

**FINAL
TOLL TRAFFIC OPERATIONS
TECHNICAL MEMORANDUM**

GASTON EAST-WEST CONNECTOR

STIP PROJECT NO. U-3321

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- A. Traffic Forecast Model AADT and Peak Hour Plots from M/A/B
- B. Individual Element Analysis Worksheets

1 BACKGROUND

1.1 Proposed Action

The North Carolina Turnpike Authority proposes to improve east-west travel between I-85 west of Gastonia in Gaston County and I-485/NC 160 in Mecklenburg County. The Gaston East-West Connector is designated as STIP Project Number U-3321 in the NCDOT's *Draft 2009-2015 Transportation Improvement Program* (STIP). **Figure 1-1** shows the general project location.

1.2 Project Alternatives

There are twelve new location Detailed Study Alternatives (DSA) under consideration for the proposed project. The corridor segments comprising these twelve DSAs are shown in **Table 1-1** and **Figure 1-2**.

Table 1-1: Corridor Segments Comprising Each Detailed Study Alternative

Detailed Study Alternative #	West Area - generally west of US 321	Central Area – Generally east of US 321 and west of NC 279 or the South Fork Catawba River	East Area – generally east of NC 279 or the South Fork Catawba River
	H Segments	J Segments	K Segments
4	H2A-H3	J4a-J4b-J2c-J2d-J5a-J5b	K2A-KX1-K3B-K3C
5	H2A-H3	J4a-J2b-J2c-J2d-JX4-J1e-J1f	K1A-K1B-K1C-K4A
9	H2A-H3	J4a-J2b-J2c-J2d-JX4-J1e-J1f	K1A-K3A-K3B-K3C
22	H2A-H2B-H2C	J3-J2c-J2d-J5a-J5b	K2A-KX1-K3B-K3C
23	H2A-H2B-H2C	J3-J2c-J2d-JX4-J1e-J1f	K1A-K1B-K1C-K4A
27	H2A-H2B-H2C	J3-J2c-J2d-JX4-J1e-J1f	K1A-K3A-K3B-K3C
58	H1A-H1B-H1C	J1a-JX1-J2d-J5a-J5b	K2A-KX1-K3B-K3C
64	H1A-H1B-H1C	J1a-J1b-J1c-J1d-J1e-J1f	K1A-K1B-K1C-K4A
68	H1A-H1B-H1C	J1a-J1b-J1c-J1d-J1e-J1f	K1A-K3A-K3B-K3C
76	H1A-HX2	J2a-J2b-J2c-J2d-J5a-J5b	K2A-KX1-K3B-K3C
77	H1A-HX2	J2a-J2b-J2c-J2d-JX4-J1e-J1f	K1A-K1B-K1C-K4A
81	H1A-HX2	J2a-J2b-J2c-J2d-JX4-J1e-J1f	K1A-K3A-K3B-K3C

Refer to the attached **Figure 1-2** for a map of the Detailed Study Alternatives and their corridor segments

1.3 Previous Analysis

In December 2007, the *Gaston East-West Connector Traffic Operations Technical Memorandum* was completed. At that time, project traffic forecasts assumed that the Connector would operate as a non-toll facility. The report presented the traffic operations analysis of the Connector in support of the preparation of preliminary engineering designs for the DSAs, which were completed in early 2008.

1.4 Purpose of Report

Since the completion of the *East-West Connector Traffic Operations Technical Memorandum*, a new project traffic forecast was completed assuming that the Connector would operate as a tolled facility. A comparison between the non-toll traffic forecast and the toll traffic forecast showed that the toll traffic forecast is lower for the Connector mainline and ramp segments. However, several cases exist where individual turning movements at Connector ramp terminal intersections are higher under the toll traffic scenario and one case exists where ramp volumes increased at the I-85 interchange at Bessemer City Road.

As a result, the Authority requested that the Connector ramp terminal intersections at the service interchanges be reanalyzed using the new toll traffic forecasts. Because the mainline traffic on the Connector was found to be lower under the toll traffic scenario, it was determined that the system interchanges with the Connector and I-85 and I-485 would not need to be reanalyzed.

At the interchange with I-85 and Bessemer City Road the traffic forecast for the southbound off-ramp and the northbound on-ramp had an increase in volumes under the toll traffic scenario for modeled corridor 4. At this interchange, the SB ramp diverge analysis, NB ramp merge analysis and two ramp terminal intersections affected by the increase in volumes have been reanalyzed to ensure that adequate capacity was provided with the preliminary designs.. The reanalysis of these elements of the Bessemer City Road interchange can be found in **Appendix B**.

The purpose of this report is to present the toll traffic operations analysis so it can be verified that the preliminary designs for the DSAs will still provide adequate capacity if the Connector is constructed as a tolled facility.

This analysis includes:

- A summary of the 2030 daily and peak hour toll traffic forecasts prepared by Martin/Alexiou/Bryson and a comparison of these forecasts to the non-toll forecasts found in the *East-West Connector Traffic Operations Technical Memorandum*.
- Verification that all basic freeway segments, system interchange ramps, merge locations, and diverge locations will operate with an equal or better LOS under the toll traffic scenario compared to the non-toll traffic scenario.
- A reanalysis of the ramp terminal intersections at the service interchanges using the new toll traffic forecasts.

2 FORECAST VOLUMES

2.1 Modeled Scenarios

Traffic forecasts were prepared by Martin/Alexiou/Bryson (M/A/B) and described in the technical memorandum titled *Gaston East-West Connector Traffic Forecasting and System Level Analysis for the Detailed Study Alternatives – Revised* (April 2007).

Although twelve DSAs are being considered for the Gaston East-West Connector project, six year 2030 representative non-toll scenario traffic model corridors (Detailed Study Alternatives [DSAs] 4, 5, 58, 64, 76 and 77) were developed for the *East-West Connector Traffic Operations Technical Memorandum*. According to M/A/B, “The regional model lacks sufficient precision to accurately distinguish among some of the detailed study alternatives. Coding these alignments and assigning traffic to them would yield results that would not differ in any meaningful way. Therefore, traffic forecasts for alternatives involving such segments were obtained by manually adjusting forecasts obtained from the most similar coded alternatives.” (M/A/B, April 2007, page 3).

For the non-toll / toll traffic operations analysis comparison found in this report, M/A/B prepared a sampling of toll traffic forecasts for representative DSAs 4, 64, and 77. For the purpose of this report, the modeled DSAs are referred to as modeled corridors 4, 64, and 77, and are shown in **Figure 2-1**.

2.2 Traffic Forecast Results

The travel demand model generated year 2030 toll traffic forecasts for all mainline segments, ramp segments and turning movements between the Connector and Y-lines for the three modeled representative DSAs in the form of Annual Average Daily Traffic (AADT). Dual Truck% and TTST% for mainline segments were provided in the forecast. Projected Year 2030 toll traffic AADT volumes for the three modeled alternatives can be found in **Table 2-1**. The Year 2030 non-toll traffic volumes as found in the *East-West Connector Traffic Operations Technical Memorandum* are also provided for comparison purposes. The toll traffic AADT volume plots are contained in **Appendix A**.

Table 2-1: Year 2030 Segment Two-Way Average Annual Daily Toll Traffic Volumes (vehicles/day)

Segment	Modeled Alternative					
	4*		64		77*	
	Toll Traffic	Non-Toll Traffic	Toll Traffic	Non-Toll Traffic	Toll Traffic	Non-Toll Traffic
I-85 to US 29/74	12,800	25,000	10,000	16,700	12,200	22,500
US 29/74 to Linwood Road	20,800	42,500	11,400	35,500	18,000	43,100
Linwood Road to Lewis Road	15,400	47,400	9,600	35,300	17,400	46,500
Lewis Road to US 321	15,400	47,400	14,200	44,500	17,400	46,500

Table 2-1: Year 2030 Segment Two-Way Average Annual Daily Toll Traffic Volumes (vehicles/day)

Segment	Modeled Alternative					
	4*		64		77*	
	Toll Traffic	Non-Toll Traffic	Toll Traffic	Non-Toll Traffic	Toll Traffic	Non-Toll Traffic
US 321 to Robinson Road	20,000	52,400	18,800	49,400	21,400	53,000
Robinson Road to Bud Wilson Road	29,200	61,200	29,400	57,600	30,400	62,600
Bud Wilson Road to NC 274	28,000	59,600	28,600	57,200	28,200	58,400
NC 274 to NC 279	31,600	61,600	35,000	62,600	34,800	65,200
NC 279 to NC 273	42,200	78,400	44,200	79,000	43,400	82,000
NC 273 to Dixie River Road	58,400	106,400	61,800	105,200	60,600	110,800
Dixie River Road to I-485	55,400	96,800	54,400	89,400	53,000	93,800

* Modeled alternative does not have an interchange at Lewis Road

Table 2-1 shows that for all mainline segments on the Connector, the forecast AADT toll volumes are lower than the forecast non-toll AADT volumes.

Design year (2030) AM and PM peak hour toll traffic mainline segment, ramp segment, and ramp terminal intersection turning movement volumes were developed from AADT forecast volumes for the three modeled corridors following NCDOT Congestion Management Section’s volume breakout guidelines.

The M/A/B toll traffic forecasts and the NCDOT peak hour toll traffic volume breakout sheets can be found in **Appendix A**.

The volumes obtained from the peak hour breakout sheets were balanced between interchanges. The adjustments to the raw breakout sheet calculations and the overall balanced toll volumes can be found in **Appendix A**.

3 BASIC FREEWAY SEGMENT VOLUME COMPARISON BETWEEN TOLL AND NON-TOLL FORECASTS

A comparison between toll and non-toll peak hour volumes was completed to determine what operations analysis locations needed to be reanalyzed. The *East-West Connector Traffic Operations Technical Memorandum* provided analysis for basic freeway segments, ramp merge and diverge areas, weaving areas, and ramp terminal intersections. It was assumed that if, for any freeway or surface street analysis location, the toll traffic volumes were lower than the non-toll volumes, the calculated Level of Service (LOS) for that location could not be worse under the toll traffic scenario.

It is noted that many of the modeled corridors analyzed in the *East-West Connector Traffic Operations Technical Memorandum* overlap as they travel on the Connector between I-85 and I-485. Due to the overlap, many of the proposed interchanges are common to one or more representative modeled corridors. When more than one modeled corridor passed through an interchange location, traffic volumes from each of the corridors was compared, and traffic from the corridor with the highest volume was used for the traffic operations analysis. Because traffic patterns between modeled corridors at a location are consistent, by analyzing the corridor with the highest traffic volumes, a conservative analysis approach was taken and the interchange geometry developed will provide acceptable traffic operations regardless of which corridor volumes were used.

Analysis provided in this report looks at a comparison of modeled corridors 4, 64, and 77. These three corridors were selected because together they pass through all the interchange locations along the project study area. Modeled corridor 4 was selected due to the fact that it was the most northern corridor and modeled corridor 64 was selected because it was the southern most corridor. Finally, modeled corridor 77 was selected because it included crossover segments between corridors 4 and 64.

When comparing toll traffic and non-toll traffic at the service interchanges, it is noted that, for the reasons explained above, the toll traffic volumes for these corridors could be compared to non-toll traffic volumes from another corridor passing through the same interchange. In these cases, the non-toll traffic modeled corridor is identified in the figures.

A comparison between AM and PM peak hour basic freeway segment volumes for modeled corridor 4 between the US 29/74 and I-485 interchanges can be found in **Table 3-1**.

Table 3-1: Basic Freeway Segment Toll and Non-toll Year 2030 Peak Hour Volumes for Modeled Corridor 4

Description	Toll Traffic AM (PM) Peak Hour Volume	Non-Toll Traffic AM (PM) Peak Hour Volume
<i>East / West Connector Segments</i>		
Connector EB, between US 29/74 and Linwood Road	1,090 (990)	2,630 (1,750)
Connector WB, between US 29/74 and Linwood Road	990 (1,090)	1,750 (2,630)
Connector EB, between Linwood Rd and US 321	900 (680)	2,930 (1,950)
Connector WB, between Linwood Rd and US 321	680 (900)	1,950 (2,930)
Connector EB, between US 321 and Robinson Road	1,230 (800)	3,170 (2,130)
Connector WB, between US 321 and Robinson Road	800 (1,230)	2,130 (3,170)
Connector EB, between Robinson Road and Bud Wilson Road	1,730 (1,200)	3,740 (2,480)
Connector WB, between Robinson Road and Bud Wilson Road	1,200 (1,730)	2,480 (3,740)

Table 3-1: Basic Freeway Segment Toll and Non-toll Year 2030 Peak Hour Volumes for Modeled Corridor 4

Description	Toll Traffic AM (PM) Peak Hour Volume	Non-Toll Traffic AM (PM) Peak Hour Volume
Connector EB, between Bud Wilson Road and NC 274	1,670 (1,120)	3,500 (2,340)
Connector WB, between Bud Wilson Road and NC 274	1,120 (1,670)	2,340 (3,500)
Connector EB, between NC 274 and NC 279	1,880 (1,250)	3,800 (2,530)
Connector WB, between NC 274 and NC 279	1,250 (1,880)	2,530 (3,800)
Connector EB, between NC 279 and NC 273	2,530 (1,660)	4,730 (3,160)
Connector WB, between NC 279 and NC 273	1,660 (2,530)	3,160 (4,730)
Connector EB, between NC 273 and Dixie River Road	3,430 (2,360)	6,470 (4,320)
Connector WB, between NC 273 and Dixie River Road	2,360 (3,430)	4,320 (6,470)
Connector EB, between Dixie River Road and I-485	3,290 (2,210)	5,910 (3,940)
Connector WB, between Dixie River Road and I-485	2,210 (3,290)	3,940 (5,910)

A comparison between AM and PM peak hour basic freeway segment volumes for modeled corridor 64 can be found in **Table 3-2**.

Table 3-2: Basic Freeway Segment Toll and Non-toll Year 2030 Peak Hour Volumes for Modeled Corridor 64

Description	Toll Traffic AM (PM) Peak Hour Volume	Non-Toll Traffic AM (PM) Peak Hour Volume
<i>East / West Connector Segments</i>		
Connector EB, between US 29/74 and Linwood Road	620 (540)	2,590 (1,730)
Connector WB, between US 29/74 and Linwood Road	540 (620)	1,730 (2,590)
Connector EB, between Linwood Rd and Lewis Road	550 (430)	2,780 (1,870)
Connector WB, between Linwood Rd and Lewis Road	430 (550)	1,870 (2,780)
Connector EB, between Lewis Road and US 321	810 (600)	2,750 (1,830)

Table 3-2: Basic Freeway Segment Toll and Non-toll Year 2030 Peak Hour Volumes for Modeled Corridor 64

Description	Toll Traffic AM (PM) Peak Hour Volume	Non-Toll Traffic AM (PM) Peak Hour Volume
Connector WB, between Lewis Road and US 321	600 (810)	1,830 (2,750)
Connector EB, between US 321 and Robinson Road	1,190 (750)	3,090 (2,060)
Connector WB, between US 321 and Robinson Road	750 (1,190)	2,060 (3,090)
Connector EB, between Robinson Road and Bud Wilson Road	1,730 (1,210)	3,450 (2,310)
Connector WB, between Robinson Road and Bud Wilson Road	1,210 (1,730)	2,310 (3,450)
Connector EB, between Bud Wilson Road and NC 274	1,700 (1,160)	3,430 (2,290)
Connector WB, between Bud Wilson Road and NC 274	1,160 (1,700)	2,290 (3,430)
Connector EB, between NC 274 and NC 279	2,140 (1,380)	3,910 (2,610)
Connector WB, between NC 274 and NC 279	1,380 (2,140)	2,610 (3,910)
Connector EB, between NC 279 and NC 273	2700 (1,740)	4920 (3,280)
Connector WB, between NC 279 and NC 273	1740 (2,700)	3280 (4,920)
Connector EB, between NC 273 and Dixie River Road	3450 (2,600)	6,650 (4,430)
Connector WB, between NC 273 and Dixie River Road	2600 (3,540)	4,430 (6,650)
Connector EB, between Dixie River Road and I-485	3,300 (2,160)	5,630 (3,750)
Connector WB, between Dixie River Road and I-485	2,160 (3,300)	3,750 (5,630)

A comparison between AM and PM peak hour basic freeway segment volumes for modeled corridor 77 can be found in **Table 3-3**.

Table 3-3: Basic Freeway Segment Toll and Non-toll Year 2030 Peak Hour Volumes for Modeled Corridor 77

Description	Toll Traffic AM (PM) Peak Hour Volume	Non-Toll Traffic AM (PM) Peak Hour Volume
<i>East / West Connector Segments</i>		
Connector EB, between US 29/74 and Linwood Road	1,010 (810)	2,590 (1,730)
Connector WB, between US 29/74 and Linwood Road	810 (1,010)	1,730 (2,590)
Connector EB, between Linwood Rd and US 321	1,010 (750)	2,780 (1,870)
Connector WB, between Linwood Rd and US 321	750 (1,010)	1,870 (2,780)
Connector EB, between US 321 and Robinson Road	1,300 (870)	3,170 (2,130)
Connector WB, between US 321 and Robinson Road	870 (1,300)	2,130 (3,170)
Connector EB, between Robinson Road and Bud Wilson Road	1,750 (1,260)	3,740 (2,480)
Connector WB, between Robinson Road and Bud Wilson Road	1,260 (1,750)	2,480 (3,740)
Connector EB, between Bud Wilson Road and NC 274	1,660 (1,140)	3,500 (2,340)
Connector WB, between Bud Wilson Road and NC 274	1,140 (1,660)	2,340 (3,500)
Connector EB, between NC 274 and NC 279	2,110 (1,380)	3,910 (2,610)
Connector WB, between NC 274 and NC 279	1,380 (2,110)	2,610 (3,910)
Connector EB, between NC 279 and NC 273	2,710 (1,670)	4,920 (3,280)
Connector WB, between NC 279 and NC 273	1,670 (2,710)	3,280 (4,920)
Connector EB, between NC 273 and Dixie River Road	3,500 (2,520)	6,650 (4,430)
Connector WB, between NC 273 and Dixie River Road	2,520 (3,500)	4,430 (6,650)
Connector EB, between Dixie River Road and I-485	3,230 (2,100)	5,630 (3,750)
Connector WB, between Dixie River Road and I-485	2,100 (3,230)	3,750 (5,630)

As seen in **Tables 3-1, 3-2, and 3-3**, basic freeway segment peak hour volumes for modeled corridors 4, 64, and 77 are all lower in the toll traffic forecasts, compared to the non-toll traffic forecasts. Therefore, no additional analysis is recommended for the basic freeway segments, and the preliminary basic freeway segment designs prepared based on the analysis found in the *East-West Connector Traffic Operations Technical Memorandum* will provide an acceptable LOS though the year 2030 if the East-West Connector is built as a toll facility.

4 RAMP SEGMENT VOLUME COMPARISON BETWEEN TOLL AND NON-TOLL FORECASTS

To determine whether ramp merge and diverge areas warrant reanalysis using toll traffic, a comparison between AM and PM peak hour on and off-ramp volumes was conducted. It was assumed that since the basic freeway segment analysis showed that the East-West Connector mainline would operate at an acceptable LOS with toll traffic, if peak hour volumes on ramp segments are lower under the toll traffic scenario, then the ramp merge or diverge areas will also operate with an acceptable LOS.

At the Bessemer City road interchange, one ramp merge location (Northbound on-ramp) and one ramp diverge location (Southbound off-ramp) was identified for reanalysis because they have a forecasted toll volume significantly higher than the non-toll volume. These individual elements were reanalyzed with the toll volumes to ensure that they would still operate with an acceptable LOS.

A comparison between AM and PM peak hour ramp segment volumes for modeled corridor 4 can be found in **Table 4-4**.

Table 4-4: Ramp Segment Toll and Non-toll Year 2030 Peak Hour Volumes for Modeled Corridor 4

Description	Toll Traffic AM (PM) Peak Hour Volume	Non-Toll Traffic AM (PM) Peak Hour Volume
<i>Bessemer City Road Interchange Ramps</i>		
Northbound off-ramp	220 (350)	300 (200)
Northbound on-ramp	900 (380)	350 (250)
Southbound off-ramp	380 (900)	250 (360)
Southbound on-ramp	350 (220)	200 (300)
<i>Linwood Road Interchange Ramps</i>		
Eastbound off-ramp	310 (370)	440 (290)
Eastbound on-ramp	120 (60)	740 (490)
Westbound off-ramp	60 (120)	490 (740)
Westbound on-ramp	370 (310)	290 (440)
<i>US 321 Interchange Ramps</i>		
Eastbound off-ramp	230 (220)	570 (390)
Eastbound on-ramp	560 (340)	960 (650)

Table 4-4: Ramp Segment Toll and Non-toll Year 2030 Peak Hour Volumes for Modeled Corridor 4

Description	Toll Traffic AM (PM) Peak Hour Volume	Non-Toll Traffic AM (PM) Peak Hour Volume
Westbound off-ramp	340 (560)	650 (960)
Westbound on-ramp	220 (230)	390 (570)
<i>Robinson Road Interchange Ramps</i>		
Eastbound off-ramp	80 (60)	310 (210)
Eastbound on-ramp	580 (460)	780 (520)
Westbound off-ramp	460 (580)	520 (780)
Westbound on-ramp	60 (80)	210 (310)
<i>Bud Wilson Road Interchange Ramps</i>		
Eastbound off-ramp	90 (100)	500 (340)
Eastbound on-ramp	30 (20)	250 (170)
Westbound off-ramp	20 (30)	170 (250)
Westbound on-ramp	100 (90)	340 (500)
<i>NC 274 Interchange Ramps</i>		
Eastbound off-ramp	320 (280)	590 (390)
Eastbound on-ramp	530 (410)	740 (490)
Westbound off-ramp	410 (530)	490 (740)
Westbound on-ramp	280 (320)	390 (590)
<i>NC 279 Interchange Ramps</i>		
Eastbound off-ramp	140 (150)	340 (220)
Eastbound on-ramp from SB NC 279	580 (420)	910 (610)
Eastbound on-ramp from NB NC 279	210 (140)	360 (240)
Westbound off-ramp	560 (790)	850 (1270)
Westbound on-ramp	80 (70)	220 (340)
<i>NC 273 Interchange Ramps</i>		
Eastbound off-ramp	190 (160)	300 (200)

Table 4-4: Ramp Segment Toll and Non-toll Year 2030 Peak Hour Volumes for Modeled Corridor 4

Description	Toll Traffic AM (PM) Peak Hour Volume	Non-Toll Traffic AM (PM) Peak Hour Volume
Eastbound on-ramp	1,090 (860)	2,040 (1,360)
Westbound off-ramp	860 (1,090)	1,360 (2,040)
Westbound on-ramp	160 (190)	200 (300)
<i>Dixie River Road Interchange Ramps</i>		
Eastbound off-ramp	480 (490)	960 (640)
Eastbound on-ramp	340 (340)	400 (260)
Westbound off-ramp	340 (340)	260 (400)
Westbound on-ramp	490 (480)	640 (960)

A comparison between AM and PM peak hour ramp segment volumes for modeled corridor 64 can be found in **Table 4-5**.

Table 4-5: Ramp Segment Toll and Non-toll Year 2030 Peak Hour Volumes for Modeled Corridor 64

Description	Toll Traffic AM (PM) Peak Hour Volume	Non-Toll Traffic AM (PM) Peak Hour Volume
<i>Linwood Road Interchange Ramps</i>		
Eastbound off-ramp	140 (150)	80 (50)
Eastbound on-ramp	70 (40)	270 (210)
Westbound off-ramp	40 (70)	190 (270)
Westbound on-ramp	150 (140)	50 (80)
<i>Lewis Road Interchange Ramps</i>		
Eastbound off-ramp	90 (80)	230 (160)
Eastbound on-ramp	350 (250)	730 (480)
Westbound off-ramp	250 (350)	480 (730)
Westbound on-ramp	80 (90)	160 (230)

Table 4-5: Ramp Segment Toll and Non-toll Year 2030 Peak Hour Volumes for Modeled Corridor 64

Description	Toll Traffic AM (PM) Peak Hour Volume	Non-Toll Traffic AM (PM) Peak Hour Volume
<i>US 321 Interchange Ramps</i>		
Eastbound off-ramp	50 (80)	550 (360)
Eastbound on-ramp	430 (230)	890 (590)
Westbound off-ramp	230 (430)	590 (890)
Westbound on-ramp	80 (50)	360 (550)
<i>Robinson Road Interchange Ramps</i>		
Eastbound off-ramp	50 (40)	150 (100)
Eastbound on-ramp	590 (500)	640 (430)
Westbound off-ramp	500 (590)	430 (640)
Westbound on-ramp	40 (50)	100 (150)
<i>Bud Wilson Road Interchange Ramps</i>		
Eastbound off-ramp	80 (80)	250 (160)
Eastbound on-ramp	50 (30)	230 (140)
Westbound off-ramp	30 (50)	140 (230)
Westbound on-ramp	80 (80)	160 (250)
<i>NC 274 Interchange Ramps</i>		
Eastbound off-ramp	240 (230)	410 (280)
Eastbound on-ramp	680 (450)	820 (550)
Westbound off-ramp	450 (680)	550 (820)
Westbound on-ramp	230 (240)	280 (410)
<i>NC 279 Interchange Ramps</i>		
Eastbound off-ramp	140 (160)	280 (190)
Eastbound on-ramp from SB NC 279	410 (250)	690 (460)
Eastbound on-ramp from NB NC 279	370 (220)	600 (400)
Westbound off-ramp	470 (780)	860 (1,290)

Table 4-5: Ramp Segment Toll and Non-toll Year 2030 Peak Hour Volumes for Modeled Corridor 64

Description	Toll Traffic AM (PM) Peak Hour Volume	Non-Toll Traffic AM (PM) Peak Hour Volume
Westbound on-ramp	160 (140)	190 (280)
NC 273 Interchange Ramps		
Eastbound off-ramp	240 (150)	270 (180)
Eastbound on-ramp from SB NC 273	900 (950)	1,830 (1,220)
Eastbound on-ramp from NB NC 273	100 (100)	170 (100)
Westbound off-ramp	1,050 (1,000)	1,330 (2,000)
Westbound on-ramp	150 (240)	180 (270)
Dixie River Road Interchange Ramps		
Eastbound off-ramp	570 (690)	1,300 (870)
Eastbound on-ramp	330 (250)	280 (190)
Westbound off-ramp	250 (330)	190 (280)
Westbound on-ramp from NB Dixie River Road	630 (480)	720 (1,070)
Westbound on-ramp from SB Dixie River Road	60 (90)	150 (230)

A comparison between AM and PM peak hour ramp segment volumes for modeled corridor 77 can be found in **Table 4-6**.

Table 4-6: Ramp Segment Toll and Non-toll Year 2030 Peak Hour Volumes for Modeled Corridor 77

Description	Toll Traffic AM (PM) Peak Hour Volume	Non-Toll Traffic AM (PM) Peak Hour Volume
Linwood Road Interchange Ramps		
Eastbound off-ramp	130 (140)	80 (50)
Eastbound on-ramp	130 (80)	270 (200)
Westbound off-ramp	80 (130)	190 (270)

Table 4-6: Ramp Segment Toll and Non-toll Year 2030 Peak Hour Volumes for Modeled Corridor 77

Description	Toll Traffic AM (PM) Peak Hour Volume	Non-Toll Traffic AM (PM) Peak Hour Volume
Westbound on-ramp	140 (130)	50 (80)
<i>US 321 Interchange Ramps</i>		
Eastbound off-ramp	190 (200)	570 (390)
Eastbound on-ramp	480 (320)	960 (650)
Westbound off-ramp	320 (480)	650 (960)
Westbound on-ramp	200 (190)	390 (570)
<i>Robinson Road Interchange Ramps</i>		
Eastbound off-ramp	60 (50)	310 (210)
Eastbound on-ramp	510 (440)	780 (520)
Westbound off-ramp	440 (510)	520 (780)
Westbound on-ramp	50 (60)	210 (310)
<i>Bud Wilson Road Interchange Ramps</i>		
Eastbound off-ramp	150 (160)	500 (340)
Eastbound on-ramp	60 (40)	250 (170)
Westbound off-ramp	40 (60)	170 (250)
Westbound on-ramp	160 (150)	340 (500)
<i>NC 274 Interchange Ramps</i>		
Eastbound off-ramp	190 (200)	410 (280)
Eastbound on-ramp	640 (440)	820 (550)
Westbound off-ramp	440 (640)	550 (820)
Westbound on-ramp	200 (190)	280 (410)
<i>NC 279 Interchange Ramps</i>		
Eastbound off-ramp	150 (150)	280 (190)
Eastbound on-ramp from SB NC 279	390 (230)	690 (460)
Eastbound on-ramp from NB NC 279	360 (210)	600 (400)

Table 4-6: Ramp Segment Toll and Non-toll Year 2030 Peak Hour Volumes for Modeled Corridor 77

Description	Toll Traffic AM (PM) Peak Hour Volume	Non-Toll Traffic AM (PM) Peak Hour Volume
Westbound off-ramp	440 (750)	860 (1,290)
Westbound on-ramp	150 (150)	190 (280)
<i>NC 273 Interchange Ramps</i>		
Eastbound off-ramp	240 (160)	270 (180)
Eastbound on-ramp from SB NC 273	890 (910)	1,830 (1,220)
Eastbound on-ramp from NB NC 273	140 (100)	170 (110)
Westbound off-ramp	1,010 (1,030)	1,330 (2,000)
Westbound on-ramp	160 (240)	180 (270)
<i>Dixie River Road Interchange Ramps</i>		
Eastbound off-ramp	600 (670)	1,300 (870)
Eastbound on-ramp	330 (250)	280 (190)
Westbound off-ramp	250 (330)	190 (280)
Westbound on-ramp from NB Dixie River Road	610 (500)	720 (1,070)
Westbound on-ramp from SB Dixie River Road	60 (100)	150 (230)

As seen in **Tables 4-4, 4-5, and 4-6**, the majority of Connector ramp segment peak hour volumes for modeled corridors 4, 64, and 77 are lower in the toll traffic forecasts, compared to the non-toll traffic forecasts. As seen in **Tables 3-1, 3-2, and 3-3**, all basic freeway segment peak hour volumes for modeled corridors 4, 64, and 77 also are all lower in the toll traffic forecasts, compared to the non-toll traffic forecasts. Since the LOS for merge and diverge locations are determined by analyzing the freeway segment and ramp segment peak hour volumes, no additional analysis is recommended for the ramp merge and diverge analysis. Preliminary designs of the Connector ramp proper, Connector ramp merge, and Connector ramp diverge locations performed based on the analysis found in the *East-West Connector Traffic Operations Technical Memorandum* will provide an acceptable LOS though the year 2030 if the East-West Connector is built as a toll facility.

