



NORTH CAROLINA

Turnpike Authority

Operations Statistics Report

Triangle Expressway

2015 Fourth Quarter and Annual Report

1 S. Wilmington Street
Raleigh, NC 27601



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INTRODUCTION

Purpose

The North Carolina Turnpike Authority (NCTA) presents the operations statistics for the Triangle Expressway during the year 2015. The report includes data related to traffic volumes, toll system, safety, and roadway operations and maintenance. The statistics will allow for future analysis to identify quarterly and annual trends over time, providing a quantifiable method to track performance.

Project

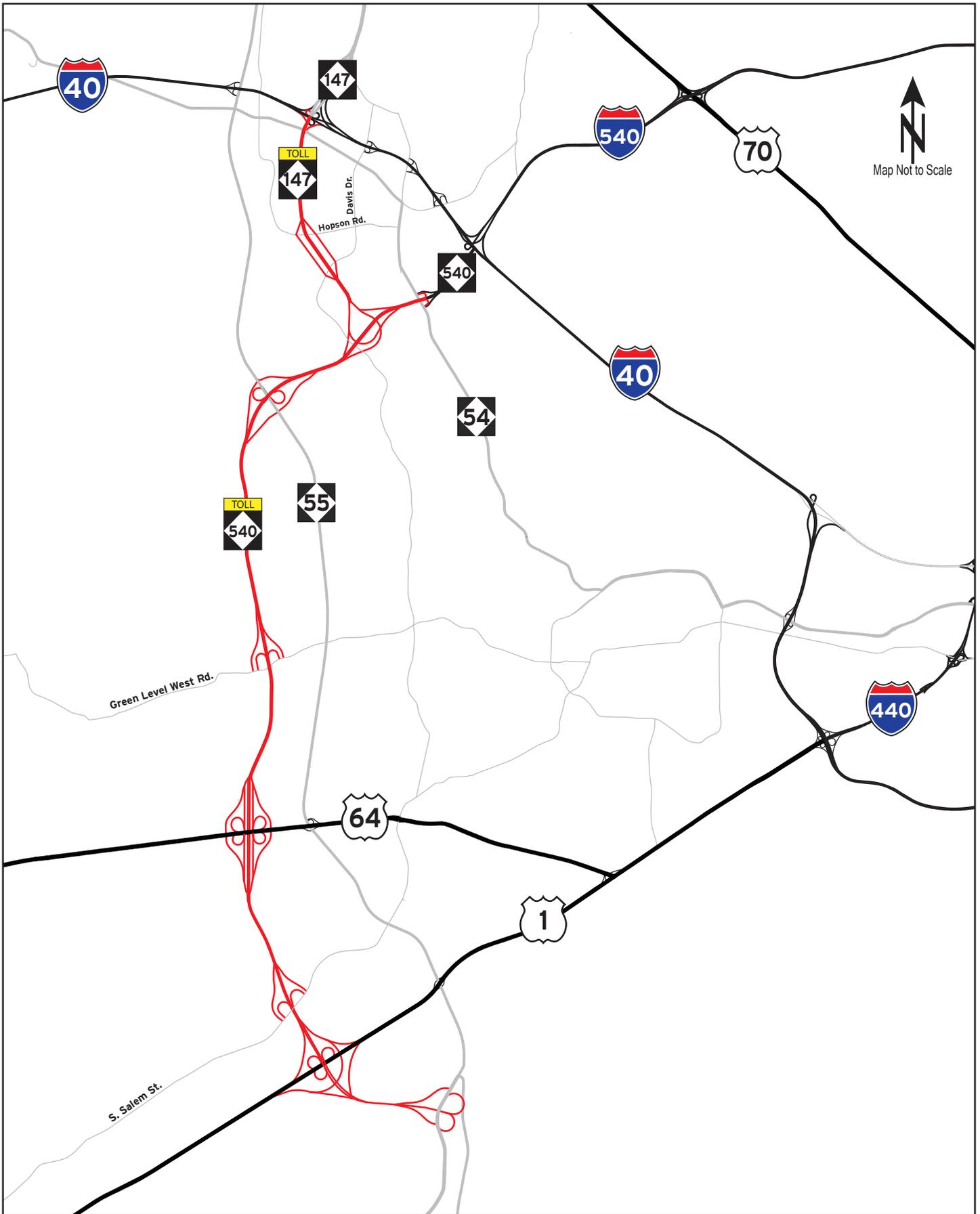
The Triangle Expressway is an 18.8-mile toll road that extends the partially complete “Outer Loop” around the greater Raleigh, North Carolina area from I-40 to NC-55 Bypass. The six-lane, controlled-access toll facility relieves congestion on NC-55, while improving access to the Research Triangle Park by reducing travel times for commuters residing to the south and east. The Triangle Expressway is currently comprised of two sections: Toll NC-147 and Toll NC-540.

Toll NC-147 includes 3.4 miles of toll road between I-40 and Toll NC-540. This section of the Triangle Expressway includes interchanges at Hopson Road, Davis Drive, and NC-540. It opened to toll-free traffic on December 8, 2011; tolling on this section began on January 3, 2012.

Toll NC-540 includes 15.4 miles of toll road between NC-54 in western Cary and the NC-55 Bypass near the Town of Holly Springs. The section from NC-54 to US-64 includes interchanges at NC-54, NC-55, Green Level West Road and US-64 and opened to toll-free traffic on August 1, 2012. Tolling on this section began on August 2, 2012. The section from US-64 to NC-55 Bypass includes interchanges at S. Salem St., US-1 and NC-55 Bypass and opened to toll-free traffic on December 20, 2012. Tolling on this section began on January 2, 2013.

The Triangle Expressway utilizes an all-electronic non-stop tolling system where there are no toll plazas at which drivers stop and pay cash tolls. Instead, free-flow toll zones are employed where vehicles are detected while traveling at highway speeds. Payments are accepted through an Electronic Toll Collection (ETC) program called NC Quick Pass or a video billing program called Bill by Mail.

NCTA toll zones are located along the Triangle Expressway at mainline and interchange ramp locations. An illustration of the Triangle Expressway can be seen in *Figure 1*.



Triangle Expressway System Map

**Figure
1**

Traffic Statistics

TRAFFIC STATISTICS

Current and historical traffic data is collected and stored through the use of roadside microwave vehicle detectors (MVD's) installed throughout the Triangle Expressway. The data provides an overview of the roadway's current utilization. The data can also be analyzed to identify trends that could more accurately predict future utilization.

