier	Impacted Receiver	DU	Feasibility Concern	5 dBA reduction percentage	Feasible?
1	12,14,21	3	All criterion satisfied	100%	**Yes**
2	472,473	2	All criterion satisfied	100%	**Yes**
3	25,27,29,30	4	All criterion satisfied	100%	**Yes**
4	37,38,40,42,43	5	Acoustic Feasibility – 5 dBA reduction	60%	No
5	50,52,53	3	Acoustic Feasibility – 5 dBA reduction	67%	No
6	460	1	Acoustic Feasibility – 5 dBA reduction	0%	No
7	58,59,63,64,67, 69,72,73,76,77, 79,80,82,83,85, 86,88,89, 91-95	86	All criterion satisfied	81%	**Yes**
8	402-409,411,413,415, 417-447,449-452	231	Acoustic Feasibility – 5 dBA reduction	71%	No
9	98-101	4	Acoustic Feasibility – 5 dBA reduction	50%	No
10	112-118	47	Acoustic Feasibility – 5 dBA reduction	0%	No
11*	N/A	N/A	N/A	N/A	N/A
12	299	1	Acoustic Feasibility – 5 dBA reduction	0%	No
13	308-313	6	All criterion satisfied	100%	**Yes**
14	363,368,370	3	All criterion satisfied	100%	**Yes**
15	394	1	Acoustic Feasibility – 5 dBA reduction	0%	No
16	208,211,216,217, 218	5	Acoustic Feasibility – 5 dBA reduction	0%	No
17	151,153	2	Acoustic Feasibility – 5 dBA reduction	0%	No
18	166	1	Acoustic Feasibility – 5 dBA reduction	0%	No
19	193	1	Acoustic Feasibility – 5 dBA reduction	0%	No

*More detailed modeling as part of the barrier analysis resulted in a decrease at some receivers. Receivers 248 through 250 would no longer be impacted by the proposed project. Therefore, no wall would be proposed for the receivers located in this area.

** Receiver 401 was not included in the barrier analysis as a barrier at this location was not feasible due to the required access break for the Roper Mountain Road Bridge.

cost per benefited receiver is determined by dividing the construction cost of the barrier (based on $35 per square foot) by the number of benefited receivers. The barrier is determined to be reasonable if the cost per benefited receiver is less than $30,000. The final reasonable factor states that a noise reduction of at least 8 dBA must be achieved for 80% of those receivers determined to be benefited. The reasonableness determination of the six feasible barrier locations is summarized in Table 11. No barrier locations would achieve the required 8 dBA noise reduction goal of 80% for the benefited receivers. Therefore, it is determined that noise barriers are not feasible or reasonable to construct for noise abatement along the subject project.

Table 11. Reasonableness Assessment of Wall Locations

Barrier	Impacted Receiver	DU	Reasonableness Concern	8 dBA reduction percentage	Reasonable?
1	12,14,21	3	Noise Reduction Design Goal	0%	No
2	472,473	2	Noise Reduction Design Goal	0%	No
3	25,27,29,30	4	Noise Reduction Design Goal	0%	No
7	58,59,63,64,67, 69,72,73,76,77, 79,80,82,83,85, 86,88,89,91-95	86	Noise Reduction Design Goal	20%	No
13	308-313	6	Noise Reduction Design Goal	18%	No
14	363,368,370	3	Noise Reduction Design Goal	67%	No

DU = Dwelling units

In conclusion, it is determined that noise barriers are not feasible or reasonable to construct for noise abatement along the subject project. The Noise Impact Assessment prepared for this project is included in Appendix D, and includes the detailed analysis and findings supporting this determination.

4.10 Hazardous Waste and Underground Storage Tanks

Hazardous waste/material sites are regulated by the Resource Conservation and Recovery Act (RCRA), as amended, the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended, and the Superfund Amendments and Reauthorization Act of 1986 (SARA). An Initial Site Assessment (ISA) was conducted to identify possible sites involving the presence and/or past use of underground storage tanks (USTs), above ground storage tanks (ASTs), and/or other hazardous materials within the project study area. A review of the SCDHEC CERCLA site inventory and an on-site reconnaissance survey of the project study area were performed.

The ISA identified 35 documented contamination sites within the project area, and 59 potential contamination sites within the appropriate research distances. These sites are primarily associated with current and/or former gasoline service stations; auto repair facilities; trucking/transport facilities; industrial facilities; and other retail facilities. The ISA further identified approximately 43 of these sites to have moderate to high potential for subsurface contamination along the project study area. [26] The potential sites of concern are illustrated in Figures 25a-25e. The proposed project is expected to require the acquisition of right-of-way from 8 sites, including the following sites:

- *Home Depot 119*, located at 79 Woodruff Industrial Road;
- *RL Carriers* (Former Thruston Motor Lines), located at 25 Chrome Drive;
- *Harley Davidson of Greenville*, located at 30 Chrome Drive;
- *Southern Mulch*, located at 427 Independence Boulevard;
- *Piedmont Clarklift*, located at 425 Independence Boulevard;
- *SED*, located at 6099 Ponders Court;
- *Rockwell Automation Dodge,* located at 6040 Ponders Court;
- *AT&T,* located at 471 Garlington Road.

RL Carriers and *Piedmont Clarklift* have been identified as sites that are considered to represent a moderate to high potential for subsurface contamination. Upon further project development and identification of required right-of-way, it may be warranted to conduct detailed investigations (i.e. Phase II Site Assessment) of the potential contamination sites to further evaluate if the new right-of-way has been adversely impacted. The determination of areas that warrant Phase II Assessment services should

[26] ARM Environmental Services. I-*85 Auxiliary Lane & I-85/I-385 Interchange Improvements Project, Greenville County, Hazardous Material/Waste Site Assessment*. January 3, 2011.

be site specific, based on hydrogeologic conditions, distance from specific environmental concerns, and other relative factors. If avoidance of the contamination area is not a viable alternative, tanks and other hazardous materials would be tested and removed and/or treated in accordance with the U.S. Environmental Protection Agency (USEPA) and SCDHEC requirements. Cost of necessary remedial actions would be considered during the right-of-way appraisal and acquisition process. A copy of the ISA report is included in Appendix E.