The LOS for the two Bessemer City Ramps recommended for reanalysis can be found in **Table 4-7**

Table 4-7: Ramp Merge and Diverge Year 2030 Toll Peak Hour LOS for Modeled Corridor 4

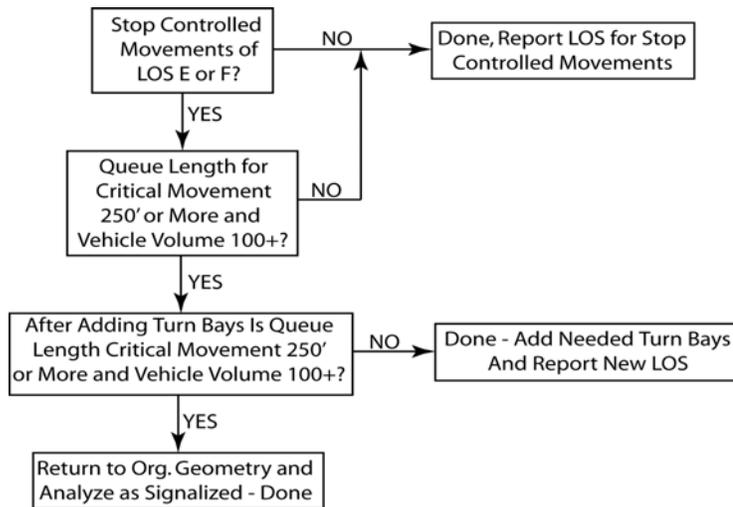
Description	Toll Traffic AM (PM) Peak Hour LOS	Non-Toll Traffic AM (PM) Peak Hour LOS
<i>Bessemer City Road Interchange Ramps</i>		
Northbound on-ramp	D(C)	D(B)
Southbound off-ramp	B(C)	B(C)

5 METHODOLOGY FOR THE REANALYSIS OF RAMP TERMINAL INTERSECTIONS

A comparison between the non-toll traffic forecast and the toll traffic forecast showed that although the toll traffic forecast is lower for the Connector mainline and ramp segments, several cases exist where individual turning movements at ramp terminal intersections are higher under the toll traffic scenario. As a result, the Authority has requested that the ramp terminal intersections at the service interchanges be reanalyzed using the new toll traffic forecasts.

5.1 Previous Analysis Performed Using Non-Toll Traffic

All new ramp terminal intersections created by the East-West Connector project were initially analyzed as stop-controlled intersections. Stop-controlled intersections were analyzed using HCS 2000, Version 4.1f. Highway Capacity Manual (HCM) LOS results were presented for all unsignalized intersections. To determine if the intersection needed to be analyzed as signalized, the following flowchart was followed to determine what improvements to recommend.



All intersections recommended for signalization were analyzed using Synchro software package, Version 7, Build 755. LOS D or better is considered acceptable for all signalized intersections.

At all ramp terminal intersections located on proposed Gaston East-West Connector interchanges, exclusive left turn lanes and right turn lanes onto the on-ramps were analyzed, regardless of whether the intersections operated at an acceptable LOS without them. These lanes were added to provide conservative design recommendations at proposed grade-separated locations.

The 95th percentile queue lengths for each yield or stop controlled lane of the unsignalized intersection were calculated based on the HCS 2000 peak hour traffic analysis results. The 95th percentile queue lengths for each lane of the signalized intersection were calculated based on the SimTraffic traffic simulation results. The simulation utilizes specific information such as traffic signal timings, peak hour volumes and factors, storage bay lengths, etc., to develop a sophisticated visual model of the roadway network operations. Based on NCDOT guidelines, one hundred feet was the minimum queue distance reported.

5.2 Updated Analysis Performed Using Toll Traffic

All ramp terminal intersections analyzed in the *Gaston East-West Connector Traffic Operations Technical Memorandum* were reanalyzed using peak hour toll traffic.

The purpose of this report is to present the toll traffic operations analysis so it can be verified that the preliminary designs for the DSAs will still provide adequate capacity if the Connector is constructed as a tolled facility. To determine if adequate capacity exists under the preliminary designs, intersection lane geometry was held constant between the non-toll traffic scenario and toll traffic scenarios.

As in the non-toll analysis, when dealing with two approaches with different truck percentages, the higher truck percentage was used for both. This was done to obtain a conservative LOS and also to keep the percent trucks consistent throughout the interchange along the mainline and y-lines.

Intersection control also was held constant between the non-toll traffic scenario and toll traffic scenarios. It is noted that if intersection control was reevaluated for the toll traffic scenario, volumes at several ramp terminal intersections are significantly lower and these locations would be designed to operate with stop controlled conditions. Since the purpose of the reevaluation was to determine if additional capacity would be required to handle the toll traffic, the intersections were continued to be evaluated as signalized. The proposed laneage and phasing will be reevaluated during the design build process to determine the appropriate intersection designs with the updated toll volumes.

6 RAMP TERMINAL INTERSECTION REANALYSIS

Tables 6-1, 6-2, 6-3 and Figures 6-1 through 6-26 show the results of the reanalysis of the ramp terminal intersections. All analysis results can be found in **Appendix B**.

Table 6-1: Ramp Terminal Intersection Levels of Service for Modeled Corridor 4

Description	Toll Traffic AM (PM) Peak Hour LOS	Non-Toll Traffic AM (PM) Peak Hour LOS
<i>Bessemer City Road Interchange Intersections</i>		
Northbound ramp terminal intersection	F(D)*	E(F)*
Southbound ramp terminal intersection	C(C)	C(C)
<i>Linwood Road Interchange Intersections</i>		
Eastbound ramp terminal intersection	B(B)	B(A)
Westbound ramp terminal intersection	A(B)	C(C)
<i>US 321 Interchange Ramps</i>		
Eastbound ramp terminal intersection	A(A)	B(B)
Westbound ramp terminal intersection	B(C)	C(C)
<i>Robinson Road Interchange Ramps</i>		
Eastbound ramp terminal intersection	B(A)	B(B)
Westbound ramp terminal intersection	B(B)	B(C)
<i>Bud Wilson Road Interchange Ramps</i>		
Eastbound ramp terminal intersection	C(C)	C(C)
Westbound ramp terminal intersection	B(A)	C(C)
<i>NC 274 Interchange Ramps</i>		
Eastbound ramp terminal intersection	B(B)	C(B)
Westbound ramp terminal intersection	B(C)	C(C)
<i>NC 279 Interchange Ramps</i>		
Eastbound ramp terminal intersection	A(A)	B(A)
Westbound ramp terminal intersection	B(B)	B(C)
<i>NC 273 Interchange Ramps</i>		
Eastbound ramp terminal intersection	B(B)	C(B)
Westbound ramp terminal intersection	A(A)	A(A)
<i>Dixie River Road Interchange Ramps</i>		
Eastbound ramp terminal intersection	B(B)	B(B)
Westbound ramp terminal intersection	C(C)	B(C)

* Stop-controlled intersection with unacceptable side street LOS, but does not warrant signalization

Table 6-2: Ramp Terminal Intersection Levels of Service for Modeled Corridor 64

Description	Toll Traffic AM (PM) Peak Hour LOS	Non-Toll Traffic AM (PM) Peak Hour LOS
<i>Linwood Road Interchange Intersections</i>		
Eastbound ramp terminal intersection	B(A)	B(B)
Westbound ramp terminal intersection	B(B)	B(B)
<i>Lewis Road Interchange Intersections</i>		
Eastbound ramp terminal intersection	C(C)	F(F)*
Westbound ramp terminal intersection	C(C)	C(C)
<i>US 321 Interchange Ramps</i>		
Eastbound ramp terminal intersection	A(A)	C(B)
Westbound ramp terminal intersection	B(B)	C(C)
<i>Robinson Road Interchange Ramps</i>		
Eastbound ramp terminal intersection	A(A)	B(A)
Westbound ramp terminal intersection	B(B)	B(C)
<i>Bud Wilson Road Interchange Ramps</i>		
Eastbound ramp terminal intersection	A(A)	B(B)
Westbound ramp terminal intersection	B(B)	C(C)
<i>NC 274 Interchange Ramps</i>		
Eastbound ramp terminal intersection	B(A)	C(B)
Westbound ramp terminal intersection	B(C)	C(C)
<i>NC 279 Interchange Ramps</i>		
Eastbound ramp terminal intersection	A(A)	A(A)
Westbound off-ramp terminal intersection	B(C)	C(C)
Westbound on-ramp intersection	A(A)	A(A)
<i>NC 273 Interchange Ramps</i>		
Eastbound ramp terminal intersection	B(B)	B(B)
Westbound off-ramp terminal intersection	B(B)	B(B)
Westbound on-ramp intersection	A(A)	A(A)
<i>Dixie River Road Interchange Ramps</i>		
Eastbound ramp terminal intersection	C(B)	B(B)
Westbound ramp terminal intersection	B(B)	B(B)

* Stop-controlled intersection with unacceptable side street LOS, but does not warrant signalization

Table 6-3: Ramp Terminal Intersection Levels of Service for Modeled Corridor 77

Description	Toll Traffic AM (PM) Peak Hour LOS	Non-Toll Traffic AM (PM) Peak Hour LOS
<i>Linwood Road Interchange Intersections</i>		
Eastbound ramp terminal intersection	B(B)	B(B)
Westbound ramp terminal intersection	B(C)	B(B)
<i>US 321 Interchange Ramps</i>		
Eastbound ramp terminal intersection	A(A)	B(B)
Westbound ramp terminal intersection	B(B)	C(C)
<i>Robinson Road Interchange Ramps</i>		
Eastbound ramp terminal intersection	B(A)	B(B)
Westbound ramp terminal intersection	B(B)	B(C)
<i>Bud Wilson Road Interchange Ramps</i>		
Eastbound ramp terminal intersection	C(C)	C(C)
Westbound ramp terminal intersection	B(B)	C(C)
<i>NC 274 Interchange Ramps</i>		
Eastbound ramp terminal intersection	C(A)	C(B)
Westbound ramp terminal intersection	C(C)	C(C)
<i>NC 279 Interchange Ramps</i>		
Eastbound ramp terminal intersection	A(A)	A(A)
Westbound off-ramp terminal intersection	B(C)	C(C)
Westbound on-ramp intersection	A(A)	A(A)
<i>NC 273 Interchange Ramps</i>		
Eastbound ramp terminal intersection	B(B)	B(B)
Westbound off-ramp terminal intersection	B(B)	B(B)
Westbound on-ramp intersection	A(A)	A(A)
<i>Dixie River Road Interchange Ramps</i>		
Eastbound ramp terminal intersection	B(B)	B(B)
Westbound ramp terminal intersection	B(B)	B(B)

Based on the results of the service interchange reanalysis using toll facility traffic which analyzed the preliminary roadway geometry under the toll traffic scenario, all ramp terminal intersections will operate with acceptable LOS.

Improvements were made to the ramp terminal intersections at the Bessemer City Road interchange in order to obtain an acceptable LOS and provide queue lengths within acceptable limits. These improvements included the addition of dual left turn lanes at the southbound I-85 ramp terminal intersection on the northbound (ramp approach) and westbound (left turn from Bessemer City Road to the on-ramp) approaches. Due to the addition of new turn lanes at the

intersection, a queue analysis was performed to ensure that adequate storage capacity would be available. Because the intersections of the diamond interchange are closely spaced, the queue results from both intersections are presented, even though the geometry of the southbound ramp terminal intersection was not adjusted. The results of the queue analysis can be found in **Table 6-4** and **Figure 6-1**. As shown in the table, the modified design (with the added turn lanes) would provide adequate storage capacity.

**Table 6-4: Queue Analysis for Bessemer City Road Interchange
Modeled Corridor 4**

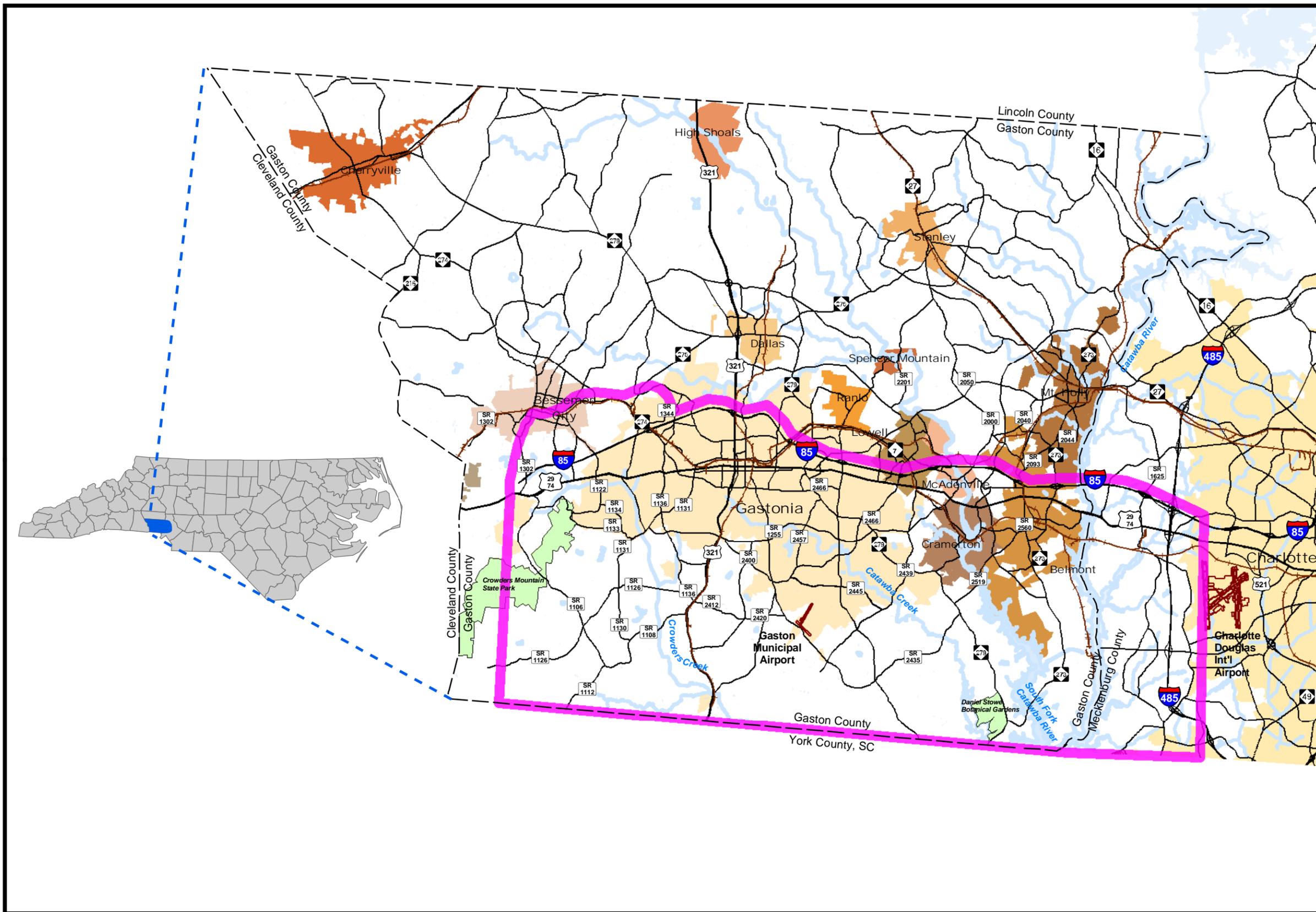
Movement	Number of Lanes	Queue Length (feet)
Northbound I-85 Ramp Terminal Intersection		
Northbound Left Turn	1	100
Northbound Right Turn	1	100
Westbound Left Turn	1	100
Southbound I-85 Ramp Terminal Intersection		
Northbound Left Turn	2	525
Northbound Right Turn	1	125
Eastbound Right Turn	1	175
Westbound Left Turn	2	175

7 CONCLUSION

The purpose of this report is to present the toll traffic operations analysis to verify that the preliminary designs for the DSAs will still provide adequate capacity if the Connector is constructed as a tolled facility.

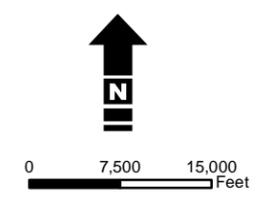
Based on the reanalysis of the preliminary designs using toll facility forecast traffic, all individual freeway and ramp merge and diverge elements will operate at an acceptable LOS without adjustment to the preliminary geometry.

Individual element analysis of the ramp terminal intersections using the toll scenario traffic show that all intersections will operate with acceptable LOS, except at the Bessemer City Road interchange. Due to the higher volumes at this interchange, minor modifications to the preliminary designs are recommended. These modifications include adding a second turn lane to the southbound I-85 ramp terminal intersection on the northbound and westbound approaches. These modifications can be made within the current estimated right of way shown in the preliminary engineering designs.



- Legend**
- Study Area Boundary
 - Railroads
 - County Lines
 - Major Roads
 - Major Parks/Recreation Areas
 - Hydrology

Source: Gaston County and Mecklenburg Counties GIS. Map Printed On 4-23-08.



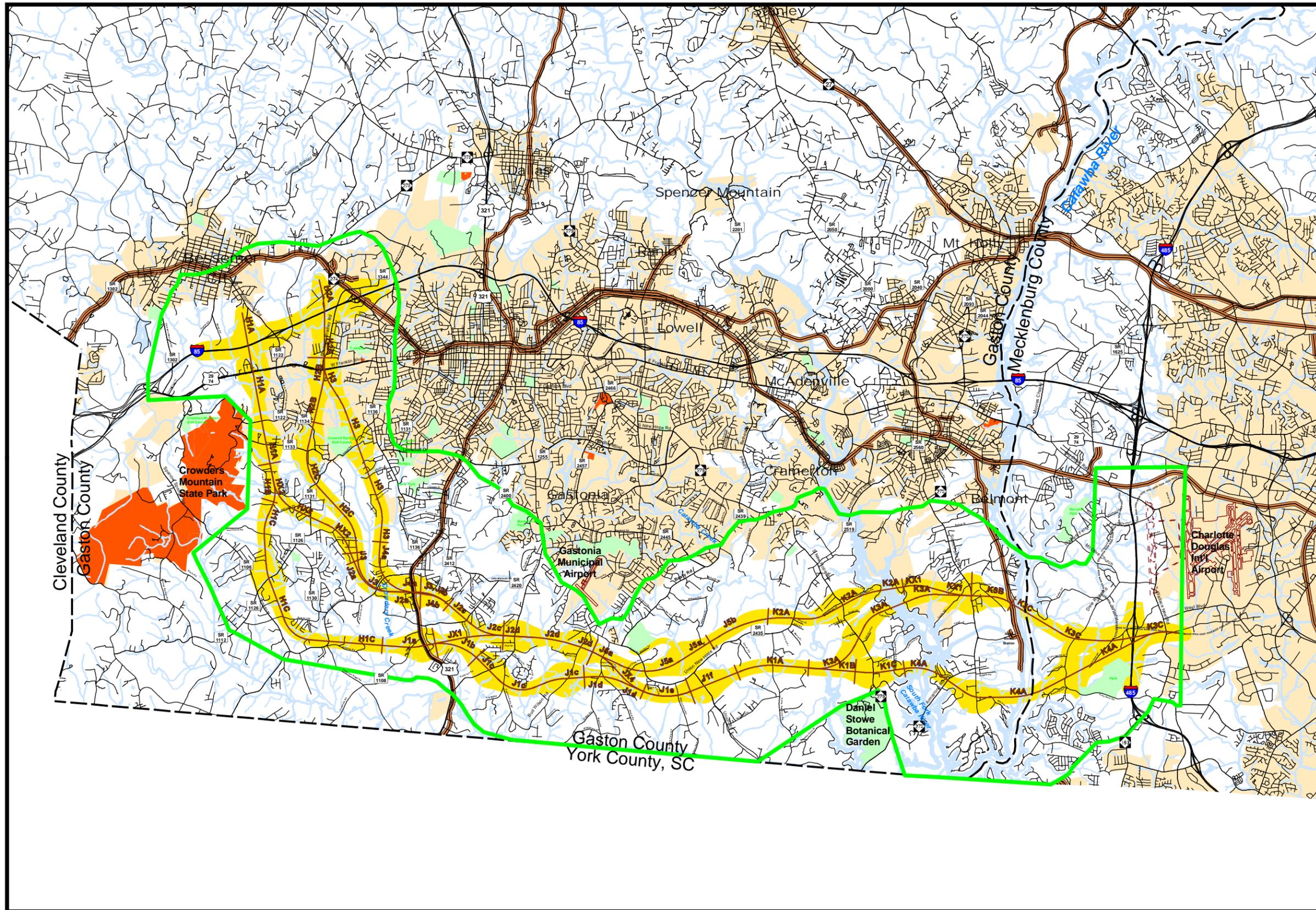
STIP PROJECT NO. U-3321

Gaston County and Mecklenburg County

GASTON EAST-WEST CONNECTOR

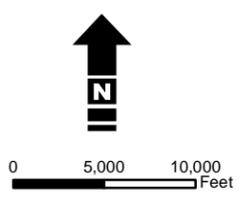
PROJECT LOCATION MAP

Figure 1-1



- Legend**
- Refined Study Area Boundary for New Location Alternatives
 - Centerline of Corridors
 - Corridor Segment Break Lines
 - County Lines
 - Interstates
 - Other Roads
 - Railroads
 - Hydrology
 - Detailed Study Alternatives
 - Parks/Recreation Areas
 - State Complexes

Source: Gaston County and Mecklenburg Counties GIS. Map Printed On 4-17-08.

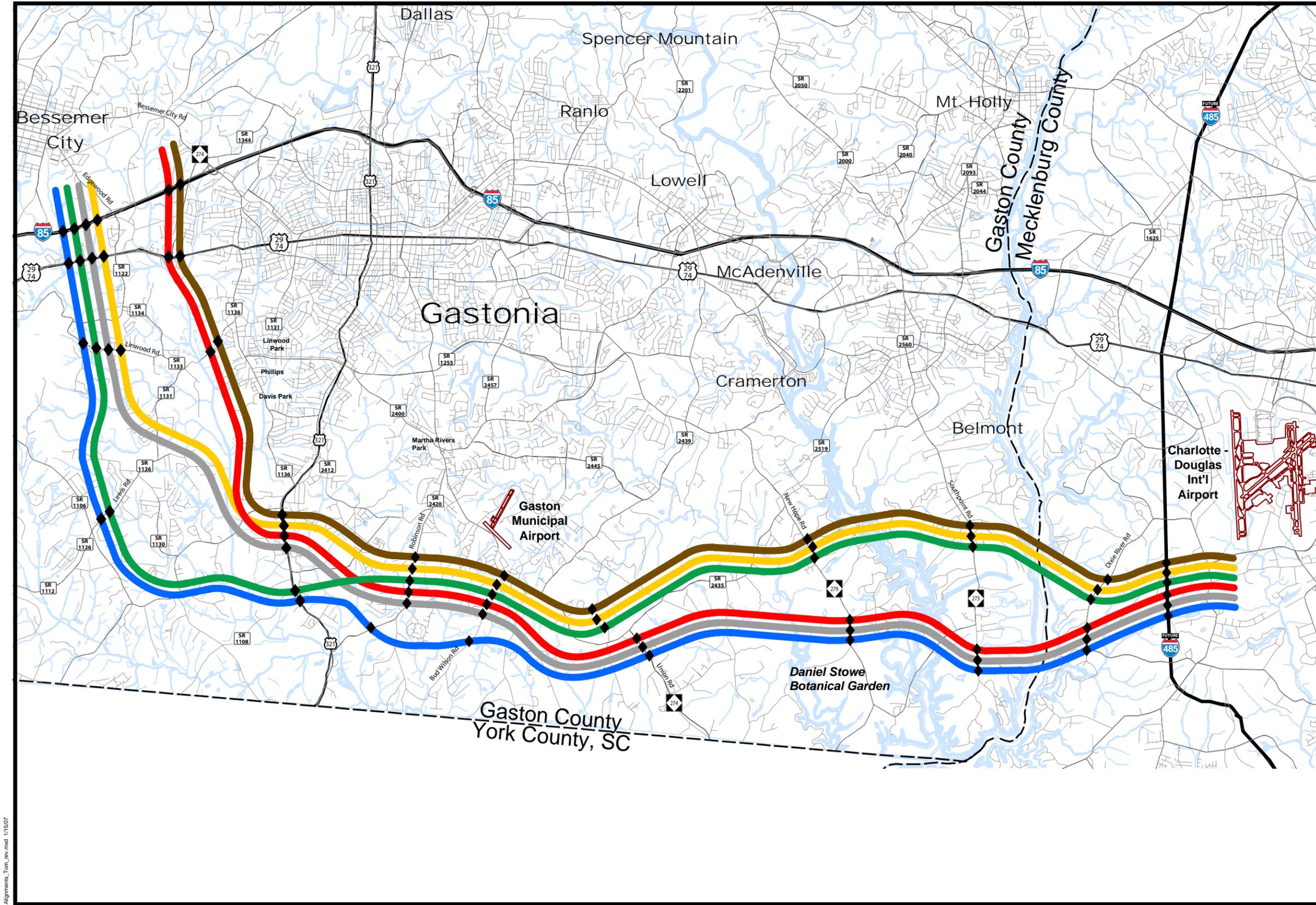


STIP PROJECT NO. U-3321

Gaston County and Mecklenburg County

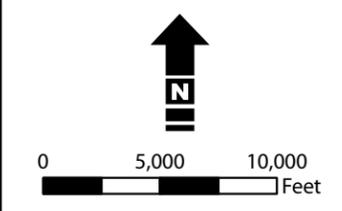
GASTON EAST-WEST CONNECTOR
RECOMMENDED DETAILED STUDY ALTERNATIVES

Figure 1-2



- Legend**
- Alternative 64
 - Alternative 77
 - Alternative 5
 - Alternative 58
 - Alternative 76
 - Alternative 4
 - ◆ Proposed Interchange

Source: Gaston County and Mecklenburg Counties GIS. Map Printed On 4-23-08.