It should be noted that the Triangle Expressway continues to experience a traffic pattern known as "ramp-up." During a ramp-up period, the traffic volumes on a new facility increase at a faster rate than typical growth on existing facilities. Traffic volumes increase significantly as the customers become more familiar with the facility. The ramp-up period for the Triangle Expressway is expected to continue through 2017.

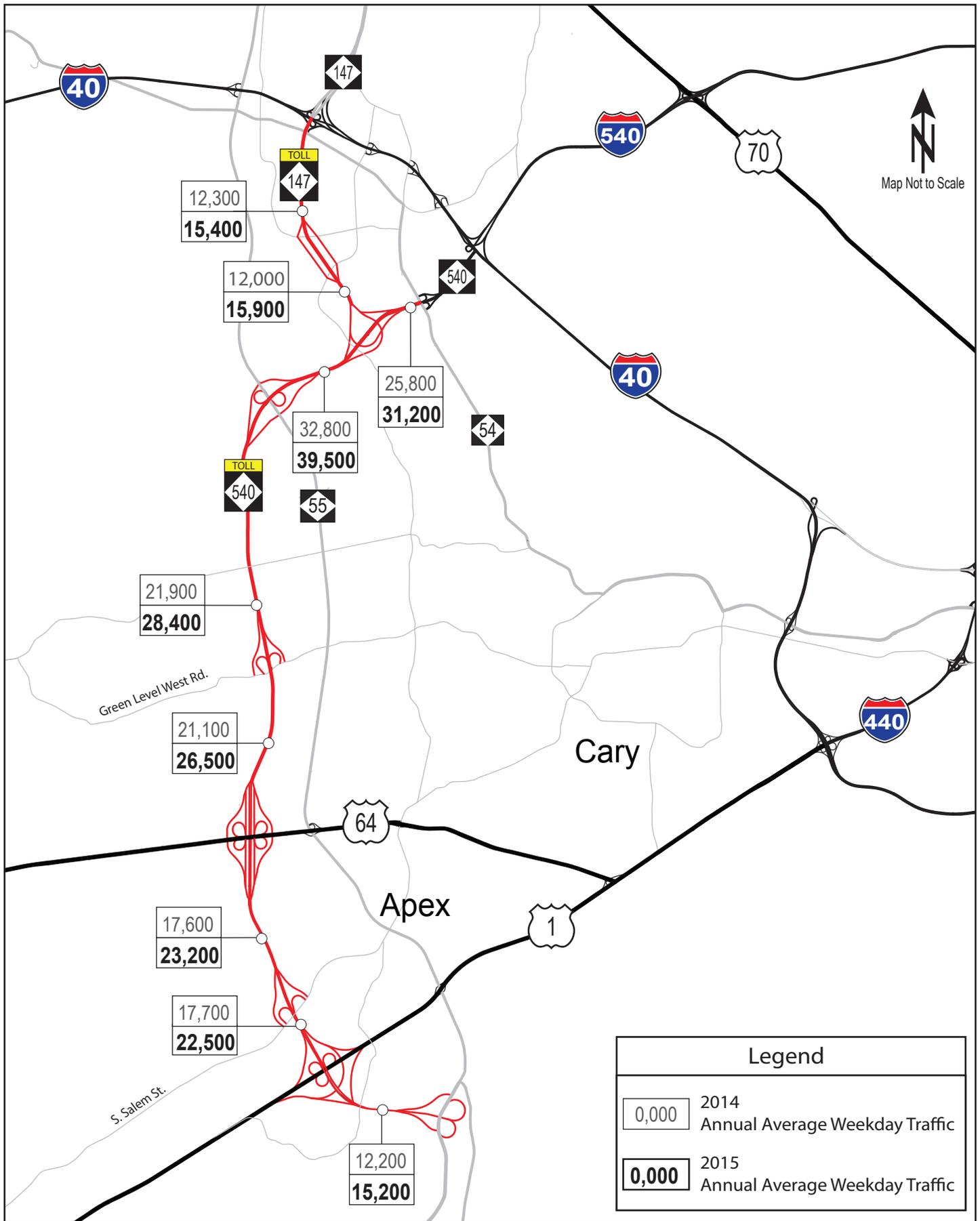
Average Weekday Traffic (AWT)

Traffic volume data is collected on all ramps and mainline segments between interchanges. The location of interchanges along the Triangle Expressway can be seen in *Figure 2*. Typically there is a large difference between peak and off-peak volumes, as well as between weekday and weekend volumes. This gap becomes significantly larger for a tolled facility because it tends to have a much higher percentage of traffic on weekdays during peak hours than non-toll facilities, as there is less of a benefit for toll users during off-peak hours. For this reason, Average Weekday Traffic (AWT) is reported instead of average daily traffic (ADT). AWT is a measure of the average daily traffic collected on a typical Monday through Friday over a designated time period.

Annual Average Weekday Traffic (AAWT)

AAWT is a measure of the average daily volumes collected on a typical Monday through Friday over an entire year. Adjustment factors for raw AWT data were calculated monthly, based on the ratio of weekday to weekend traffic, and applied to the monthly averages to calculate the annual average weekday traffic. It is necessary to normalize the variations in monthly traffic to allow for a valid comparison between counts taken at different times of the year. This allows the normalized monthly values to be combined together to form a single AAWT for each location.

Figure 2 contains a visual representation of AAWT recorded during the years 2014 and 2015 at all mainline segments along the Triangle Expressway.