4.11 Cultural Resources

Section 106 of the National Historic Preservation Act of 1966 as amended requires federal agencies to consider the effects of their actions on historic properties. In accordance with 36 CFR 800.4, archival research, field investigations, and coordination with the State Historic Preservation Officer (SHPO) were performed to identify and help predict the locations of significant cultural resources in the vicinity of the proposed project. The archaeological and architectural surveys performed were designed to provide the necessary management data to allow for the sites and properties to be evaluated for recommendations of eligibility to the National Register of Historic Places (NRHP).

An intensive Phase I cultural resources survey of approximately 1,850 acres associated with the project study area was conducted between September and November 2010. Specifically this included an archaeological reconnaissance survey and an architectural survey along the project area, with the findings summarized in the *Phase I Cultural Resources Survey of the Proposed Improvements to I-385/I-85 Interchange and Access Roads, Greenville County, SC*.[27] Three new archaeological sites were identified from the survey, with all three sites recommended as "not eligible" for the NRHP. Seven historical architectural sites were identified as a result of the survey, along with one previously identified site (Walker Family Cemetery). These architectural sites are recommended as "not eligible" for the NRHP. However, while the Walker Family Cemetery was previously listed as not eligible, it was recommended that this area be avoided to minimize potential impacts to existing graves.

Additional investigations were conducted along the Walker Family Cemetery to identify potential grave locations that may lie outside the formal cemetery boundary, and

[27] Newsouth Associates, *Phase I Cultural Resources Survey of the Proposed Improvements to I-385/I-85 Interchange and Access Roads, Greenville County, SC;* December 20, 2010.

ensure the proposed project did not impact any potential grave sites. In addition, the entire cemetery was mapped and assessed for eligibility for listing in the NRHP. Ten graves or potential graves were identified between the cemetery boundaries and Roper Mountain Road, with no graves identified along the edge of Roper Mountain Road, as this area has been previously impacted by utility installation. In summary, the proposed project is not expected to impact any identified graves or potential graves. In addition, the SCDOT has committed to having an archaeologist on-site to monitor the ground disturbance in this area. These determinations have been appropriately coordinated with the SHPO, including the determination that the cemetery is not eligible for listing in the NRHP.

For more detailed analysis, please refer to the *Phase I Cultural Resources Survey of the Proposed Improvements to I-385/I-85 Interchange and Access Roads, Greenville County, SC*, along with the *Remote Sensing, Mapping, and NRHP Assessment of the Walker Cemetery* found in found in Appendix F. Copies of SHPO coordination, including applicable correspondences and concurrences also provided in Appendix F.

4.12 Section 4(f) Resources

The project would not impact or involve any Section 4(f) resources as defined in CFR 771.135, which includes publicly owned parks, recreational areas, wildlife and waterfowl refuges, and significant historical sites.

4.13 Relocation Impacts

The proposed project would result in the potential relocation/displacement of two commercial businesses. This includes parcel #21 (ID# 547020103002) and #36 (ID# 547020101800). Parcel 21 is located along the northwest quadrant of the interchange, and is expected to be displaced as a result of reconstruction of the interchange, specifically the I-385 southbound ramp to I-85 southbound. This property is currently being utilized for commercial retail. Parcel 36 is located along Roper Mountain Road, just southeast of the bridge over I-85. The parcel is expected to be displaced as a result of replacement and widening of the Roper Mountain Road bridge over I-85 (Figures 25a and 25b), and is currently being utilized for automotive retail services

The SCDOT would acquire all new right-of-way and process these relocations in compliance with the Uniform Relocation Assistance and Real Property Acquisition policies Act of 1970, as amended (42 U.S. C. 4601 *et seq.).* The purpose of these regulations is to ensure that owners of real property to be acquired for Federal and

federally-assisted projects are treated fairly and consistently, to encourage and expedite acquisition by agreements with such owners, to minimize litigation and relieve congestion in the courts, and to promote public confidence in Federal and federally-assisted land acquisition programs. In addition, these regulations ensure that persons displaced as a direct result of Federal or federally-assisted projects are treated fairly, consistently, and equitably so that such displaced persons will not suffer disproportionate injuries as a result of projects designed for the benefit of the public as a whole, and that agencies implement these regulations in a manner that is efficient and cost effective.

4.14 Social and Economic

The proposed project is located largely within the City limits of Greenville, and the existing I-85 and I-385 transportation facilities provide vital access for local commuters as well as for inter-state commerce. As documented, the majority of the surrounding area is comprised of urban/commercial land uses, including large retailers, shopping centers, restaurants, hotels, automotive service centers, gas stations, and manufacturing industry. Therefore, the proposed project has the potential to impact various aspects of the human environment, including social, economic, community cohesion, environmental justice, and quality of life.

The study area is located within Census Tracts 28.05 and 28.08, Greenville County. A review of the U.S. Census 2010 data indicates that the project is located along a predominately white, middle aged, middle to upper class area of Greenville County. The following table is a brief summary of these findings:

Table 12. Demographic Data

	South Carolina	Greenville County	Census Tract 28.05	Census Tract 28.08
Total Population	4,625,364	451,225	4,704	6,750
White	3,060,000	333,084	3,874	4,907
Black or African American	1,290,684	81,497	467	989
Asian	59,051	8,849	114	617
Hispanic or Latino	235,682	36,495	361	287
Median Household Income	$43,939	$45,185	$55,504	$83,958
Median Age		37.2	40.2	37.4

Source: U.S. Census 2010

4.14.1 Social

The social and economic impacts identified in this assessment are largely associated with impacts to the existing commercial developments that are located immediately adjacent to the project corridor, along with impacts to the existing travel patterns. As such, these include potential impacts to the existing social interaction patterns, commercial displacements, physical impacts, landuse patterns, and access. The assessment did not identify any public service facilities such as schools, police stations, fire stations, or hospitals within the immediate vicinity of the project. The assessment identified potential beneficial and adverse social impacts associated with the project.