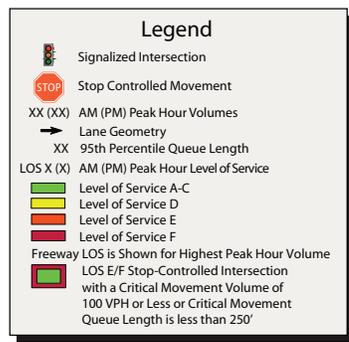
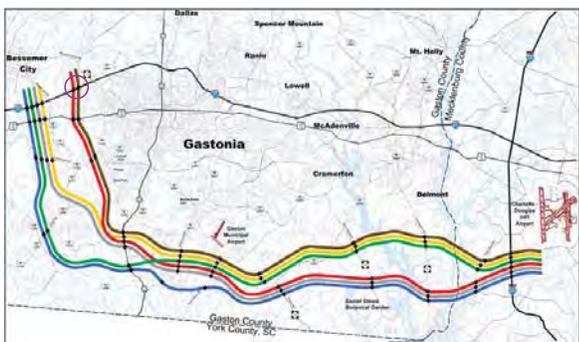
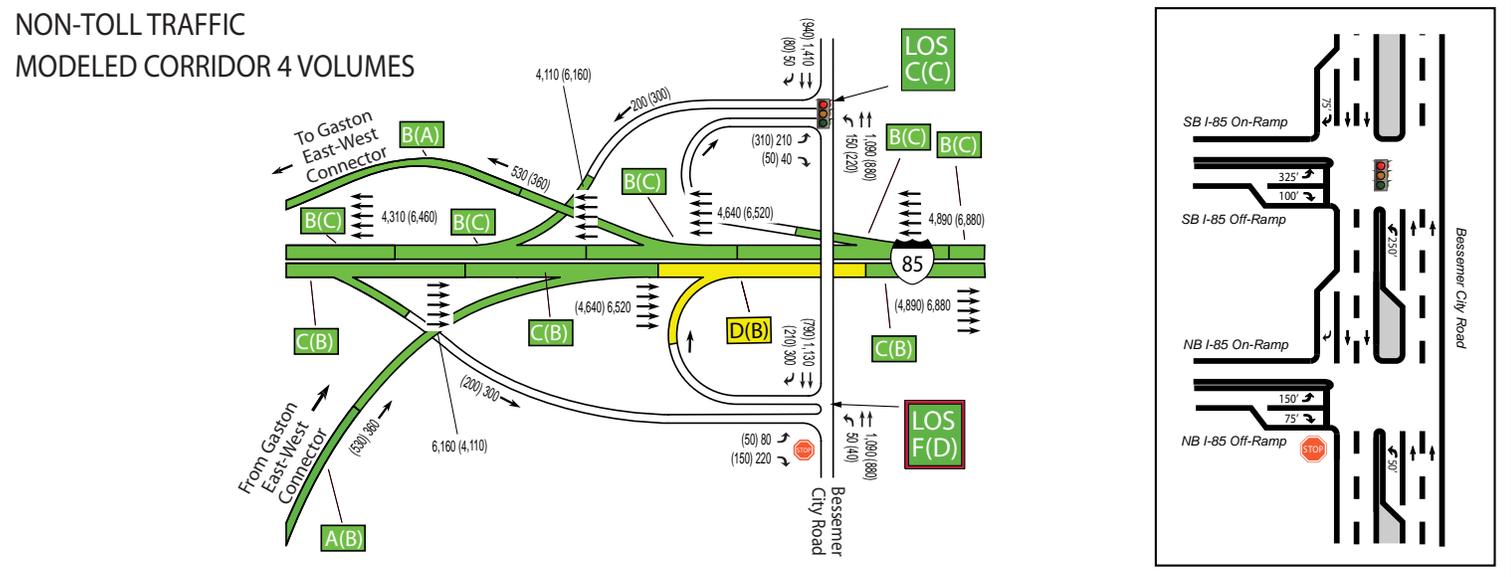
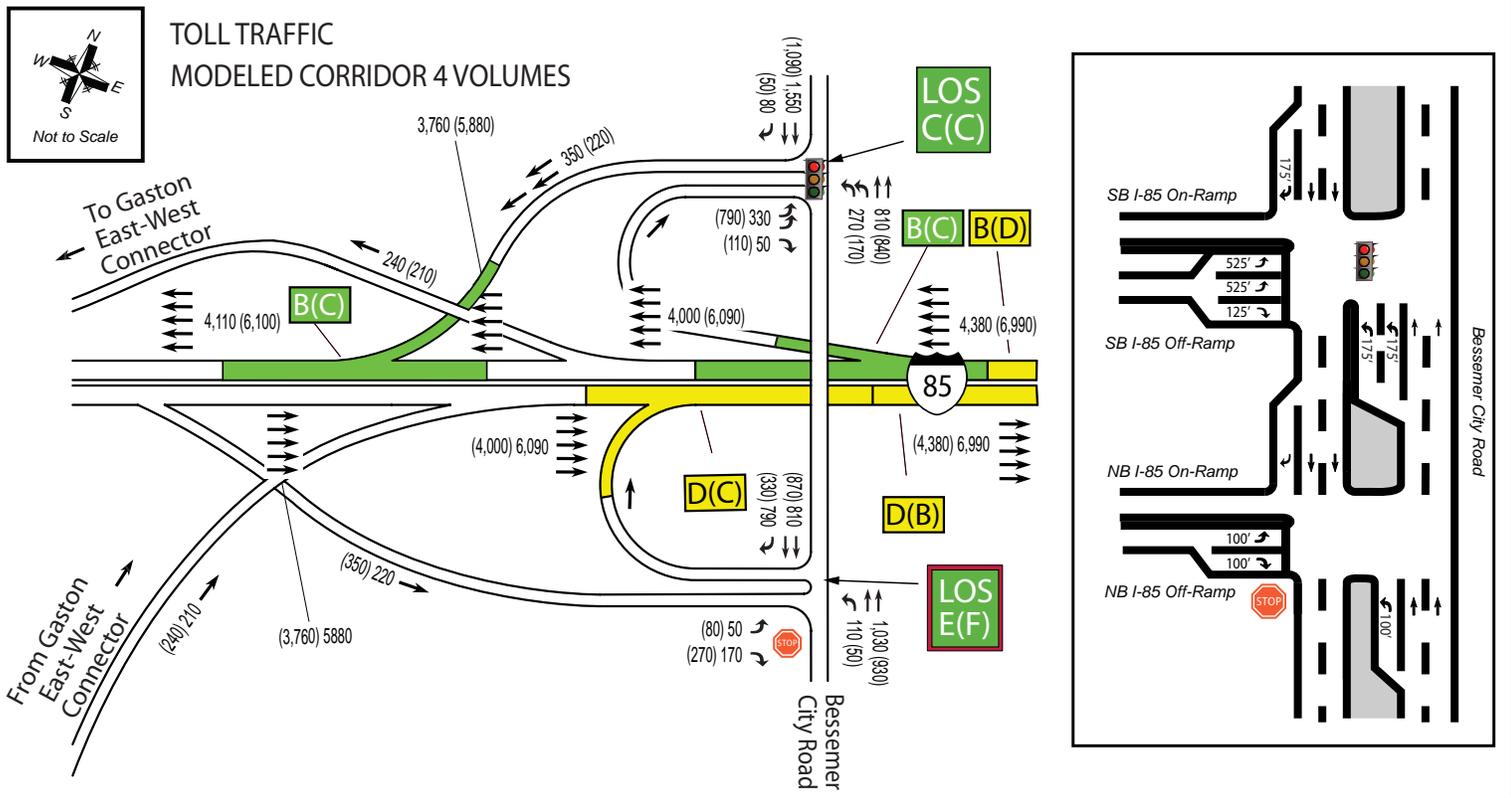


STIP PROJECT NO. U-3321
 Gaston County and Mecklenburg County

GASTON EAST-WEST CONNECTOR
MODELED DETAILED STUDY ALTERNATIVES

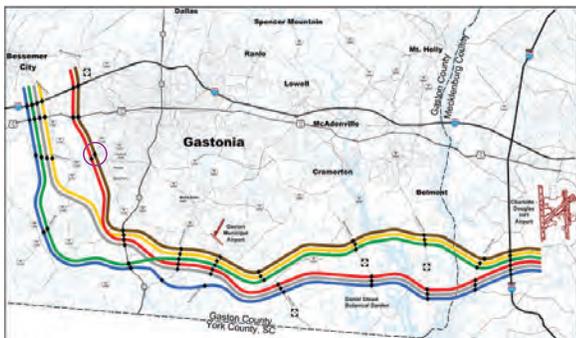
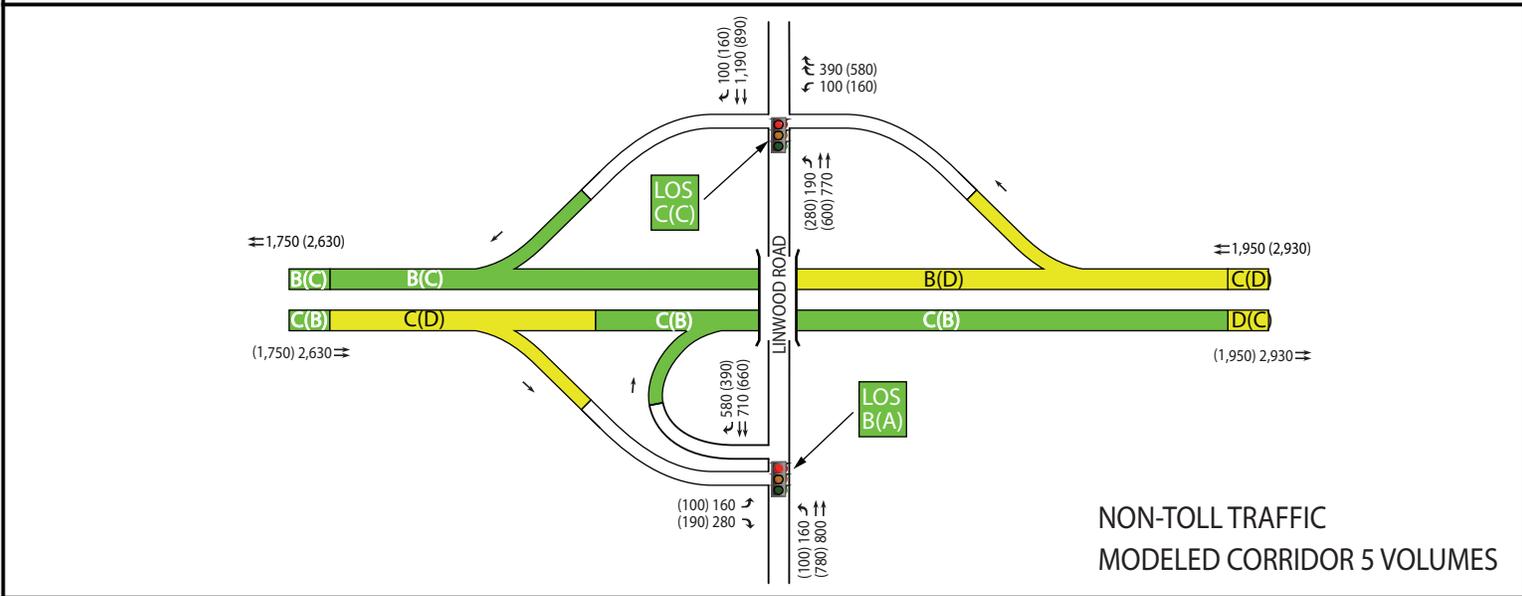
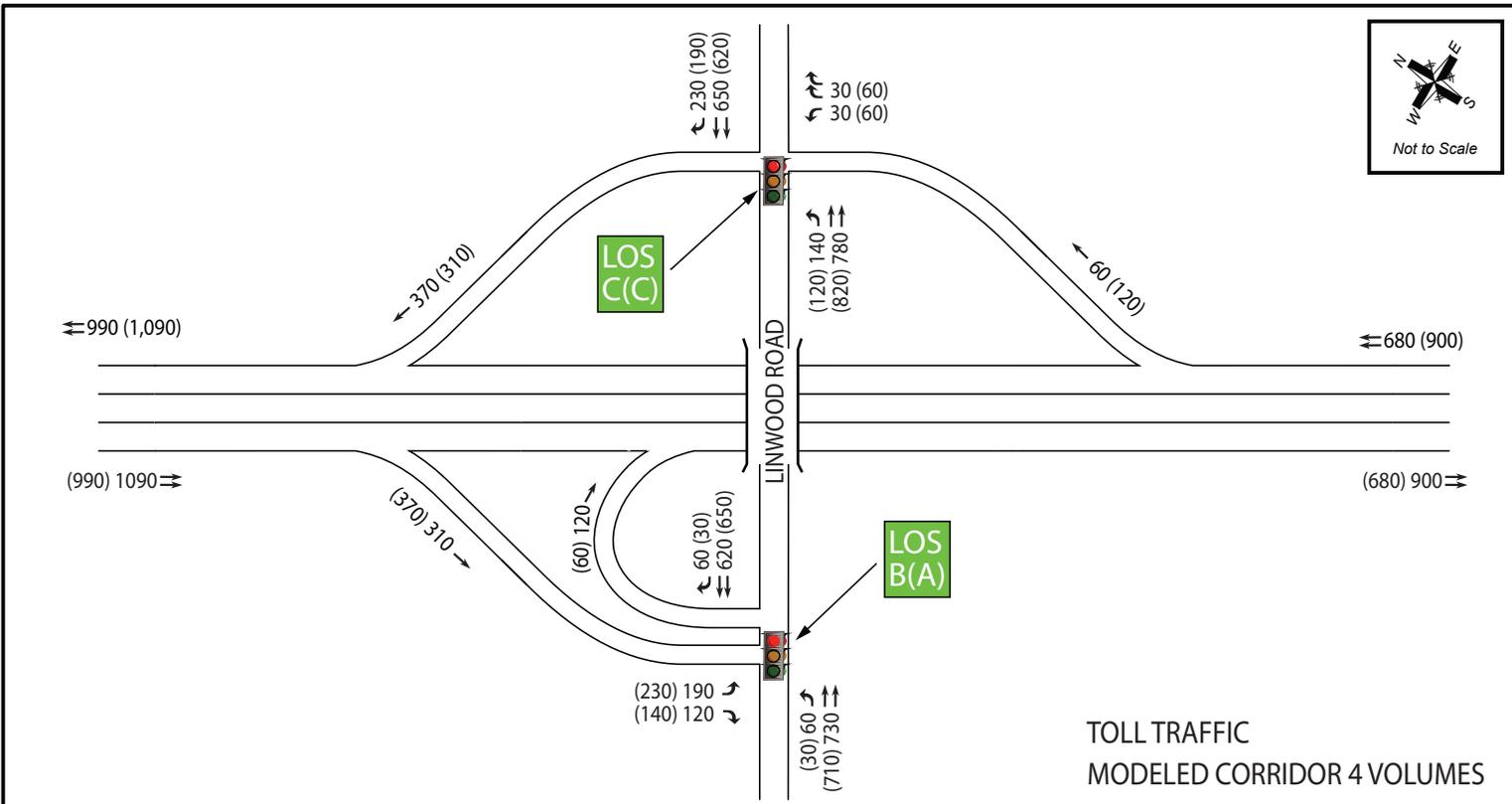
Figure 2-1

Alignments_Tom_rev.mxd 1/15/07



TIP PROJECT NO. U-3321
GASTON EAST-WEST CONNECTOR
GASTON AND MECKLENBURG COUNTIES

Bessemer City Road
Modeled Corridor 4
Toll Traffic Analysis,
Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
FIGURE 6-1



- Alternative 64
- Alternative 77
- Alternative 5
- Alternative 58
- Alternative 76
- Alternative 4
- Interchanges

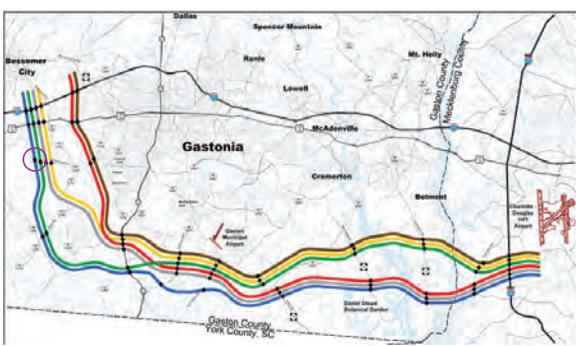
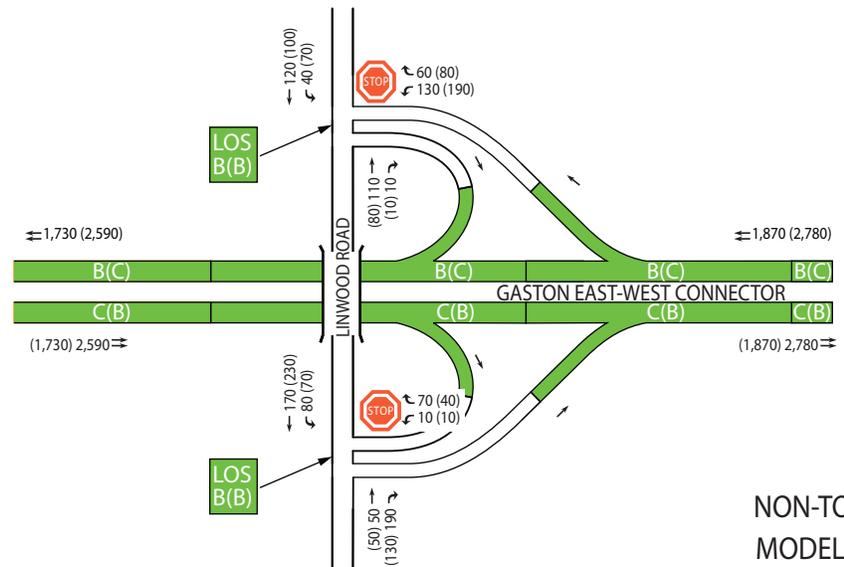
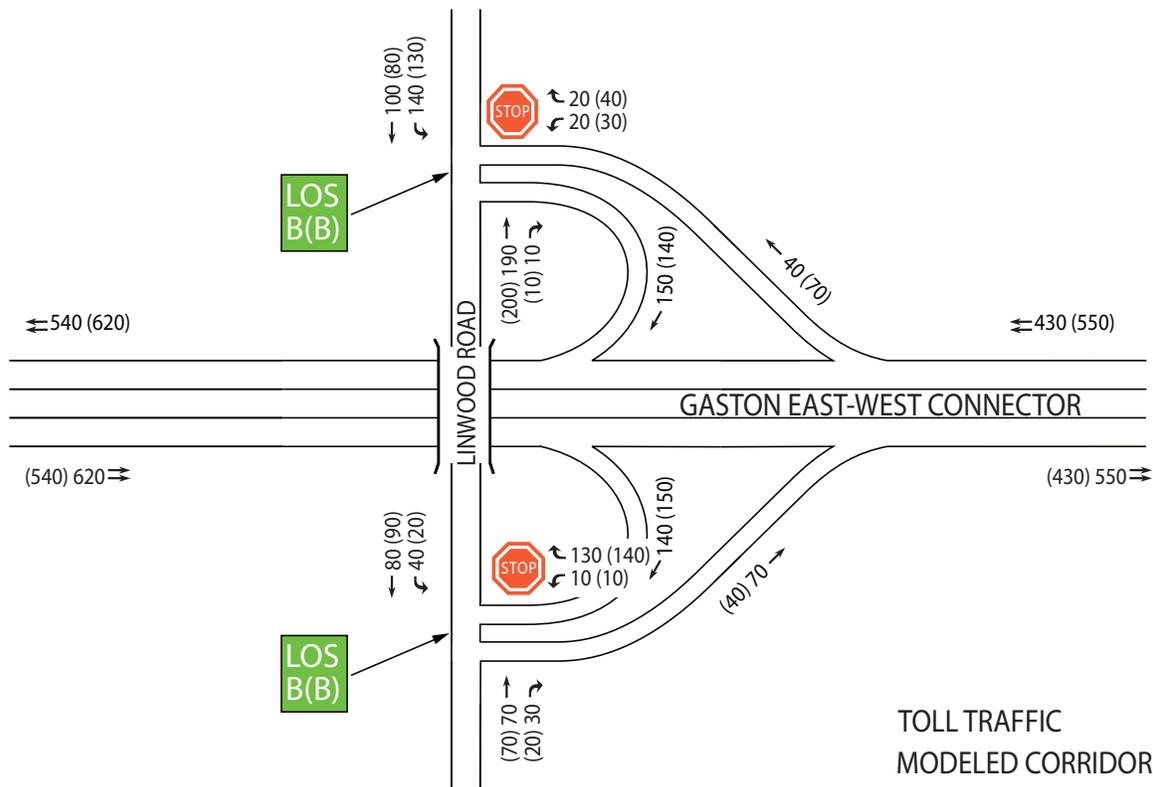
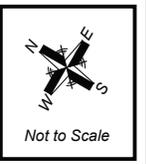
Legend

- Signalized Intersection
- Stop Controlled Movement
- XX (XX) AM (PM) Peak Hour Volumes
- Lane Geometry
- XX 95th Percentile Queue Length
- LOS X (X) AM (PM) Peak Hour Level of Service
- Level of Service A-C
- Level of Service D
- Level of Service E
- Level of Service F
- Freeway LOS is Shown for Highest Peak Hour Volume
- LOS E/F Stop-Controlled Intersection with a Critical Movement Volume of 100 VPH or Less or Critical Movement Queue Length is less than 250'



TIP PROJECT NO. U-3321
GASTON EAST-WEST CONNECTOR
GASTON AND MECKLENBURG COUNTIES

**Linwood Road
Modeled Corridor 4
Toll Traffic Analysis,
Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
FIGURE 6-2**



- Alternative 64
- Alternative 77
- Alternative 5
- Alternative 58
- Alternative 76
- Alternative 4
- Interchanges

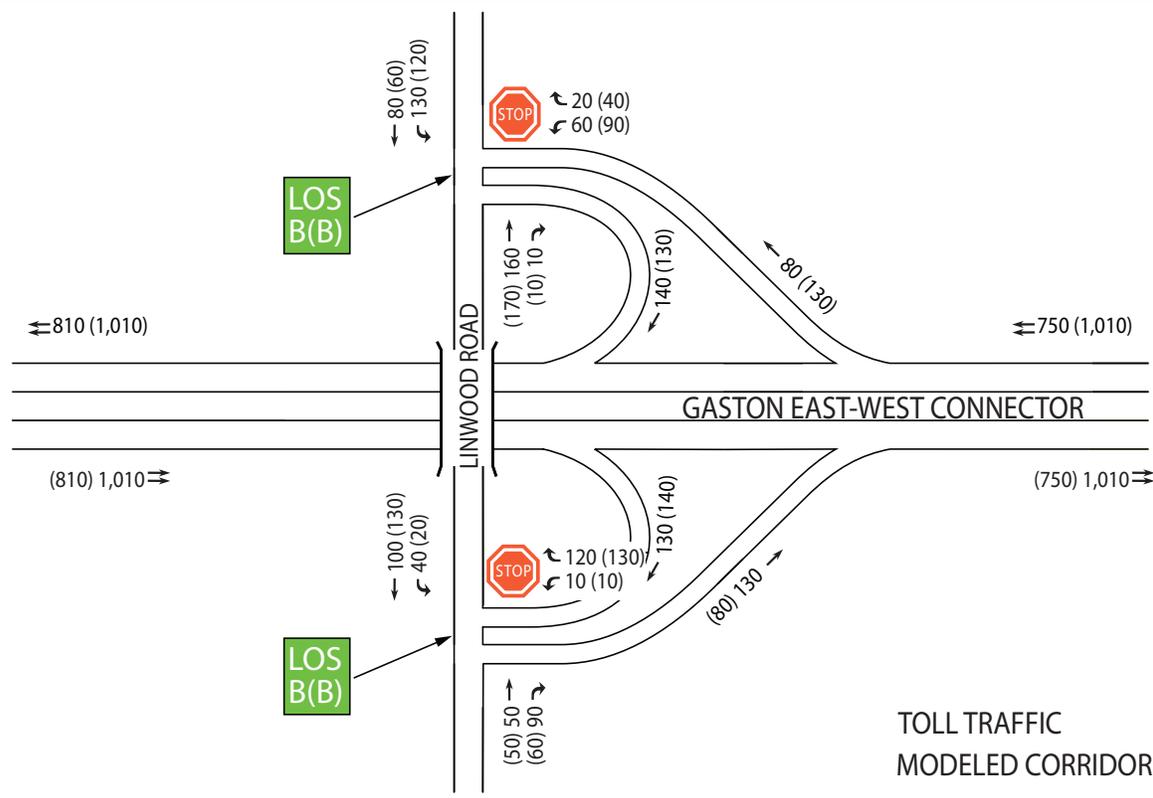
Legend

- Signalized Intersection
- Stop Controlled Movement
- XX (XX) AM (PM) Peak Hour Volumes
- Lane Geometry
- XX 95th Percentile Queue Length
- LOS X (X) AM (PM) Peak Hour Level of Service
- Level of Service A-C
- Level of Service D
- Level of Service E
- Level of Service F
- Freeway LOS is Shown for Highest Peak Hour Volume
- LOS E/F Stop-Controlled Intersection with a Critical Movement Volume of 100 VPH or Less or Critical Movement Queue Length is less than 250'

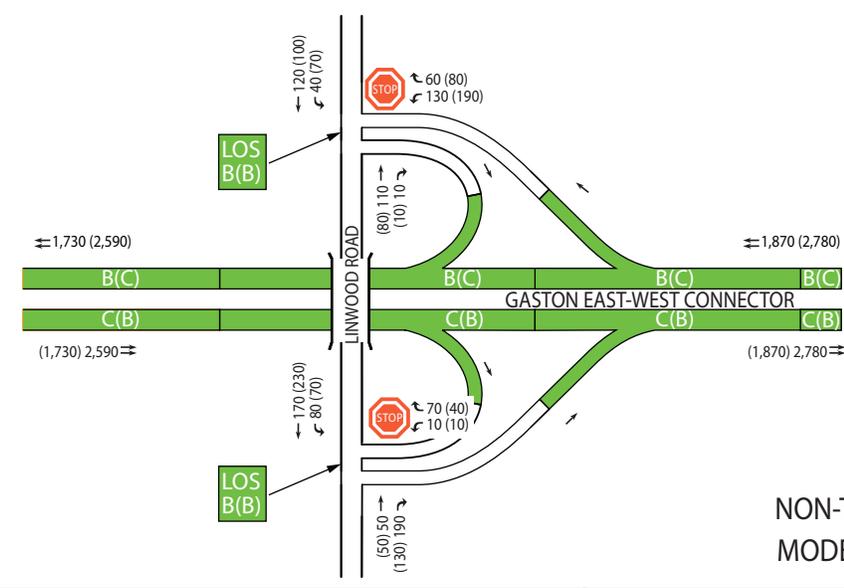


TIP PROJECT NO. U-3321
 GASTON EAST-WEST CONNECTOR
 GASTON AND MECKLENBURG COUNTIES

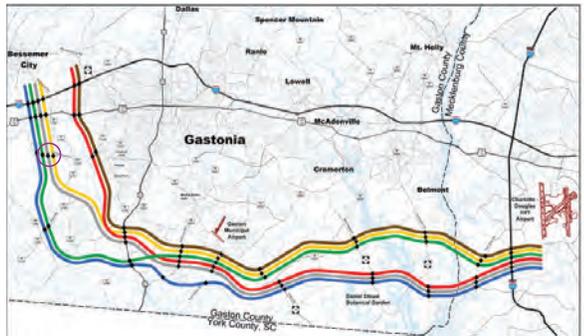
**Linwood Road
 Modeled Corridor 64
 Toll Traffic Analysis,
 Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
 FIGURE 6-3**



TOLL TRAFFIC
MODELED CORRIDOR 77 VOLUMES



NON-TOLL TRAFFIC
MODELED CORRIDOR 77 VOLUMES



- Alternative 64
- Alternative 77
- Alternative 5
- Alternative 58
- Alternative 76
- Alternative 4
- Interchanges

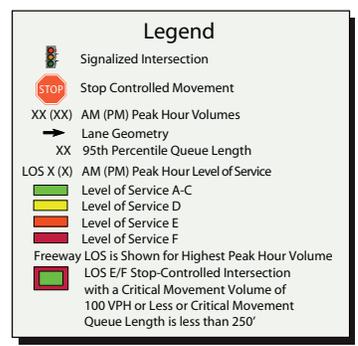
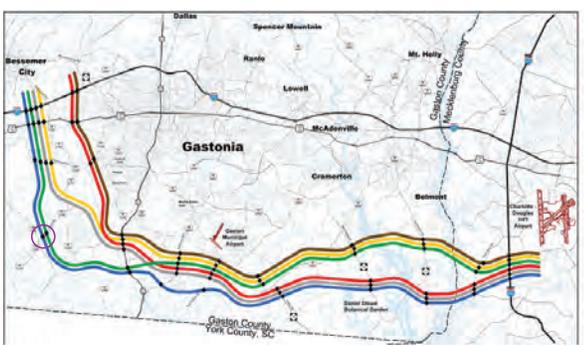
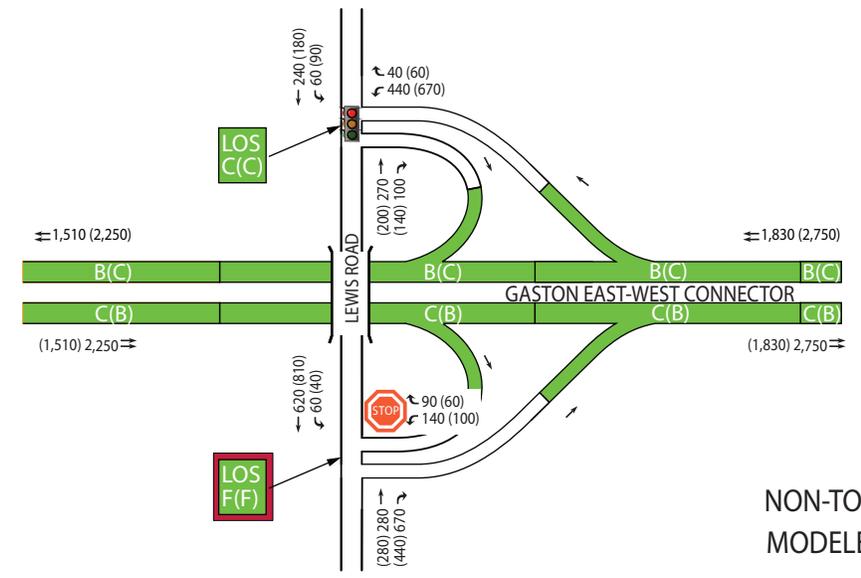
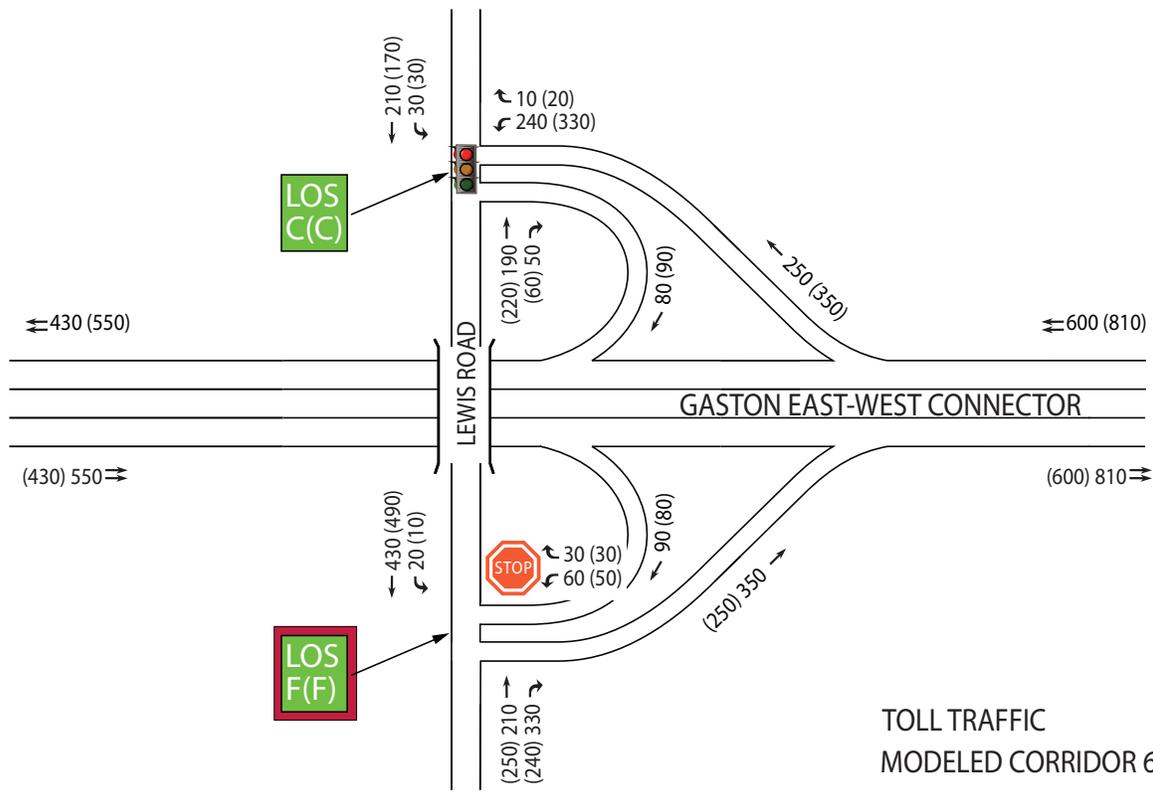
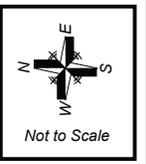
Legend