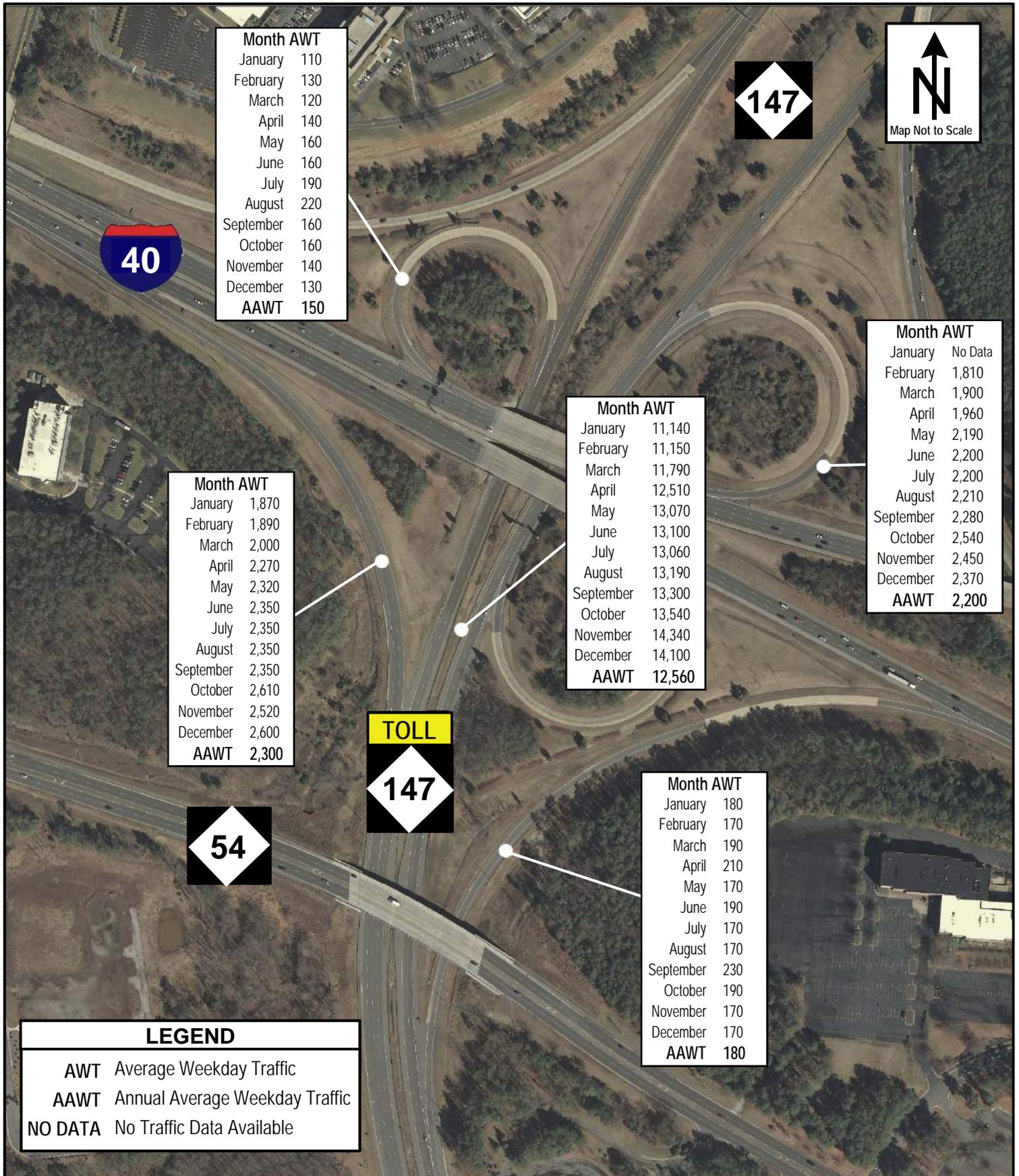
Triangle Expressway AAWT Map

Figure 2

Interchange Statistics

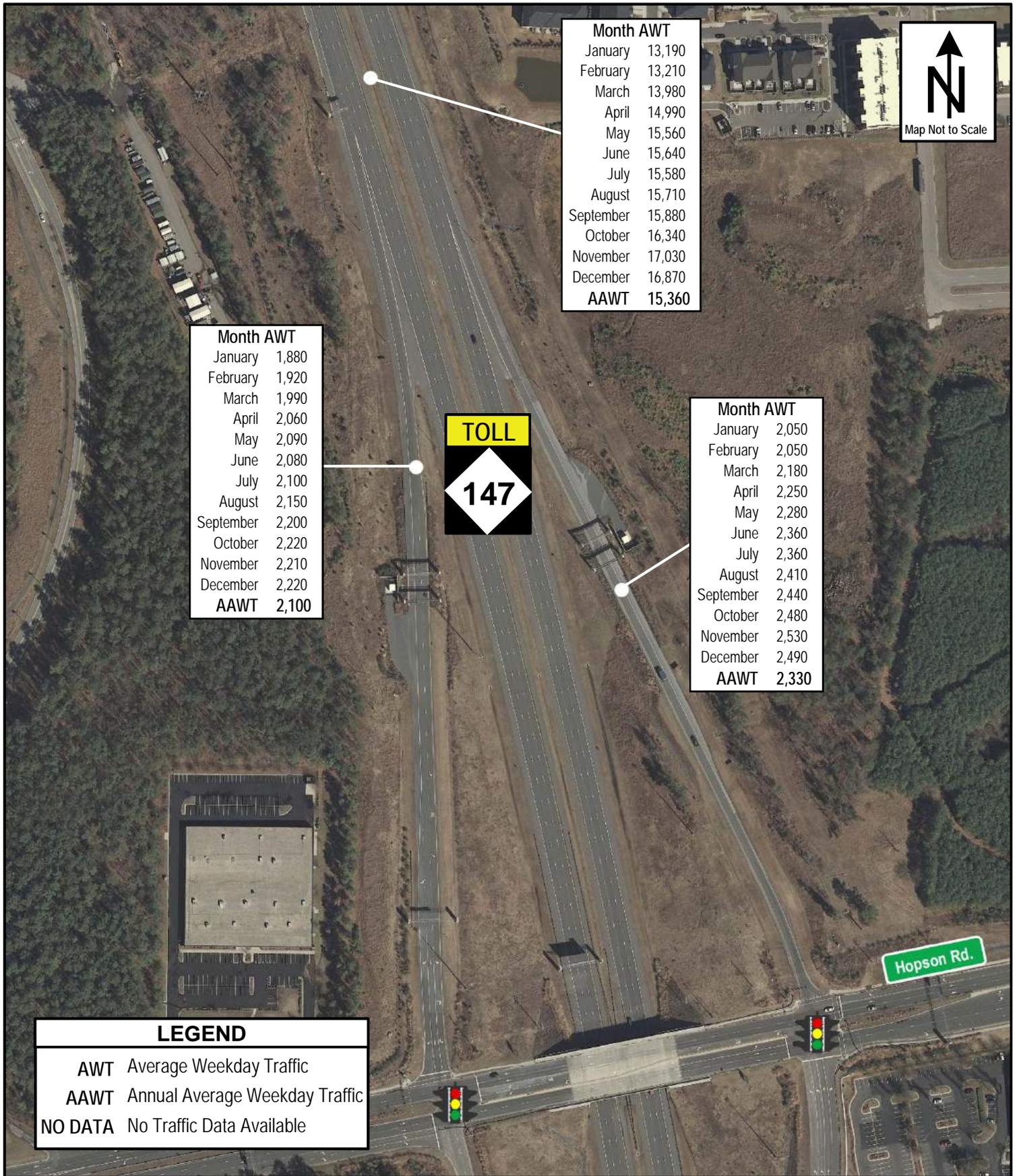
Figures 3 to 13 contain visual representations of AWT and AAWT along the facility and are representative of NCTA's 2015 MVD data.

