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TRAFFIC ENGINEERING

PREPARED BY TRAFFIC DESIGN GROUP

INTERCHANGE MODIFICATION REPORT FOR I-95 @ US 301 IN ORANGEBURG COUNTY

EXECUTIVE SUMMARY

The US 301 interchange with I-95 in Orangeburg County currently provides only partial access to and from the north. The purpose of the Interchange Modification Report (IMR) is to evaluate the current geometric and operating conditions of the interchange and to justify modifications to provide full access. Orangeburg County's industrial recruitments, mainly the Global Logistics Triangle (GLT) Jafza South Carolina Logistics and Distribution Park (simply called Jafza Development in this report), has played a major role in the need for a full access interchange at US 301. The county received a TIGER III Discretionary Grant for this project which includes modifications to the interchange and a roadway extension from the interchange to SC 6.

Traffic data for I-95 was obtained from an Automatic Traffic Recorder (ATR) near Santee and turning movement counts were performed at key intersections near the US 301 interchange and at the two adjacent interchanges, SC 6 to the north and US 15 to the south of the project. Growth rates were determined from projected future ADTs provided by SCDOT's Planning Department. The rates were applied to the traffic data to come up with future background traffic volumes up to design year 2035. Projected trips from the Jafza Development were added to the background volumes to come up with total volumes for the analysis.

Three alternatives for the US 301 interchange were evaluated in five year increments from opening year 2015 to design year 2035. They include a No Build Alternative with the existing interchange layout and two Build Alternatives: Alternative 1 with a Diamond Interchange layout and Alternative 2 with a Partial Cloverleaf A Interchange layout. The SC 6 interchange was included in the analysis because of the proximity to US 301 and the impacts it will incur. Freeway, ramp, and intersection analyses were performed under each alternative in

order to evaluate the existing operating conditions and the future operating conditions with improvements.

Alternative 2 with the Parc-lo A layout is the preferred alternative for the US 301 interchange with I-95 based on the analysis results and observations. The loop on-ramp from northbound US 301 onto northbound I-95 provides free-flow access as it exists today while the loop on-ramp onto southbound I-95 will accommodate the heavy movements from the Jafza Development. Providing full access at US 301 will also relieve congestion and improve operations at the SC 6 interchange.

PROJECT BACKGROUND AND DESCRIPTION

US 301 is a north/south, four-lane divided minor arterial that converges with I-95, a four-lane facility, just south of the town of Santee and Lake Marion. The route diverges back from the interstate after crossing the lake. The point where US 301 and I-95 converge is in the form of a Partial Interchange with travel lanes on US 301 transitioning into directional entrance and exit ramps for I-95. The project location map in Figure 1 shows the US 301 interchange and adjacent interchanges. The current interchange layout provides only partial access to and from the north. Access from northbound US 301 to southbound I-95 and from northbound I-95 to southbound US 301 are not possible with the current interchange as shown in Figure 2. Currently, the only signalized intersection along US 301 at the vicinity of this interchange is at US 15, approximately 1 mile west of I-95.

The interchange has experienced some moderate growth due to Orangeburg County's aggressive economic development strategies and industrial recruitments and with its use as a connector between I-26 and I-95. A new interchange design is needed to provide full access to I-95 and to adequately handle the increased traffic volumes from these industrial recruitments, particularly the proposed Jafza Development. As a result, Orangeburg County has received a TIGER III Discretionary Grant (under the grants for National Infrastructure Investments under the FY 2011 Appropriations Act) to provide for an interchange with full movements and for economic development.

Approximately 1.5 miles north of US 301, the SC 6 interchange currently provides full access to I-95 and is the main entrance into the town of Santee and the south side of Lake Marion. This diamond interchange handles the bulk of local and tourist traffic and contains numerous commercial developments on both sides of I-95. Approximately 4 miles south of US 301, the US 15 interchange also provides full access to I-95. This diamond interchange is in a sparsely populated area with no adjacent commercial development and will not be affected by this project. The proposed Jafza Development is expected to generate a considerable amount of traffic that will greatly impact the SC 6 interchange under existing conditions. Modifications to the US 301 interchange will provide full access for all traffic and provide a primary I-95 access point for Jafza.

Figure 1

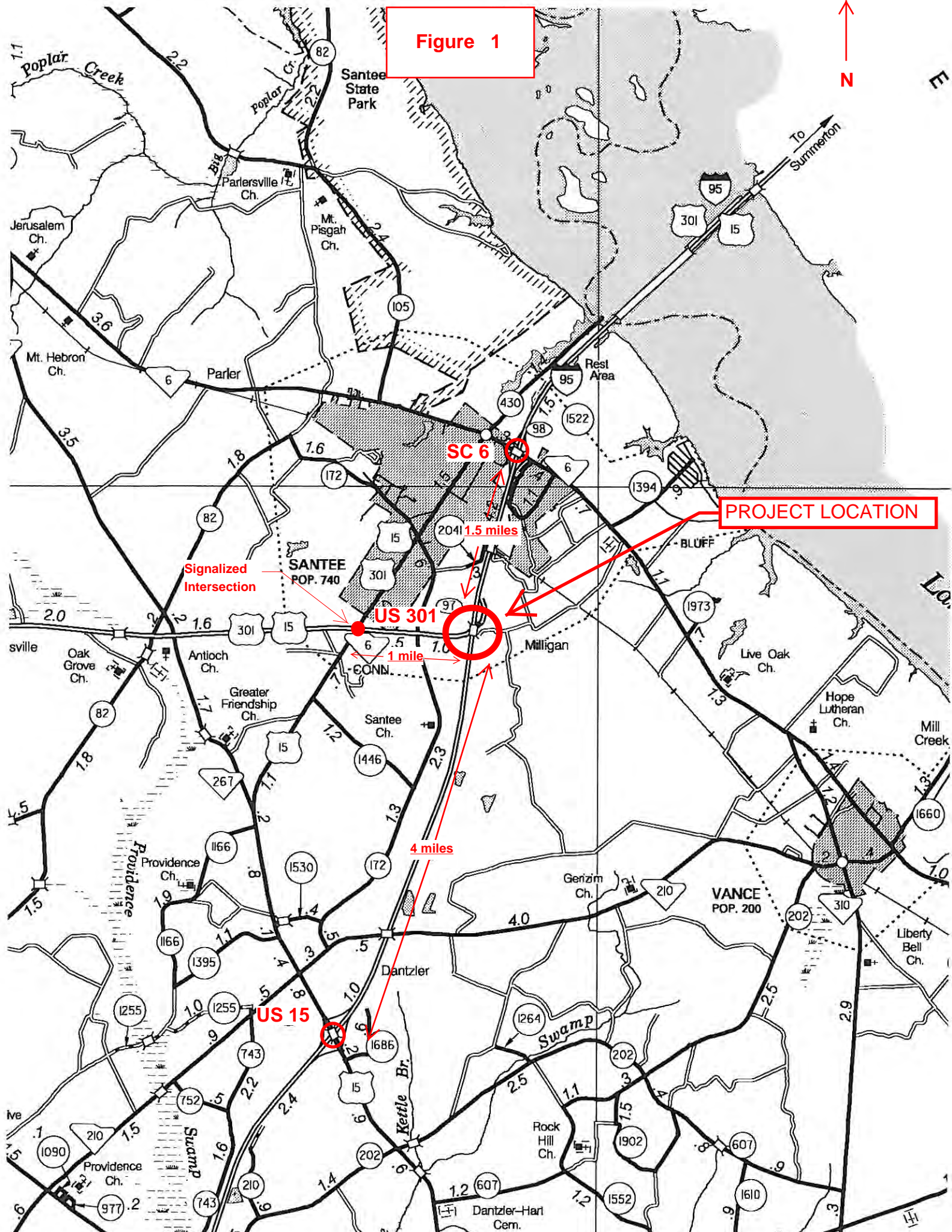


FIGURE 2
Interstate 95 at US 301
No-Build Alternative

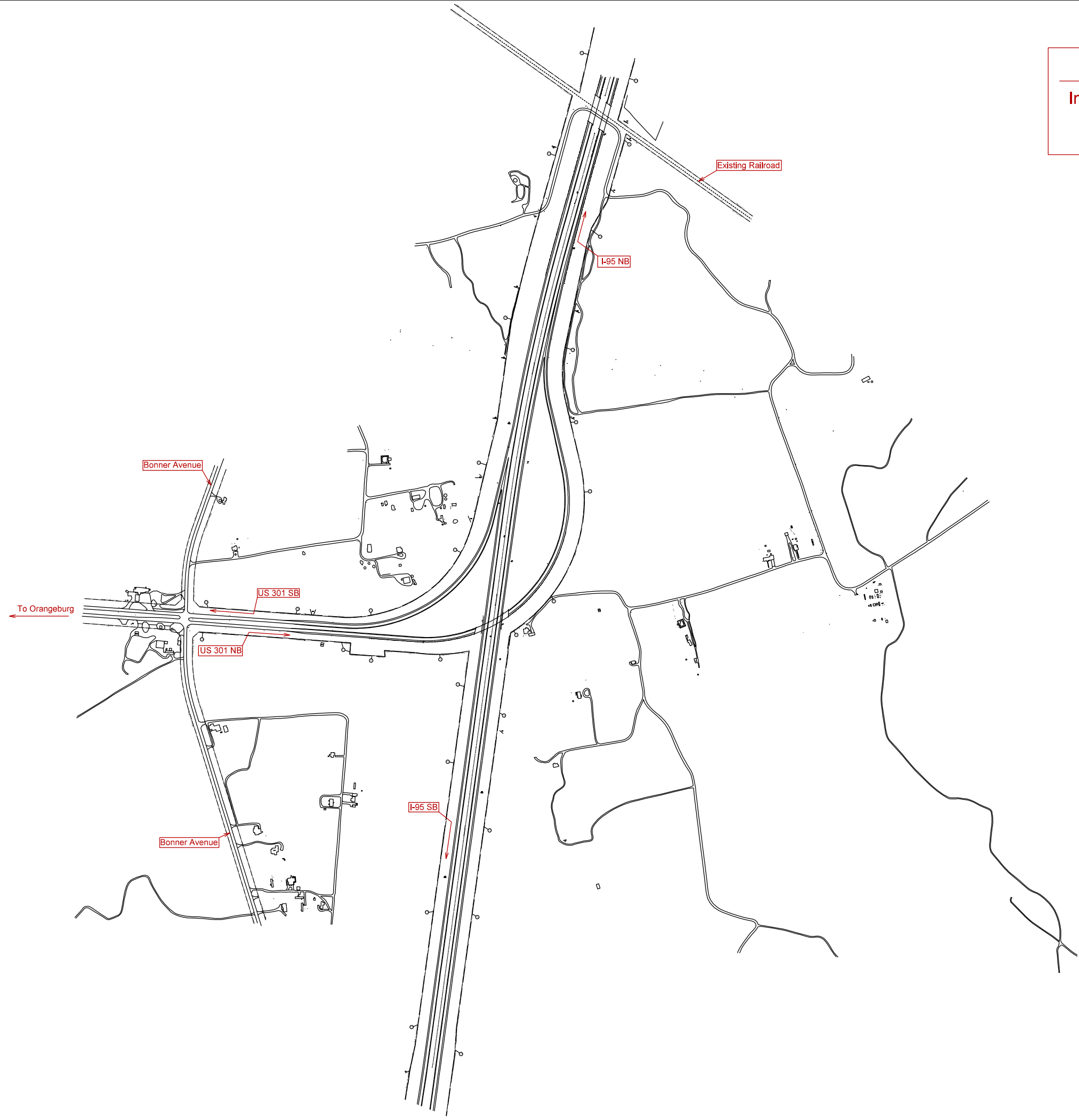


FIGURE 3
Interstate 95 at US 301
Alternative #1 (Diamond)