- Signalized Intersection
- Stop Controlled Movement
- XX (XX) AM (PM) Peak Hour Volumes
- Lane Geometry
- XX 95th Percentile Queue Length
- LOS X (X) AM (PM) Peak Hour Level of Service
- Level of Service A-C
- Level of Service D
- Level of Service E
- Level of Service F
- Freeway LOS is Shown for Highest Peak Hour Volume
- LOS E/F Stop-Controlled Intersection with a Critical Movement Volume of 100 VPH or Less or Critical Movement Queue Length is less than 250'



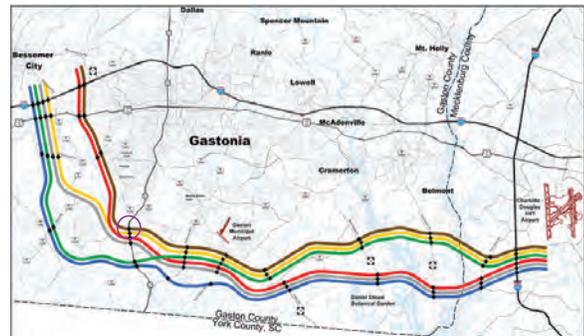
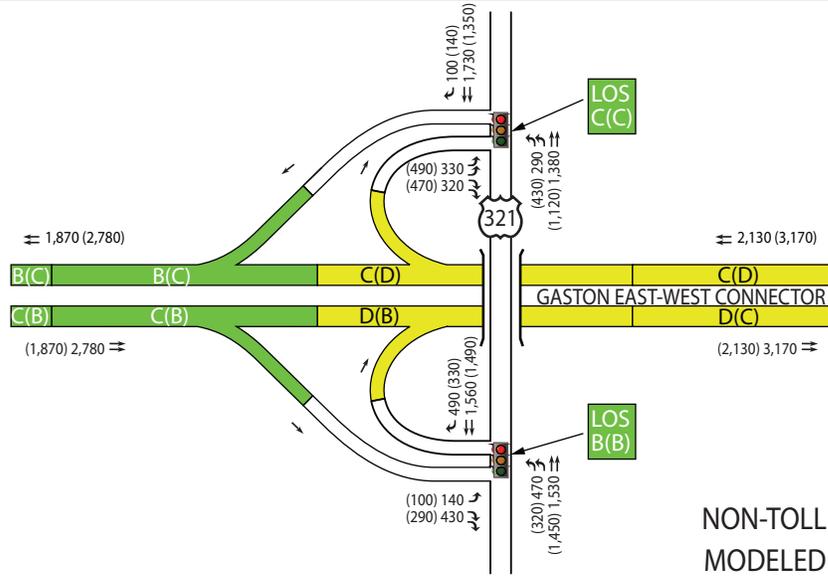
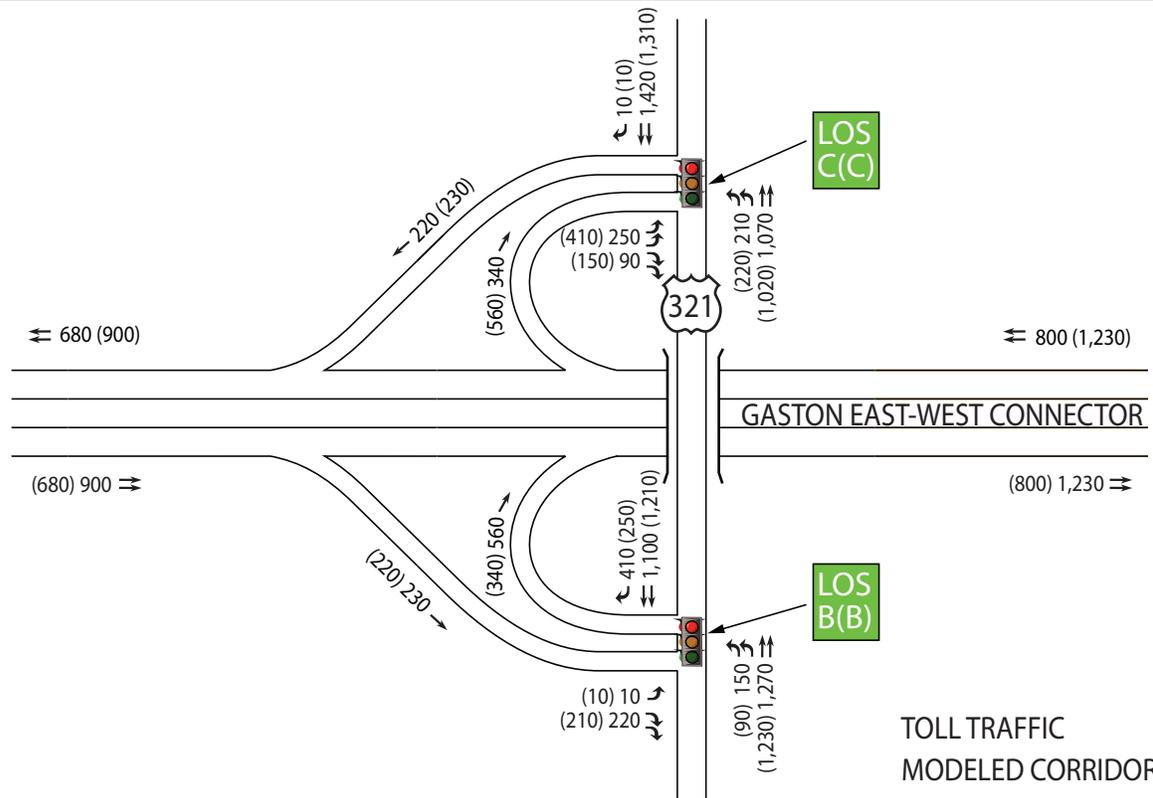
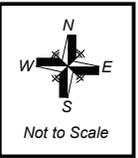
TIP PROJECT NO. U-3321
GASTON EAST-WEST CONNECTOR
GASTON AND MECKLENBURG COUNTIES

**Linwood Road
Modeled Corridor 77
Toll Traffic Analysis,
Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
FIGURE 6-4**



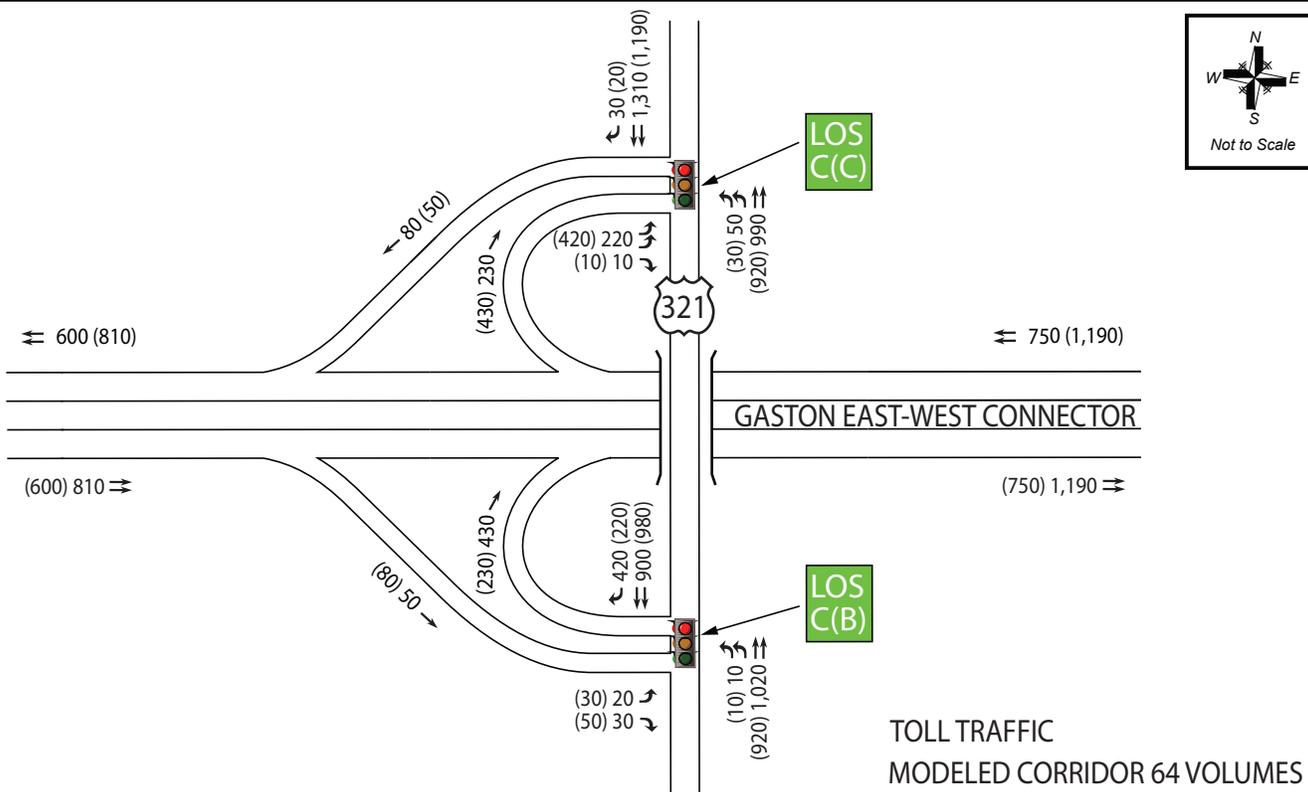
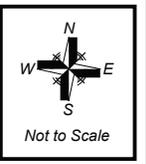
TIP PROJECT NO. U-3321
 GASTON EAST-WEST CONNECTOR
 GASTON AND MECKLENBURG COUNTIES

**Lewis Road
 Modeled Corridor 64
 Toll Traffic Analysis,
 Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
 FIGURE 6-5**

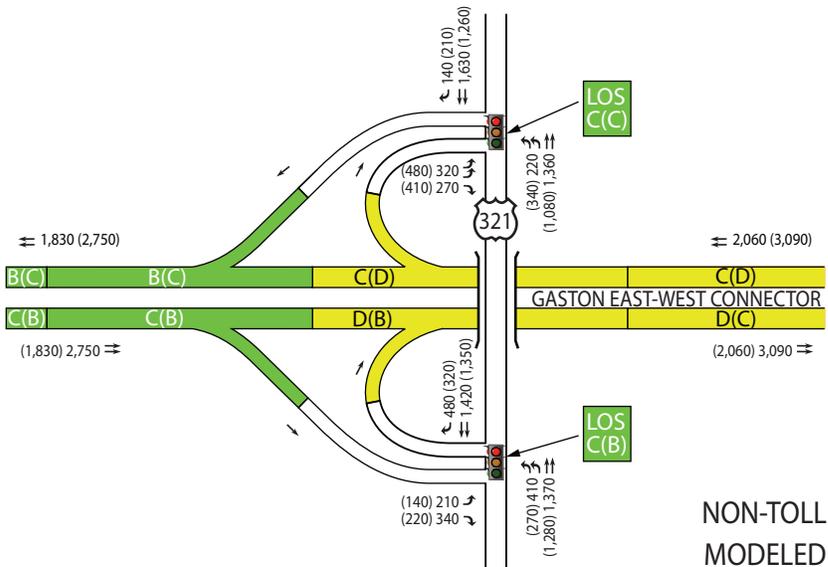


TIP PROJECT NO. U-3321
 GASTON EAST-WEST CONNECTOR
 GASTON AND MECKLENBURG COUNTIES

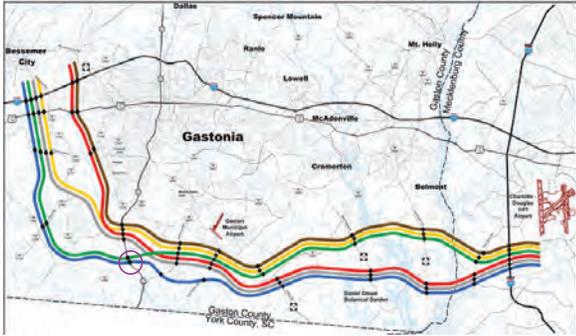
**US 321
 Modeled Corridor 4
 Toll Traffic Analysis,
 Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
 FIGURE 6-6**



TOLL TRAFFIC
MODELED CORRIDOR 64 VOLUMES



NON-TOLL TRAFFIC
MODELED CORRIDOR 58 VOLUMES



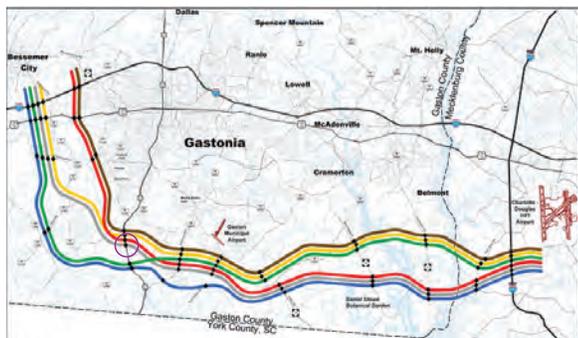
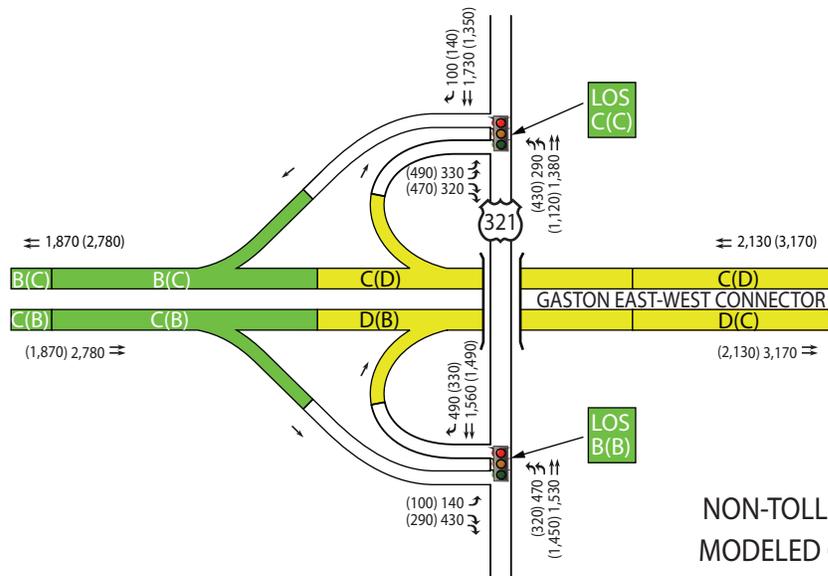
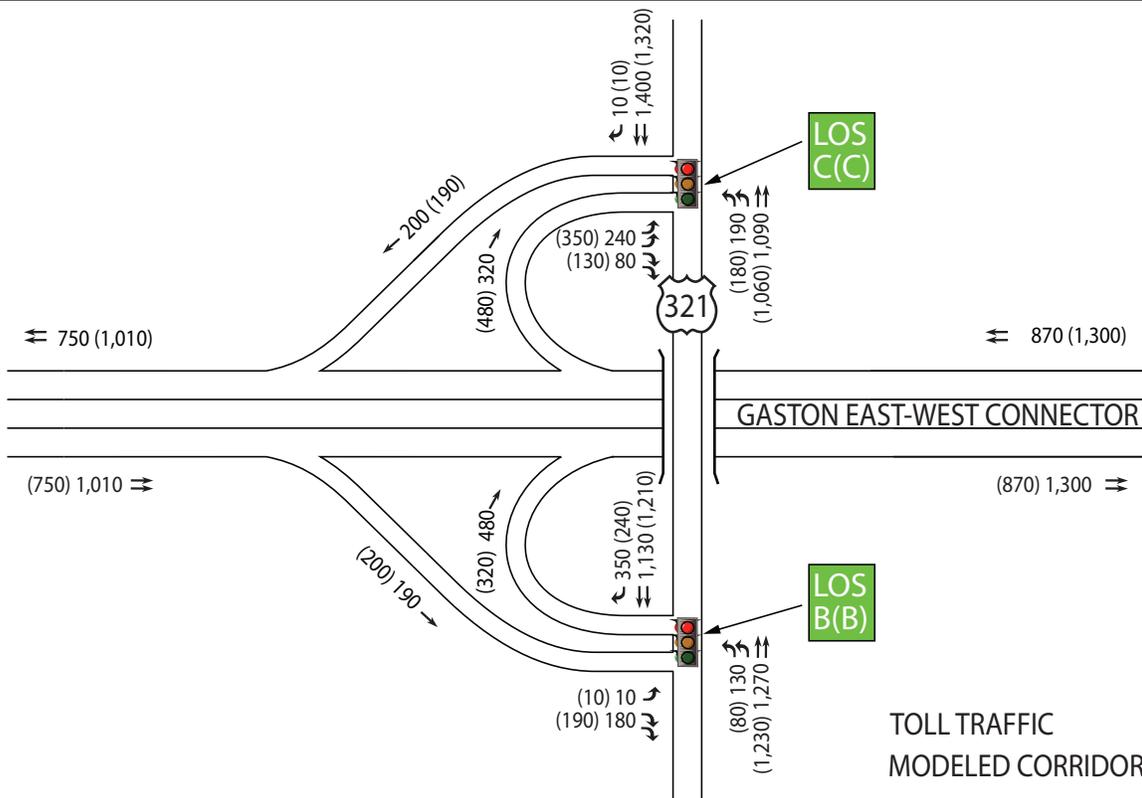
Legend

- Signalized Intersection
- Stop Controlled Movement
- XX (XX) AM (PM) Peak Hour Volumes
- Lane Geometry
- XX 95th Percentile Queue Length
- LOS X (X) AM (PM) Peak Hour Level of Service
- Level of Service A-C
- Level of Service D
- Level of Service E
- Level of Service F
- Freeway LOS is Shown for Highest Peak Hour Volume
- LOS E/F Stop-Controlled Intersection with a Critical Movement Volume of 100 VPH or Less or Critical Movement Queue Length is less than 250'



TIP PROJECT NO. U-3321
GASTON EAST-WEST CONNECTOR
GASTON AND MECKLENBURG COUNTIES

**US 321
Modeled Corridor 64
Toll Traffic Analysis,
Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
FIGURE 6-7**



- Alternative 64
- Alternative 77
- Alternative 5
- Alternative 58
- Alternative 76
- Alternative 4
- Interchanges

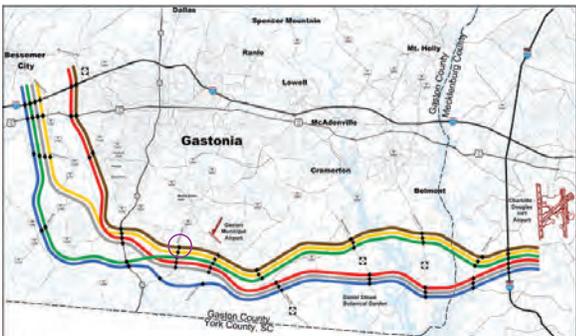
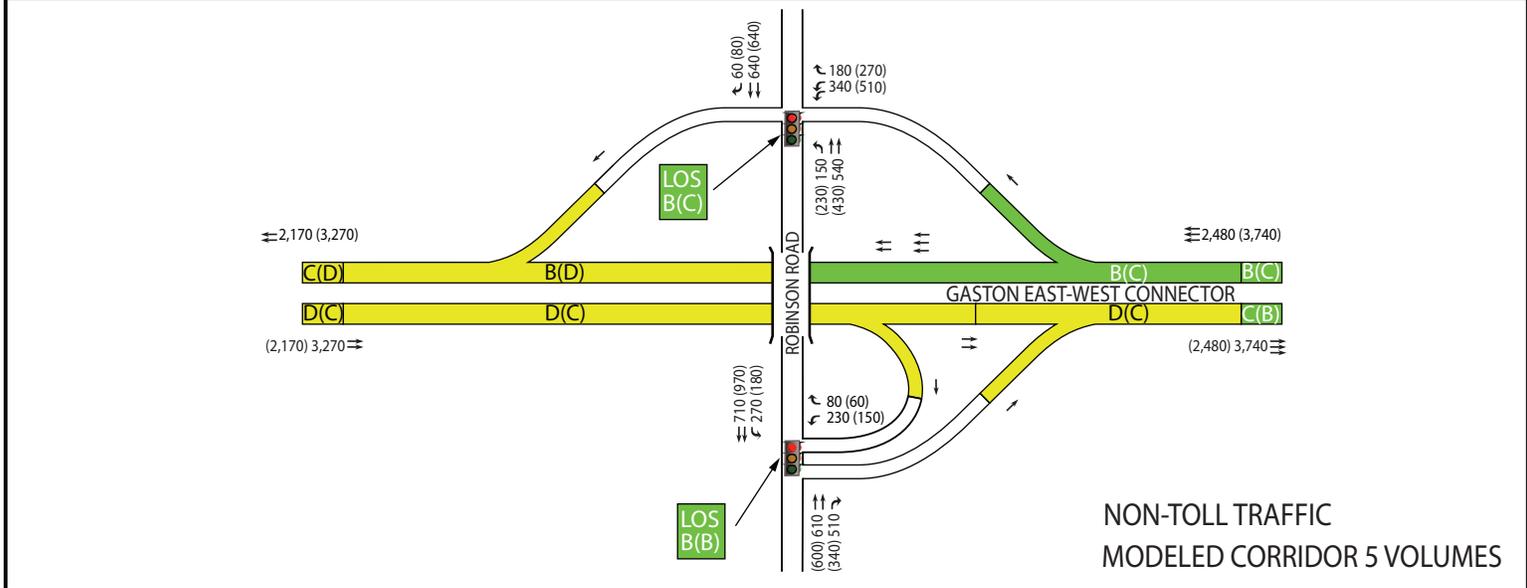
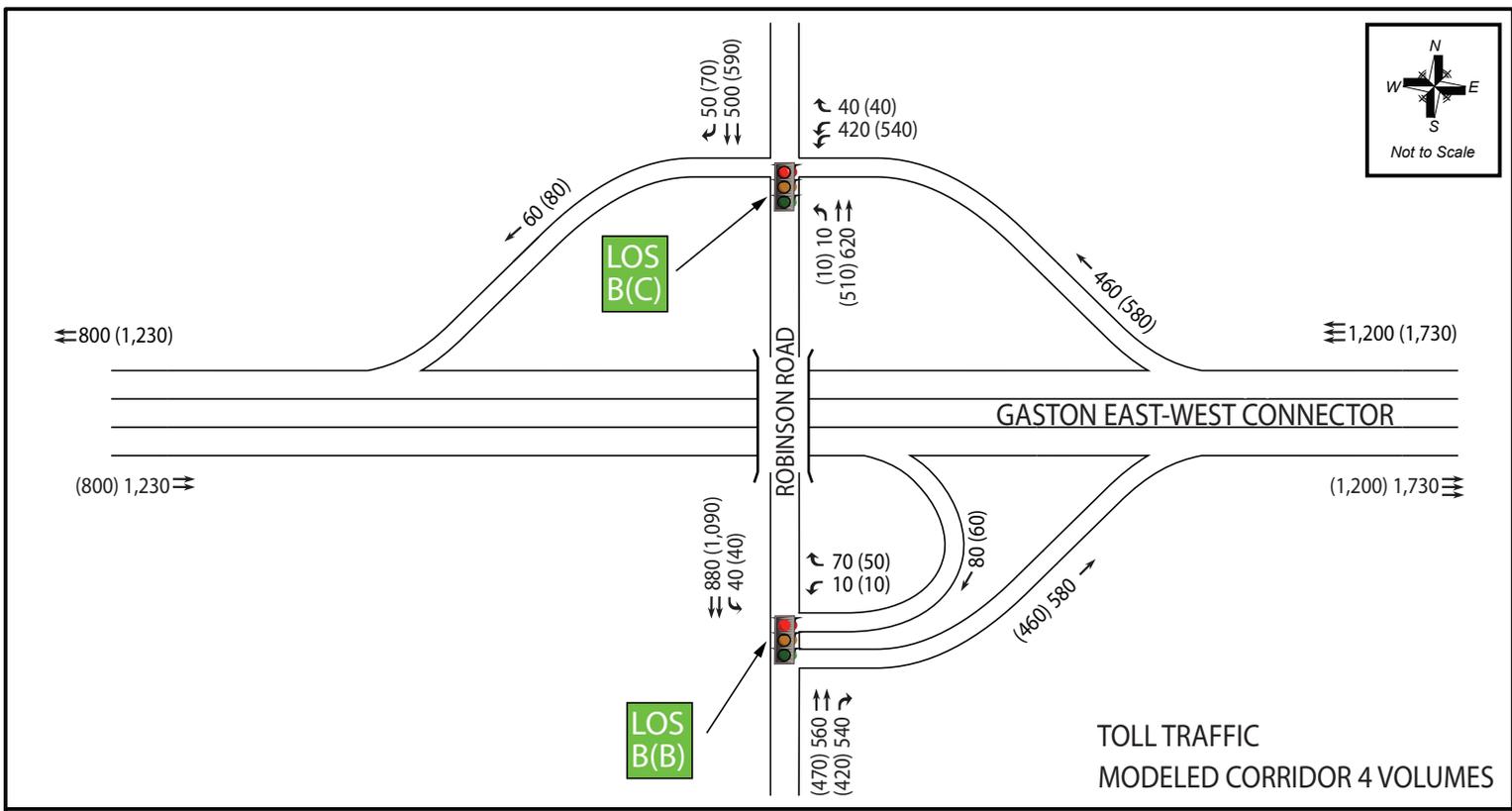
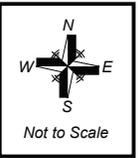
Legend

- Signalized Intersection
- Stop Controlled Movement
- XX (XX) AM (PM) Peak Hour Volumes
- Lane Geometry
- XX 95th Percentile Queue Length
- LOS X (X) AM (PM) Peak Hour Level of Service
- Level of Service A-C
- Level of Service D
- Level of Service E
- Level of Service F
- Freeway LOS is Shown for Highest Peak Hour Volume
- LOS E/F Stop-Controlled Intersection with a Critical Movement Volume of 100 VPH or Less or Critical Movement Queue Length is less than 250'



TIP PROJECT NO. U-3321
GASTON EAST-WEST CONNECTOR
GASTON AND MECKLENBURG COUNTIES

**US 321
 Modeled Corridor 77
 Toll Traffic Analysis,
 Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
 FIGURE 6-8**



- Alternative 64
- Alternative 77
- Alternative 5
- Alternative 58
- Alternative 76
- Alternative 4
- Interchanges