It should be noted that if an MVD fails to provide reliable data (meeting the established threshold) for at least five days in a month, "NO DATA" is reported for that MVD. Due to equipment malfunction, this year two detectors reported "NO DATA." MVD 66, located at the off-loop connecting NC-147 northbound to I-40 westbound, reported "NO DATA" during the month of January. MVD 1, located at the off-loop connecting NC-540 southbound to NC-55 Bypass westbound, reported "NO DATA" during the month of December. These detectors have been fixed and are now recording accurate data.



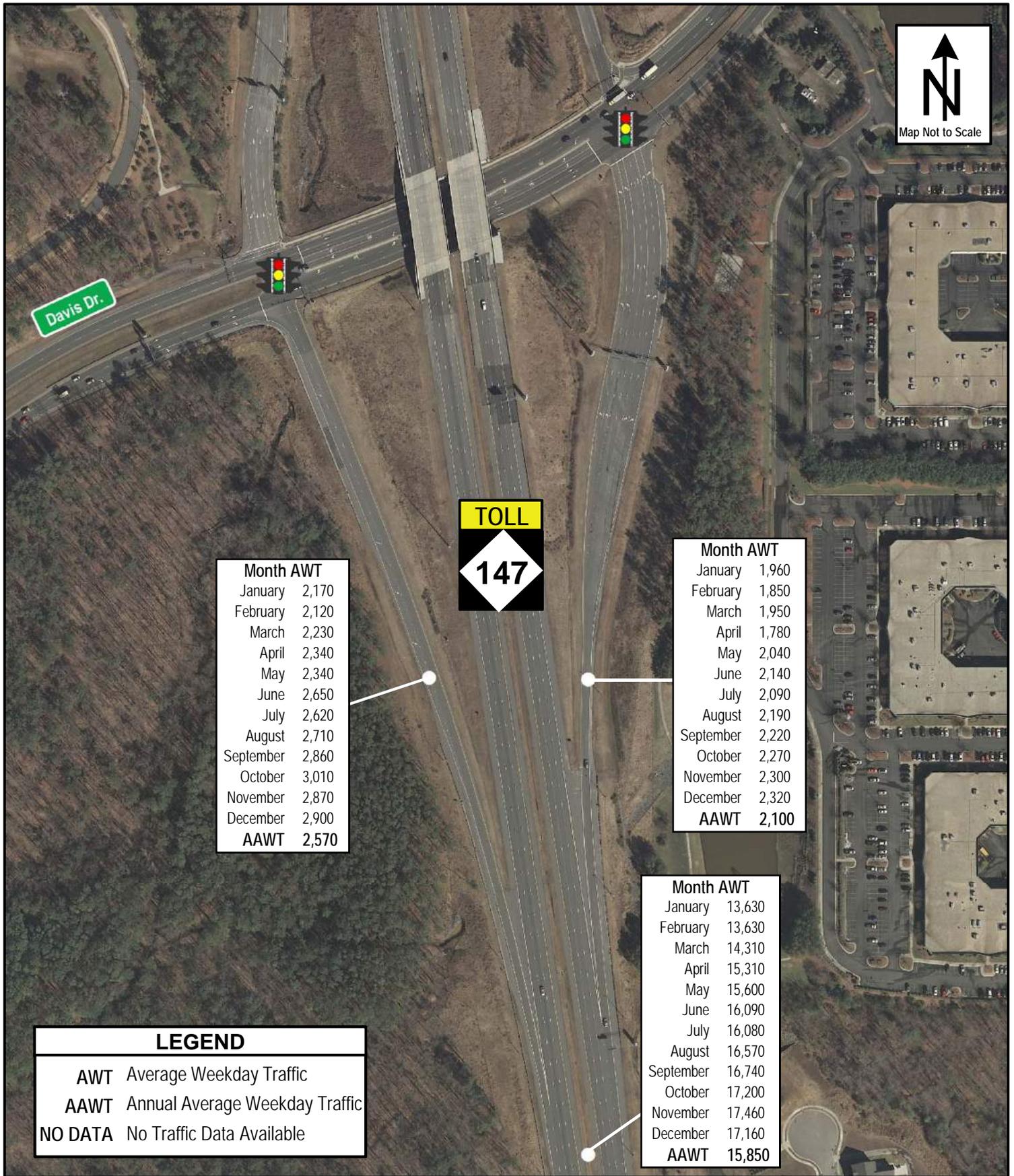
NC-147 at I-40 Interchange
 2015 Annual Average Weekday Traffic