The proposed project would essentially reconfigure the existing interchange, and would not create an additional barrier to social interaction or isolate any residential community or commercial developments. The potential adverse impacts are primarily associated with the physical impacts of the project, which result in changes to access and directly converting commercial land-uses to transportation right-of-way. Access to the I-85/Woodruff Road interchange would be limited by the preferred alternative. Specifically, the preferred alternative eliminates access to the I-85/Woodruff Road interchange from the I-385 northbound and southbound to I-85 southbound movements. However, these movements have viable alternate access routes at the I-385/Woodruff Road and I-385/Roper Mountain Road interchanges. Further evaluation of these movements was conducted, with the finding that the proposed project is not expected to have an adverse impact on these facilities. Access would also be modified along Chrome Drive as the project would eliminate a portion of this roadway, thus not providing connection from Garlington Road to Roper Mountain Road.

The preferred alternative would require approximately 20 acres of new right-of-way. Much of this right-of-way would be acquired from existing commercial/developed property that is located immediately adjacent to the existing right-of-way. The 20 acres of new right-of-way is not expected to alter the existing and projected landuses, and is considered consistent with the planned landuses for this area as prescribed by the City and County of Greenville.

The proposed improvements are also expected to have beneficial social impacts by improving the operation of the existing interchange, which would reduce traffic delays, provide a safer facility, and enhance mobility along the project area. The Census 2010 data documents that approximately 92-94% of the work force in the immediate area utilizes personal vehicles to commute to work, with an estimated travel time to work of

17-20 minutes.[28] Therefore, the improved facility is expected to benefit a number of local commuters as well as transient commuters. In addition, the project has been closely coordinated with many local stakeholders in an effort to accommodate the various needs of the surrounding community.

4.14.2 Economic

The proposed project was evaluated for potential economic impacts to the surrounding communities. The economic impacts considered include the anticipated impacts to local businesses, employment, and tax base. As a result, it is anticipated that the proposed project would result in both positive and negative economic impacts. The cost of the proposed project is estimated at $245 million, a portion of which would be a direct cost to the local and regional governments. Also, the acquisition of approximately 20 acres of additional right-of-way would result in a slight reduction in property tax assessments.

The surrounding area is largely comprised of industry and travel-oriented businesses including hotels, restaurants, and gas stations along with general retail businesses. As such, many of these businesses have been developed and depend upon the local transportation facilities. These developments also provide various employment opportunities for local residents. The proposed project would result in two commercial displacements. However, there appears to be sufficient opportunities for these businesses to relocate within the area. Further, the business owners would be appropriately compensated for the physical right-of-way acquisition, along with other property damages.

The proposed project could also have beneficial economic impacts through improved operations, reduced travel delays, and safer conditions. These improvements would improve the overall quality of life by reducing time delays and providing safer driving conditions, which would encourage and sustain the existing retail centers. The project would also result in a direct savings to motorists by decreasing travel time and reducing the potential for traffic accidents and property damage.

[28] U.S. Census Bureau, Census 2010. http://www.census.gov/ .

4.14.3 Environmental Justice

The proposed project was evaluated in accordance with Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations). As summarized in Table 12, the demographics of the study area includes an approximate 23% minority population compared to the approximate 26% minority population for Greenville County. The census data also reveals that the median household income for Census Tract 28.05 is $55,504 and $83,598 for Census Tract 28.08. These median incomes are up to approximately 91% greater than the median ($43,939) for Greenville County. This median income level is also substantially greater than the $22,050 (family of four) poverty guidelines established for 2010 by the U.S. Department of Health and Human Services.[29] These findings are consistent with the field observations of the immediate project area, which is largely commercially developed with isolated residential areas. Therefore the project is not expected to result in specific benefit, harm, or disproportionately impact any social group, including low-income and minority groups.

4.15 Indirect and Cumulative Impacts

It is the Federal Highway Administration (FHWA) and other federal agencies responsibility to consider direct, indirect, and cumulative impacts in the NEPA process was established in the Council on Environmental Quality (CEQ) Regulations for implementing the Procedural Provisions of the National Environmental Policy Act. The CEQ regulations define the impacts and effects that must be addressed and considered by federal agencies in satisfying the requirements of the NEPA process. The CEQ regulations note three impact categories - direct, indirect, and cumulative. According to FHWA guidance, the determination or estimation of reasonably foreseeable actions is essential to both indirect and cumulative impact analysis.

The various transportation facilities, adjacent land uses, and streams were identified for study as part of the indirect and cumulative impact analysis. The identification of these resources took into consideration input received during the agency coordination and public involvement process. The indirect impact analysis focuses on:

[29] U.S. Department of Health and Human Services. Website. http://aspe.hhs.gov/poverty/figures-fed-reg.shtml. Accessed December 21, 2011.

- I-85 Corridor
- I-385 Corridor
- Woodruff Road
- Land Use Impacts
- Streams

Indirect impacts, or effects, are reasonably foreseeable impacts to the environment that are caused by an action, but occur later in time, or are further removed in distance from the project area. Indirect impacts are generally associated with impacts from induced growth, and other impacts that result from the induced changes in the existing land use patterns, population density, or growth rate of an area.[30] Transportation projects often reduce travel time, enhancing the attractiveness of surrounding land for development through changes in accessibility. These changes in access could influence local development trends. Subsequently, these land use changes could lead to environmental impacts such as habitat fragmentation or water quality issues.[31]

4.15.1 Indirect impacts

The potential indirect impacts along the project area could result from induced growth, land use changes, and/or changes in travel patterns as a result of the proposed activity. Induced growth and land use changes would be specific to secondary development as a result of improved access resulting from the interchange improvements.