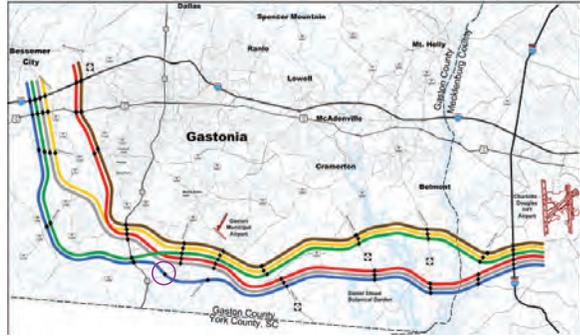
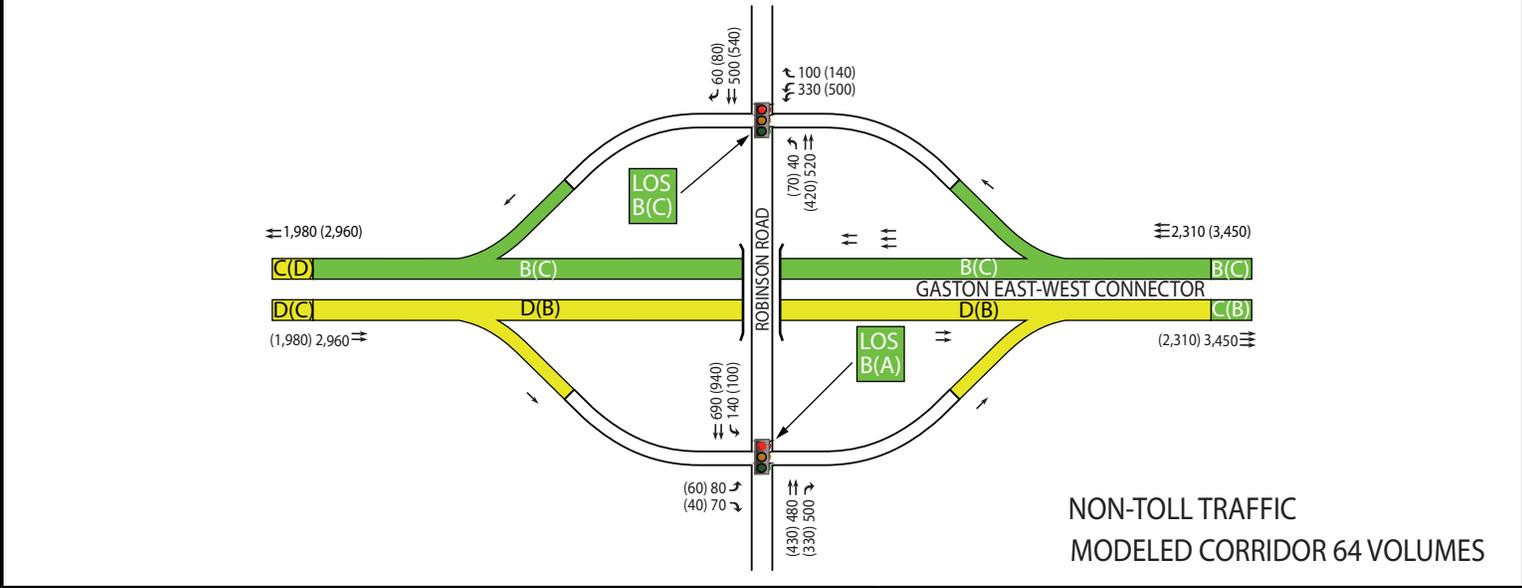
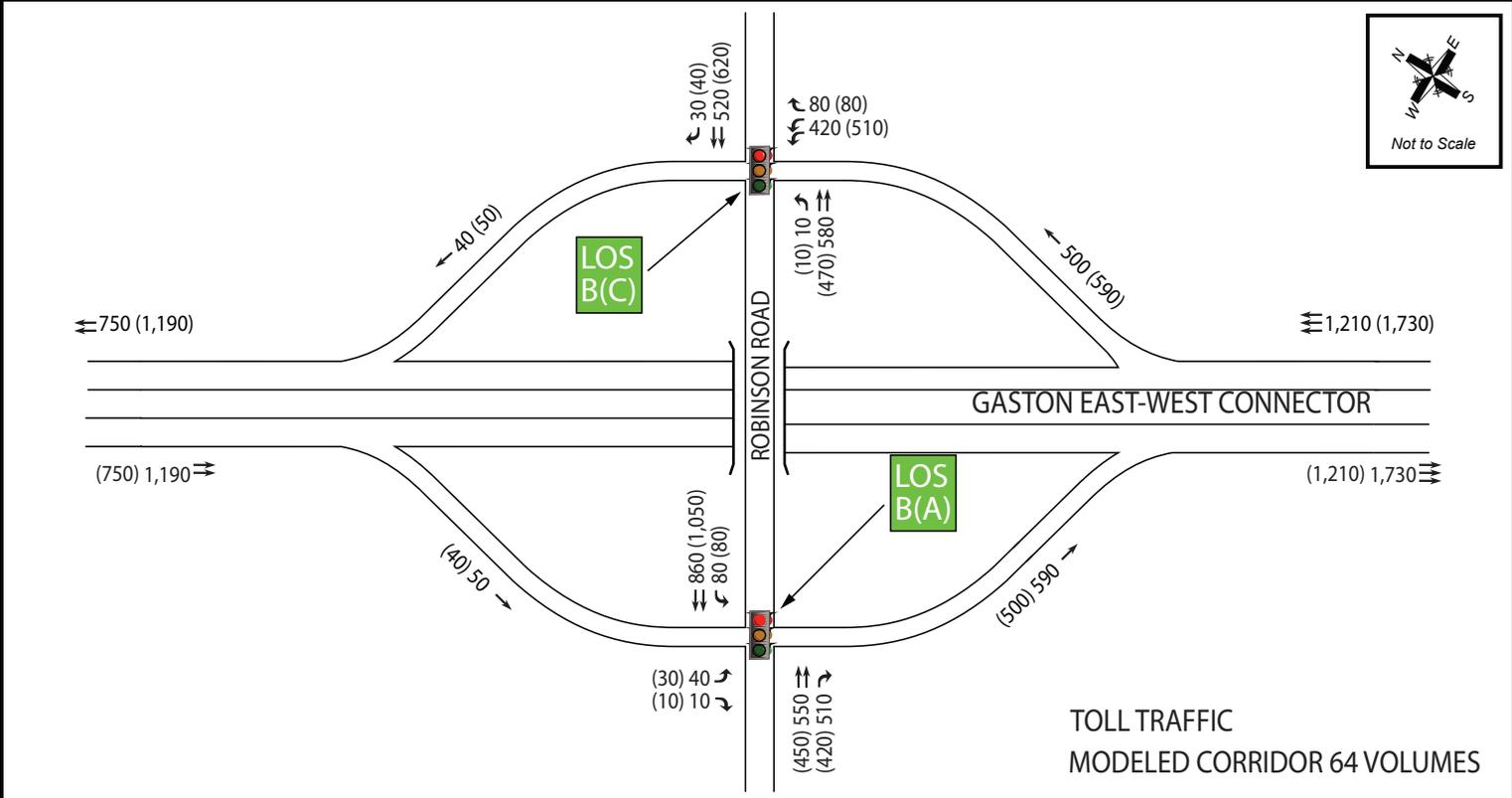
Legend

- Signalized Intersection
- Stop Controlled Movement
- XX (XX) AM (PM) Peak Hour Volumes
- Lane Geometry
- XX 95th Percentile Queue Length
- LOS X (X) AM (PM) Peak Hour Level of Service
- Level of Service A-C
- Level of Service D
- Level of Service E
- Level of Service F
- Freeway LOS is Shown for Highest Peak Hour Volume
- LOS E/F Stop-Controlled Intersection with a Critical Movement Volume of 100 VPH or Less or Critical Movement Queue Length is less than 250'



TIP PROJECT NO. U-3321
 GASTON EAST-WEST CONNECTOR
 GASTON AND MECKLENBURG COUNTIES

**Robinson Road
 Modeled Corridor 4
 Toll Traffic Analysis,
 Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
 FIGURE 6-9**



- Alternative 64
- Alternative 77
- Alternative 5
- Alternative 58
- Alternative 76
- Alternative 4
- Interchanges

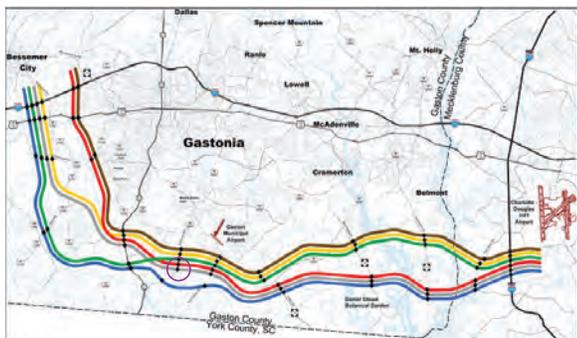
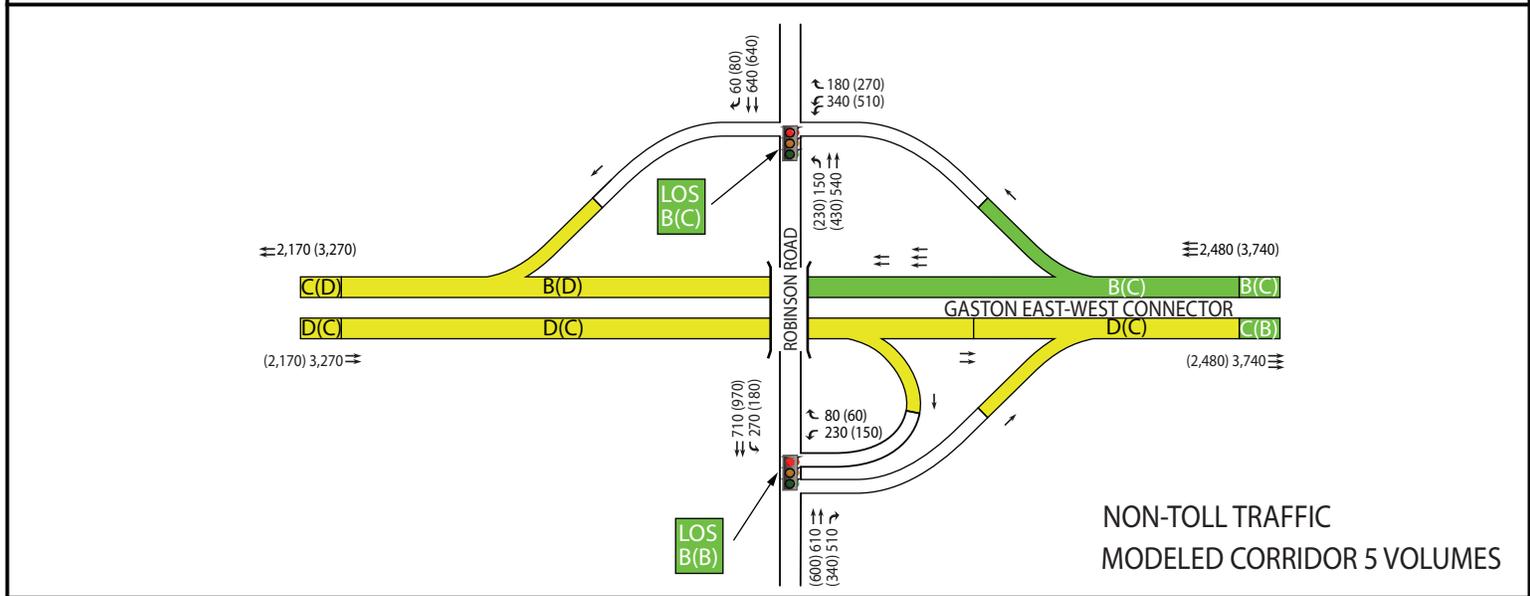
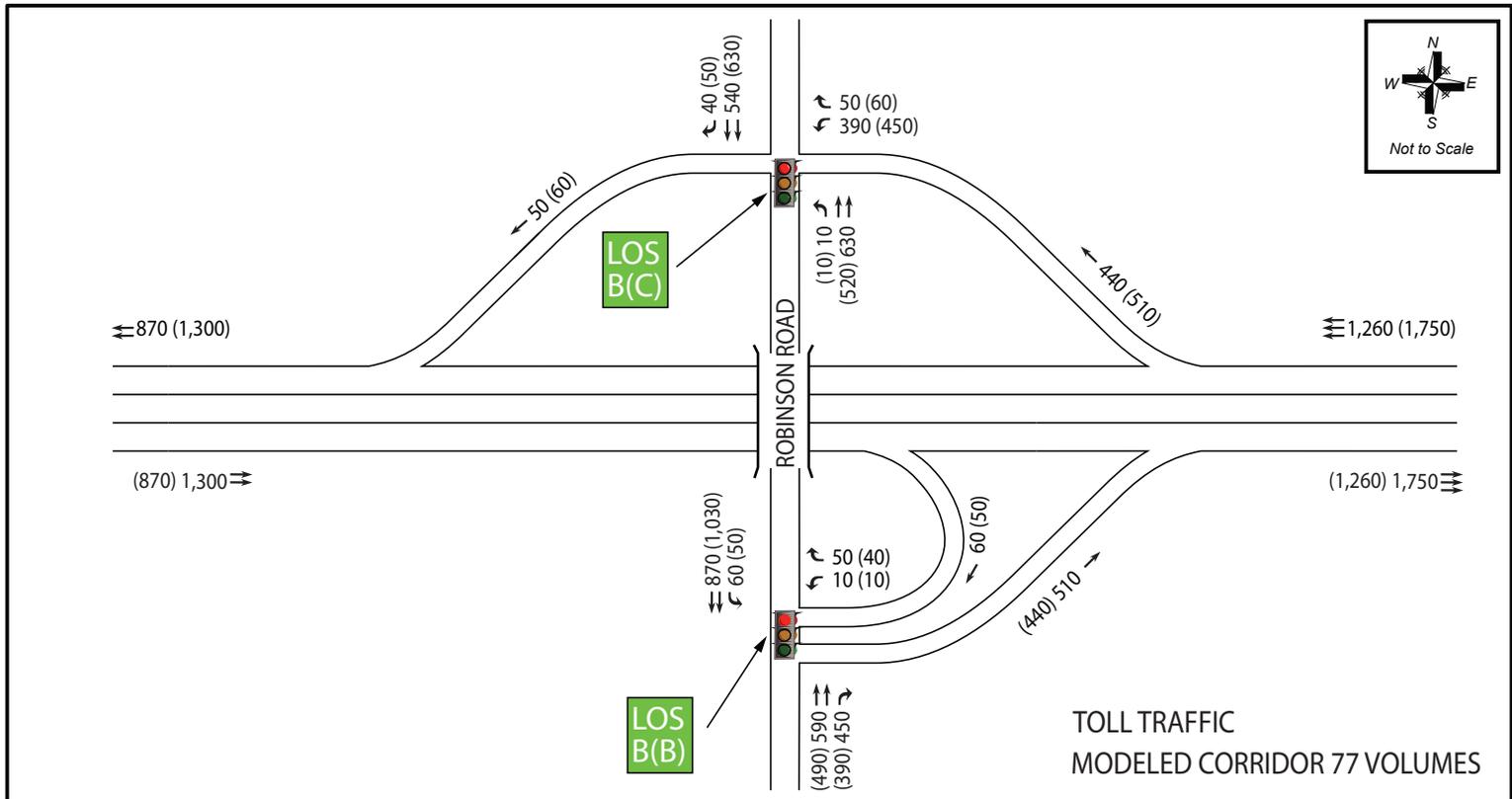
Legend

- Signalized Intersection
- Stop Controlled Movement
- XX (XX) AM (PM) Peak Hour Volumes
- Lane Geometry
- XX 95th Percentile Queue Length
- LOS X (X) AM (PM) Peak Hour Level of Service
- Level of Service A-C
- Level of Service D
- Level of Service E
- Level of Service F
- Freeway LOS is Shown for Highest Peak Hour Volume
- LOS E/F Stop-Controlled Intersection with a Critical Movement Volume of 100 VPH or Less or Critical Movement Queue Length is less than 250'

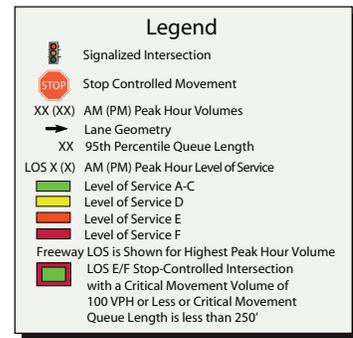


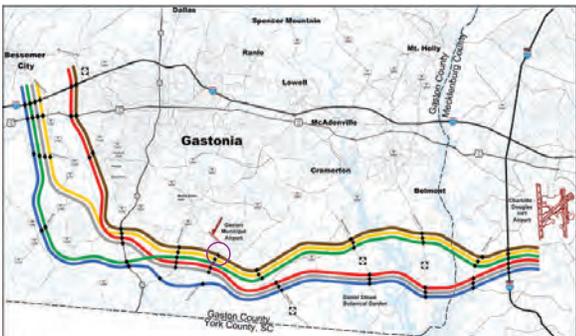
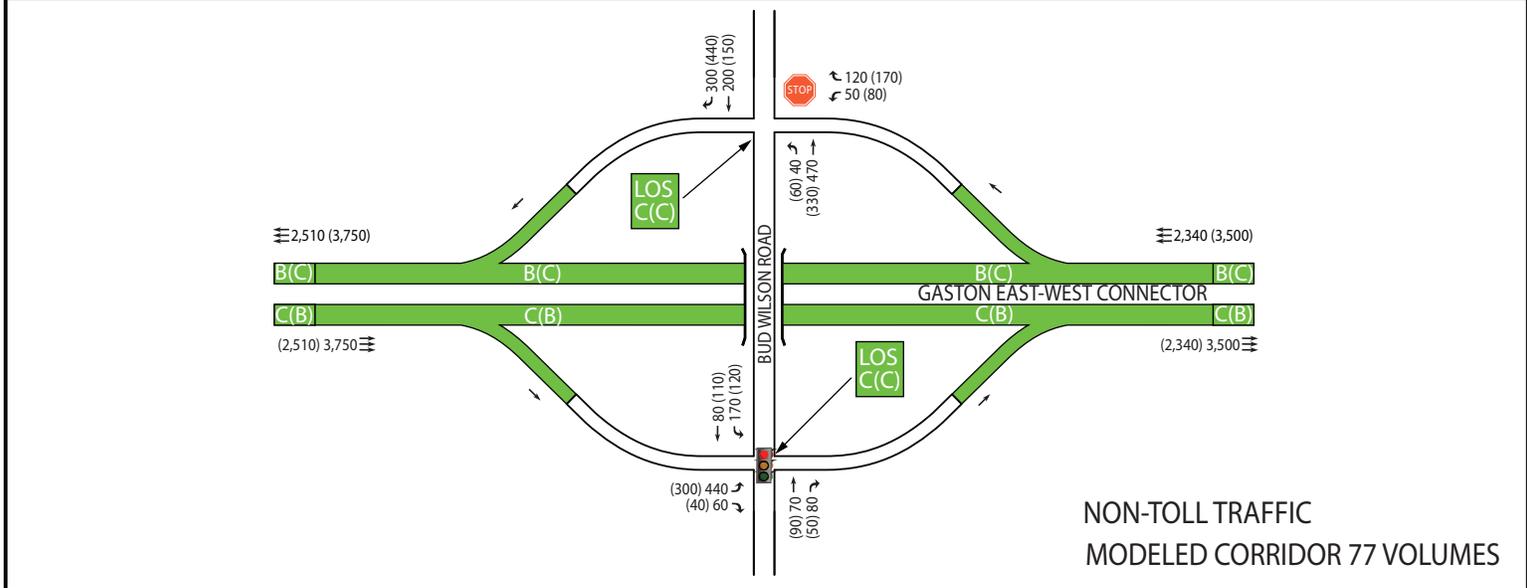
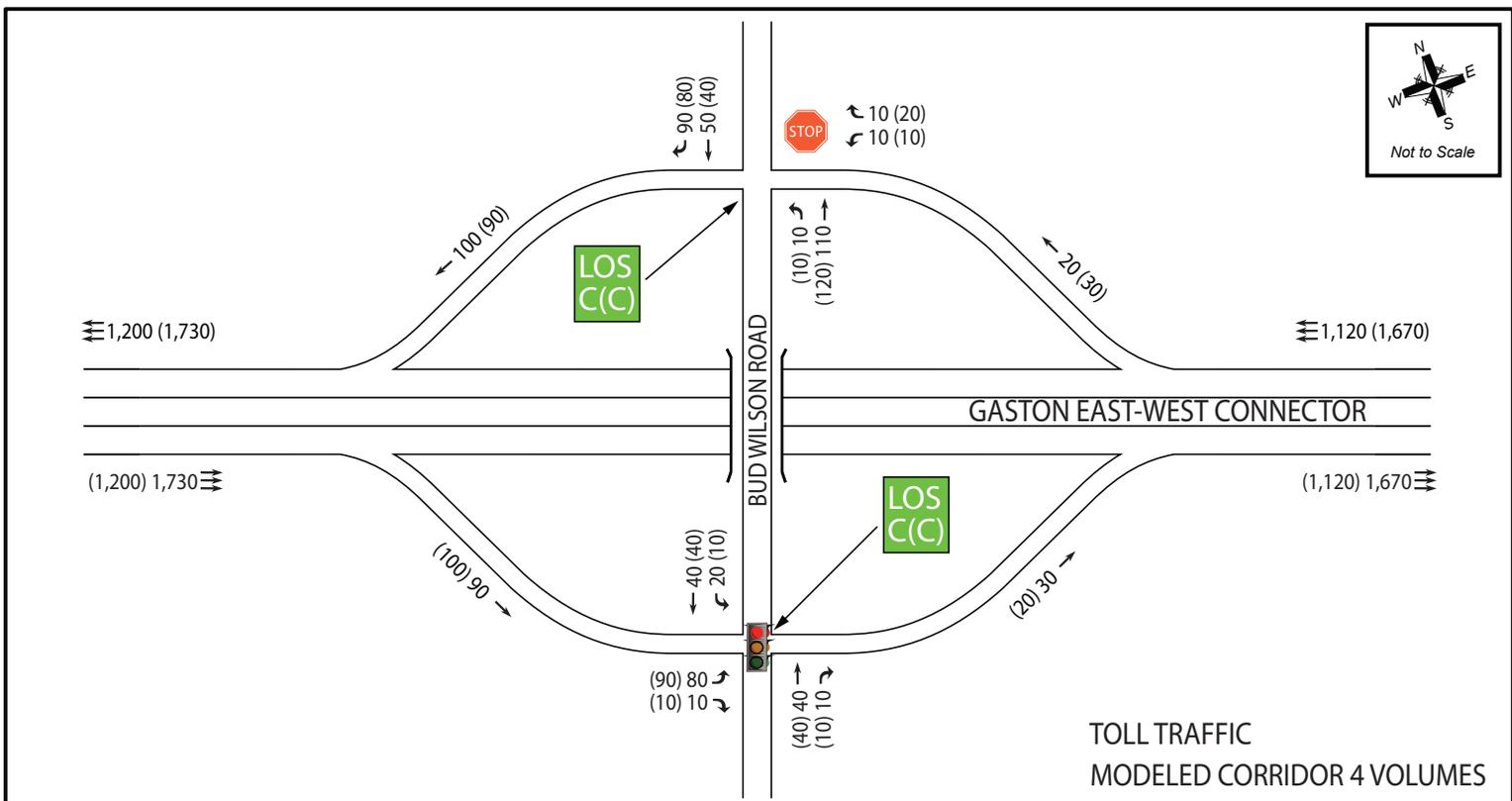
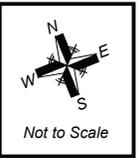
TIP PROJECT NO. U-3321
 GASTON EAST-WEST CONNECTOR
 GASTON AND MECKLENBURG COUNTIES

**Robinson Road
 Modeled Corridor 64
 Toll Traffic Analysis,
 Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
 FIGURE 6-10**



- Alternative 64
- Alternative 77
- Alternative 5
- Alternative 58
- Alternative 76
- Alternative 4
- Interchanges





- Alternative 64
- Alternative 77
- Alternative 5
- Alternative 58
- Alternative 76
- Alternative 4
- Interchanges

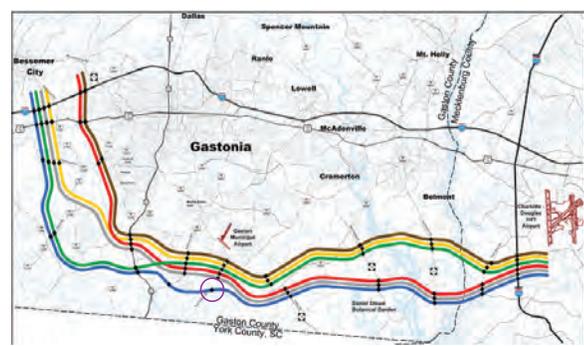
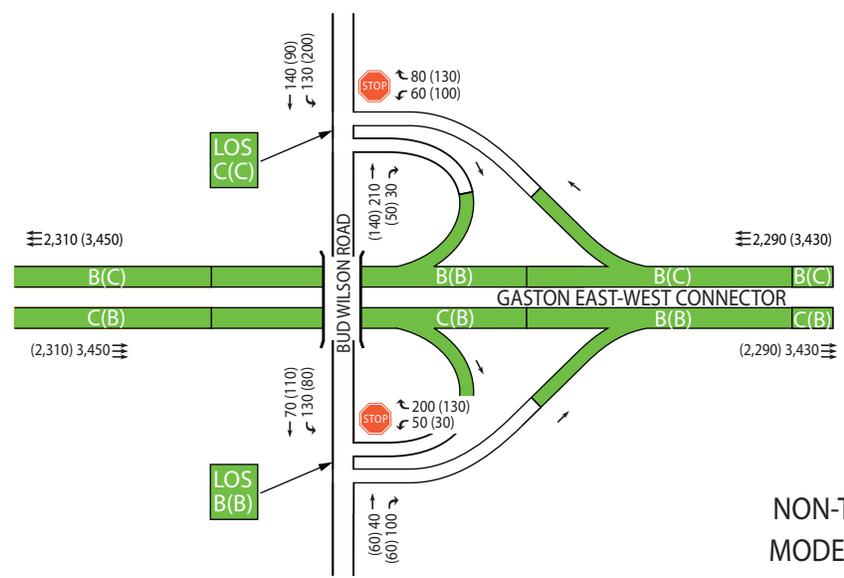
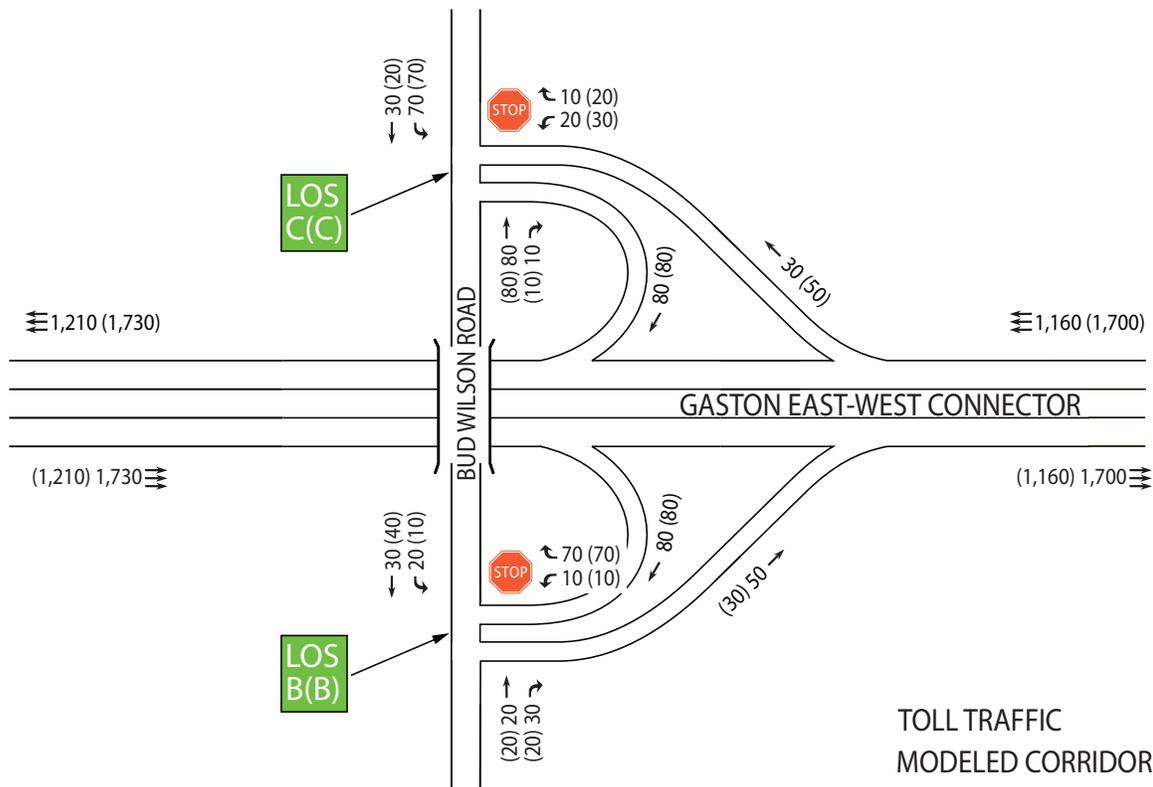
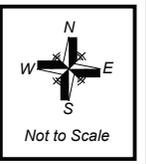
Legend

- Signalized Intersection
- Stop Controlled Movement
- XX (XX) AM (PM) Peak Hour Volumes
- Lane Geometry
- XX 95th Percentile Queue Length
- LOS X (X) AM (PM) Peak Hour Level of Service
- Level of Service A-C
- Level of Service D
- Level of Service E
- Level of Service F
- Freeway LOS is Shown for Highest Peak Hour Volume
- LOS E/F Stop-Controlled Intersection with a Critical Movement Volume of 100 VPH or Less or Critical Movement Queue Length is less than 250'



TIP PROJECT NO. U-3321
GASTON EAST-WEST CONNECTOR
GASTON AND MECKLENBURG COUNTIES

**Bud Wilson Road
Modeled Corridor 4
Toll Traffic Analysis,
Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
FIGURE 6-12**



- Alternative 64
- Alternative 77
- Alternative 5
- Alternative 58
- Alternative 76
- Alternative 4
- Interchanges