Figure
3



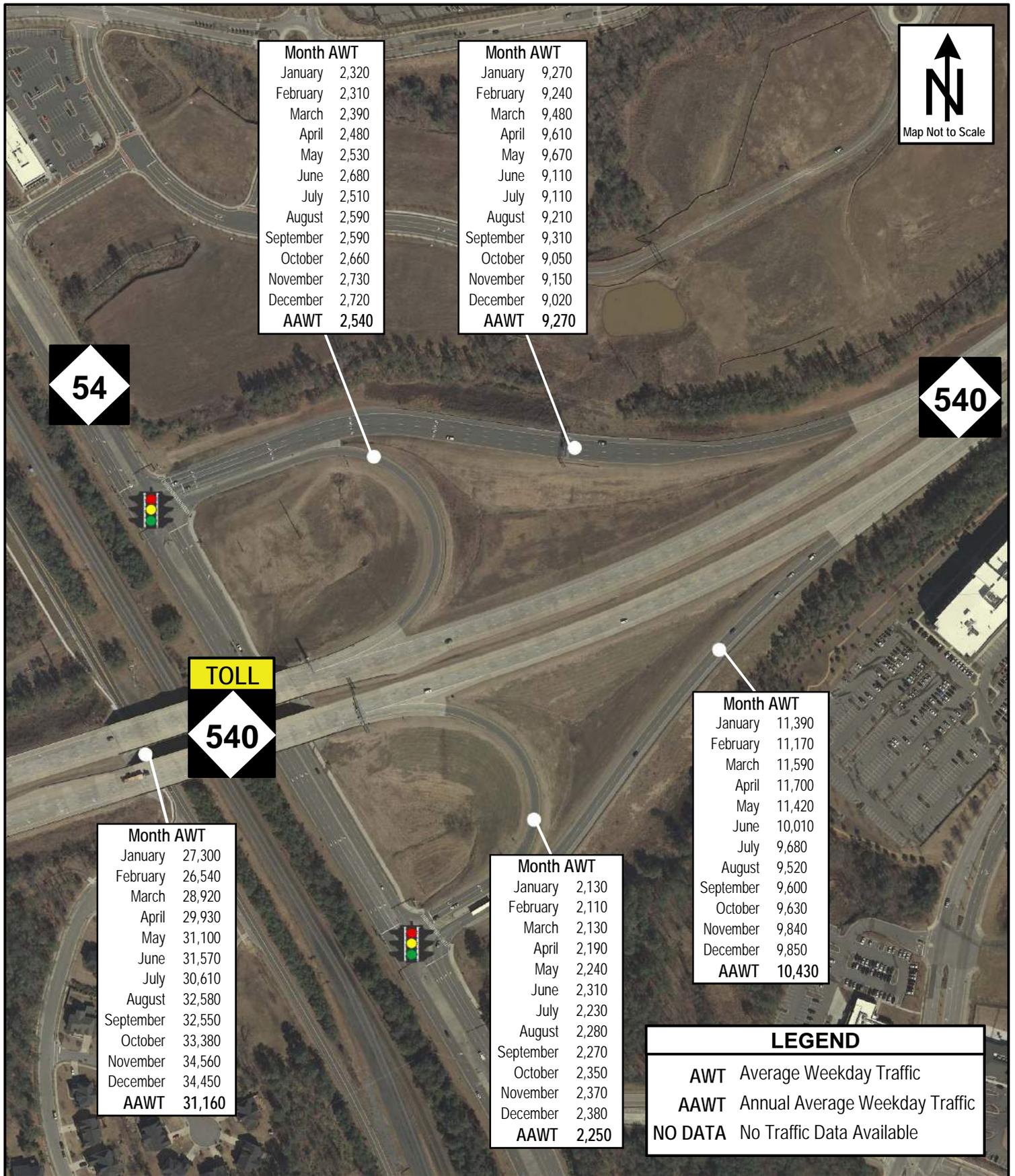
NC-147 at Hopson Rd. Interchange
2015 Annual Average Weekday Traffic

Figure
4



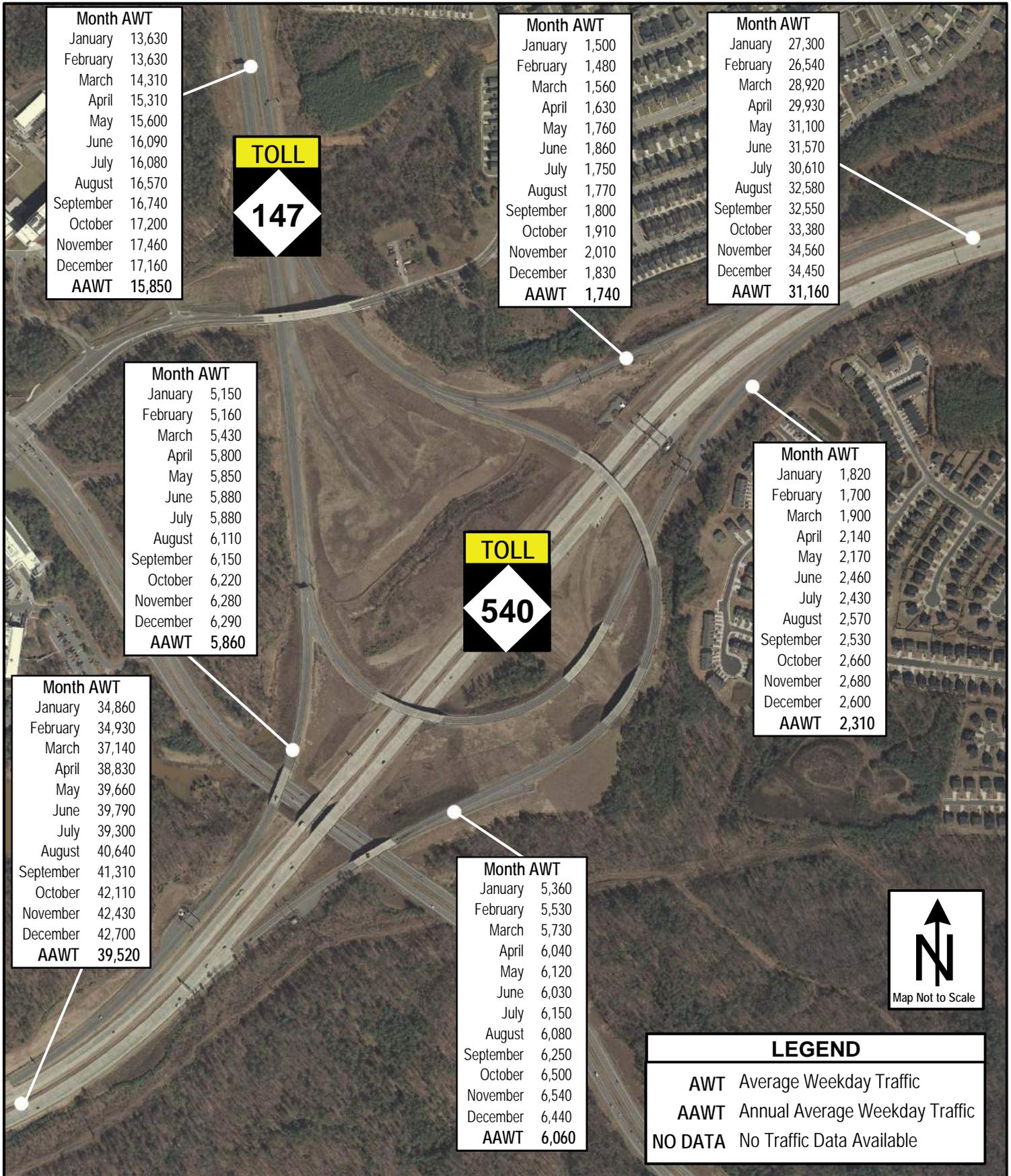
NC-147 at Davis Dr. Interchange
2015 Annual Average Weekday Traffic