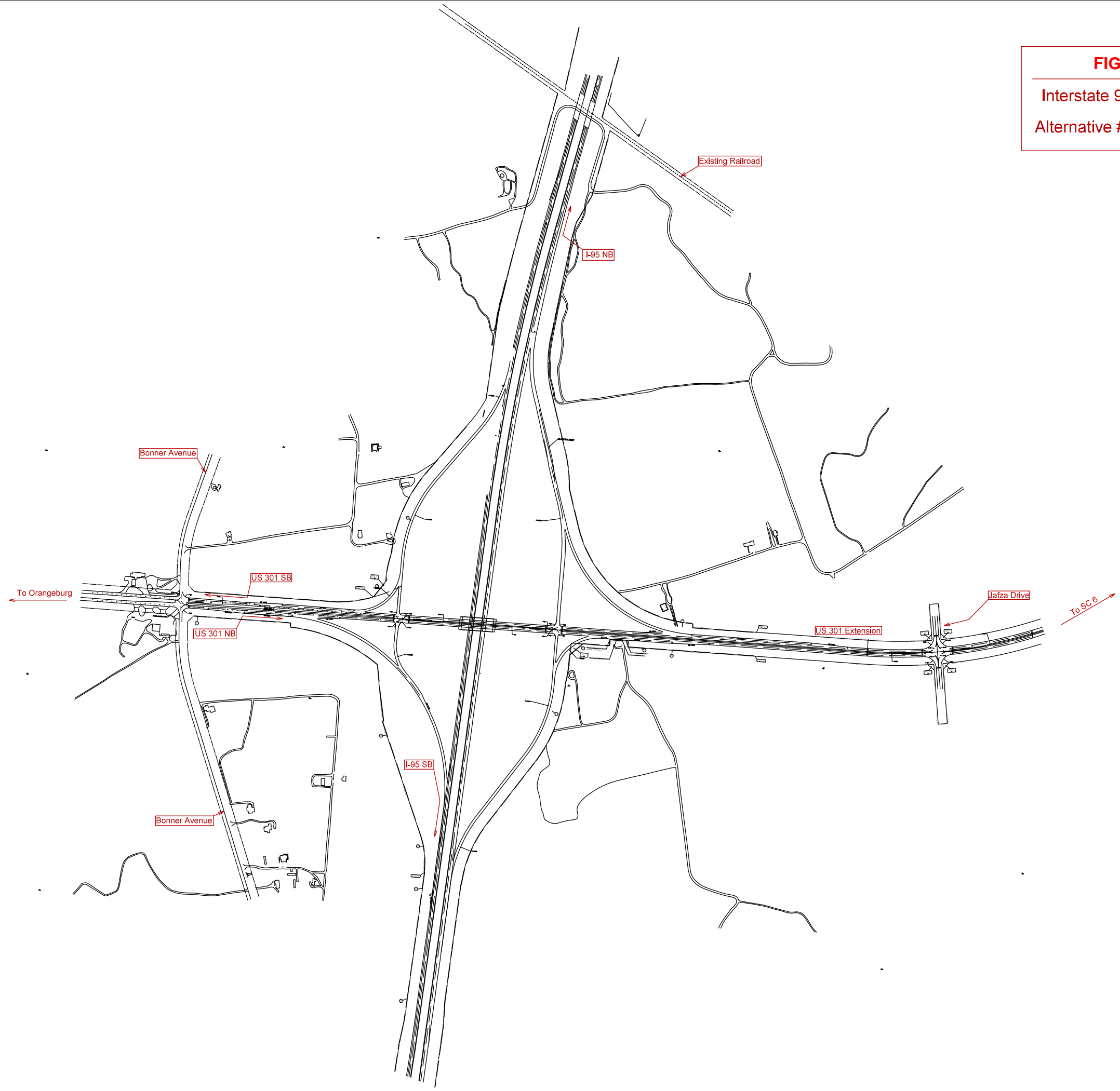
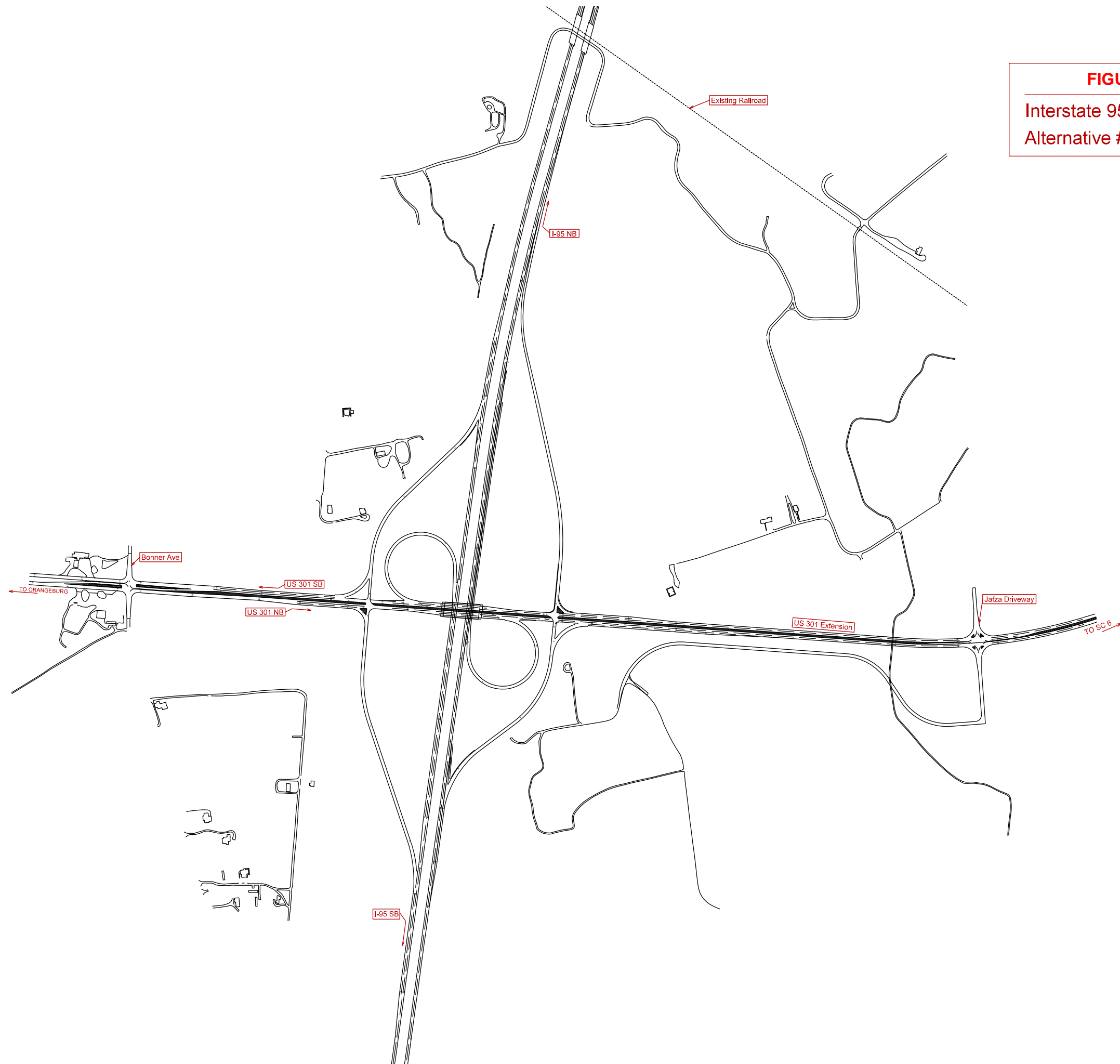


FIGURE 4
Interstate 95 and US 301
Alternative #2 (Partclo-A)



Two Build Alternatives were considered as modifications to the US 301 interchange with both alternatives providing full-access to I-95 and an extension of US 301 to Route SC 6. The existing interchange layout referred to as the No-Build Alternative is shown in Figure 2. Alternative 1, as shown in Figure 3, consists of a Diamond interchange layout with a 5-lane section on US 301 throughout the interchange area. Both northbound and southbound exit ramps are stop controlled with free-flow right turns onto US 301. Alternative 2, as shown in Figure 4, consists of a Partial Cloverleaf A interchange layout with a 5-lane section on US 301 throughout the interchange area and deceleration lanes for the loop entrance ramps. The loop ramps eliminate the need for left turn lanes on the bridge to access the northbound and southbound entrance ramps. The exit ramps are stop controlled with free-flow right turns onto US 301. In both alternatives, driveways for the Jafza Development are located east of I-95 on the new US 301 Extension.

DATA COLLECTION

Traffic counts were conducted at the following locations.

- US 301 at US 15
- US 301 at Bonner Ave (S-172)
- SC 6 at US 15
- SC 6 at I-95 South Ramps
- SC 6 at I-95 North Ramps
- SC 6 at Laredo Rd (S-1394)
- US 15 at I-95 South Ramps
- US 15 at I-95 North Ramps

The traffic counts were conducted in October 2010 in order to obtain the AM and PM peak hour turning movement volumes. The freeway traffic data for I-95 was obtained from Traffic Engineering's Traffic Count Section for years 2009 and 2010. This traffic data was collected from an Automatic Traffic Recorder (ATR) 88 located on I-95 just north of US 301 and south of Lake Marion and SC 6.

Projected trips generated from the Jafza Development were obtained from the "Jafza Logistics and Distribution Park Design Traffic Technical Report" prepared by HDR and dated June 25, 2009. Only the peak hour trips were gathered from tables and figures in the Technical Report. Peak hour truck and non-truck trips were obtained from Jafza Tables 2, 3, 4 and 5 representing each phase of the development. The trips were converted to inbound and outbound turning movements using project distributions in Figures 4, 5, and 6 for the No-Build Alternative (existing interchange layout) and project distributions in Figures 7, 8 and 9 for Build Alternatives found in the Technical Report and shown below.

JAFZA TRIP TABLES & JAFZA DISTRIBUTION FIGURES

(From Jafza – Technical Traffic Report prepared by HDR, June 2009)

**Table 2
Jafza Site Traffic Generation for Phase 1A (2014)**

Land Use	ITE Code	Intensity	Daily Trip Ends	PM Peak-Hour Trip Ends				
				Total	In		Out	
					%	Trips	%	Trips
General Office	710	10 KSF	227	90	17%	15	83%	75
Warehouse	150	25 KSF	150	25	25%	6	75%	19
<i>Truck Trips (20%)</i>			30	5	25%	1	75%	4
<i>Non-Truck Trips (80%)</i>			120	20	25%	5	75%	15
Total			377	115	18%	21	82%	94

**Table 3
Jafza Site Traffic Generation for Cumulative Phase 1B (2016)**

Land Use	ITE Code	Intensity	Daily Trip Ends	PM Peak-Hour Trip Ends				
				Total	In		Out	
					%	Trips	%	Trips
General Office	710	10 KSF	227	90	17%	15	83%	75
Light Manufacturing	140	70 KSF	251	39	36%	14	64%	25
<i>Truck Trips (20%)</i>			50	8	36%	3	64%	5
<i>Non-Truck Trips (80%)</i>			201	31	36%	11	64%	20
Warehouse	150	140 KSF	658	74	25%	19	75%	55
<i>Truck Trips (20%)</i>			132	15	25%	4	75%	11
<i>Non-Truck Trips (80%)</i>			526	59	25%	15	75%	44
Total			1,136	203	24%	48	76%	155

Table 4
Jafza Site Traffic Generation for Cumulative Phase 1C (2020)

Land Use	ITE Code	Intensity	Daily Trip Ends	PM Peak-Hour Trip Ends				
				Total	In		Out	
					%	Trips	%	Trips
General Office	710	10 KSF	227	90	17%	15	83%	75
Light Manufacturing	140	70 KSF	251	39	36%	14	64%	25
Truck Trips (20%)			50	8	36%	3	64%	5
Non-Truck Trips (80%)			201	31	36%	11	64%	20
Warehouse	150	870 KSF	3,168	238	25%	60	75%	178
Truck Trips (20%)			634	48	25%	12	75%	36
Non-Truck Trips (80%)			2,534	190	25%	48	75%	142
Total			3,646	367	24%	89	76%	278

Table 5
Jafza Site Traffic Generation for Cumulative Phase 3 (2030)