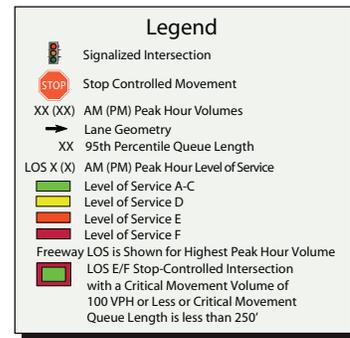
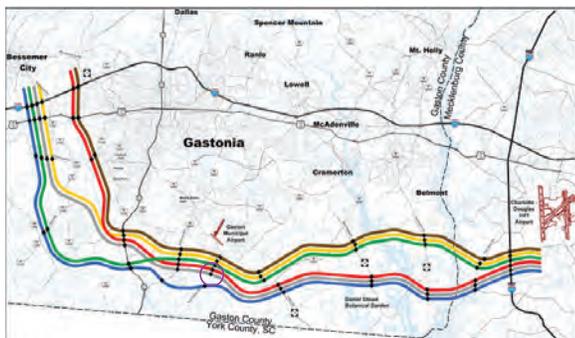
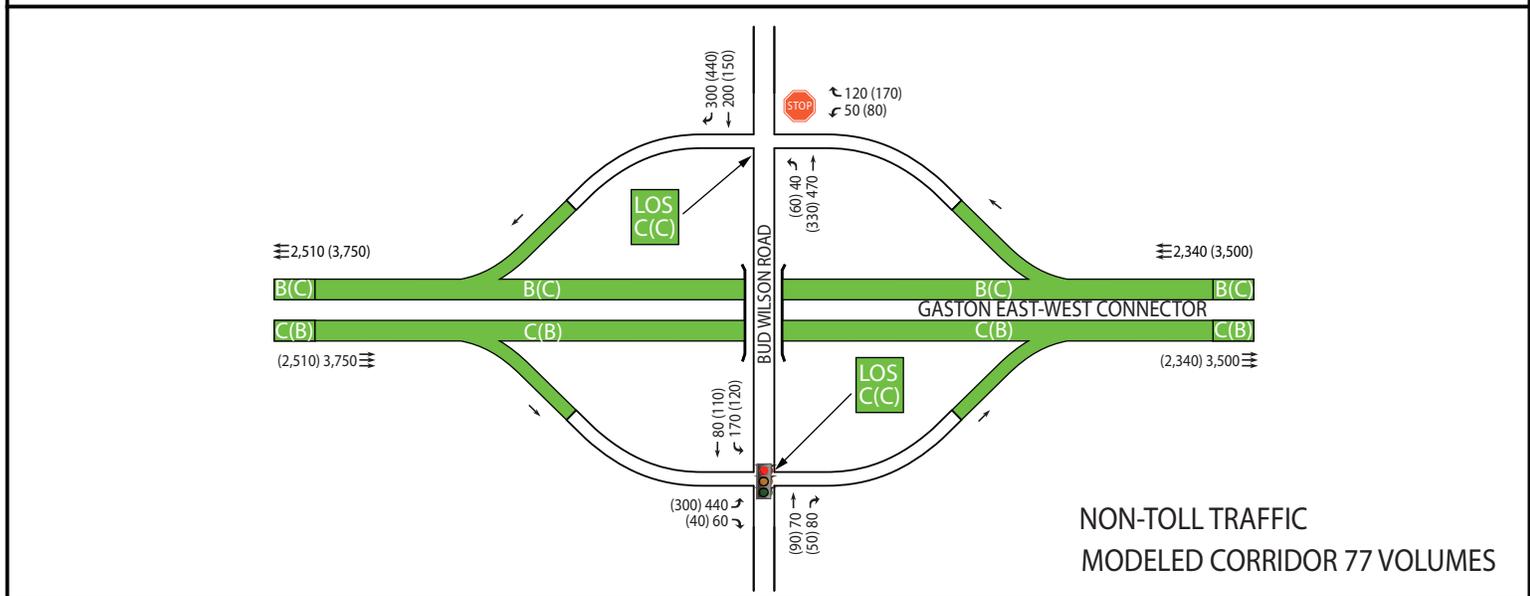
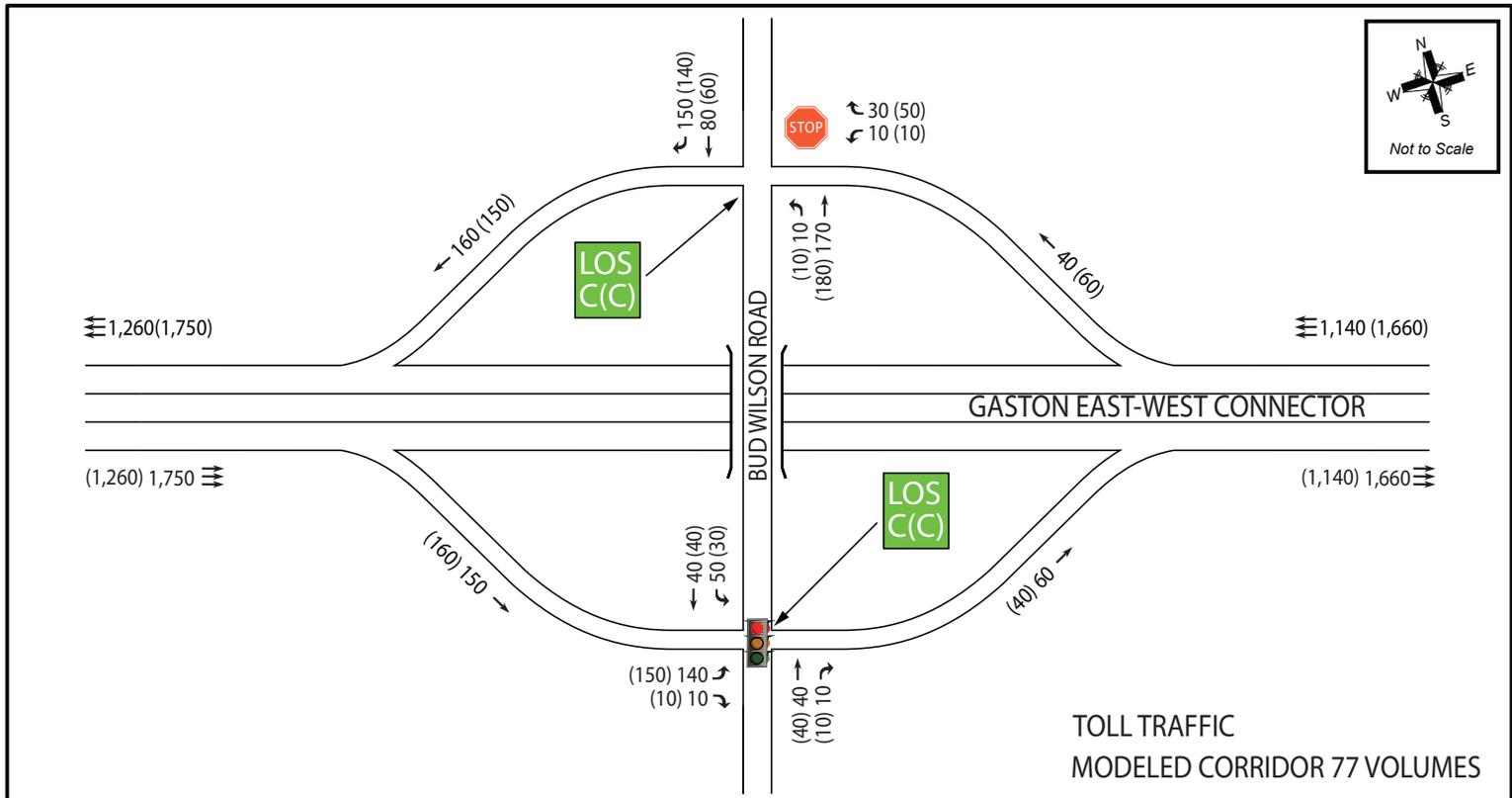
Legend

- Signalized Intersection
- Stop Controlled Movement
- XX (XX) AM (PM) Peak Hour Volumes
- Lane Geometry
- XX 95th Percentile Queue Length
- LOS X (X) AM (PM) Peak Hour Level of Service
- Level of Service A-C
- Level of Service D
- Level of Service E
- Level of Service F
- Freeway LOS is Shown for Highest Peak Hour Volume
- LOS E/F Stop-Controlled Intersection with a Critical Movement Volume of 100 VPH or Less or Critical Movement Queue Length is less than 250'



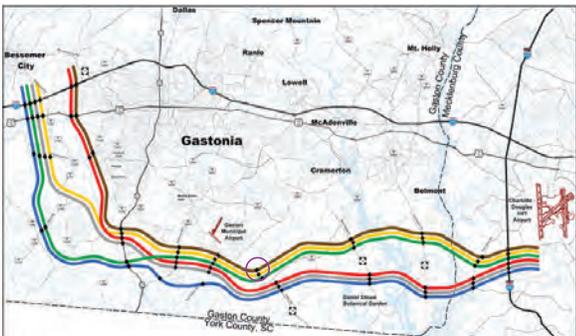
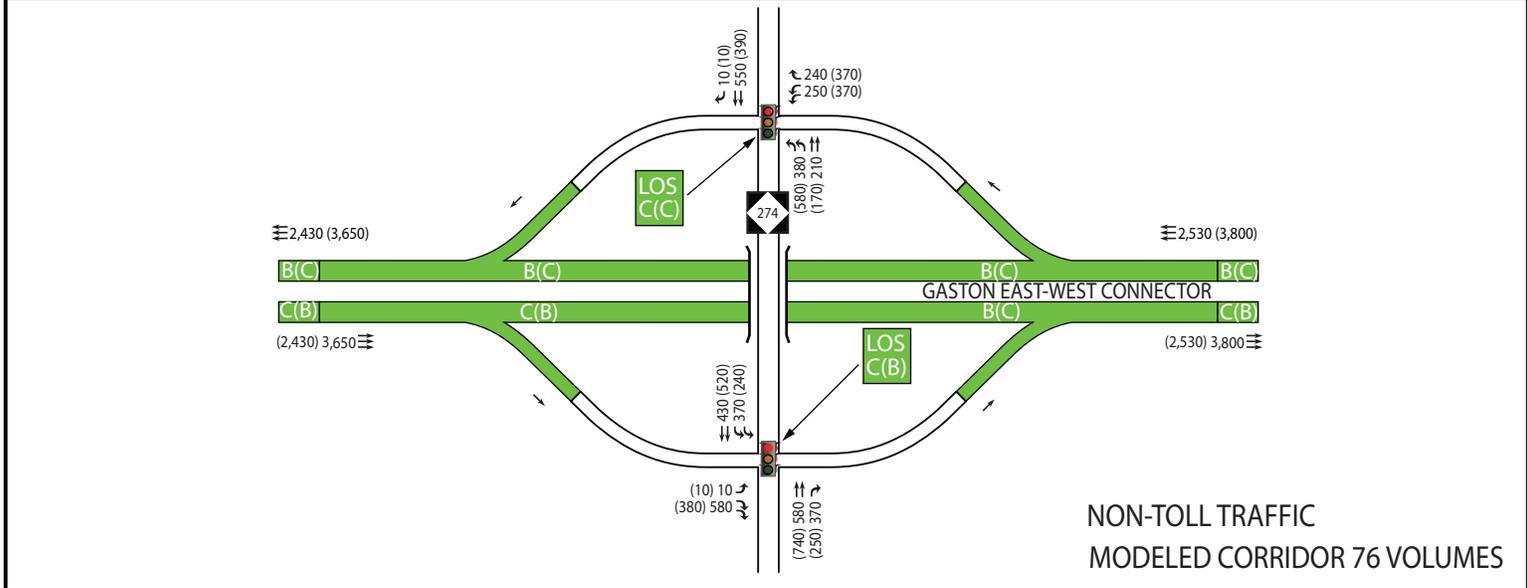
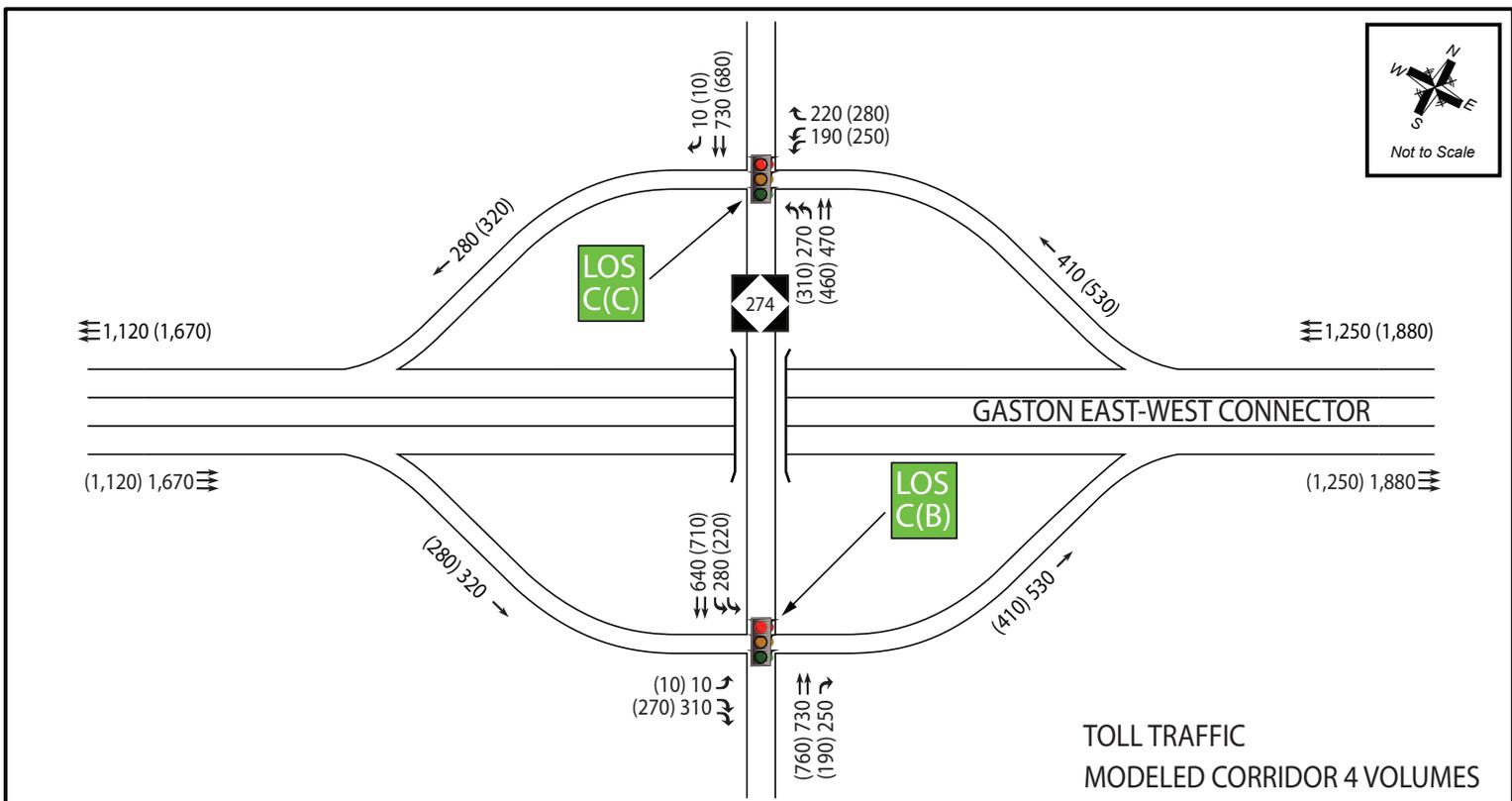
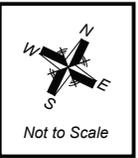
TIP PROJECT NO. U-3321
 GASTON EAST-WEST CONNECTOR
 GASTON AND MECKLENBURG COUNTIES

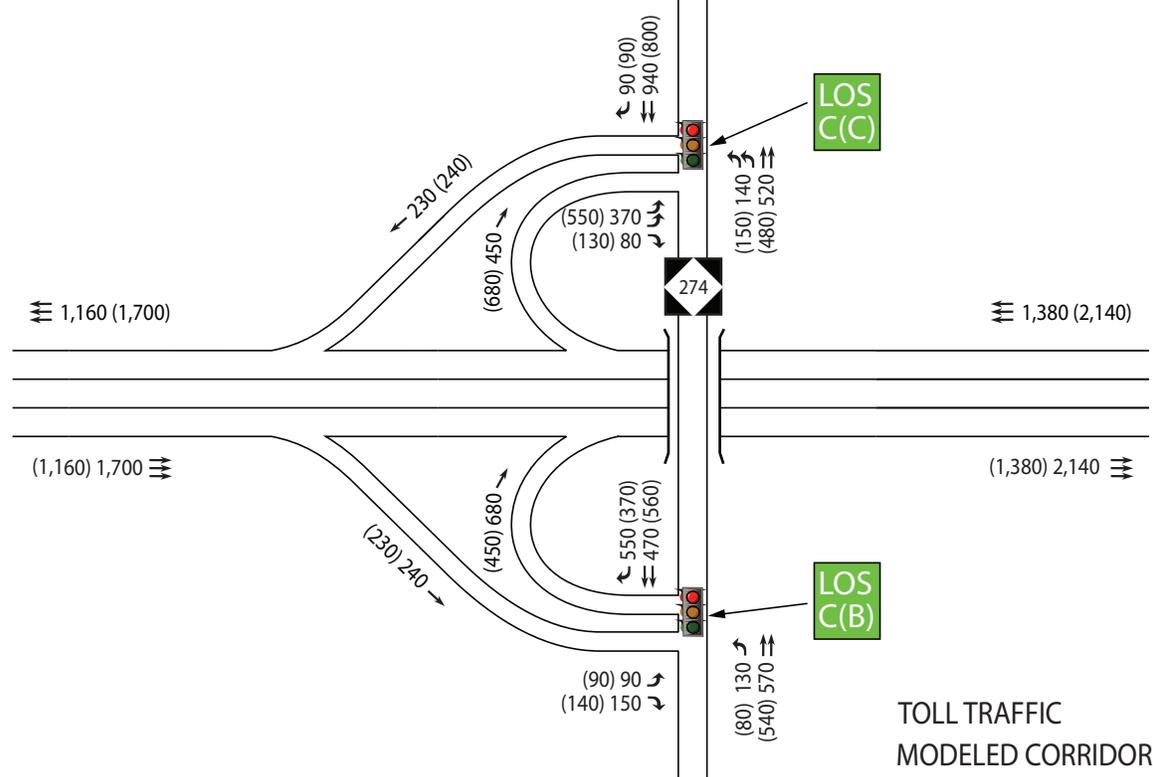
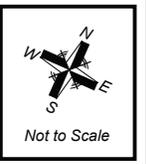
**Bud Wilson Road
 Modeled Corridor 64
 Toll Traffic Analysis,
 Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
 FIGURE 6-13**



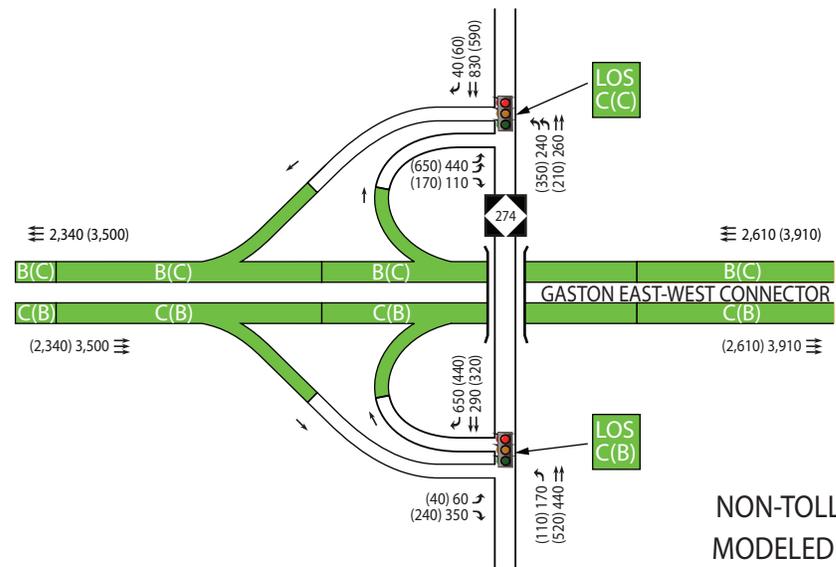
TIP PROJECT NO. U-3321
GASTON EAST-WEST CONNECTOR
GASTON AND MECKLENBURG COUNTIES

**Bud Wilson Road
Modeled Corridor 77
Toll Traffic Analysis,
Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
FIGURE 6-14**

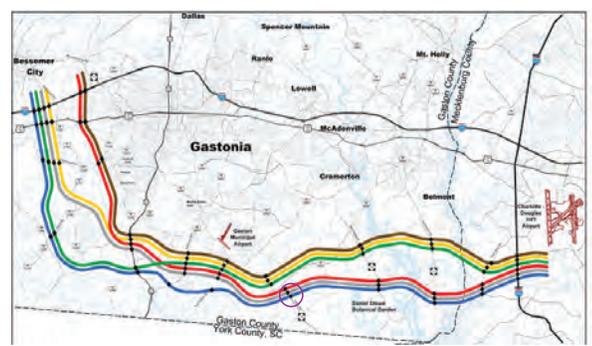




TOLL TRAFFIC
MODELED CORRIDOR 64 VOLUMES



NON-TOLL TRAFFIC
MODELED CORRIDOR 77 VOLUMES



- Alternative 64
- Alternative 77
- Alternative 5
- Alternative 58
- Alternative 76
- Alternative 4
- Interchanges

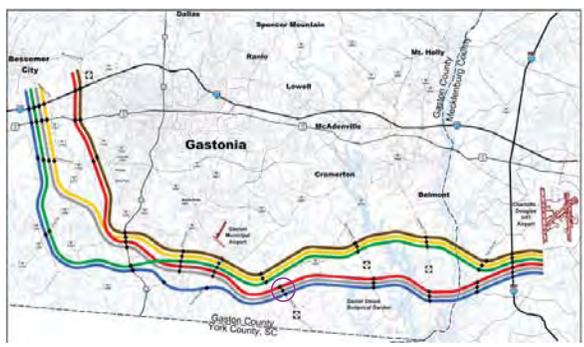
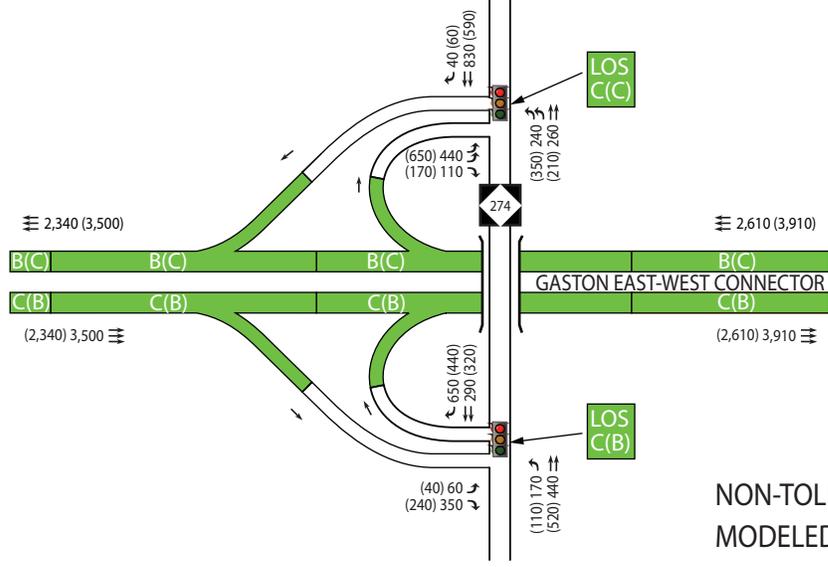
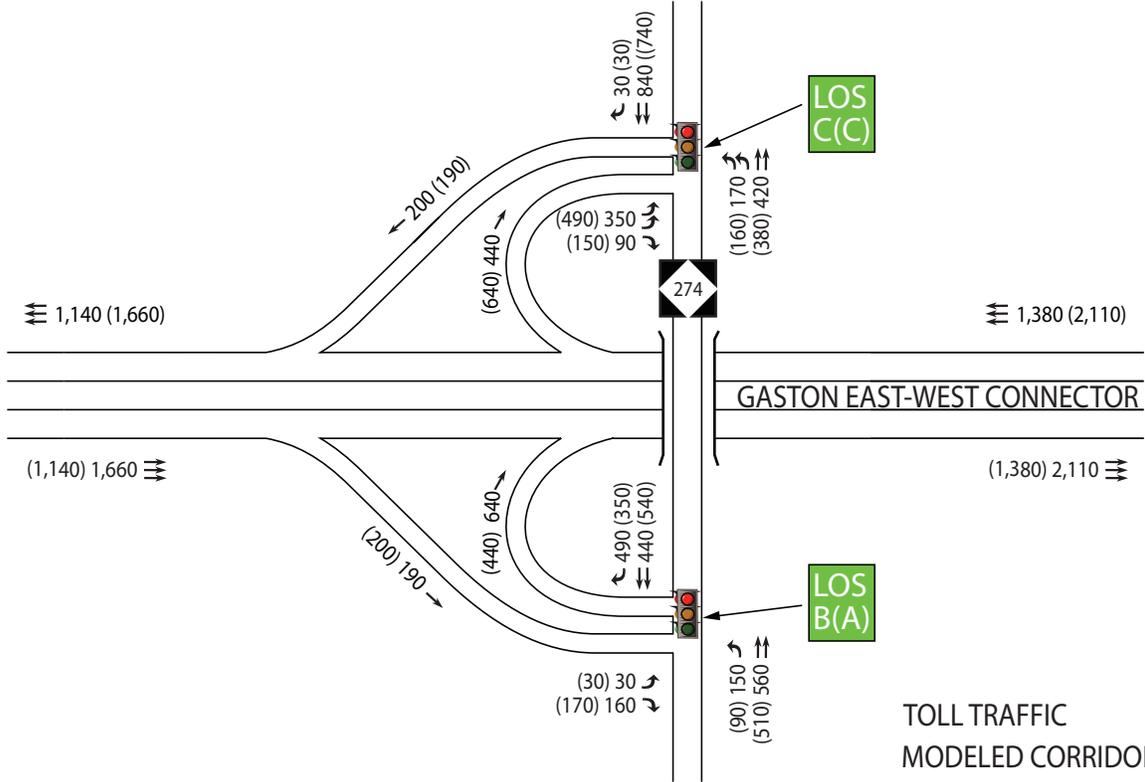
Legend

- Signalized Intersection
- Stop Controlled Movement
- XX (XX) AM (PM) Peak Hour Volumes
- Lane Geometry
- XX 95th Percentile Queue Length
- LOS X (X) AM (PM) Peak Hour Level of Service
- Level of Service A-C
- Level of Service D
- Level of Service E
- Level of Service F
- Freeway LOS is Shown for Highest Peak Hour Volume
- LOS E/F Stop-Controlled Intersection with a Critical Movement Volume of 100 VPH or Less or Critical Movement Queue Length is less than 250'



TIP PROJECT NO. U-3321
GASTON EAST-WEST CONNECTOR
GASTON AND MECKLENBURG COUNTIES

NC 274
Modeled Corridor 64
Toll Traffic Analysis,
Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
FIGURE 6-16



- Alternative 64
- Alternative 77
- Alternative 5
- Alternative 58
- Alternative 76
- Alternative 4
- Interchanges

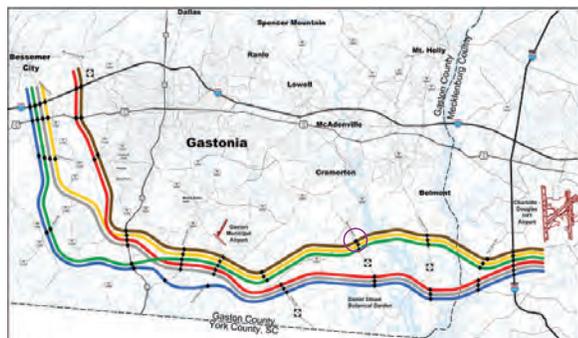
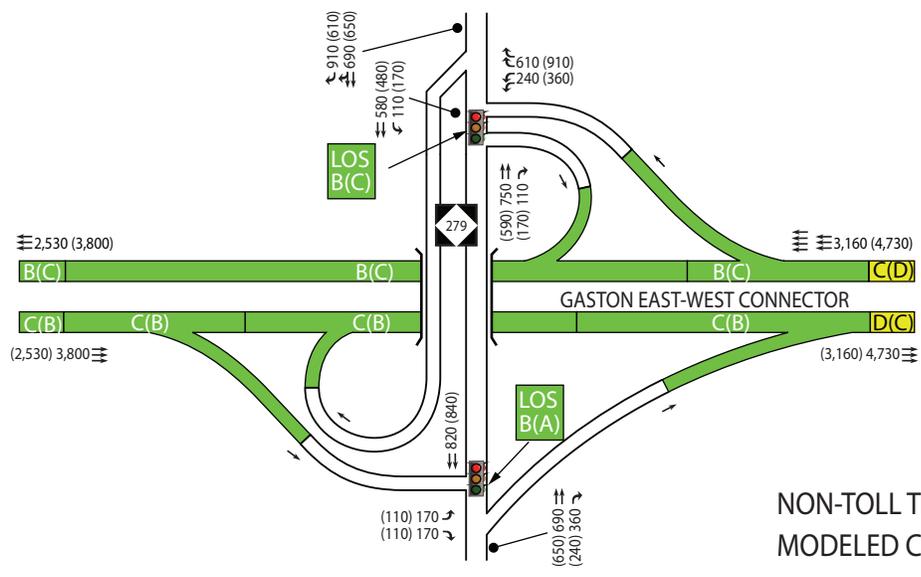
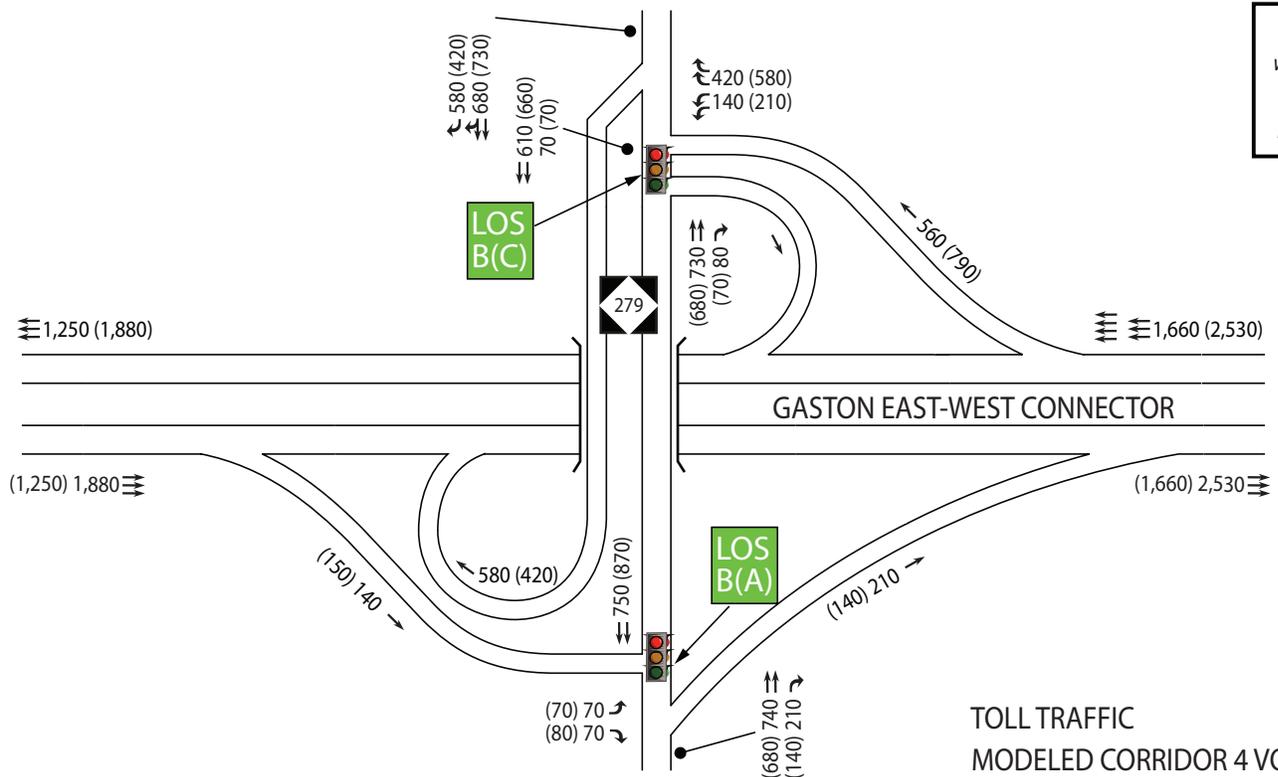
Legend