Figure 5



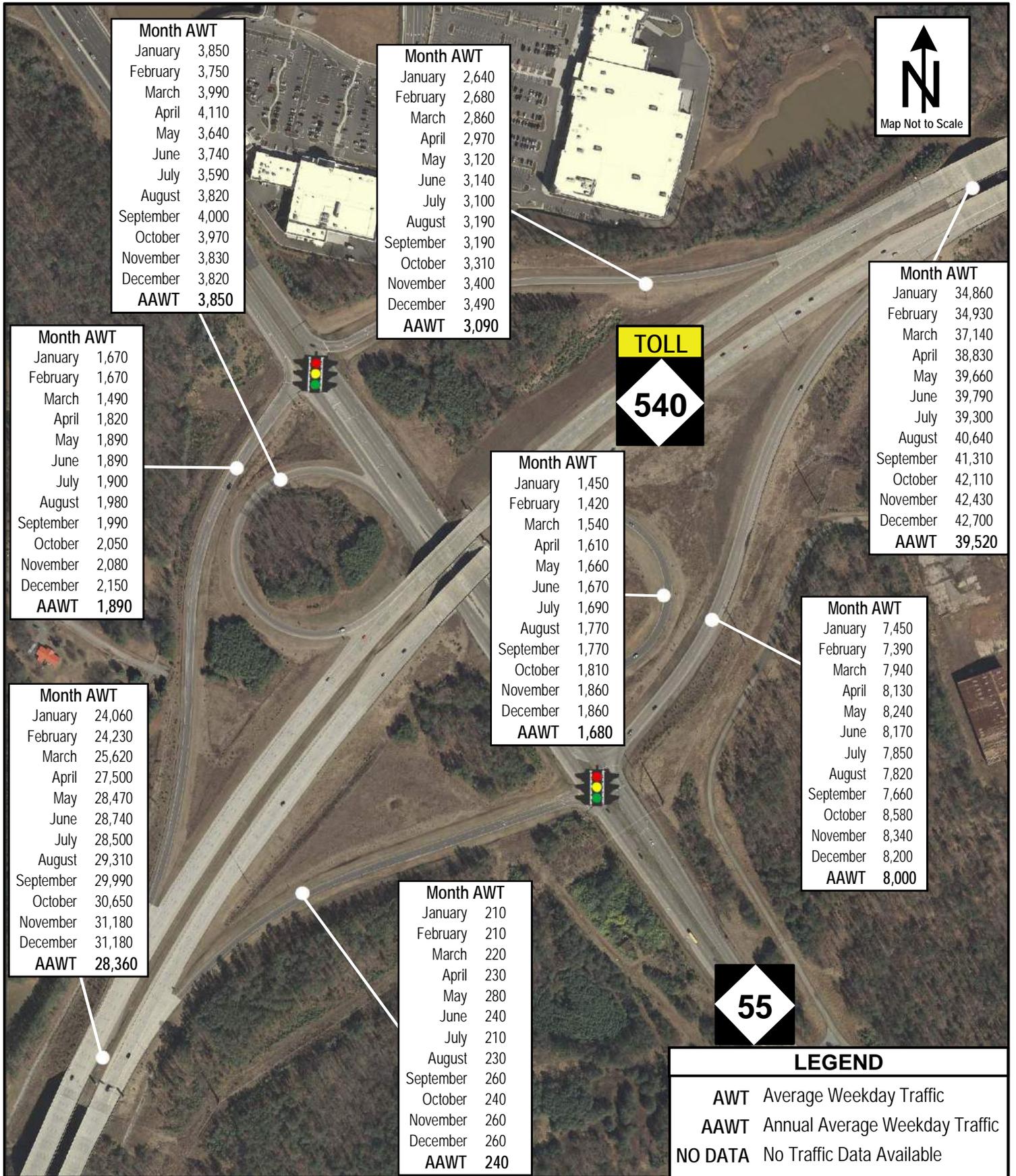
NC-540 at NC-54 Interchange
2015 Annual Average Weekday Traffic

Figure 6



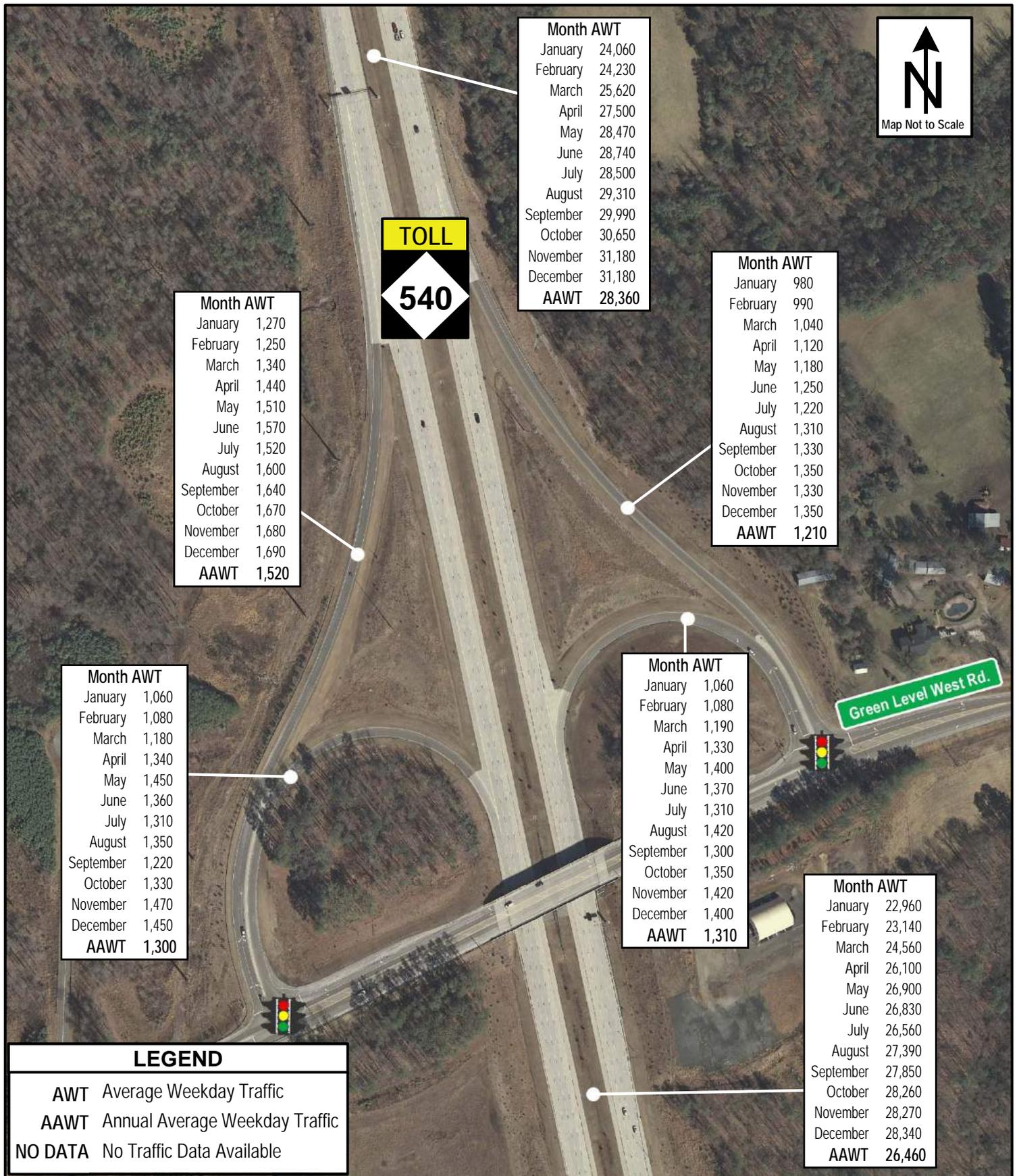
NC-540 at NC-147 Interchange
2015 Annual Average Weekday Traffic