Step 1 – Study Area Boundaries

Indirect and cumulative impacts are analyzed for resources of concern within particular geographic and temporal boundaries. This allows for the appropriate context to be developed for each resource. Study area boundaries are developed through consideration of input received during the agency coordination and public involvement process.

The indirect impacts will be assessed for each notable resource within a particular geographical area with the naturalized condition after construction of I-85 being the historical baseline. For the indirect analysis, the study area coincides with the project

[30] FHWA Interim Guidance: *Questions and Answers Regarding the Consideration of Indirect and Cumulative Impacts in the NEPA Process* (2003).

[31] AASHTO Center for Environmental Excellence, Indirect and Cumulative Impacts http://environment.transportation.org/environmental_issues/indirect_effects/ .

study area boundary. The project corridor is located along the southern limits of the City of Greenville, and includes various urbanized land uses including transportation, commercial development, industrial, and residential land uses. The project corridor includes the existing I-85 freeway, I-385 freeway, I-85/I385 interchange, and adjacent interchanges in each direction along I-85 and I-385. The study area contains approximately 1,812 acres (Figure 2).

Step 2 – Study Area Communities Trends and Goals

The project area is located within the Piedmont of South Carolina, which is the transitional boundary between the mountainous regions along the Appalachians (northwest) and the coastal plain (southeast). Specifically, the project area is located along the "Southern Outer Piedmont" ecoregion, which is characterized by lower elevation and less relief with expansive areas of pine and mixed oak forests.[32]

The project corridor is located along the southern limits of the City of Greenville, and includes various urbanized land uses including transportation, commercial development, industrial, and residential land uses. According to the City of Greenville Planning Department, the general zoning along the area includes 'regular commercial district', 'planned development district', and 'service district' with future land uses committed to 'mixed use regional' (Figure 26). As such, the project area consists of little to no natural community habitat and has been heavily disturbed through previous development and urbanization.

The immediate project area consists largely of highway oriented and transient developments including gas stations, hotels, restaurants, general retail, and industrial. Residential developments are located in the northwest, northeast, and southeast quadrants of the project area. These developments are generally located outside of the commercial/industrial development that is located in the immediate vicinity of the project area. In addition, the project area includes portions of various streams, many of which have been previously impacted from road construction. These land uses are expected to continue in the future. Approximately 20 acres of the new right-of-way would be required to accommodate the proposed improvements. The majority of this right-of-way would be acquired from existing commercial developments, or areas that are zoned for commercial land uses. As such, this acquisition and transfer of land use is

[32] "Ecoregions of North Carolina and South Carolina (EPA)". Griffith, Glenn; Omernik, James. Encyclopedia of Earth Website, http://www.eoearth.org. Accessed July 15, 2009.

consistent with the future long range planning and zoning of both the City and County of Greenville. There is presently little available developable land in the surrounding area.

The project area includes various tributaries associated with Rocky Creek, Gilder Creek, and Laurel Creek. These tributaries primarily consist of first and second order streams with perennial flow. These systems have been previously impacted by the construction of the existing transportation facilities and surrounding developments, mainly through relocation, channelization, dimension, and profile. Many of these areas also function largely for stormwater capacity and conveyance, which affect downstream water quality.

Step 3 – Inventory Notable Features

The indirect impact analysis focuses on potential impacts to the existing transportation facilities, surrounding land use, and streams as these resources have been identified as the primary concern. The project is expected to result in minimal impacts to other natural resources due to previous disturbance and development along the study corridor.

Step 4 – Identify Impact Causing Activities of the Proposed Action

The potential indirect impact to the surrounding facilities would include changes in access and land use that could result in additional development in the surrounding area. The proposed project is not adding capacity or creating additional access, although it is changing some existing access; but it is improving the operation and safety of the existing interchange which could make the surrounding area more attractive for development.

The preferred alternative would construct a new collector-distributor along I-85 northbound beginning at the I-385/Woodruff Road interchange. This facility would collect I-385 northbound traffic, along with exiting traffic from Woodruff Road, destined for I-85. A separate ramp movement would be provided for exiting Woodruff Road traffic to I-385 northbound. The I-385 northbound collector-distributor would provide a direct connect ramp to I-85 southbound. A two lane exit ramp to I-85 northbound would also be provided, which would collect traffic from the direct-connect ramp from I-385 southbound, providing a four-lane ramp section. Due to the proximity with the I-85/Pelham Road interchange, an additional lane from the northbound ramp would be

provided to the Pelham Road exit ramp. I-385 southbound traffic would continue to access I-85 northbound by a direct-connect ramp movement at acceptable LOS.

I-385 southbound to I-85 southbound would exit and merge with traffic from the I-385 northbound ramp prior to merging with I-85 southbound traffic. I-85 southbound traffic to I-385 would exit onto a three-lane ramp which would provide ultimate access to I-385 northbound and southbound along with Woodruff Road. The proposed configuration would include multiple elevated ramps to minimize vehicular conflicts. This would include a two lane ramp that ultimately merges with I-385 northbound. An elevated, two-lane ramp structure would be provided to I-385 southbound, along with a one-lane elevated ramp to Woodruff Road.

I-85 northbound traffic to I-385 would exit onto a collector-distributor facility, similar to the existing configuration, which would also provide access to Woodruff Road. This collector-distributor facility collects additional traffic from Woodruff Road, and distributes to I-385 north- and southbound and I-85 northbound. A one-lane ramp would be provided to I-385, which would merge into the I-385 collector-distributor which collects traffic from I-385 southbound and I-85 southbound destined for Woodruff Road and I-385 southbound

The preferred alignment would modify existing access, mainly along the I-85/Woodruff Road interchange and physically alter various stream reaches. Specifically, access to Woodruff Road along I-85 would be eliminated from the I-385 north- and southbound to I-85 southbound movements. As such, I-385 northbound traffic would access Woodruff Road at the I-385/Woodruff Road interchange, and I-385 southbound traffic could access Woodruff Road from the I-385/Roper Mountain Road or the I-385/Woodruff Road interchanges. The preferred would also impact access along Chrome Drive, which serves as a frontage road with connection from Garlington to Roper Mountain Road.