- Signalized Intersection
- Stop Controlled Movement
- XX (XX) AM (PM) Peak Hour Volumes
- Lane Geometry
- XX 95th Percentile Queue Length
- LOS X (X) AM (PM) Peak Hour Level of Service
- Level of Service A-C
- Level of Service D
- Level of Service E
- Level of Service F
- Freeway LOS is Shown for Highest Peak Hour Volume
- LOS E/F Stop-Controlled Intersection with a Critical Movement Volume of 100 VPH or Less or Critical Movement Queue Length is less than 250'



TIP PROJECT NO. U-3321
GASTON EAST-WEST CONNECTOR
GASTON AND MECKLENBURG COUNTIES

NC 274
Modeled Corridor 77
Toll Traffic Analysis,
Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
FIGURE 6-17



- Alternative 64
- Alternative 77
- Alternative 5
- Alternative 58
- Alternative 76
- Alternative 4
- Interchanges

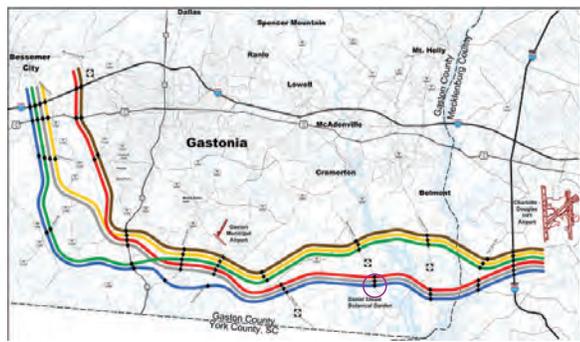
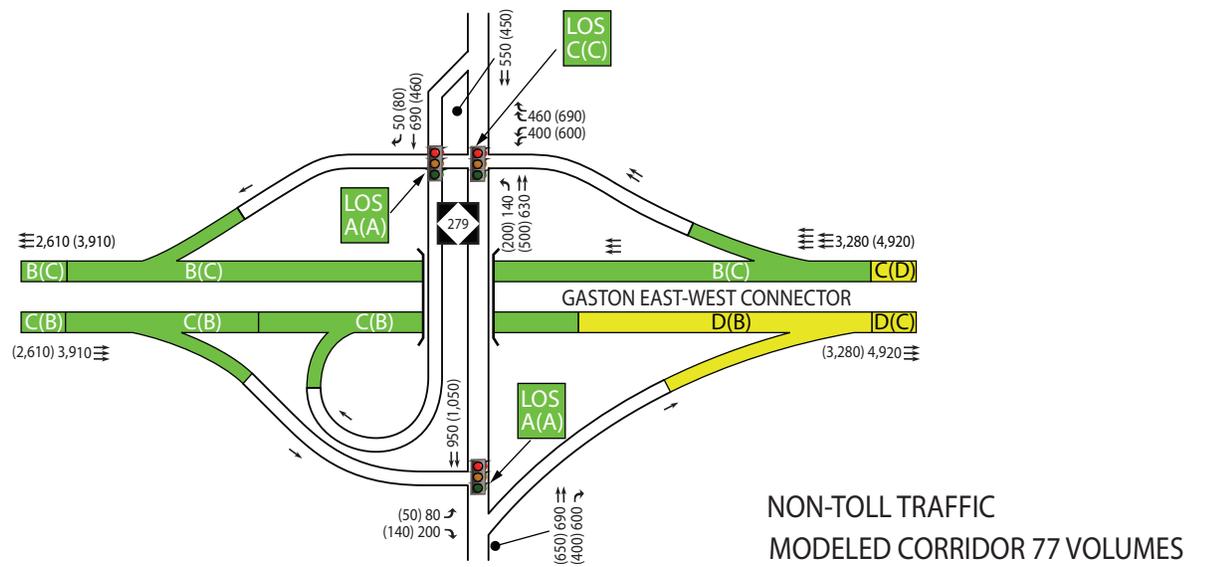
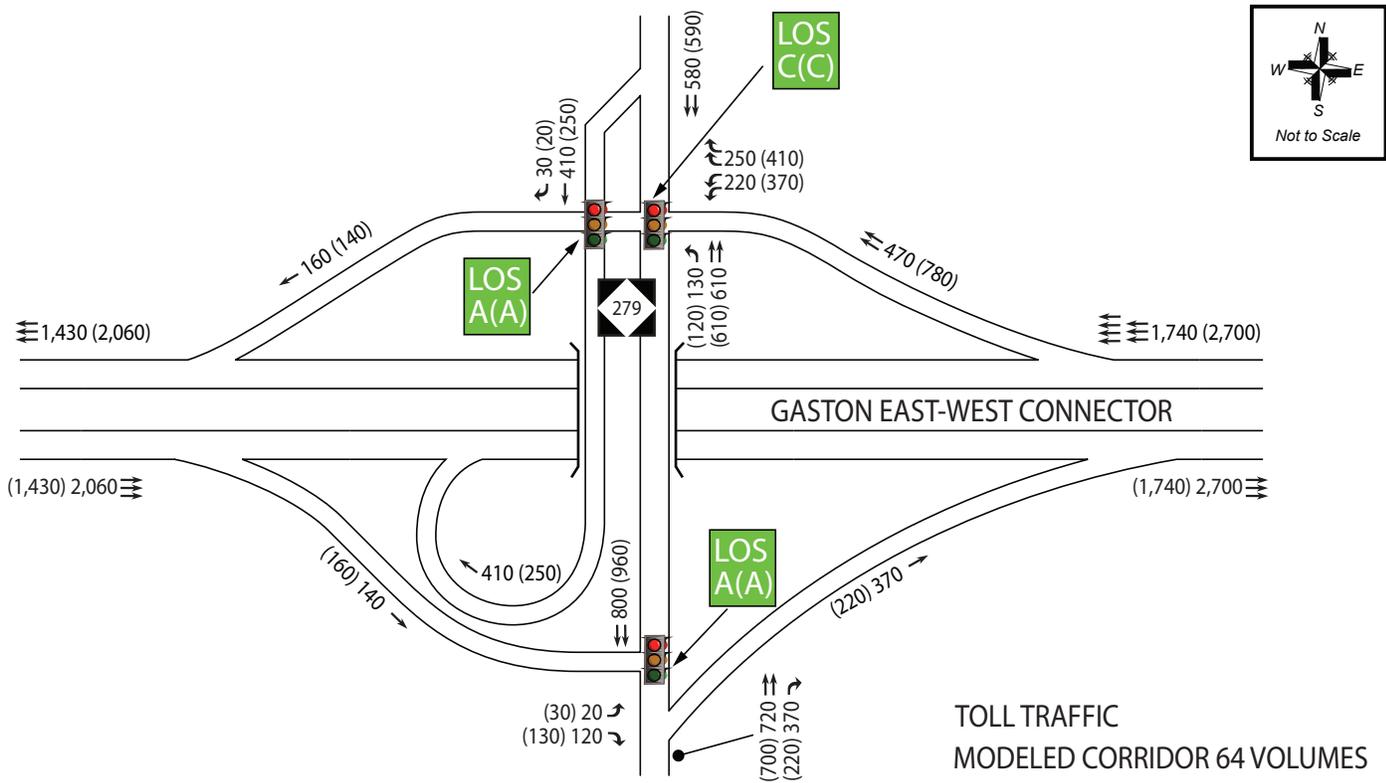
Legend

- Signalized Intersection
- Stop Controlled Movement
- XX (XX) AM (PM) Peak Hour Volumes
- Lane Geometry
- XX 95th Percentile Queue Length
- LOS X (X) AM (PM) Peak Hour Level of Service
- Level of Service A-C
- Level of Service D
- Level of Service E
- Level of Service F
- Freeway LOS is Shown for Highest Peak Hour Volume
- LOS E/F Stop-Controlled Intersection with a Critical Movement Volume of 100 VPH or Less or Critical Movement Queue Length is less than 250'



TIP PROJECT NO. U-3321
GASTON EAST-WEST CONNECTOR
GASTON AND MECKLENBURG COUNTIES

**NC 279
Modeled Corridor 4
Toll Traffic Analysis,
Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
FIGURE 6-18**



- Alternative 64
- Alternative 77
- Alternative 5
- Alternative 58
- Alternative 76
- Alternative 4
- Interchanges

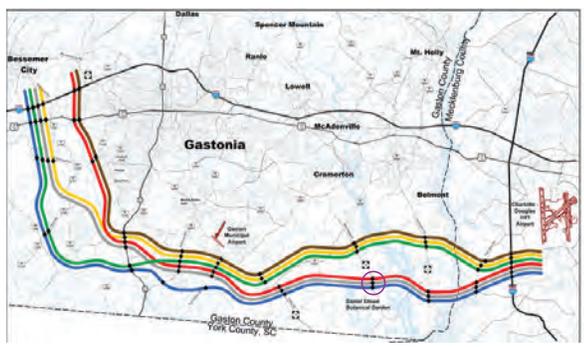
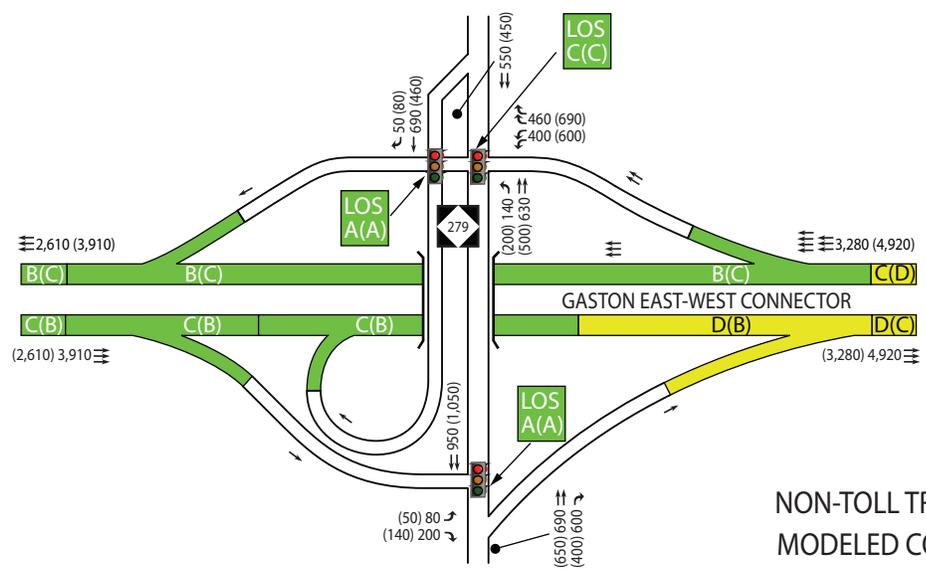
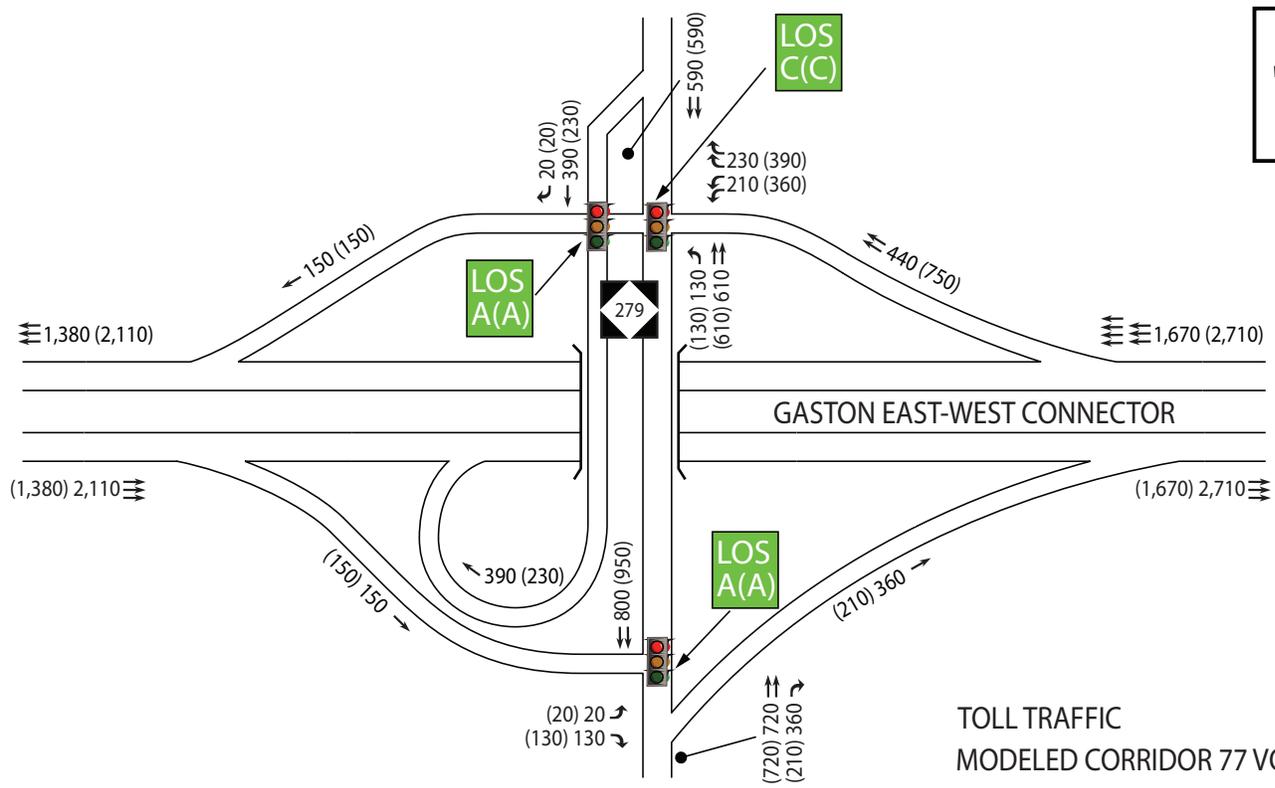
Legend

- Signalized Intersection
- Stop Controlled Movement
- XX (XX) AM (PM) Peak Hour Volumes
- Lane Geometry
- XX 95th Percentile Queue Length
- LOS X (X) AM (PM) Peak Hour Level of Service
- Level of Service A-C
- Level of Service D
- Level of Service E
- Level of Service F
- Freeway LOS is Shown for Highest Peak Hour Volume
- LOS E/F Stop-Controlled Intersection with a Critical Movement Volume of 100 VPH or Less or Critical Movement Queue Length is less than 250'



TIP PROJECT NO. U-3321
GASTON EAST-WEST CONNECTOR
GASTON AND MECKLENBURG COUNTIES

NC 279
Modeled Corridor 64
Toll Traffic Analysis,
Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
FIGURE 6-19



- Alternative 64
- Alternative 77
- Alternative 5
- Alternative 58
- Alternative 76
- Alternative 4
- Interchanges

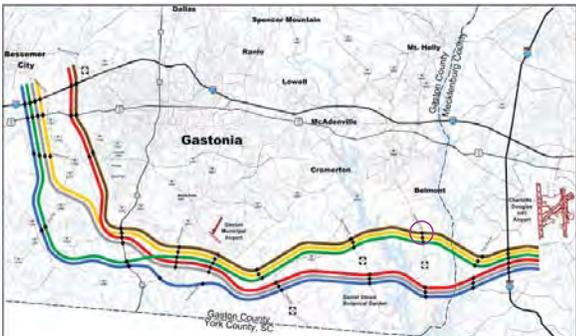
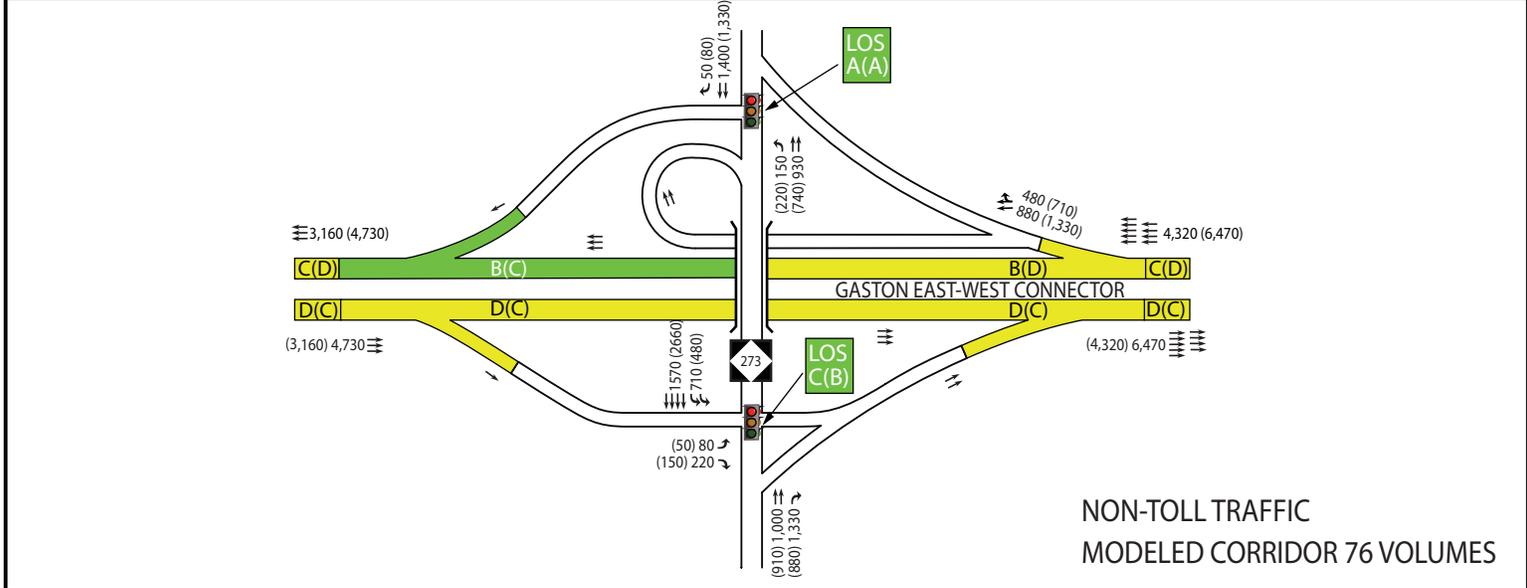
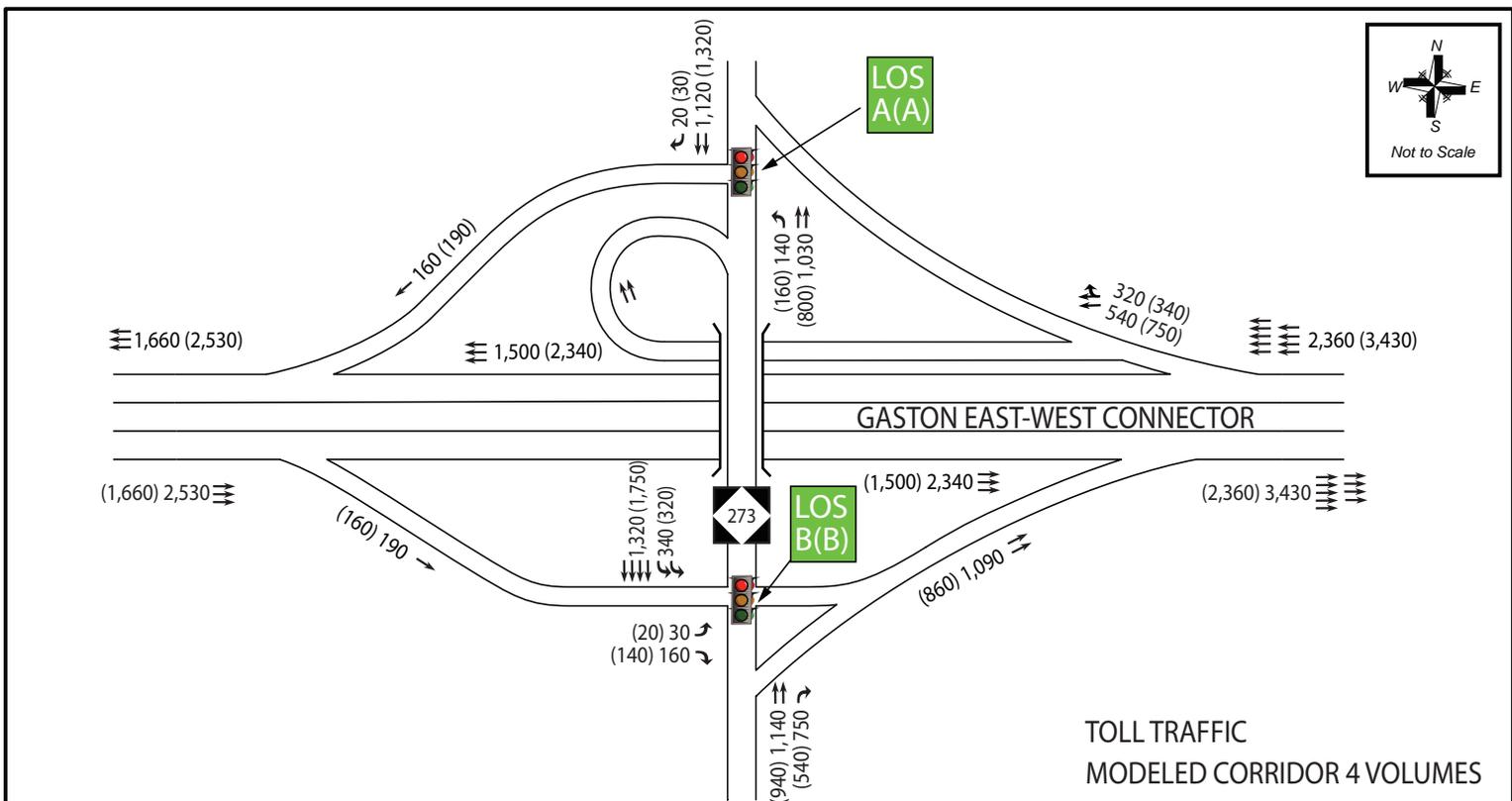
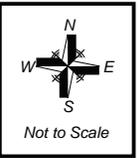
Legend

- Signalized Intersection
- Stop Controlled Movement
- XX (XX) AM (PM) Peak Hour Volumes
- Lane Geometry
- XX 95th Percentile Queue Length
- LOS X (X) AM (PM) Peak Hour Level of Service
- Level of Service A-C
- Level of Service D
- Level of Service E
- Level of Service F
- Freeway LOS is Shown for Highest Peak Hour Volume
- LOS E/F Stop-Controlled Intersection with a Critical Movement Volume of 100 VPH or Less or Critical Movement Queue Length is less than 250'



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GASTON AND MECKLENBURG COUNTIES

NC 279
Modeled Corridor 77
Toll Traffic Analysis,
Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
FIGURE 6-20



- Alternative 64
- Alternative 77
- Alternative 5
- Alternative 58
- Alternative 76
- Alternative 4
- Interchanges

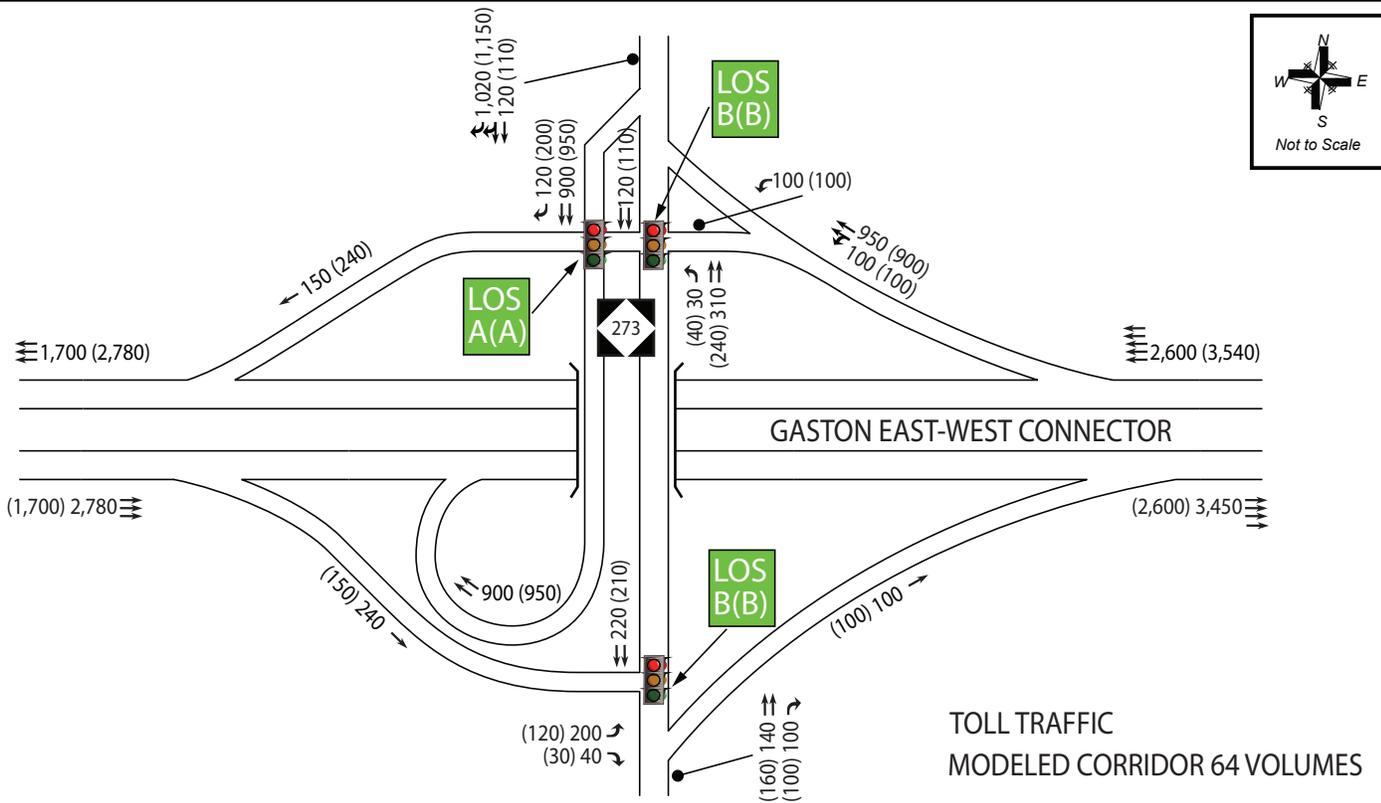
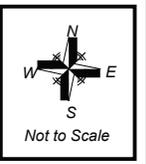
Legend

- Signalized Intersection
- Stop Controlled Movement
- XX (XX) AM (PM) Peak Hour Volumes
- Lane Geometry
- XX 95th Percentile Queue Length
- LOS X (X) AM (PM) Peak Hour Level of Service
 - Level of Service A-C
 - Level of Service D
 - Level of Service E
 - Level of Service F
- Freeway LOS is Shown for Highest Peak Hour Volume
- LOS E/F Stop-Controlled Intersection with a Critical Movement Volume of 100 VPH or Less or Critical Movement Queue Length is less than 250'

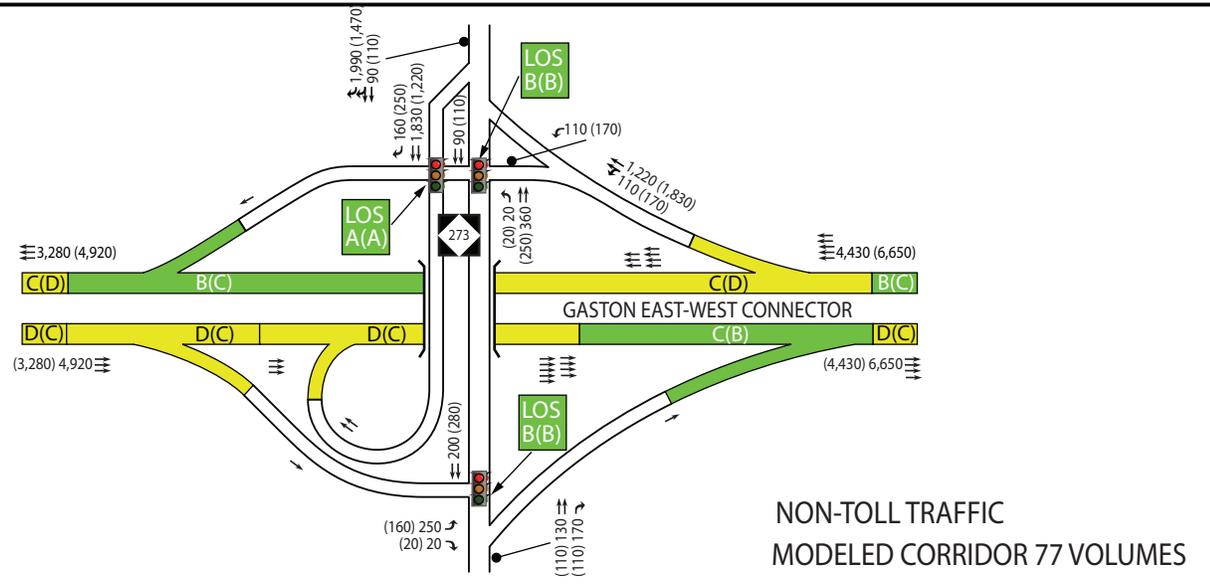


TIP PROJECT NO. U-3321
GASTON EAST-WEST CONNECTOR
GASTON AND MECKLENBURG COUNTIES

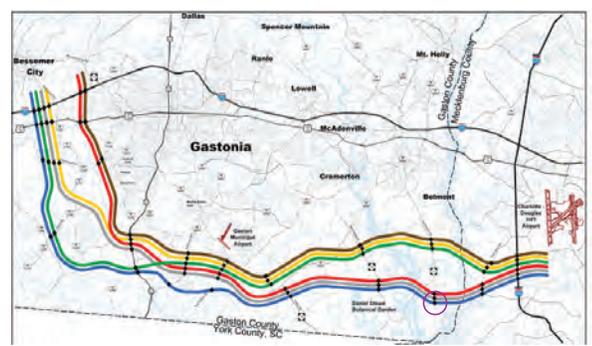
NC 273
Modeled Corridor 4
Toll Traffic Analysis,
Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
FIGURE 6-21