Figure
7



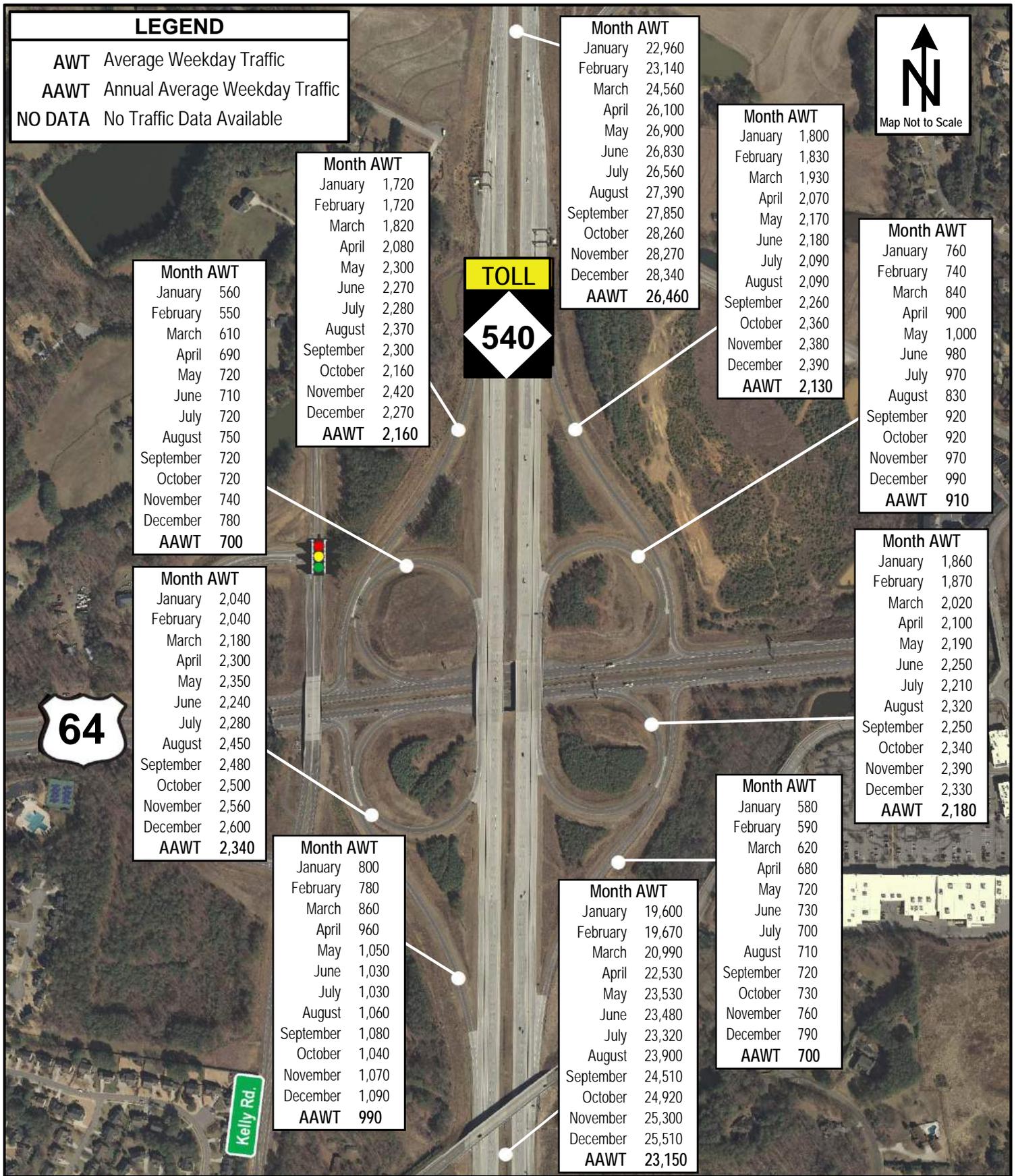
NC-540 at NC-55 Interchange
2015 Annual Average Weekday Traffic