The preferred alternative improves numerous ramp movements and segments from LOS F to an LOS D or better. In addition, the preferred results in numerous safety enhancements, including elimination of undesirable weave movements, isolation of merge movements, reduction of vehicular conflicts, and increased capacity.

Steps 5 & 6 – Identify and Analyze Potential Impacts

Direct impacts would be the additional right-of-way needed for the project along with impacts to the streams as a result of the proposed improvements. The majority of the

right-of-way would be acquired from existing commercial and industrial businesses located within the project area. Indirect impacts would be land use changes that could result in the surrounding area. However, the area surrounding the interchange is currently heavily developed with little open space for additional development. The interchange and associated freeway components would be controlled access which would preclude any development directly adjacent to the freeway. Any potential development would likely occur at the interchange areas.

The proposed improvements and configuration of the preferred alternative would result in modification to existing access. Specifically, I-385 northbound to I-85 southbound would not have access to the I-85/Woodruff Road interchange. This is a function of the new direct-connect ramps to I-85 northbound and the need to eliminate multiple conflicts and weaves due to the proximity of Woodruff Road to the I-85/I-385 interchange. In addition, I-385 southbound to I-85 southbound would also not have access to the I-85/Woodruff Road interchange. This again is a function of eliminating undesirable movements due to proximity. I-385 northbound and southbound would continue to have access to Woodruff Road at the I-385/Woodruff Road interchange. In addition, access would continue to be provided to Woodruff Road via Roper Mountain Road at the I-385/Roper Mountain Road interchange. These improvements would provide a more efficient interchange operation and safer connecting freeway sections.

An Origin-Destination Study was conducted at the I-85/I-385 interchange to determine the impact of the potential traffic movements that could be eliminated. As a result of the study, the I-385 southbound to I-85/Woodruff Road interchange and the I-385 northbound to I-85/Woodruff Road interchange traffic movements are proposed to be eliminated. Data indicates that the observed traffic movements that are proposed for elimination are very small in number when compared to the total traffic volumes through the I-85/I-385 interchange. These traffic movements are expected to reassign to either the I-385/Roper Mountain Road or the I-385/Woodruff Road interchanges.

The project is not expected to impact traffic volumes, capacity, access, or efficiency of the I-85 and I-385 corridors beyond the project area. The project has been designed in conjunction with multiple other projects and potential projects to ensure consistency and independent utility. The interchange ramps would include similar access points, but with the elimination of undesirable weave and merge-diverge movements. In addition, the project would extend the proposed ramps along I-85 to the Pelham Road interchange. These improvements would provide additional spacing and minimize vehicular conflicts. As such, the improvements are expected to benefit the existing I-

85/Pelham Road interchange without the need for direct modifications to this interchange.

The construction of the project is anticipated to directly impact approximately 2,370 linear feet of stream through channel relocation, fill, and extension of existing culvert structures. These systems are located immediately adjacent to the existing roadway facilities, and function largely for conveyance and storage for roadway stormwater. Potential indirect impacts to these systems would include increased stormwater runoff from surrounding developments, leading to downstream degradation of water quality.

Temporary impacts could include construction noise, temporary access closures to facilitate various construction activities, temporary lane closures, and reduction of speeds through work zone.

Step 7 – Evaluate Analysis Results

Both qualitative and quantitative methods were used to identify and analyze the potential indirect impacts to the resources of concern resulting from this proposed project. These methods and/or resources included:

- GIS information obtained from public and private sector agencies
- Historical photographs
- Computer Aided Drawing and Design (CADD)
- County planning documents
- Internet research

Table 13 lists the potential impacts resulting from this project. Current land uses and proposed land use designations will provide the necessary restrictions to help control future land uses that would potentially affect the character and integrity of the area. However, unforeseen changes in public and/or private land use patterns could affect the characteristics of the area in the future.

Step 8 – Assess Consequences and Develop Mitigation

Based on existing development, the lack of developable land, and the existing or proposed land use designations, there would be minimal indirect impacts resulting from this project. The project would benefit commuters by improving the operation and safety of the interchange and by providing improved access to surrounding areas.

Table 13. Indirect and Cumulative Impact Matrix

Resources	Direct Impacts	Indirect Impacts	Cumulative Impacts			
			Past	Present	Reasonable Foreseeable	Overall
I-85 Corridor	Modify existing movements; construct additional lane; construct C-D facility	Does not effectively increase capacity; improvement to I-85/Pelham Interchange traffic	Transportation; commercial, industrial, and residential development	Commercial, industrial, and residential development	Additional improvements (i.e. widening); additional right-of-way	Minimal development expected due to lack of developable land; project would not impact capacity, volumes or access
I-385 Corridor	Modify existing movements; construct additional lane; construct C-D facility	Does not effectively increase capacity	Transportation; commercial, industrial, and residential development	Commercial, industrial, and residential development	Additional improvements (i.e. widening); additional right-of-way	Minimal development expected due to lack of developable land; project would not impact capacity, volumes or access
Woodruff Road	Modify Access	Changes to existing travel patterns	Transportation; commercial, industrial, and residential development	Commercial, industrial, and residential development	Additional improvements (i.e. intersection improvements; additional right-of-way; change in access and traffic patterns;	Minimal development expected due to lack of developable land; project would not impact capacity or volumes; some change in access
Land Use Impacts	Change in some access; acquisition of additional right-of-way	No additional travel lanes; limited changes in land use due to lack of availability of developable land	Transportation; commercial, industrial, and residential development	No increase in capacity; some change in access; limited development due to majority of area already developed	Minimal development expected based on existing landuses	Replaces existing conditions; some changes in access; minimal development expected due to lack of developable land
Streams	2,370 LF of impact	Impacts to water quality based on continued urbanization of area; project not expected to impact or alter the land use trends	Direct physical stream impacts from the construction of I-85, I-385, and surrounding facilities and urbanized development	Stormwater runoff from adjacent transportation and urbanized development	Direct physical impacts associated with future transportation improvements; water degradation from increased urbanization	Replaces existing conditions in regards to water conveyance and stream dimensions; minimal water degradation as no changes in land uses anticipated

Due to the lack of developable land in the area, there is a low likelihood of this project inducing additional development; thus, no mitigation is proposed. However, current land uses and zoning would guide any potential development/redevelopment that might occur.