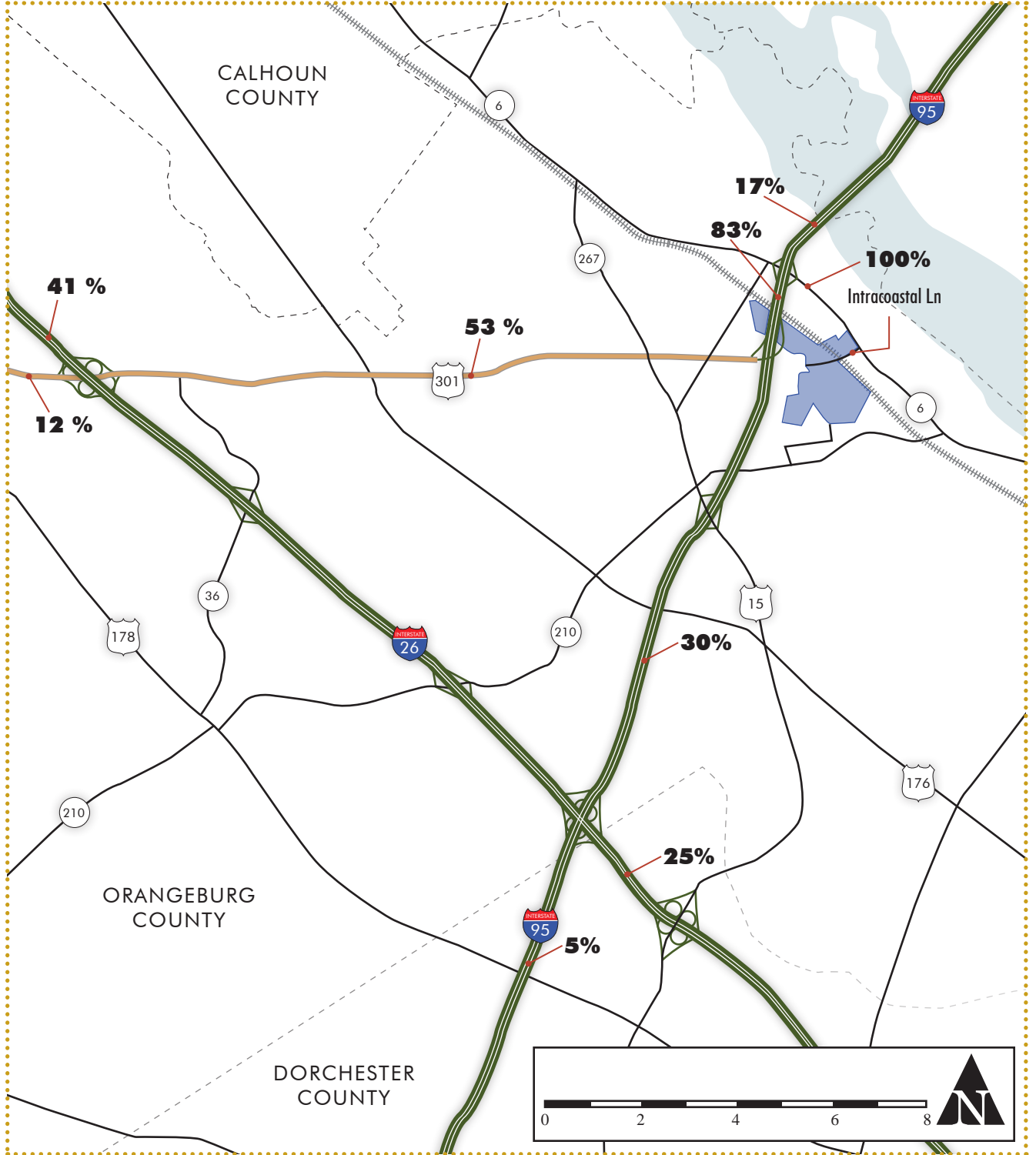
Land Use	ITE Code	Intensity	Daily Trip Ends	PM Peak-Hour Trip Ends				
				Total	In		Out	
					%	Trips	%	Trips
General Office	710	10 KSF	227	90	17%	15	83%	75
Light Manufacturing	140	70 KSF	251	39	36%	14	64%	25
Truck Trips (20%)			50	8	36%	3	64%	5
Non-Truck Trips (80%)			201	31	36%	11	64%	20
Warehouse	150	3,050 KSF	9,318	531	25%	133	75%	398
Truck Trips (20%)			1,864	106	25%	27	75%	80
Non-Truck Trips (80%)			7,454	425	25%	106	75%	318
Intermodal Rail Yard	Study	61.3 Acres	1,421	123	29%	36	71%	87
Truck Trips			1,088	40	57%	28	43%	12
Non-Truck Trips		100 Emp	333	83	10%	8	90%	75
Total								
Truck Trips			3,002	154	38%	58	62%	97
Non-Truck Trips			8,215	629	22%	140	78%	488
Internal Capture								
Truck Trips	see Note (1)		870	32	57%	22	43%	10
Non-Truck Trips			0	0	0%	0	0%	0
Net External Trips								
Truck Trips			2,132	122	30%	36	70%	87
Non-Truck Trips			8,215	629	22%	140	78%	488
Total			10,347	751	23%	176	77%	575

Notes:

(1) 40% of Intermodal Rail Yard truck trips and an equivalent portion of Warehouse Development truck trips were assumed to be internally captured as the origin and destination of these trips will be within the project site.

Jafza Logistics and Distribution Park

Fig 4 - Inbound Truck Distribution - Phases 1A, 1B & 1C



LEGEND:



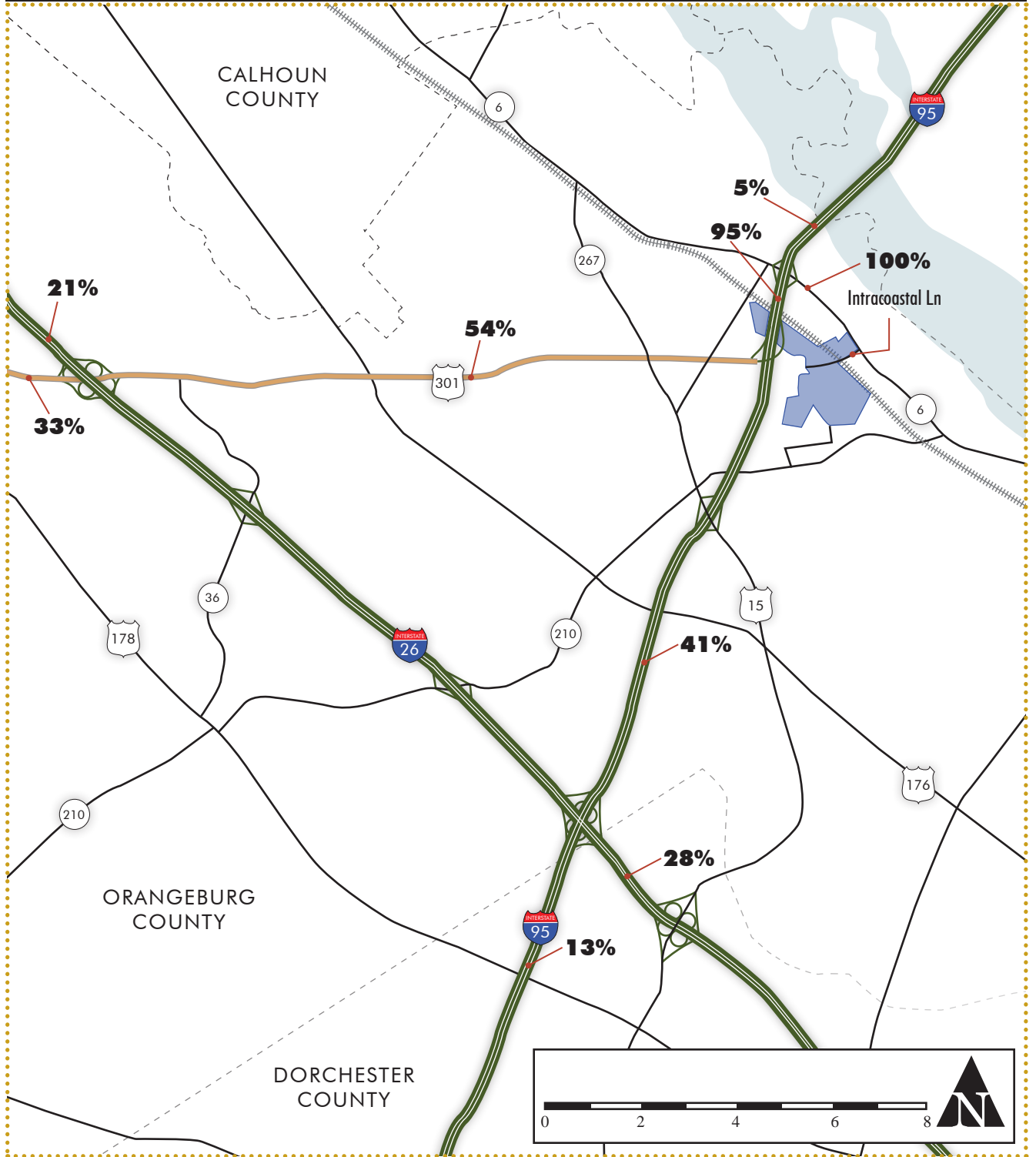
Project Site

XX% Project Distribution



Jafza Logistics and Distribution Park

Fig 5 - Outbound Truck Distribution - Phases 1A, 1B & 1C



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Project Site

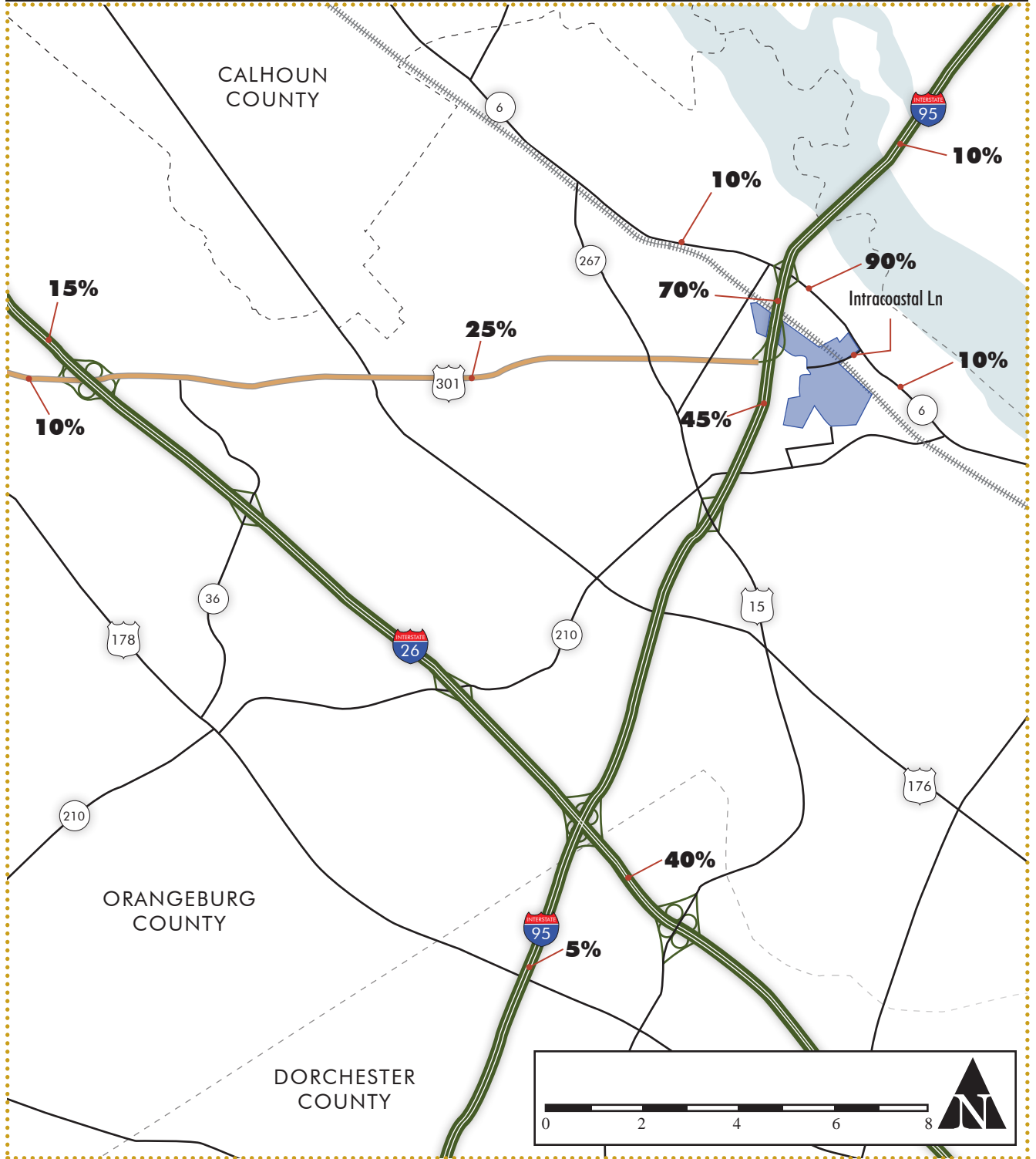
XX% Project Distribution



HDR
JUNE 2009

Jafza Logistics and Distribution Park

Fig 6 - Non-Truck Distribution - Phases 1A, 1B & 1C



LEGEND:



Project Site

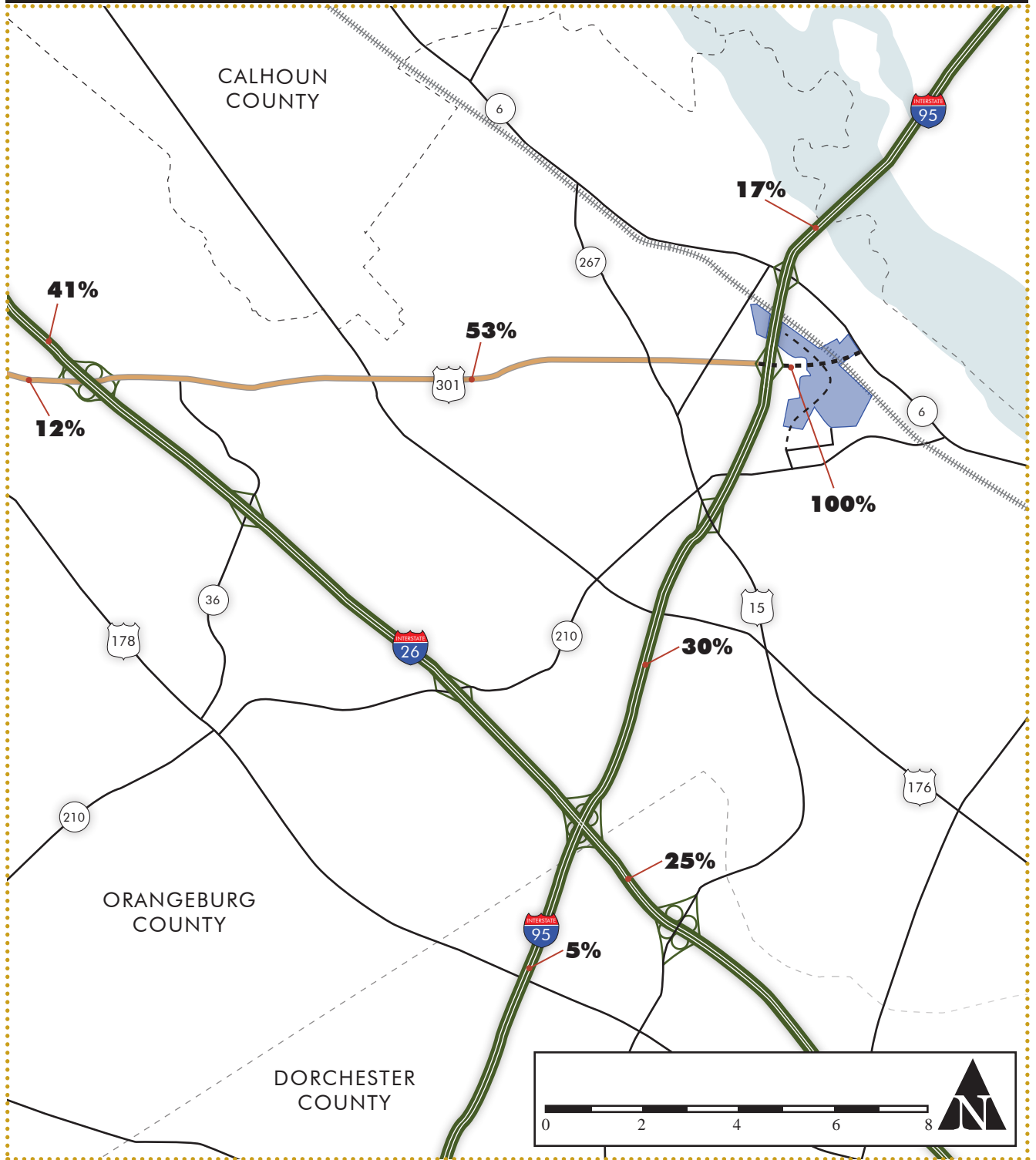
XX% Project Distribution



HDR
JUNE 2009

Jafza Logistics and Distribution Park

Fig 7 - Inbound Truck Distribution - Phase 3 (2030)