TOLL TRAFFIC
MODELED CORRIDOR 64 VOLUMES



NON-TOLL TRAFFIC
MODELED CORRIDOR 77 VOLUMES



- Alternative 64
- Alternative 77
- Alternative 5
- Alternative 58
- Alternative 76
- Alternative 4
- Interchanges

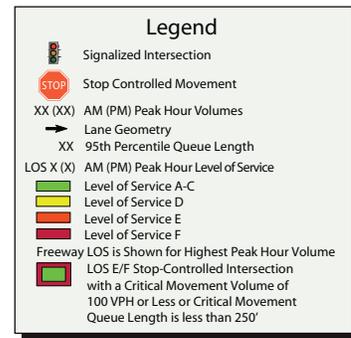
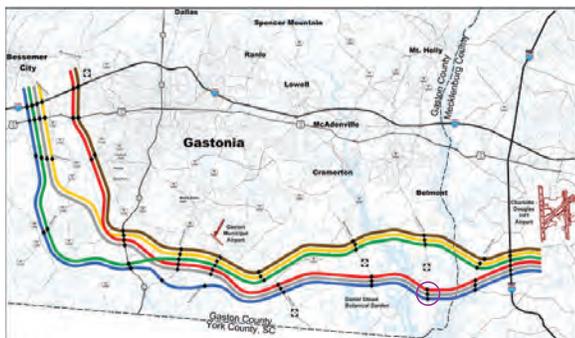
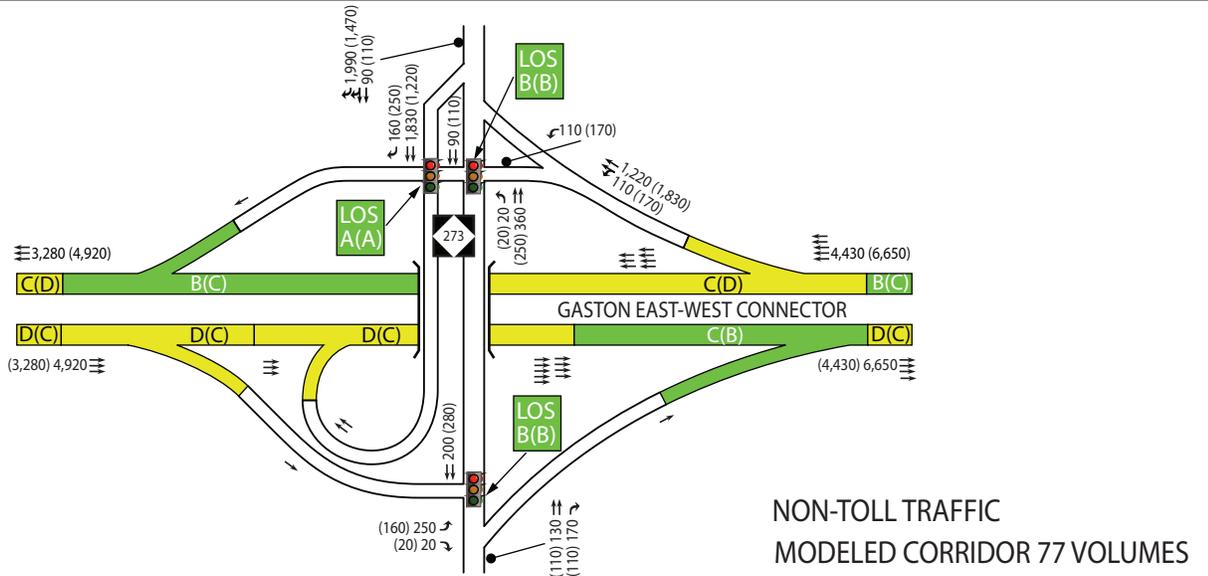
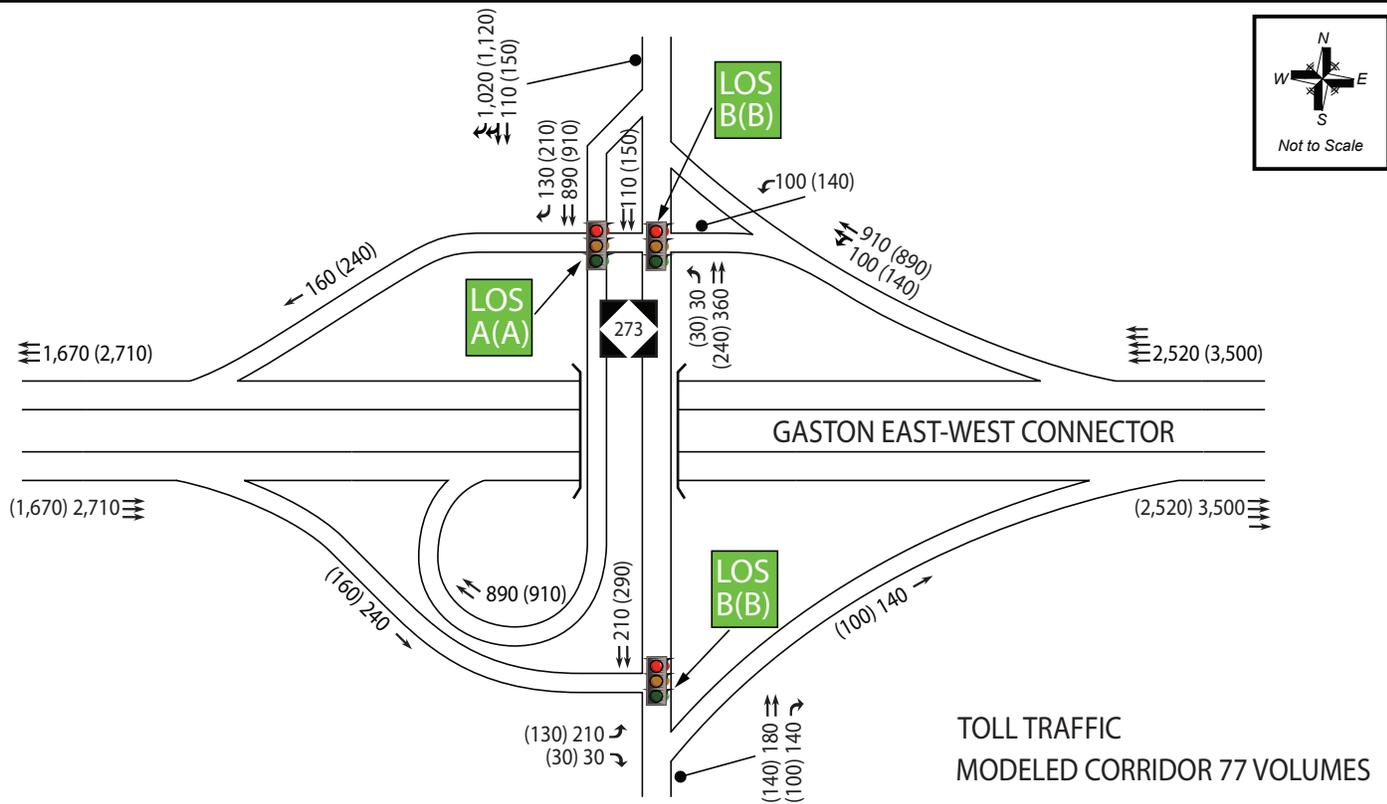
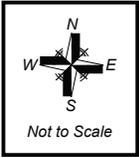
Legend

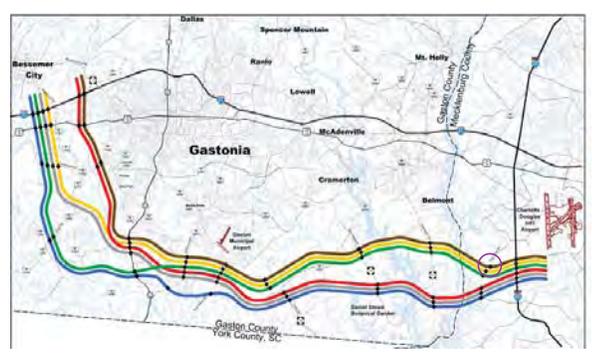
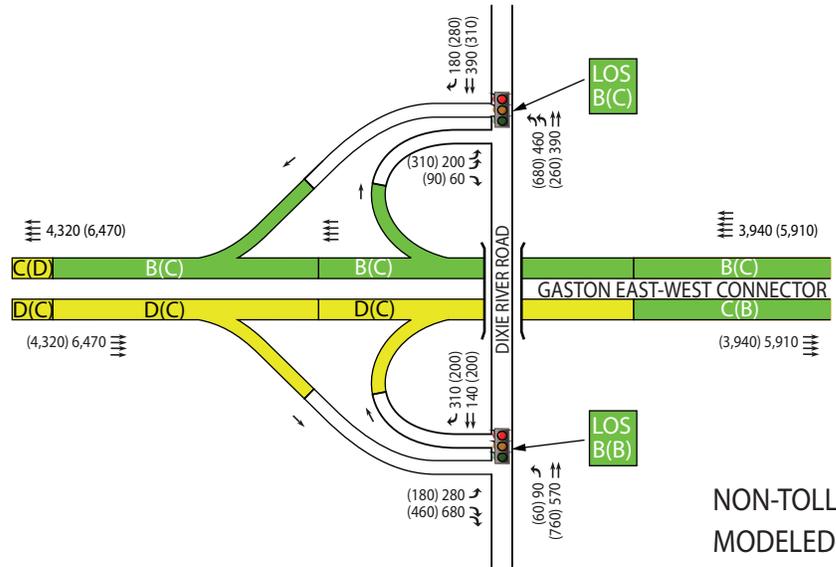
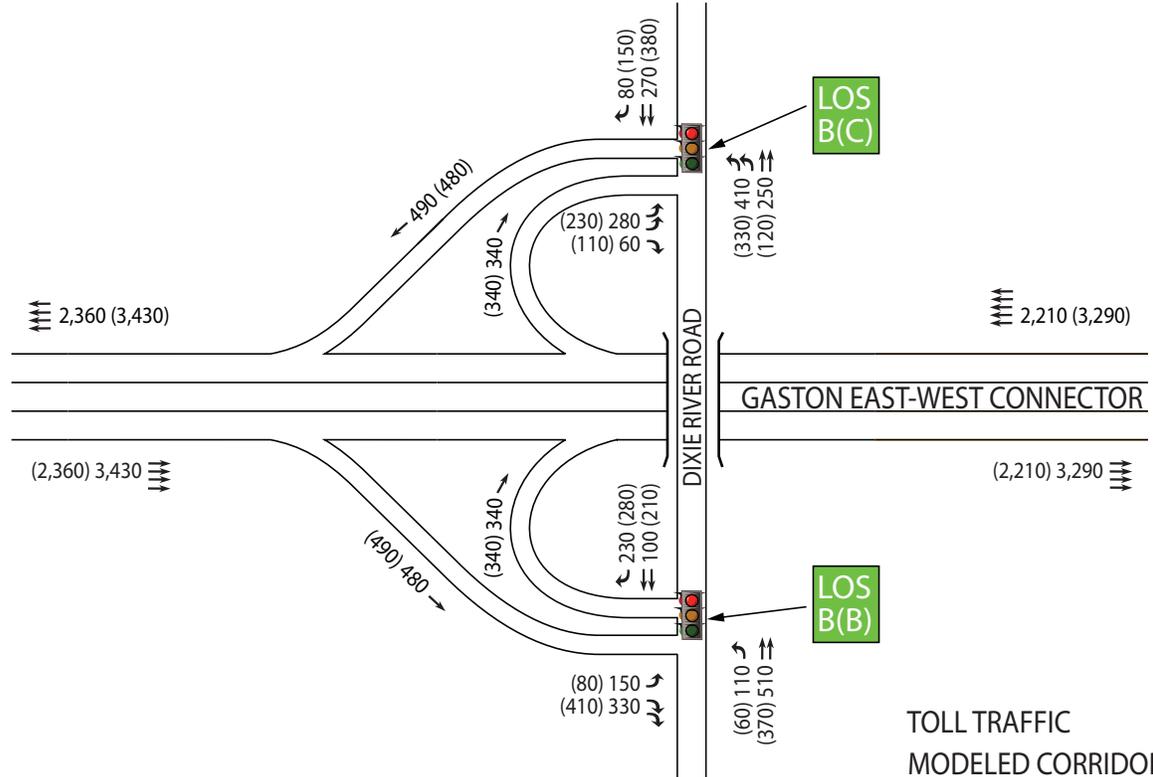
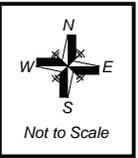
- Signalized Intersection
- Stop Controlled Movement
- XX (XX) AM (PM) Peak Hour Volumes
- Lane Geometry
- XX 95th Percentile Queue Length
- LOS X (X) AM (PM) Peak Hour Level of Service
- Level of Service A-C
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- LOS E/F Stop-Controlled Intersection with a Critical Movement Volume of 100 VPH or Less or Critical Movement Queue Length is less than 250'



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GASTON AND MECKLENBURG COUNTIES

NC 273
Modeled Corridor 64
Toll Traffic Analysis,
Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
FIGURE 6-22





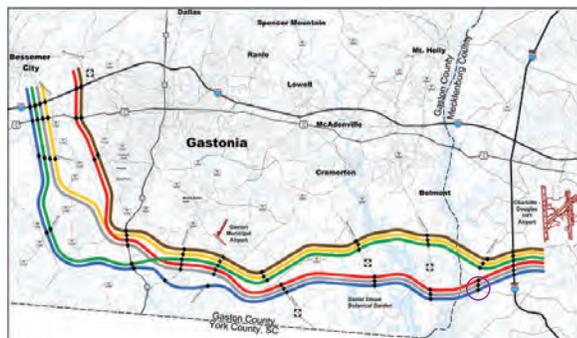
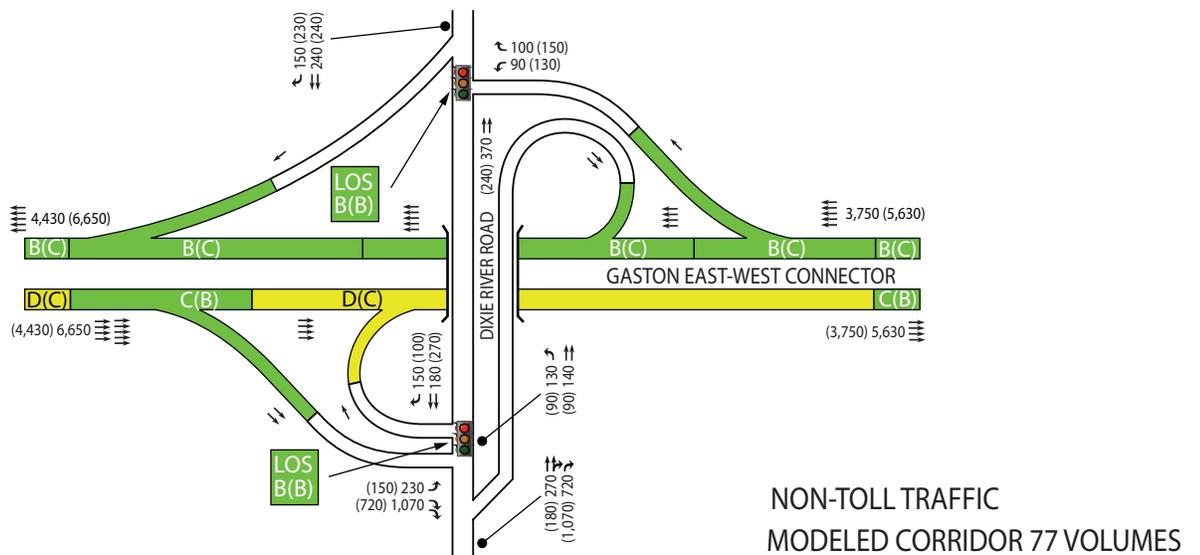
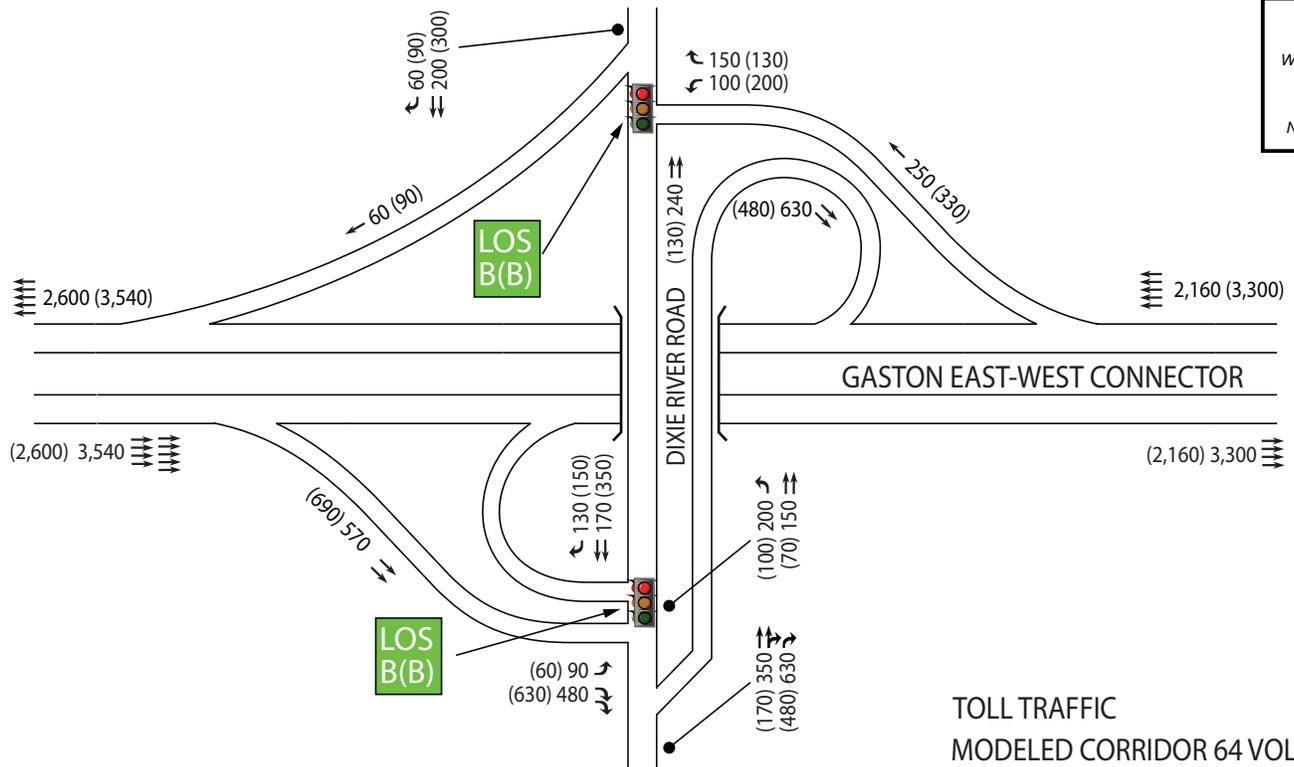
Legend

- Signalized Intersection
- Stop Controlled Movement
- XX (XX) AM (PM) Peak Hour Volumes
- Lane Geometry
- XX 95th Percentile Queue Length
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 GASTON AND MECKLENBURG COUNTIES

Dixie River Road
 Modeled Corridor 4
 Toll Traffic Analysis,
 Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
 FIGURE 6-24



- Alternative 64
- Alternative 77
- Alternative 5
- Alternative 58
- Alternative 76
- Alternative 4
- Interchanges

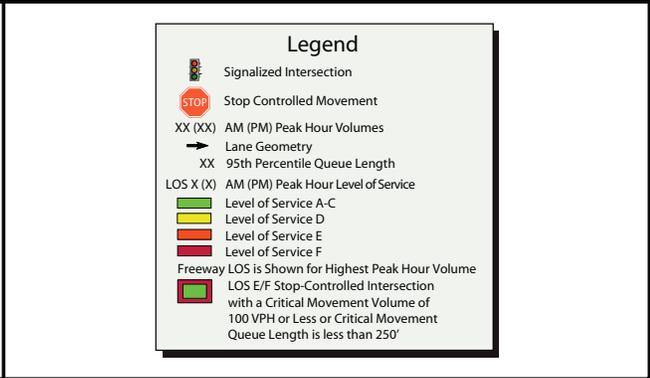
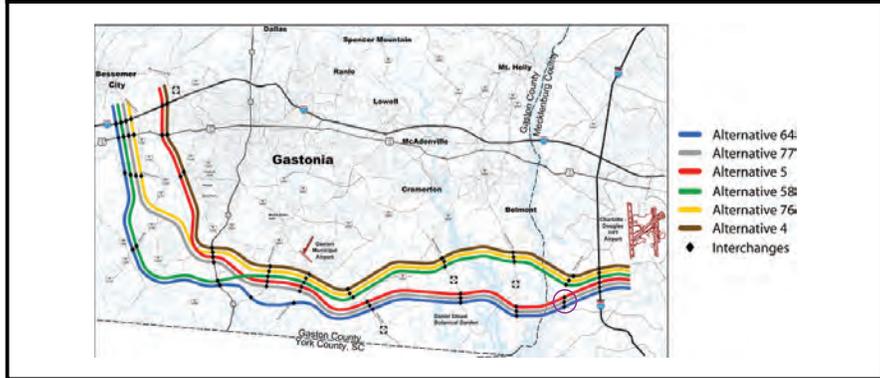
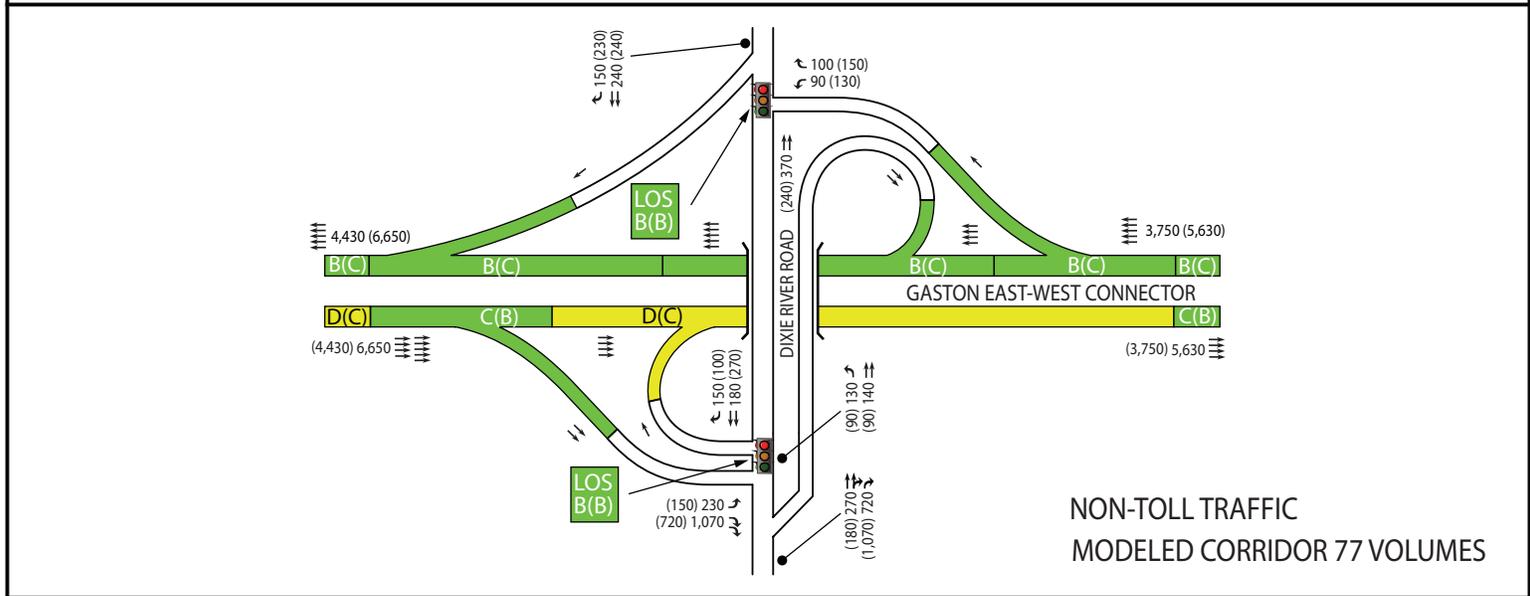
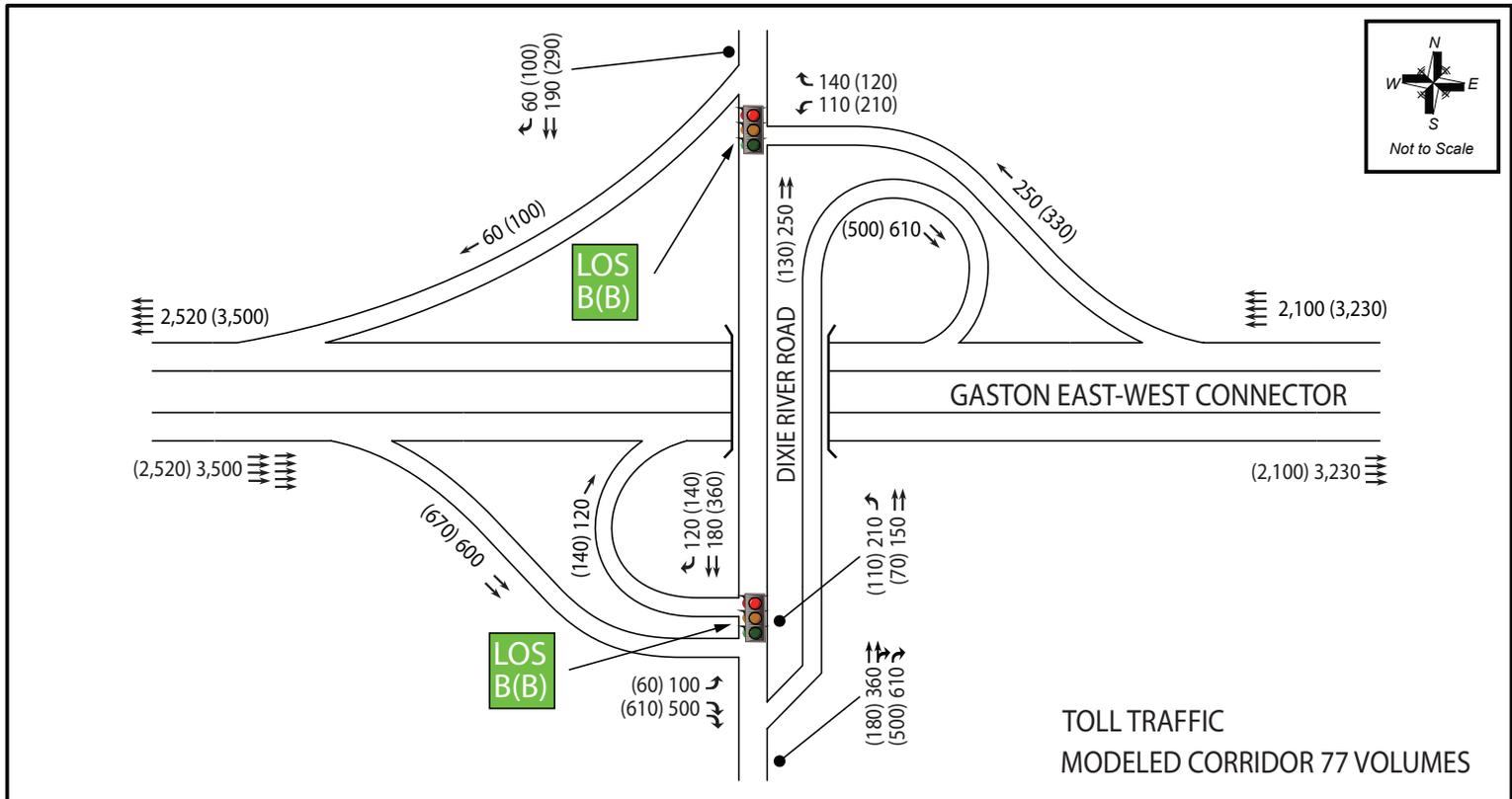
Legend

- Signalized Intersection
- Stop Controlled Movement
- XX (XX) AM (PM) Peak Hour Volumes
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GASTON AND MECKLENBURG COUNTIES

**Dixie River Road
 Modeled Corridor 64
 Toll Traffic Analysis,
 Year 2030 Peak Hour Volumes, Lane Geometry, and LOS
 FIGURE 6-25**



Appendix A

Traffic Forecast Model AADT and Peak Hour Plots from M/A/B

Appendix B

Individual Element Analysis Worksheets