4.15.2 Cumulative Impacts

Cumulative impacts, or effects, are the impacts on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. According to the FHWA, cumulative impact analysis is resource specific and generally performed for the environmental resources directly impacted by a Federal action under study, such as a transportation project. Cumulative impacts would occur when impacts resulting from the proposed project are added to historical changes in land use.

The various transportation facilities and land use were identified for study as part of the Indirect and Cumulative Impact Analysis. The identification of these resources took into consideration input received during the agency coordination and public involvement process.

Step 1 – Identify Resources of Importance

The indirect and cumulative impact analysis focuses on potential impacts to the existing transportation facilities, surrounding land use, and streams as these resources have been identified as the primary concern. The project is expected to result in minimal natural resource impacts due to previous disturbance and development along the study corridor. The cumulative impact analysis focuses on:

- I-85 Corridor
- I-385 Corridor
- Woodruff Road
- Land Use Impacts
- Streams

Step 2 – Identify Study Area

Indirect and cumulative impacts are analyzed for resources of concern within particular geographic and temporal boundaries. This allows for the appropriate context to be developed for each resource. Study area boundaries are developed through

consideration of input received during the agency coordination and public involvement process. The cumulative impacts will be evaluated based on the I-85 freeway construction in 1965, and subsequent development, with a future horizon of 20 years to coincide with the project's design year.

Step 3 – Discuss Current Health and Context of the Affected Resources

I-85 is a major interstate highway within the southeastern United States. Its southern terminus is at I-65 in Montgomery, Alabama and its northern terminus is at I-95 in Petersburg, Virginia. I-85 provides the major transportation route for the Upstate of South Carolina, linking together Greenville and Spartanburg with other major regional centers such as Atlanta, Georgia and Charlotte, North Carolina. Within the study area, I-85 is a six-lane median divided freeway with a posted speed limit of 60 mph. I-85 has grade separated interchanges at Laurens Road (US 276 – Exist 48); Woodruff Road (SC-146 – Exit 50); I-385 (Exit 51); and Pelham Road (S-492 – Exit 54). There is also an existing structure carrying Roper Mountain Road (S-548) traffic over I-85 near milepost 52, along with a double box culvert carrying two-lanes of traffic along Muddy Ford Road under I-85 near milepost 53. The existing year (2010) average daily traffic (ADT) volumes along mainline I-85 vary from 87,600 to 107,200 within the project area.

From the start, I-85 brought an economic boom to the upstate areas of South Carolina. Within ten years of its opening in South Carolina, land values in Greenville County along the I-85 corridor doubled.[33] The I-85 corridor has continued to attract numerous commercial and industrial businesses that have transformed the once rural area to a commercial/industrial corridor.

I-385 is a north-south interstate route that provides direct connection from I-26 near Clinton, SC to Greenville, SC. South of I-85, I-385 is a four-lane divided freeway with a grassed median and cable median barrier. North of I-85, I-385 is an eight-lane (including auxiliary lanes) freeway with concrete median barrier up to the Roper Mountain Road interchange. The existing year (2010) ADT along I-385 vary from 78,300 to 95,100 within the project area.

The I-85/I-385 interchange is an existing Interstate-to-Interstate interchange with a combination of directional, semi-directional, and loop ramps providing for all movements from one interstate to the other. Initially this was a trumpet interchange

[33] Highway History - I-*85 The Boom Belt, South Carolina*. https://international.fhwa.dot.gov/infrastructure/boombelt.cfm .

which only provided movements to and from I-85 in the direction of downtown Greenville. As I-385 was extended to the south of I-85, additional ramps were added to accommodate the additional movements. There are also other interchanges in close proximity to this interchange including the I-85 interchange with Woodruff Road and the I-385 interchanges with Roper Mountain Road and Woodruff Road. The geometry and spacing of the existing interchanges do not meet modern design criteria and, along with the increased traffic demands over the years and in the foreseeable future, have created a number of problems including short weaves, inadequate signing, and safety issues.

Woodruff Road (SC 146) is a five-lane undivided roadway with a center turn lane and has a general east-west orientation with a posted speed limit varying between 35 and 45 mph within the project area. This corridor is heavily commercialized, and includes numerous intersections and driveways for adjacent developments which result in congestion and undesirable traffic conditions.

The project corridor is located along the southern limits of the City of Greenville, and includes various urbanized land uses including transportation, commercial development, industrial, and residential land uses. According to the City of Greenville Planning Department, the general zoning along the area includes 'regular commercial district', 'planned development district', and 'service district' with future land uses committed to 'mixed use regional' (Figure 26). As such, the project area consists of little to no natural community habitat and has been heavily disturbed through previous development and urbanization.

The immediate project area consists largely of highway oriented and transient developments including gas stations, hotels, restaurants, general retail, and industrial. Residential developments are located in the northwest, northeast, and southeast quadrants of the project area. These developments are generally located outside of the commercial/industrial development that is located in the immediate vicinity of the project area. Approximately 20 acres of new right-of-way would be required to accommodate the proposed improvements. The majority of this right-of-way would be acquired from existing commercial developments, or areas that are zoned for commercial land uses. As such, this acquisition and transfer of land use is consistent with the future long range planning and zoning of both the City and County of Greenville. There is presently little available developable land in the surrounding area.