LEGEND:



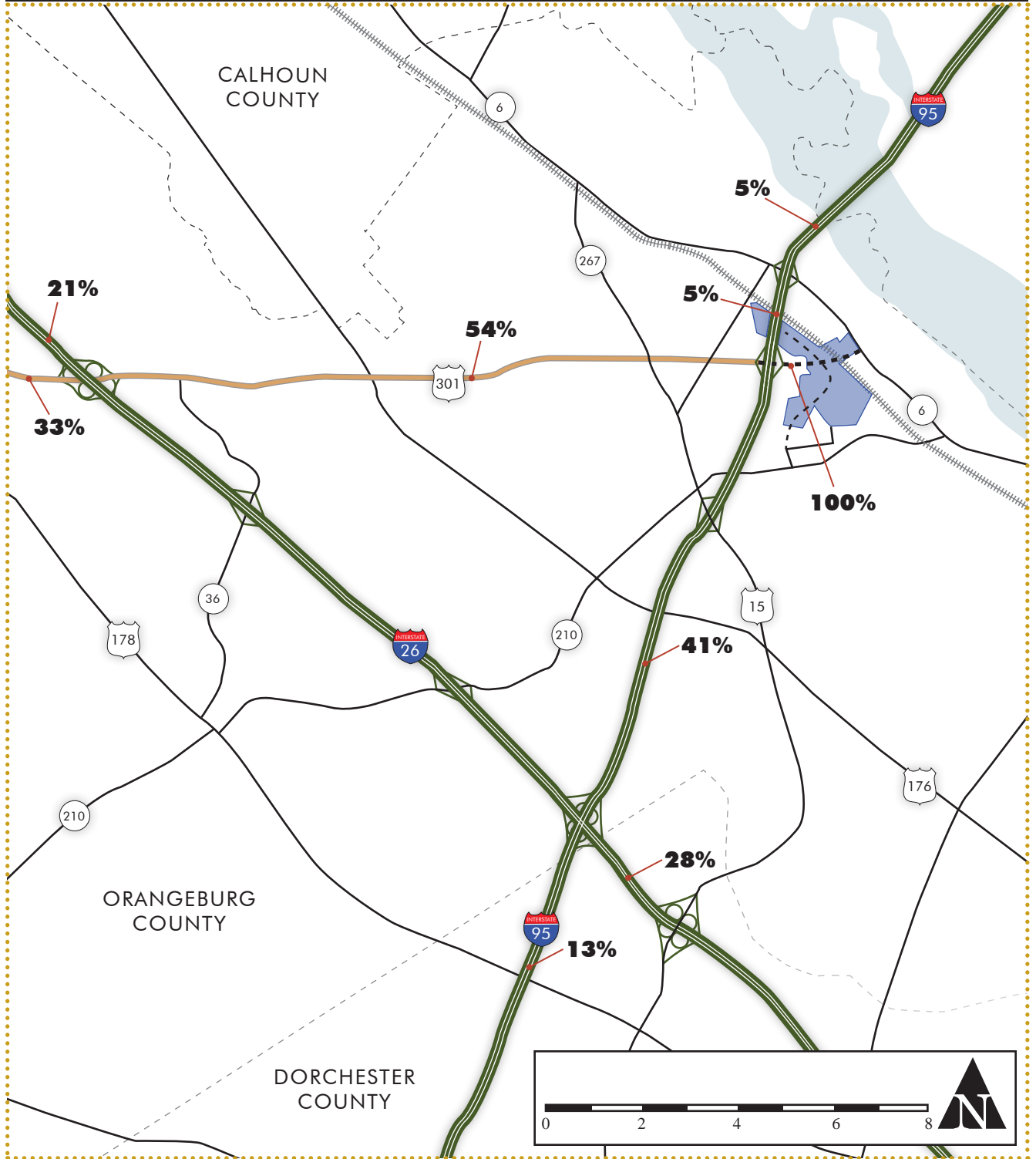
Project Site

XX% Project Distribution

HDR
JUNE 2009

Jafza Logistics and Distribution Park

Fig 8 - Outbound Truck Distribution - Phase 3 (2030)

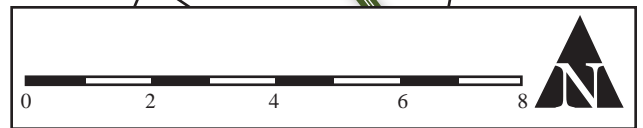


LEGEND:



Project Site

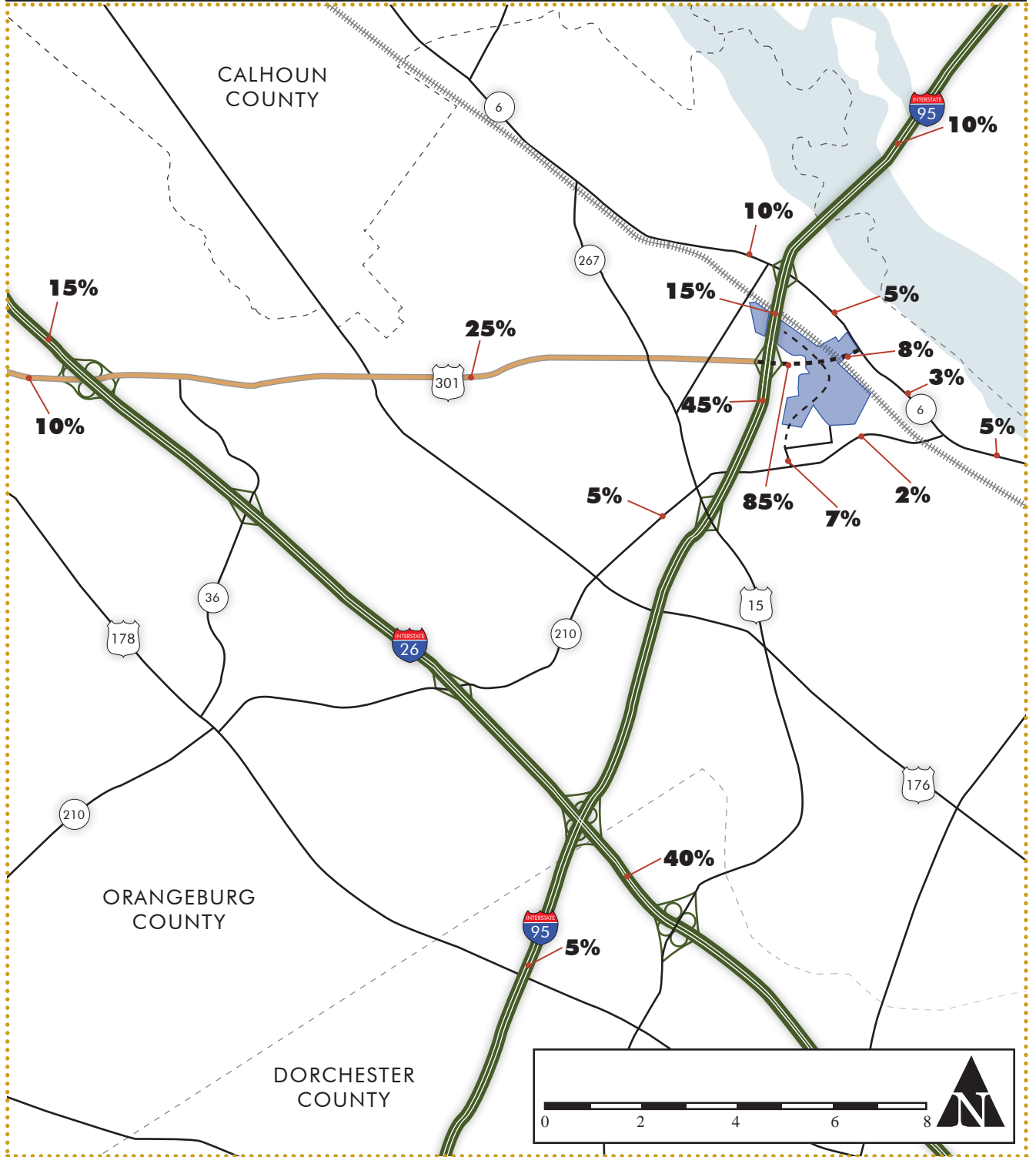
XX% Project Distribution



HDR
JUNE 2009

Jafza Logistics and Distribution Park

Fig 9 - Non-Truck Distribution - Phase 3 (2030)



LEGEND:



Project Site

XX% Project Distribution



HDR
JUNE 2009

ANALYSIS

The US 301 interchange analysis was conducted for two Build Alternatives as well as the No-Build Alternative. Due to its close proximity, the SC 6 interchange was included in the analysis to observe impacts from the US 301 interchange modification and the Jafza Development. The US 15 interchange is not included because it has little impact on the study area or traffic distribution.

The following analyses were performed:

- Freeway analysis using Highway Capacity Software version 5.2 (HCS+)
- Ramp analysis using Highway Capacity Software version 5.2 (HCS+)
- Intersection level of service analysis using the HCM Procedure on SYNCHRO version 7
- Visual observation of the existing layout and future designs using animation software (SimTraffic version 7)

For the freeway and ramp analysis, the 100th highest hourly volume on I-95 was used as the design hour traffic volume on the freeway. While the 30th-highest hour is often assumed as the design hour for rural highways, it was observed that this value occurred during a holiday period (Saturday after New Year's Day). Using this holiday period for the design hour volume is deemed unreasonable and will likely result in excessive design, therefore, further analysis of the count data was performed. The existing methodology specifies a range of the 30th to 100th highest hour for an appropriate design hour for rural highways (HCM 2000, p. 8-8). Further study of the count data revealed that the 100th highest hour results in a K-factor of 0.106, a suitable value to determine design hour traffic volumes and slightly higher than the 0.10 default for rural highways. The I-95 volume data can be found in the Appendix.

The highest intersection turning movements occurred during the PM peak hour, and those volumes are used as background volumes in the analysis. The 2010 PM peak hour volumes are illustrated in Figure 5. For Build Alternatives 1 and 2, background volumes were re-routed from the existing interchange layout to the modified US 301 interchange using engineering judgment regarding origin destinations. Growth rates determined from projected ADTs were applied to turning movement and freeway volumes

Peak hour trips generated from the Jafza Development were added to the background volumes and the total volumes were used to analyze each alternative for years 2015, 2020, 2025, 2030, and 2035. Volume diagrams with 2035 total peak hour volumes (including Jafza trips) for each alternative are shown in Figures 6 through 8.

The following analyses were conducted for each alternative:

No-Build Alternative (Existing Interchange Layout)

- Freeway analysis for two lanes south and two lanes north of the US 301 interchange and two lanes north of the SC 6 interchange in each direction on I-95.
- Ramp analysis for the exit and entrance ramps of the SC 6 interchange and the exit and entrance ramps of the partial US 301 interchange with I-95.
- Intersection analysis on SC 6 for the I-95 exit/entrance ramp intersections and the intersections at the vicinity of the SC 6 and US 301 interchanges.

Build Alternative 1 (Diamond Interchange Layout)

- Freeway analysis for two lanes south and two lanes north of the US 301 interchange and two lanes north of the SC 6 interchange in each direction on I-95.
- Ramp analysis for northbound and southbound exit and entrance ramps at the US 301 and SC 6 interchanges in each direction on I-95.
- Intersection analysis on US 301 and SC 6 for the I-95 exit/entrance ramp intersections and the intersections at the vicinity of the interchanges.

Build Alternative 2 (Parclo A Interchange Layout)

- Freeway analysis for two lanes south and two lanes north of the US 301 interchange in each direction on I-95.
- Ramp analysis for north and southbound exit and entrance ramps at US 301 in each direction on I-95.
- Intersection levels of service on US 301 for the I-95 exit/entrance ramp intersections and the intersections at the vicinity of the interchange.

ASSUMPTIONS

In performing the analysis of the existing and proposed interchanges, several assumptions were made as follows:

- For I-95, the 100th highest hourly volume was used as the peak hour volume for the analysis.
- The background traffic volumes are comprised of 15% heavy vehicles on I-95 and 10% on US 301 and SC 6. Percent heavy vehicles for I-95 were obtained from a 2010 weekly report at count station 2393 just north of the SC 6 interchange.
- A 3% annualized growth rate was applied to traffic volumes along US 301 and a 2% annualized growth rate was applied to traffic volumes along all other routes in the study area including I-95. The growth rates are based on projections obtained from the SCDOT Planning Office for years 2035 and 2040.
- The SYNCHRO default of 0.9 was used for the peak hour factor.

STUDY FINDINGS

Freeway Analysis

The results of the Highway Capacity Software Freeway Analysis for the No-Build and Build Alternatives are listed in Table 1 below. The table provides the level of service for two lanes on the freeway in each direction at both the US 301 and SC 6 interchanges. The Build Alternatives result in similar levels of service for most freeway segments except SB I-95 north of US 301 (highlighted in the table). This segment of freeway will experience slight improvements from a LOS D in the No-Build to a LOS C in the Build Alternatives in the design year. The improvements are due to southbound volumes using the new US 301 interchange instead of SC 6. The analysis confirms that improvements to the US 301 interchange will not negatively affect the interstate.

Table 1: HCS Freeway Analysis (No-Build / Build Alternatives 1 and 2)

Location	Two Lanes on the Interstate				
	2015	2020	2025	2030	2035
I-95 Northbound – South of US 301	B/B	C/C	C/C	C/C	C/C
I-95 Northbound – North of US 301	C/C	C/C	C/C	D/D	D/D
I-95 Northbound – North of SC 6	C/C	C/C	C/C	D/D	D/D
I-95 Southbound – South of US 301	B/B	C/C	C/C	C/C	C/D
I-95 Southbound – North of US 301	B/B	C/C	C/C	D/C	D/C
I-95 Southbound – North of SC 6	B/B	C/C	C/C	C/C	C/C

Ramp Analysis

The results of the Highway Capacity Software Ramp Analysis for the No-Build and Build Alternatives are listed in Tables 2, 3 and 4 below. The No-Build Alternative provides only northbound entrance and southbound exit ramps for US 301. With only partial access available at US 301, the SC 6 interchange handles most of the traffic entering southbound and exiting northbound I-95. Merging traffic from the SC 6 southbound entrance ramp will experience LOS D by year 2030 under the No Build Alternative (Table 2) as this is the only access to southbound I-95 in the vicinity.

Build Alternative 1, a Diamond interchange layout, provides a northbound exit ramp with 440' parallel deceleration length, a northbound taper entrance ramp, a southbound exit ramp with 440' parallel deceleration length, and a southbound entrance ramp with 780' parallel acceleration length. A new southbound entrance ramp from US 301 will relieve congestion at the SC 6 southbound entrance ramp, resulting in a LOS C for merging traffic in year 2030 and LOS D in year 2035 (Table 3).

Alternative 2, a Partial Cloverleaf A interchange layout, provides the same ramp design as Alternative 1 with the inclusion of a northbound and a southbound loop entrance ramp. Both loop ramps contain 1650' of parallel acceleration length. Merging traffic will operate at a LOS

C from the southbound loop ramp and LOS B from the northbound loop ramp in design year 2035, as illustrated in Table 4.

Ramps in both Alternatives 1 and 2 operate at acceptable levels of service in the design year. The loop ramps in Alternative 2 will have slightly better levels of service. The southbound loop ramp will accommodate heavy volumes entering southbound I-95 from the Jafza Development, while the northbound loop ramp will provide an uninterrupted flow for vehicles traveling from northbound US 301 to northbound I-95, as it exists today. The analysis confirms that improvements to the US 301 interchange will not negatively affect the existing interstate exit and entrance ramps and the additional US 301 ramps will provide adequate LOS.

Table 2: HCS Ramp Analysis (No-Build Alternative)

Location		Two Lanes on the Interstate				
		2015	2020	2025	2030	2035
US 301	I-95 NB EXIT RAMP	n/a	n/a	n/a	n/a	n/a
	I-95 NB ENT. RAMP	B	C	C	D	D
	I-95 SB EXIT RAMP	B	C	C	C	D
	I-95 SB ENT. RAMP	n/a	n/a	n/a	n/a	n/a
SC 6	I-95 NB EXIT RAMP	C	C	C	D	D
	I-95 NB ENT. RAMP	B	C	C	C	D
	I-95 SB EXIT RAMP	B	C	C	C	C
	I-95 SB ENT. RAMP	C	C	C	D	D

Table 3: HCS Ramp Analysis (Build Alternative 1)

Location		Two Lanes on the Interstate				
		2015	2020	2025	2030	2035
US 301	I-95 NB EXIT RAMP	B	C	C	C	D
	I-95 NB ENT. RAMP	B	C	C	C	D
	I-95 SB EXIT RAMP	B	C	C	C	C
	I-95 SB ENT. RAMP	B	B	C	C	C
SC 6	I-95 NB EXIT RAMP	C	C	C	D	D
	I-95 NB ENT. RAMP	B	C	C	C	D
	I-95 SB EXIT RAMP	B	C	C	C	C
	I-95 SB ENT. RAMP	C	C	C	C	D

Table 4: HCS Ramp Analysis (Build Alternative 2)

Location		Two Lanes on the Interstate				
		2015	2020	2025	2030	2035
US 301	I-95 NB EXIT RAMP	B	C	C	C	D
	I-95 NB ENT. RAMP A/B	B / B	B / C	B / C	C / C	C / D
	I-95 SB EXIT RAMP	B	C	C	C	C
	I-95 SB ENT. RAMP A/B	B / B	B / B	B / C	B / C	B / C

RAMP A= First ramp at the direction of travel (loop ramp) ; RAMP B= Second ramp at the direction of travel
 SC 6 results are the same as Alternative 1

Intersection Analysis

Each intersection within the project area was analyzed using volume data illustrated in Figures 5, 6, 7 and 8 as well as volumes for years leading up to design year 2035. The overall intersection Level of Service results of the analysis are shown below in Table 6 – No Build Alternative, Table 7 – Build Alternative 1, and Table 8 – Build Alternative 2.

With the No-Build Alternative, the access to the Jafza Development will be a new intersection along SC 6. This intersection will require signalization by year 2025 as shown in Table 6. The SC 6 interchange area will experience major delays with the phasing in of the Jafza Development. The I-95 ramp intersections with SC 6 will experience unacceptable LOS E in Design Year 2035. Build Alternatives 1 and 2 provide considerable relief to the SC 6 interchange by providing an improved access point for the Jafza Development as well as redirecting some background volumes. Table 7 shows the ramp intersections with SC 6 operating at LOS B in Design Year 2035 under the Build Alternatives.

Alternative 1 requires left turn lanes on US 301 at the interchange entrance ramps, from northbound US 301 to northbound I-95 and southbound US 301 to southbound I-95. This alternative provides acceptable levels of service until year 2030. Increasing volumes from the Jafza Development will cause levels of service to deteriorate, particularly for the southbound ramp intersection. The I-95 southbound exit ramp intersection is expected to operate at a LOS F in Design Year 2035, as illustrated in Table 7. Signalization of this intersection will be necessary in the future, resulting in a LOS B.

Alternative 2 provides loop entrance ramps, eliminating the need for left turns on US 301. The Partial Cloverleaf A design better accommodates the high volumes from the Jafza facility entering southbound I-95, particularly heavy trucks from the site. The loop ramp provides an uninterrupted entrance onto the interstate and removes the left turn conflict. Without the loop ramp, heavy trucks will see increased delays and fuel usage when attempting to turn left onto the entrance ramp, whether waiting on a gap or signal delay when one is eventually installed under Alternative 1. Similarly, the northbound loop ramp provides an uninterrupted movement from northbound US 301 onto northbound I-95 while eliminating the left turn conflict. The improved levels of service for the ramp intersections under Alternative 2 are illustrated in Table 8. Along US 301, the unsignalized intersection of Bonner Ave and the signalized intersection of US 15 in the vicinity of the interchange will experience acceptable levels of service in the design year.

Table 6: Synchro Intersection Levels of Service – No-Build Alternative – PM Peak

Location		2015	2020	2025	2030	2035
US 301	US 301 @ US 15 (Signalized)	B	B	B	B	B
	US 301 @ Bonner Avenue	B	B	B	C	C
	US 301 @ I-95 Southbound Ramp	N/A	N/A	N/A	N/A	N/A
	US 301 @ I-95 Northbound Ramp	N/A	N/A	N/A	N/A	N/A
	US 301 @ SC 6	N/A	N/A	N/A	N/A	N/A
SC 6	SC 6 @ US 15 (Signalized)	B	B	B	B	B
	SC 6 @ I-95 Southbound Ramps (Signalized)	B	C	C	E	E
	SC 6 @ I-95 Northbound Ramps (Signalized)	B	B	C	D	E
	SC 6 @ Laredo Road	B	B	C	C	C
	SC 6 @ Jafza Access (Unsignalized / Signalized)	B / A	D / B	F / B	F / B	F / B

Intersections are unsignalized unless noted otherwise.

Table 7: Synchro Intersection Levels of Service – Build Alternative 1 (Diamond) – PM Peak

Location		2015	2020	2025	2030	2035
US 301	US 301 @ US 15 (Signalized)	B	B	B	B	B
	US 301 @ Bonner Avenue	B	B	C	C	D
	US 301 @ I-95 Southbound Ramp	B	B	C	F	F
	US 301 @ I-95 Northbound Ramp	B	B	B	C	C
	US 301 @ SC 6	B	B	C	C	C
SC 6	SC 6 @ US 15 (Signalized)	B	B	B	B	B
	SC 6 @ I-95 Southbound Ramps (Signalized)	B	B	B	B	B
	SC 6 @ I-95 Northbound Ramps (Signalized)	B	B	B	B	B
	SC 6 @ Laredo Road	B	B	B	B	B

Intersections are unsignalized unless noted otherwise.

Table 8: Synchro Intersection Levels of Service – Build Alternative 2 (Parc-lo A) - PM Peak

Intersection		2015	2020	2025	2030	2035
US 301	US 301 @ US 15 (Signalized)	B	B	B	B	B
	US 301 @ Bonner Avenue	B	B	C	C	D
	US 301 @ I-95 Southbound Ramp	B	B	B	B	B
	US 301 @ I-95 Northbound Ramp	A	A	A	A	B
	US 301 @ SC 6	B	B	C	C	C

Intersections are unsignalized unless noted otherwise.

SC 6 results are the same as Alternative 1.

Safety Analysis

Crash data collected over the last 4 years show low crash rates along US 301 in the interchange area. Low crash rates were also observed along I-95 near US 301 and SC 6, with the majority of crashes being Run Off Road type collisions. Crash summaries can be found in the Appendix. The preferred Alternative 2 *Partial Cloverleaf A* design will have fewer conflict points along US 301 with the installation of loop entrance ramps, eliminating left turn movements for the heavier volumes entering I-95. All entrance and exit ramps will have adequate acceleration and deceleration lanes for proper merging and diverging with I-95 traffic. The control of access along US 301 will run from the east side of the Bonner Ave intersection to the west side of the Jafza Driveway intersection. Modifications to the US 301 interchange are not expected to have a significant adverse effect on safety.

ENVIRONMENTAL DOCUMENT

The environmental document is being prepared by HDR in conjunction with the Interchange Modification Report. In reference to Alternative 3A in the Environmental Assessment, the IMR Analysis reflects that alternative.

CONCLUSION

In conclusion, Alternative 2 is the preferred design. The Partial Cloverleaf A interchange layout will more effectively handle traffic accessing northbound and southbound I-95 via the loop entrance ramps. The loop ramps eliminate the need for left turn lanes on US 301 and provide uninterrupted access to I-95 for the heavier movements. The proposed Alternative 2 design will provide full access to and from I-95 and improve the traffic operations within the US 301 and SC 6 interchanges without negatively impacting the freeway. Conceptual Signing Plans for this interchange alternative are shown in the Appendix. The improvements will serve the needs of the motoring public and the surrounding businesses along US 301 and I-95, particularly the proposed Jafza Development, through year 2035. The proposed improvements, including 1) realignment of the existing SB I-95 exit ramp; 2) construction of new SB I-95 entrance ramp; 3) construction of a new SB I-95 entrance loop ramp that eliminates a left turn movement; 4) construction of a new NB I-95 exit ramp; 5) construction of a new NB I-95 entrance loop ramp that eliminates a left turn movement; 6) realignment of NB I-95 entrance ramp; and 7) extension of US 301 to SC 6 will allow for an increased capacity and improvements to overall traffic operations throughout the project area.