The project area includes various tributaries associated with Rocky Creek, Gilder Creek, and Laurel Creek. These tributaries primarily consist of first and second order streams with perennial flow. These systems have been previously impacted by the construction of the existing transportation facilities and surrounding developments, mainly through relocation, channelization, dimension, and profile. Many of these areas also function largely for stormwater capacity and conveyance, which affect downstream water quality.

Step 4 – Identify Direct and Indirect Impacts of the Proposed Project That Might Contribute to a Cumulative Impact

Direct impacts would be the additional right-of-way needed for the project along with the reconfiguration and modification of the existing interchange movements. The majority of the right-of-way would be acquired from existing commercial and industrial businesses located adjacent to the project area. Indirect impacts would be secondary development that could result in land use changes in the surrounding area.

The preferred alignment would modify existing access, mainly along the I-85/Woodruff Road interchange. Specifically, access to Woodruff Road along I-85 would be eliminated from the I-385 northbound and southbound to I-85 southbound movements. As such, I-385 northbound traffic would access Woodruff Road at the I-385/Woodruff Road interchange and I-385 southbound traffic could access Woodruff Road from the I-385/Roper Mountain Road or the I-385/Woodruff Road interchanges.

The construction of the project is anticipated to directly impact approximately 2,370 linear feet of stream through channel relocation, fill, and extension of existing culvert structures. These systems are located immediately adjacent to the existing roadway facilities, and function largely for conveyance and storage for roadway stormwater. Potential indirect impacts to these systems would include increased stormwater runoff from surrounding developments, leading to downstream degradation of water quality.

Step 5 – Identify any other Reasonably Foreseeable Actions

The SCDOT and the Greenville-Pickens Area Transportation Study (GPATS) have various other active and/or programmed projects within the vicinity of the project area. These projects vary from transportation corridor studies to bridge replacements, as described in the following summary.

- **I-385 Widening and Rehabilitation Project; Project No. IM23(019)**: The proposed project will widen approximately 5.5 miles of I-385 to six lanes, extending from near the I-385/West Georgia Road (Exit 29) to SC 146 (Woodruff Road). The project will also rehabilitate existing pavement along portions of the corridor and widen existing bridges. The proposed project is currently being constructed through a "Design-Build" contract.
- **The I-85 Corridor Analysis between US 25 and SC 129**: The SCDOT is currently conducting a corridor Analysis of I-85 between US 25 (Whitehorse Rd., Exit 44) in Greenville County and SC 129 (Fort Prince Blvd., Exit 68) in Spartanburg County. The project will establish congestion improvement strategies to identify alternate approaches to relieve the current and projected congestion issues and improve capacity. The widening of I-85 is included in the SCDOT Long Range Plan for Design Plans only.
- **Salters Road Widening from Millennium Blvd. to Verdae Blvd.; Project No. GPATS (010):** Programmed project to widen the existing roadway and replace the existing bridge over I-85. The project is currently in the environmental and preliminary design phase.
- **I-85 NB Exit Ramp at SC 146 (Woodruff Road) – Ramp Modification; Project No. GPAT (005):** The SCDOT proposes to widen the existing exit ramp onto SC 146 to accommodate dual right turn lanes and shift the I-85 NOB entrance ramp/C-D to the west approximately 250 feet. The project is currently in the design phase.
- **SC 146 (Woodruff Road) at S-564 (Miller Road/Garlington Road) – Project No. GPAT (004):** The SCDOT proposes to provide dual left turn lanes and at all four legs at the intersection of Woodruff Road at Miller Road/Garlington Road along with constructing an auxiliary lane from ramp terminal to intersection.
- **S-545 (Roper Mountain Road) Widening from Garlington Road to Feaster Road:** The SCDOT proposes to widen Roper Mountain Road to three lanes with median, bike lanes and sidewalk. The proposed project shares terminus with the replacement of the Woodruff Road Bridge over I-85 as part of the purposed I-85/I-385 Interchange project.

Land use in Greenville County surrounding the project site consists largely of highway oriented and transient developments including gas stations, hotels, restaurants, general retail, and industrial. Residential developments are located in the northwest, northeast, and southeast quadrants of the project area. These developments are generally located outside of the commercial/industrial development in the immediate vicinity of the project area.

These land uses are expected to continue as the area has been designated as a Super-Regional Center in the Greenville County Future Land Use Plan. The Super-Regional Center would contain large-scale retail and service offerings such as large hotels, movie theaters, shopping malls, specialty big-box stores, large-scale office parks, along with factory and warehousing services. The centers are characterized by mixed-use building with the highest density of residential land uses. Many of these land uses are already in place within the project area.

Step 6&7 – Assess Potential Cumulative Impacts and Report Results

The project is not expected to impact traffic volumes, capacity, access, or efficiency of the I-85 and I-385 corridors beyond the immediate project area. The interchange ramps would include similar access points, but with the elimination of undesirable weave and merge-diverge movements. In addition, the project would extend the proposed ramps along I-85 to the Pelham Road interchange. These improvements would provide additional spacing and minimize vehicular conflicts. As such, the improvements are expected to benefit the existing I-85/Pelham Road interchange without modifying the existing interchange configuration.

As documented above, there are various other projects in the foreseeable future that would improve the conditions of these transportation facilities by providing additional capacity, improve access, and improve operational efficiency. The future projects would likely require additional right-of-way, thus have the potential for direct impacts to the human and natural environment. These improvements are anticipated to be constructed along existing facilities, and therefore impacts would be minimized. As such, these improvements are not expected to impact the current traffic patterns and use of these facilities, while improving the function and operation.