Federal Highway Administration (FHWA) Policy

It is in the national interest to preserve and enhance the Interstate System to meet the needs of the 21st Century by assuring that it provides the highest level of service in terms of safety and mobility. Full control of access along the Interstate mainline and ramps, along with control of access on the crossroad at interchanges, is critical to providing such service. Therefore, FHWA's decision to approve new or revised access points to the Interstate System must be supported by substantiated information justifying and documenting that decision. The FHWA's decision to approve a request is dependent on the proposal satisfying and documenting the following requirements.

- 1. The need being addressed by the request cannot be adequately satisfied by existing interchanges to the Interstate, and/or local roads and streets in the corridor can neither provide the desired access, nor can they be reasonably improved (such as access control along surface streets, improving traffic control, modifying ramp terminals and intersections, adding turn bays or lengthening storage) to satisfactorily accommodate the design-year traffic demands.***

Interstate 95 is the main interstate corridor on the East Coast, paralleling the Atlantic Ocean for approximately 1,927 miles from Miami, Florida to Houlton, Maine at the Canadian border. Within the proposed project area, I-95 is a four-lane divided roadway with paved shoulders and ditches. The posted speed limit along I-95 within the proposed project area is 70 miles per hour. US 301 is a north-south route that runs from Sarasota, Florida to Glasgow, Delaware. The existing I-95 and US 301 Interchange (I-95 Exit 97) is a three-leg interchange that provides only partial access to northbound I-95 from northbound US 301 and to southbound US 301 from southbound I-95. Currently, there are no ramps to access I-95 southbound from northbound US 301 or to access US 301 southbound from I-95 northbound.

The existing SC 6 interchange and roadway segment provides full access to I-95 for local traffic and the planned Jafza facility. Under the No-Build Alternative, the SC 6 roadway segment and interchange will be deficient by year 2030. The Jafza facility 2030 traffic demands cannot be met with access only to SC 6 and without a direct connection to I-95 through the proposed US 301 Connector. The US 15 interchange 4 miles south of US 301 also provides full access to I-95. Due to its distance from the project and Jafza Development, this interchange is not expected to be impacted.

2. ***The need being addressed by the request cannot be adequately satisfied by reasonable transportation system management (such as ramp metering, mass transit, and HOV facilities), geometric design, and alternative improvements to the Interstate without the proposed change(s) in access.***

Two alternative designs included a Diamond configuration and a Partial Cloverleaf A configuration. All of the preliminary interchange alternatives provide full northbound and southbound access from US 301 to I-95 and vice versa. The preliminary analysis results in the partial cloverleaf design as the preferred interchange alternative. Reasoning for selection of this interchange configuration include the rural nature of the area and best option to continue relationship of I-95 with US 301, a minor roadway; more efficient use of space; avoidance of the interweaving traffic flows; and future traffic projections for the area support this type of facility. Neither ramp metering, mass transit, nor HOV facilities are warranted for the existing or design year volumes. These techniques do not improve the operations of the interchange.

3. ***An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis shall, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access. The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, shall be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street network. Request for the proposed change in access must include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network. Each request must also include conceptual plan of the type and location of the signs proposed to support each design alternative.***

The analysis of I-95 includes the interstate facility around the US 301 and SC 6 interchanges, from US 15 south of the interchange to just north of the SC 6 interchange, as well as other roads. The analysis was performed using methodologies and procedures in the Transportation Research Board “Highway Capacity Manual”. The analysis projects there will be no deficiencies in the proposed design. The freeway analysis shows segments north and south of the interchange operating at the same LOS or better with the modifications. The ramp analysis shows that all the ramps are projected to operate at LOS D or better. All intersections are expected to operate at LOS C or better, except for the unsignalized intersection of US 301 and Bonner Avenue, a rural local road operating at LOS D.

4. ***The proposed access connects to a public road only and will provide for all traffic movements. Less than “full interchanges” may be considered on a case-by-case basis for applications requiring special access for managed lanes (e.g., transit, HOVs, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards.***

The proposed design connects US 301 to SC 6, which is a public road, and the interchange provides all traffic movements. The No-Build Alternative does not provide for all movements.

5. ***The proposal considers and is consistent with local and regional land use and transportation plans. Prior to receiving final approval, all requests for new or revised access must be included in an adopted Metropolitan Transportation Plan, in the adopted Statewide or Metropolitan Transportation Improvement Program (STIP or TIP), and the Congestion Management Process with transportation management areas, as appropriate, and as specified in 23 CFR part 450, and the transportation conformity requirements of 40 CFR parts 51 and 93.***

As identified in the LSCOG Long Range Transportation Plan (LRTP) (LSCOG, 2006), and Transportation Improvement Program (TIP) (LSCOG 2009), rapid growth and development in Orangeburg County and aggressive economic development strategies implemented have brought significant industrial development and related infrastructure to the county. The proposed project will contribute to meeting the larger goals of (1) alleviating the rapidly increasing Port of Charleston congestion (2) improving the efficiency of intermodal freight movement in South Carolina and (3) complementing existing manufacturing facilities in Orangeburg County. As indicated in the LRTP, the LSCOG’s Technical Advisory Committee (TAC) unanimously supports the inland port concept and endorsed inclusion of the interchange proposal at I-95 and US 301 in the LRTP. The project is included in the State Transportation Improvements Plan (STIP).

Additionally, the proposed project will provide a safe, efficient vehicular connection to the proposed \$250 million, 1,300-acre inland port intermodal facility (Jafza) located just east of the existing I-95 and US 301 interchange. The Jafza facility will consist of an intermodal rail yard, warehouse related development and office/manufacturing space to facilitate the storage and logistics of the operations. Additionally, a portion of the site will be reserved for future market driven developments. These developments may range from more warehouse related development to commercial development.

Orangeburg County meets the national ambient Air Act Amendments of 1990 (40 CFR §51 and 93) and is considered to be in attainment with the applicable ambient air quality standards. Therefore, no project level air quality analysis was conducted for

this project. It has been determined that this project will have no meaningful potential impacts on air quality.

- 6. In corridors where the potential exists for future multiple interchange additions, a comprehensive corridor or network study must accompany all requests for new or revised access with recommendations that address all proposed and desired access within the context of a longer-range system or network plan.***

This interchange is located in a rural part of Orangeburg County. The potential for future nearby interchanges are low and none are planned at this time.

- 7. When a new or revised access point is due to a new, expanded, or substantial change in current or planned future development or land use, requests must demonstrate coordination has occurred between the development and any proposed transportation system improvements. The request must describe the commitments agreed upon to assure adequate collection and dispersion of the traffic resulting from the development with the adjoining local street network and Interstate access point.***

A public meeting associated with this project was held at Lake Marion High School in Santee, South Carolina on December 3, 2009. The meeting was attended by SCDOT staff, LSCOG staff, Orangeburg County staff, Town of Santee staff, FHWA staff, residents, SCDOT consultant staff, and local media. Sign-in sheets indicate that 97 residents or interested parties attended the meeting. The majority of comments received as a result of the meeting expressed concerns regarding the potential for an increase in traffic (particularly truck traffic) on SC 6 and associated impacts on quality of life for the existing residents along and within hearing of SC 6. “Design Alternatives and Concerns” accounted for 25 responses; “Vegetation” and “Property Concerns (Takings)” accounted for 9 responses each; “Operation Alternatives and Concerns” and “Safety” accounted for 8 responses each; and “Noise” accounted for 7 responses. Eleven respondents indicated that they were happy with the proposed project. Eight respondents requested additional information or a specific action to be taken and 3 respondents identified information that needs to be corrected.

In addition, a planned development underway by GLT Jafza Americas (Jafza) has been considered and evaluated as part of the planning process for the SCDOT project. During the planning phase of the Jafza project, a number of studies were conducted including: traffic studies, a Biological Assessment (endangered species), stream and wetland delineation, Phase 1 Environmental Site Assessment, and a cultural resource survey. In addition, Jafza submitted an application for a Section 404 permit. SCDOT coordinated its studies and agency coordination with those conducted for the Jafza development to ensure continuity and efficiency with the NEPA process. There are no commitments from private sources to fund the project.

8. *The proposal can be expected to be included as an alternative in the required environmental evaluation, review and processing. The proposal should include supporting information and current status of the environmental processing.*

A draft Environmental Assessment (EA) has been reviewed by SCDOT and is being prepared for submittal to FHWA. The project was assessed for possible effects on the human and natural environment, with a determination that no significant environmental impact would occur. In January 2010 a number of state and federal agencies were contacted and asked for their comments on the proposed action. Their responses are included in the EA document.

A Jurisdictional Determination for streams and wetlands located within a portion of the project corridor associated with the Jafza site was issued to Jafza by the USACE on February 24, 2009. Portions of the project that cross the Jafza site include a section of the proposed US 301 Connector from existing LTD Road east to existing SC 6. As part of SCDOT's environmental evaluation of the project area, an approved verification of additional jurisdictional features associated with the SCDOT project was issued by USACE on June 23, 2010. These areas include the project area associated with the interchange at I-95 and US 301 and the portion of the proposed US 301 Connector from I-95 to LTD Road. SCDOT will obtain the necessary Section 404 permit from the U.S. Army Corps of Engineers, and will adhere to any conditions set forth therein during construction.

A public meeting associated with this project was held at Lake Marion High School in Santee, South Carolina on December 3, 2009. Sign-in sheets indicate that 97 residents or interested parties attended the meeting. It is anticipated that a public hearing would be held after the EA is approved by FHWA. Area residents and stakeholders will be afforded the opportunity to review the EA and submit comments at that time.

APPENDIX

I-95 TRAFFIC VOLUME DATA

I-95 VOLUMES

ADT

31050

Rank	Volume	AM/PM	Day of Week	Day	Date	K
1	4741	PM	Sunday	1	12/27/2009	15.3%
2	4547	PM	Sunday	1	12/27/2009	14.6%
3	4485	PM	Sunday	1	12/27/2009	14.4%
4	4399	PM	Sunday	1	11/1/2009	14.2%
5	4328	AM	Sunday	1	12/27/2009	13.9%
6	4296	PM	Sunday	1	12/27/2009	13.8%
7	4207	PM	Saturday	7	12/26/2009	13.5%
8	4191	PM	Saturday	7	1/2/2010	13.5%
9	4180	AM	Saturday	7	1/2/2010	13.5%
10	4169	PM	Saturday	7	12/26/2009	13.4%
11	4053	PM	Friday	6	4/2/2010	13.1%
12	4051	PM	Saturday	7	12/26/2009	13.0%
13	4040	PM	Friday	6	4/2/2010	13.0%
14	4001	PM	Saturday	7	1/2/2010	12.9%
15	3995	PM	Wednesday	4	11/25/2009	12.9%
16	3981	AM	Saturday	7	4/3/2010	12.8%
17	3980	PM	Saturday	7	12/26/2009	12.8%
18	3974	PM	Saturday	7	1/2/2010	12.8%
19	3942	PM	Monday	2	12/28/2009	12.7%
20	3886	AM	Friday	6	4/2/2010	12.5%
21	3864	PM	Saturday	7	12/26/2009	12.4%
22	3859	PM	Saturday	7	6/12/2010	12.4%
23	3851	PM	Tuesday	3	12/22/2009	12.4%
24	3851	AM	Friday	6	4/2/2010	12.4%
25	3846	PM	Friday	6	4/2/2010	12.4%
26	3845	PM	Sunday	1	12/27/2009	12.4%
27	3840	PM	Saturday	7	8/14/2010	12.4%
28	3831	PM	Saturday	7	4/3/2010	12.3%
29	3787	PM	Saturday	7	8/14/2010	12.2%
30	3778	AM	Saturday	7	1/2/2010	12.2%
31	3766	AM	Saturday	7	12/26/2009	12.1%
32	3751	AM	Sunday	1	12/27/2009	12.1%
33	3751	PM	Monday	2	12/28/2009	12.1%
34	3751	PM	Wednesday	4	12/30/2009	12.1%
35	3734	PM	Sunday	1	1/3/2010	12.0%
36	3703	PM	Saturday	7	4/3/2010	11.9%
37	3699	PM	Wednesday	4	12/30/2009	11.9%
38	3692	PM	Wednesday	4	11/25/2009	11.9%
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44	3667	PM	Saturday	7	4/3/2010	11.8%
45	3653	PM	Sunday	1	1/3/2010	11.8%
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51	3615	PM	Tuesday	3	12/22/2009	11.6%
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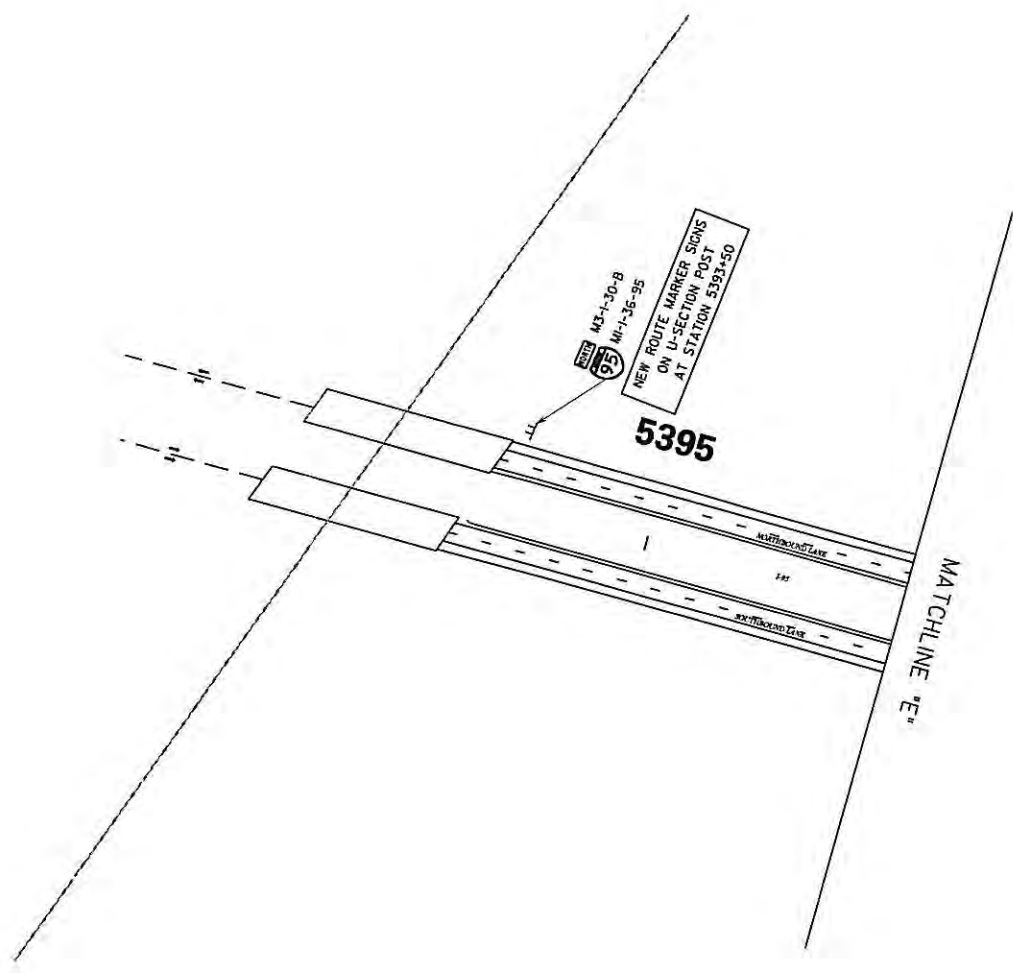
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SIGNING PLANS

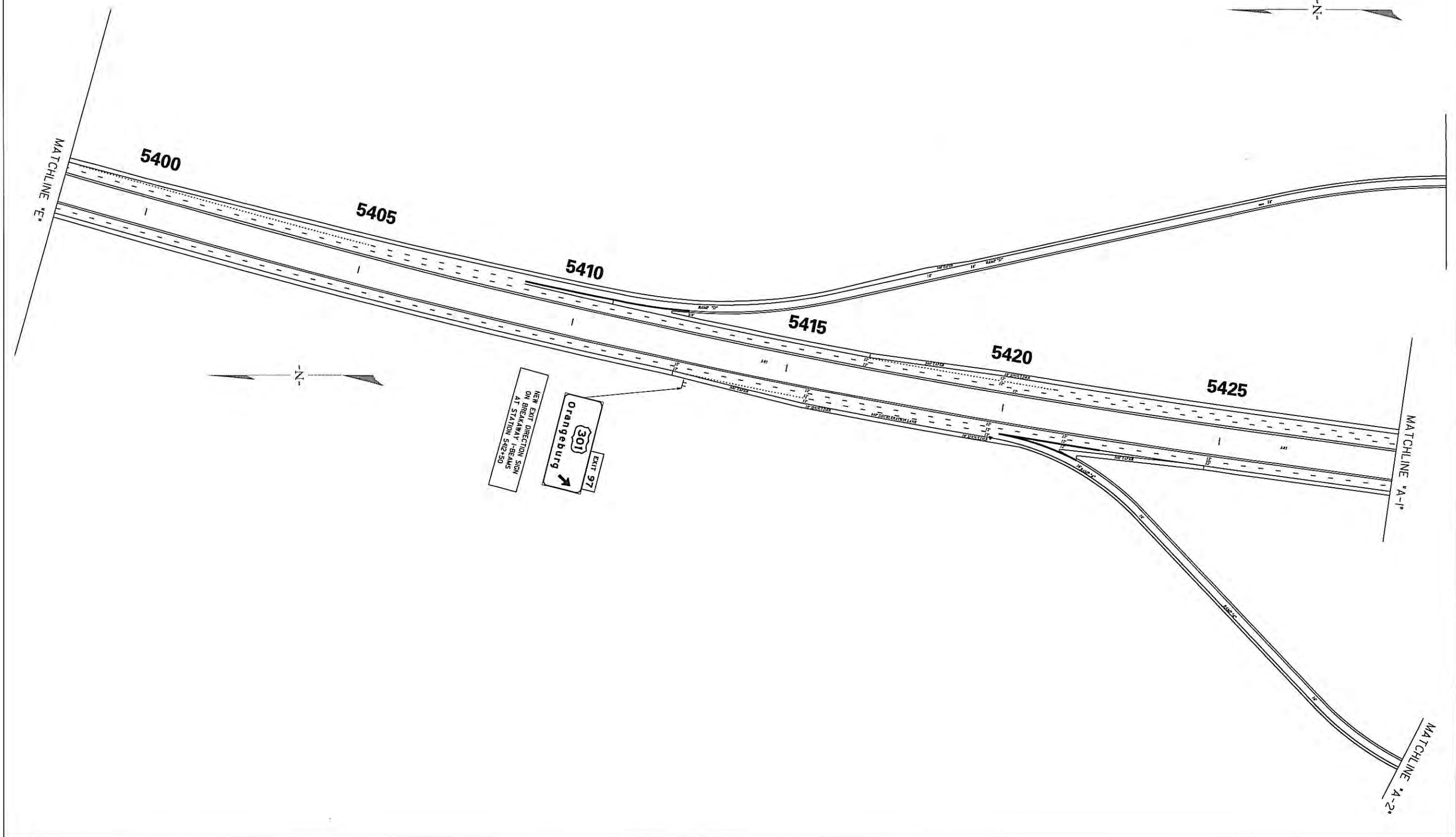
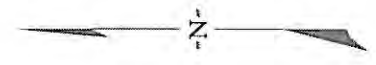
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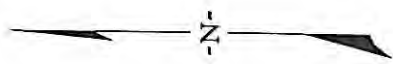
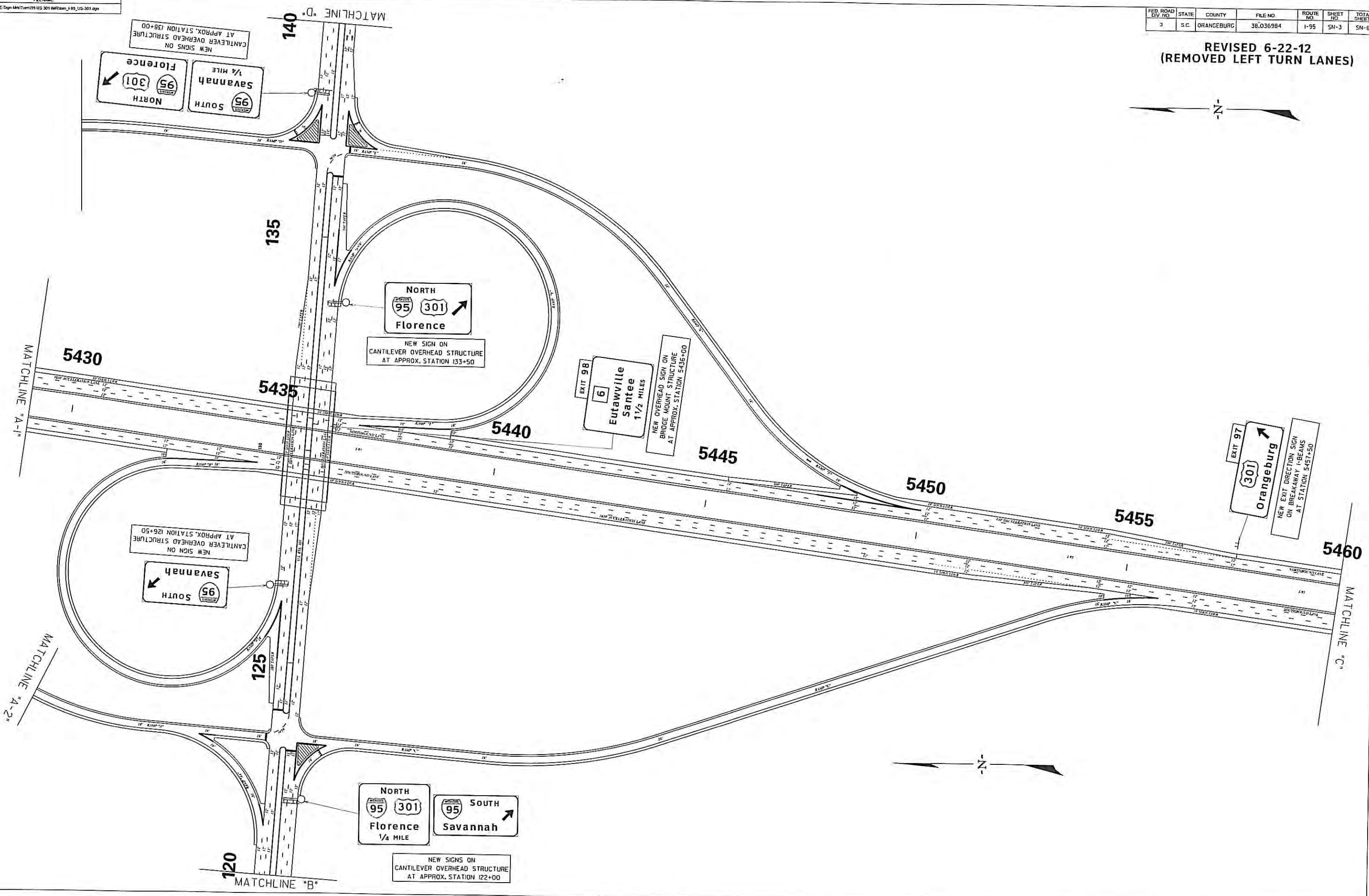
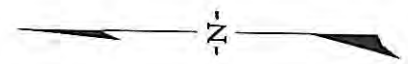


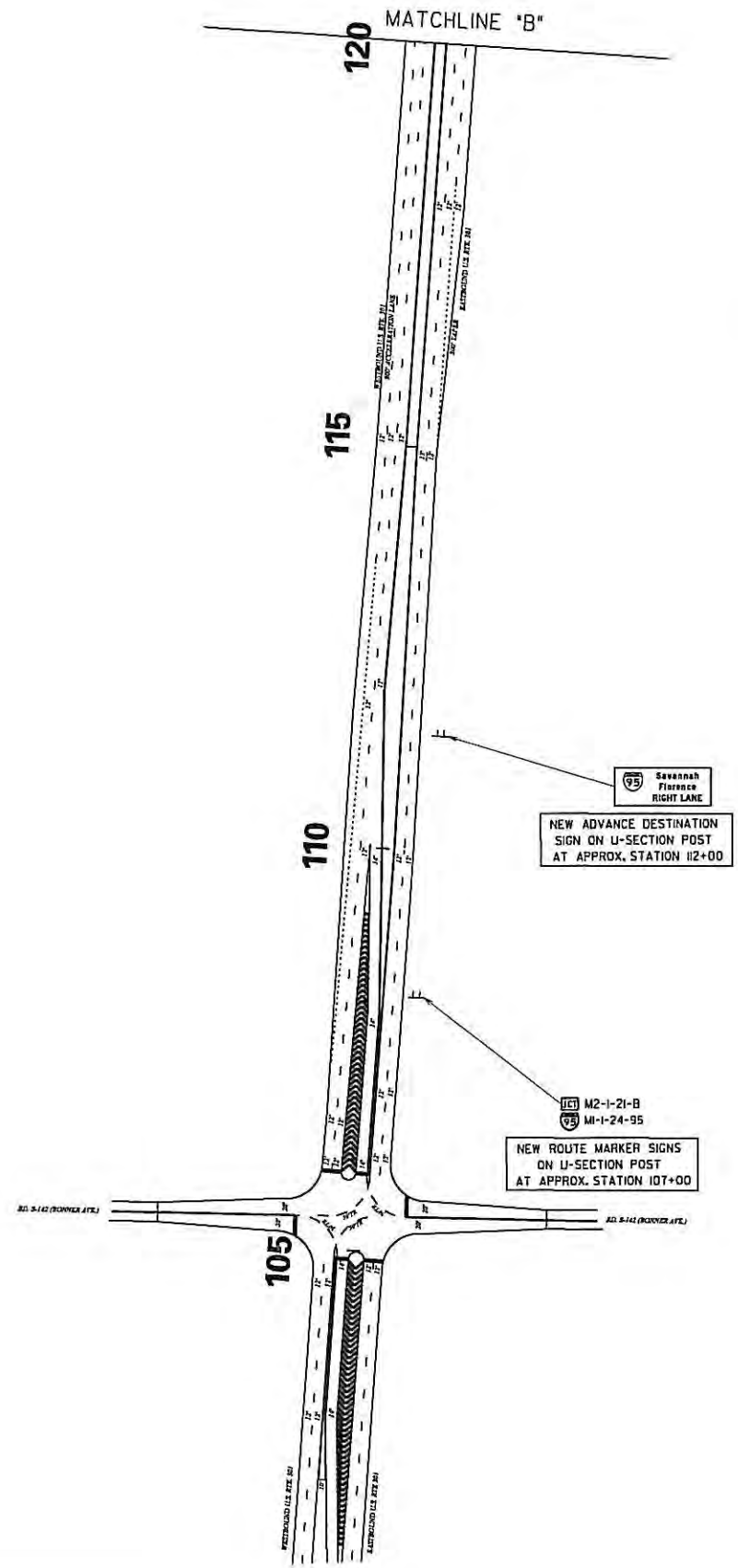
NEW EXIT DIRECTION SIGN
ON BREAKAWAY I-BEAMS
AT STATION 5424.50