The likelihood of this project leading to induced growth is low. Much of the area immediately surrounding the project site is already heavily developed with commercial/industrial land uses with residential development occurring farther out. The interchange and associated freeway components would be controlled access which prevents direct access for adjacent developments. Any potential development would likely occur at the interchange areas or along the frontage road network. Based on the existing or proposed land use designations, the character of the area, the existing land uses, and the fact that the proposed project would essentially replace existing conditions, there would be minimal cumulative impacts resulting from this project.

Cumulative impacts to streams are also expected to be minimal as the project would maintain water conveyance along with overall stream habitat and functions. The project would result in increased impervious area with potential for sediment and other pollutant loading during construction. This could have cumulative impact on downstream water quality and with altering physical characteristics of the stream. The greatest potential for these impacts would be directly associated with the various land disturbance activity during construction. However, numerous strategies would be utilized, including required sediment and erosion control practices, to avoid and minimize potential water quality impacts. The direct stream impacts and potential water quality impacts would also require authorization from the appropriate regulatory agencies, which further minimizes impact potential and requires appropriate compensatory mitigation for the unavoidable impacts.

Step 8 – Assess the Need for Mitigation

Various alternatives were developed and evaluated during the development of the project and measures incorporated to avoid and/or minimize impacts to area resources. Land use plans will control the type and intensity of development along this corridor which will aid in controlling additional development. Control of access along the freeway mainlines would limit development to interchange areas. The majority of the land surrounding the interchanges is already developed with little open land for additional development. Based on the existing or proposed land use designations, current land uses, the character of the area, and the fact that the proposed project would essentially replace existing conditions, there should be minimal indirect or cumulative impacts resulting from this project. Table 8 lists the potential indirect and cumulative impacts resulting from the proposed project.

5.0 AGENCY AND PUBLIC INVOLVEMENT

The project has been coordinated with various local, state and federal agencies; local stakeholders; and the general public to identify issues to be considered in the development of the project.

5.1 Agency Coordination

The Department sent approximately 82 "Letters of Intent" (LOI) to representatives from the following agencies and municipalities:

Federal Agencies:
U.S. Environmental Protection Agency
U.S. Army Corps of Engineers
U.S. Housing and Urban Development
U.S. Fish and Wildlife Service
Federal Highway Administration
Catawba Indian Nation

State Agencies:
SC Department of Archives and History
SC Department of Archaeology and Anthropology
SC Department of Natural Resources
SC Department of Health and Environmental Control
SC Department of Parks, Recreation, and Tourism
SC Commissioner of Human Affairs
SC Secretary of Commerce
SC Department of Agriculture
SC Budget and Control Board
SC Forestry Commission

Municipalities:
City of Easley
City of Greenville
City of Greer
City of Liberty

City of Mauldin
Fountain Inn
City of Pickens
City of Travelers Rest
City of Simpsonville
Greenville County
Pickens County
Greenville Spartanburg Area Transportation Study (GPATS)
SC State Senate, Districts: 2,5,6,7,8,9,13
SC House of Representatives, Districts: 5,10,12,13,16,18,20,22,23,25,27,28

Others:
The Nature Conservancy
The National Wild Turkey Foundation
SC Wildlife Federation

The LOI's were disseminated on September 22, 2010, and included a brief description of the proposed project, a location map, contact information, and a request for comments. Response letters were received from the following:

SC Department of Health and Environmental Control
SC Department of Commerce
Greenville County
Catawba Indian Nation
City of Mauldin

A copy of the LOI along with the response letters are included in Appendix G.

5.2 Public Involvement

A Public Involvement Plan was developed during early project development in an effort to identify the appropriate stakeholders, and determine appropriate coordination efforts. Through these continued efforts, various stakeholders were identified which primarily consisted of representatives from local municipalities and area businesses, including a retirement facility (i.e. *The Cascades at Verdae*). During early project development, the project was presented at various forums to these stakeholders, including business group meetings, County/City meetings, and numerous electronic correspondences. The primary concerns of the stakeholders included the potential

relocation of Woodruff Road (not favorable); impacts to local businesses; and potential to reduce project costs by retaining as much of the existing infrastructure as possible. These coordination efforts ultimately assisted in the development of the preferred alignment through the early identification of these issues and concerns.

A Public Information Meeting was also held on January 27, 2011 at Beck Academy located at 901 Woodruff Road in Greenville, SC. The purpose of the meeting was to provide an opportunity to review and discuss individually with representatives from the SCDOT the need for the project, limits of the project, and the various alternatives (i.e. Alternative 2C and 4) that had been developed. Specifically, the meeting included a short status update of the project, along with available project displays for public review and individual discuss of the project with appropriate Department representatives. The Public Meeting was advertised through a Project Newsletter that was distributed to the various stakeholders, local newspaper advertisement, and the Department's website.

A total of 88 people registered their attendance at the meeting. A total of 41 written comments were received, with 15 comments from individuals who were not signed in as attending the meeting. Of these comments, 10 approved Alternative 4; one supports Alternative 2 but not 2C; one supports 2C; one concerned with air pollution; one concerned with noise; with the remaining largely pertaining to various other transportation concerns along the area (traffic signal camera; traffic signal timing; secondary road access). In addition there was a common concern regarding traffic congestion along Woodruff Road and Roper Mountain Road. A detailed summary of the Public Information Meeting is included in Appendix H.

Upon approval of the EA, the Department will conduct a Public Hearing to provide an opportunity to review and comment on the project. The Public Hearing will be appropriately advertised, along with notification of availability of the approved EA, which will be made available for review prior to the Public Hearing at the appropriate Department's Central and District office.

APPENDIX A

Natural Resources Assessment

APPENDIX B

SCDOT – Location and Hydraulic Design of

Encroachments of Floodplains Checklist and Coordination

APPENDIX C

Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA

APPENDIX D

Noise Impact Assessment

APPENDIX E

Hazardous Material/Waste Site Assessment

APPENDIX F

Cultural Resource Reports and Coordination

APPENDIX G

Letters of Intent (LOI) and Comments

APPENDIX H

Public Information Meeting Summary

APPENDIX I

Traffic Study