Orangeburg
301
EXIT 97

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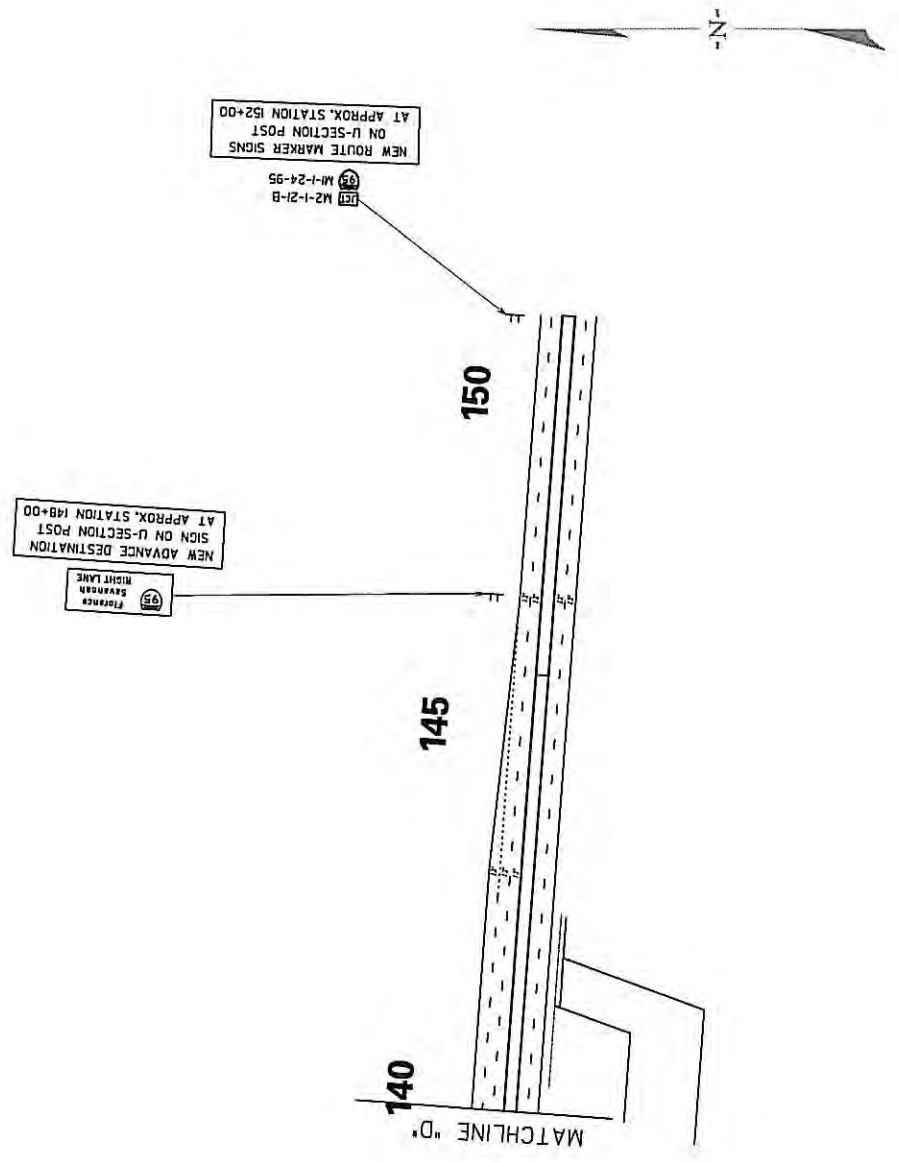
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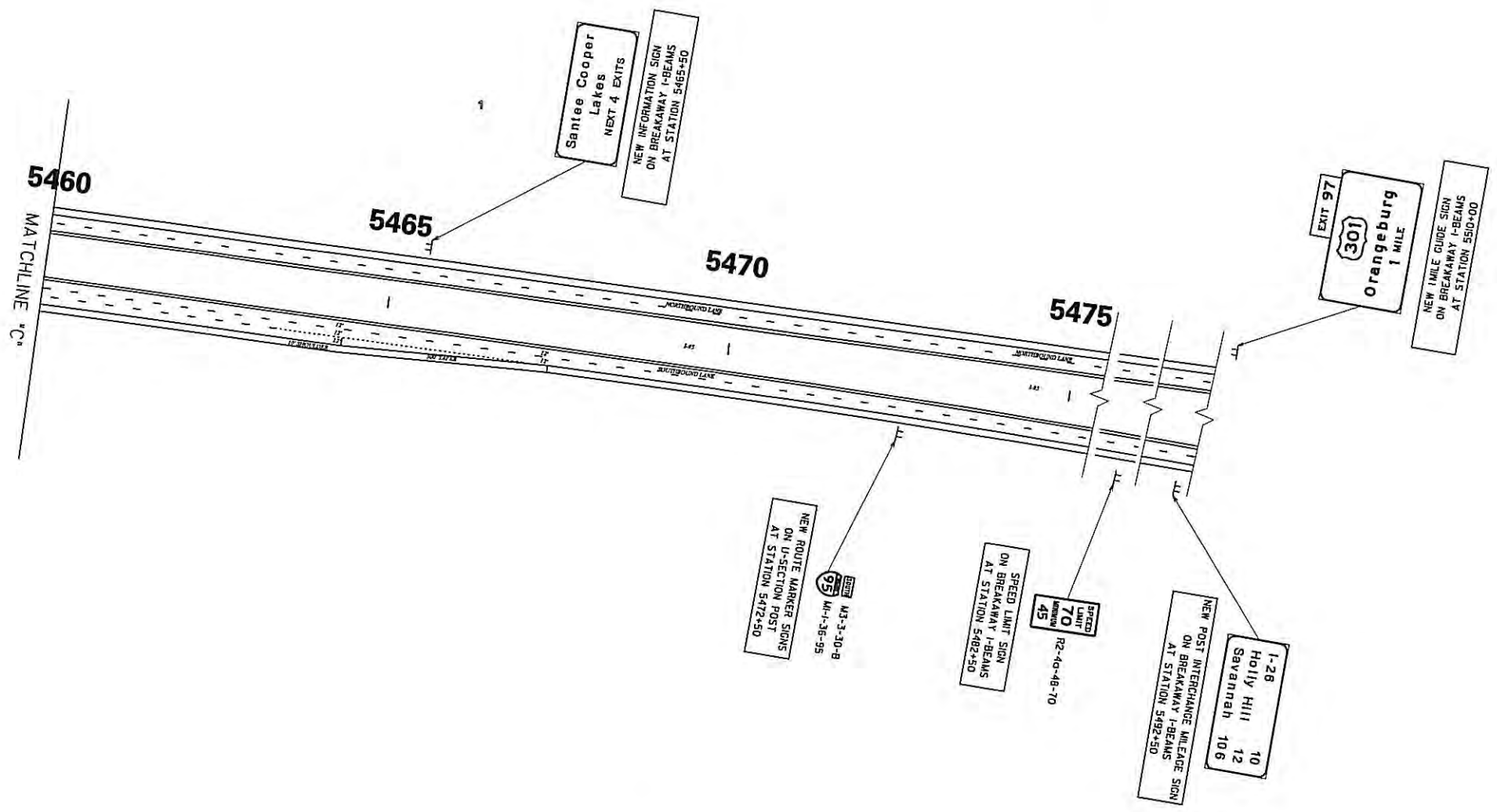




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3	S.C.	ORANGEBURG	38.036984	1-95	SN-5	SN-6





CRASH SUMMARIES

Crash Summary
US 15 from MPT 12.74 (US 301) to MPT 14.23 (I-95)
Orangeburg County
01-01-2008 to 11-30-2011 3.92 years
Length = 1.49 miles
AADT = 4,400
Functional Class - Rural Minor Arterial 4L

Crashes by Injury Class

Fatality Crashes	0
Injury Crashes	5
PDO Crashes	10

Total Crashes	15
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Crashes By Manner of Collision

Rear End	3
Angle	3
Sideswipe	4
Head On	0
Run Off Road	4
Other	1

Total Crashes	15
----------------------	-----------

Special Contributing Factors

Animal	0
Bicycle	0
Pedestrian	0

Orangeburg County US 15 from MPT 12.74 (US 301) to MPT 14.23 (I-95)



Section Crashes

MPT 12.740 to 12.790 (Stack #1)

Total Crashes: 5 Light: 4 Dark: 1 Dry: 5 Wet: 0 Fatalities: 0 Injuries: 2 PDO: 3

8123573	DAYLIGHT		DRY	INJ3	NOT COLLISION W/MOTOR VEHICLE
9013225	DAYLIGHT		DRY	INJ0	ANGLE 3
9071407	DAYLIGHT		DRY	INJ0	SIDESWIPE SAME DIRECTION
9132825	DARK (LIGHTING UNSPECIFIED)		DRY	INJ2	ANGLE 1
11543743	DAYLIGHT		DRY	INJ0	

MPT 12.940 to 12.990 (Stack #5)

Total Crashes: 1 Light: 1 Dark: 0 Dry: 1 Wet: 0 Fatalities: 0 Injuries: 0 PDO: 1

9079310	DAYLIGHT		DRY	INJ0	SIDESWIPE SAME DIRECTION
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MPT 13.140 to 13.190 (Stack #9)

Total Crashes: 1 Light: 0 Dark: 1 Dry: 1 Wet: 0 Fatalities: 0 Injuries: 0 PDO: 1

9144569	DARK (NO LIGHTS)		DRY	INJ0	NOT COLLISION W/MOTOR VEHICLE
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MPT 13.240 to 13.290 (Stack #11)

Total Crashes: 3 Light: 2 Dark: 1 Dry: 2 Wet: 1 Fatalities: 0 Injuries: 1 PDO: 2

9003875	DARK (NO LIGHTS)		WET	INJ1	ANGLE 2
10003523	DAYLIGHT		DRY	INJ0	REAR END
11542749	DAYLIGHT		DRY	INJ0	

MPT 13.540 to 13.590 (Stack #17)

Total Crashes: 2 Light: 1 Dark: 1 Dry: 2 Wet: 0 Fatalities: 0 Injuries: 1 PDO: 1

9063545	DAYLIGHT		DRY	INJ1	NOT COLLISION W/MOTOR VEHICLE
9089736	DARK (NO LIGHTS)		DRY	INJ0	REAR END

MPT 13.640 to 13.690 (Stack #19)

Total Crashes: 1 Light: 1 Dark: 0 Dry: 1 Wet: 0 Fatalities: 0 Injuries: 0 PDO: 1

8084347	DAYLIGHT		DRY	INJ0	NOT COLLISION W/MOTOR VEHICLE
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MPT 13.740 to 13.790 (Stack #21)

Total Crashes: 1 Light: 1 Dark: 0 Dry: 1 Wet: 0 Fatalities: 0 Injuries: 1 PDO: 0

11542591	DAYLIGHT		ICE	INJ1	
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MPT 13.790 to 13.840 (Stack #22)

Total Crashes: 1 Light: 0 Dark: 1 Dry: 0 Wet: 1 Fatalities: 0 Injuries: 0 PDO: 1

10016040	DARK (NO LIGHTS)		ICE	INJ0	NOT COLLISION W/MOTOR VEHICLE
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Crash Summary
I-95 NB Ramps & SC 6
Orangeburg County
01-01-2008 to 11-30-2011 3.92 Years

Crashes by Injury Class

Fatality Crashes	0
Injury Crashes	1
PDO Crashes	3

Total Crashes 4

Crashes By Manner of Collision

Rear End	1
Angle	3
Sideswipe	0
Head On	0
Run Off Road	0
Other	0

Total Crashes 4

Special Contributing Factors

Animal	0
Bicycle	0
Pedestrian	0

Crash Summary
I-95 SB Ramps & SC 6
Orangeburg County
01-01-2008 to 11-30-2011 3.92 Years

Crashes by Injury Class

Fatality Crashes	0
Injury Crashes	1
PDO Crashes	5

Total Crashes 6

Crashes By Manner of Collision

Rear End	4
Angle	2
Sideswipe	0
Head On	0
Run Off Road	0
Other	0

Total Crashes 6

Special Contributing Factors

Animal	0
Bicycle	0
Pedestrian	0