Figure
8



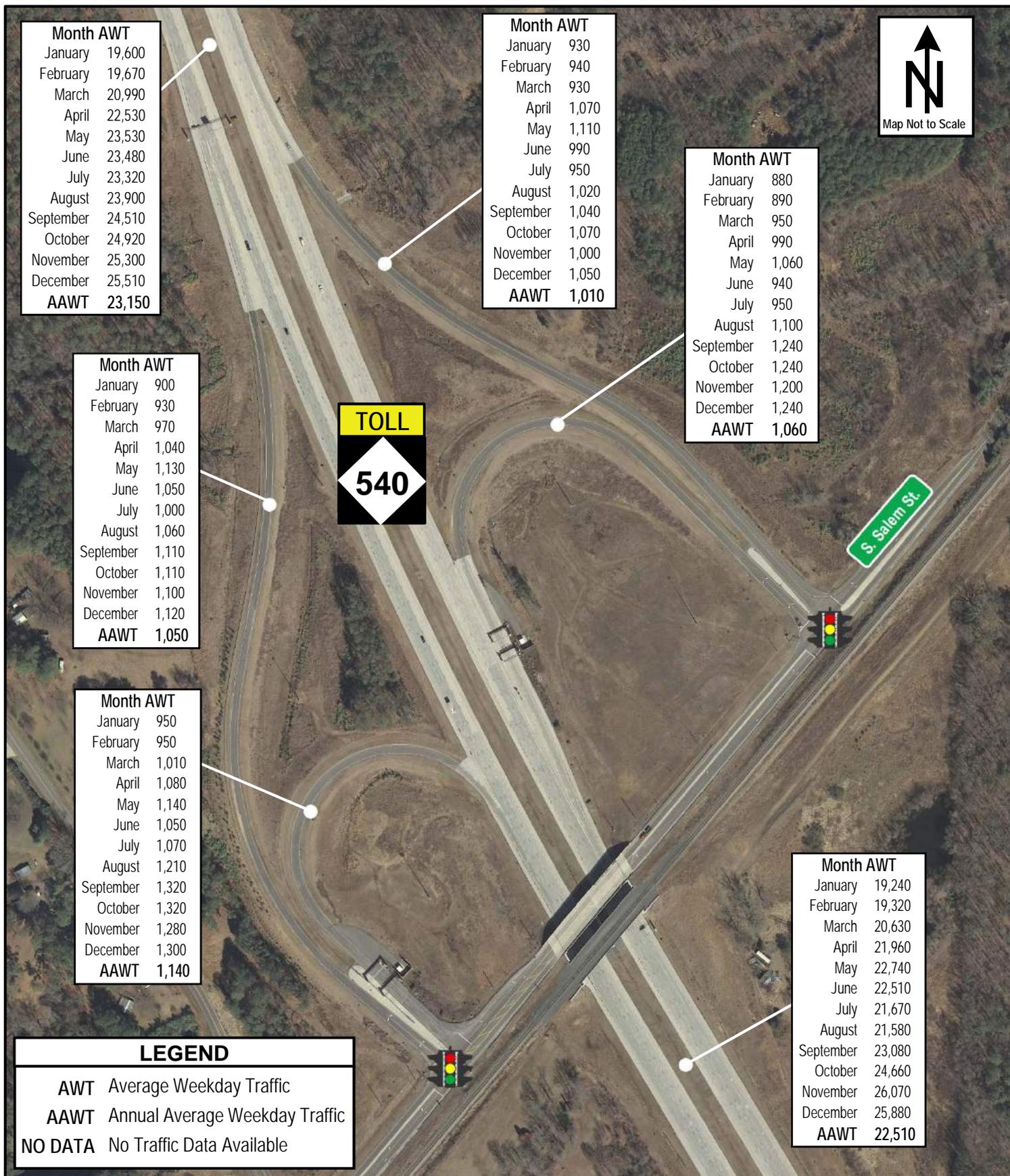
NC-540 at Green Level West Rd. Interchange
 2015 Annual Average Weekday Traffic

Figure
9



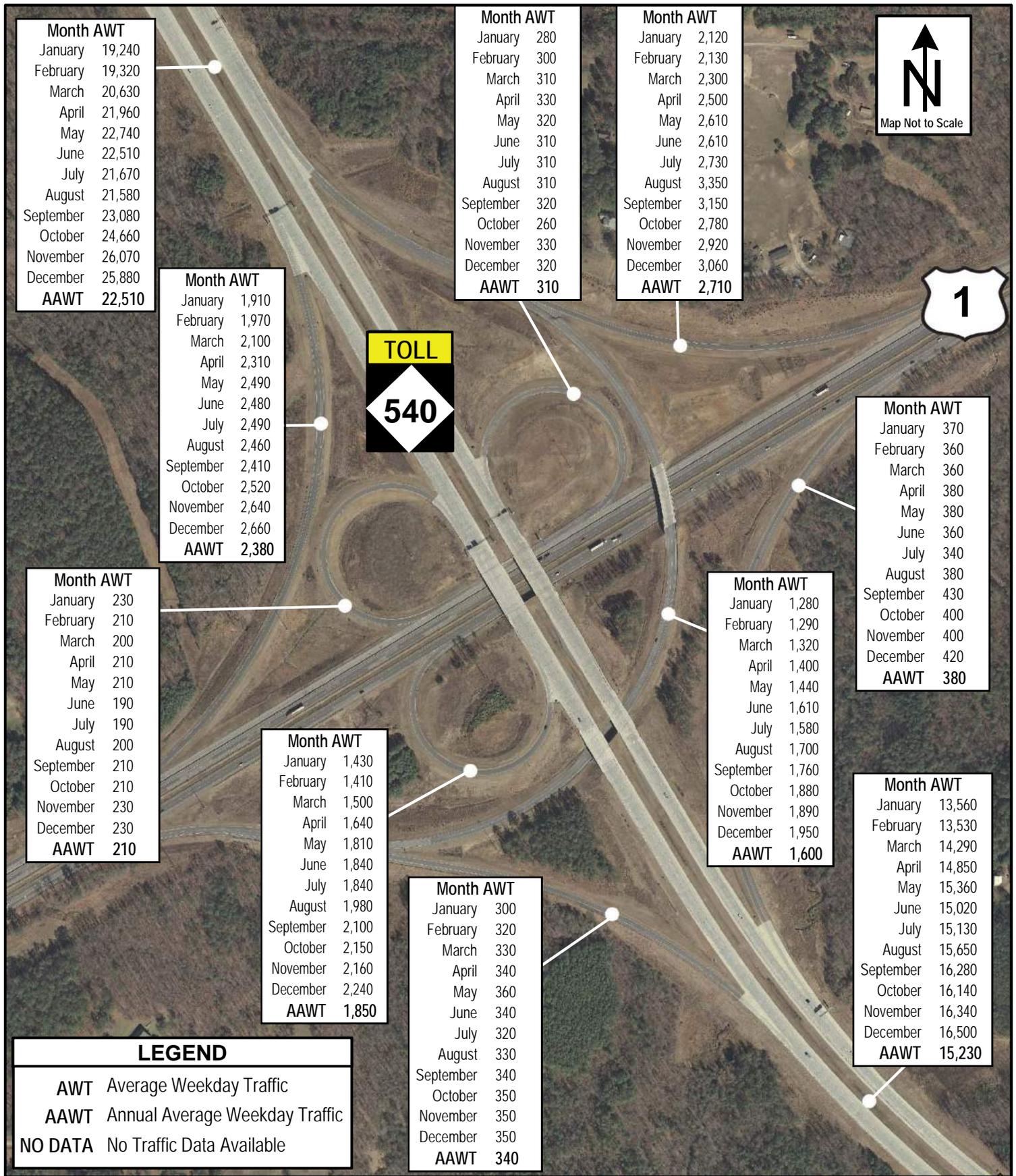
NC-540 at US-64 Interchange
2015 Annual Average Weekday Traffic

Figure
10



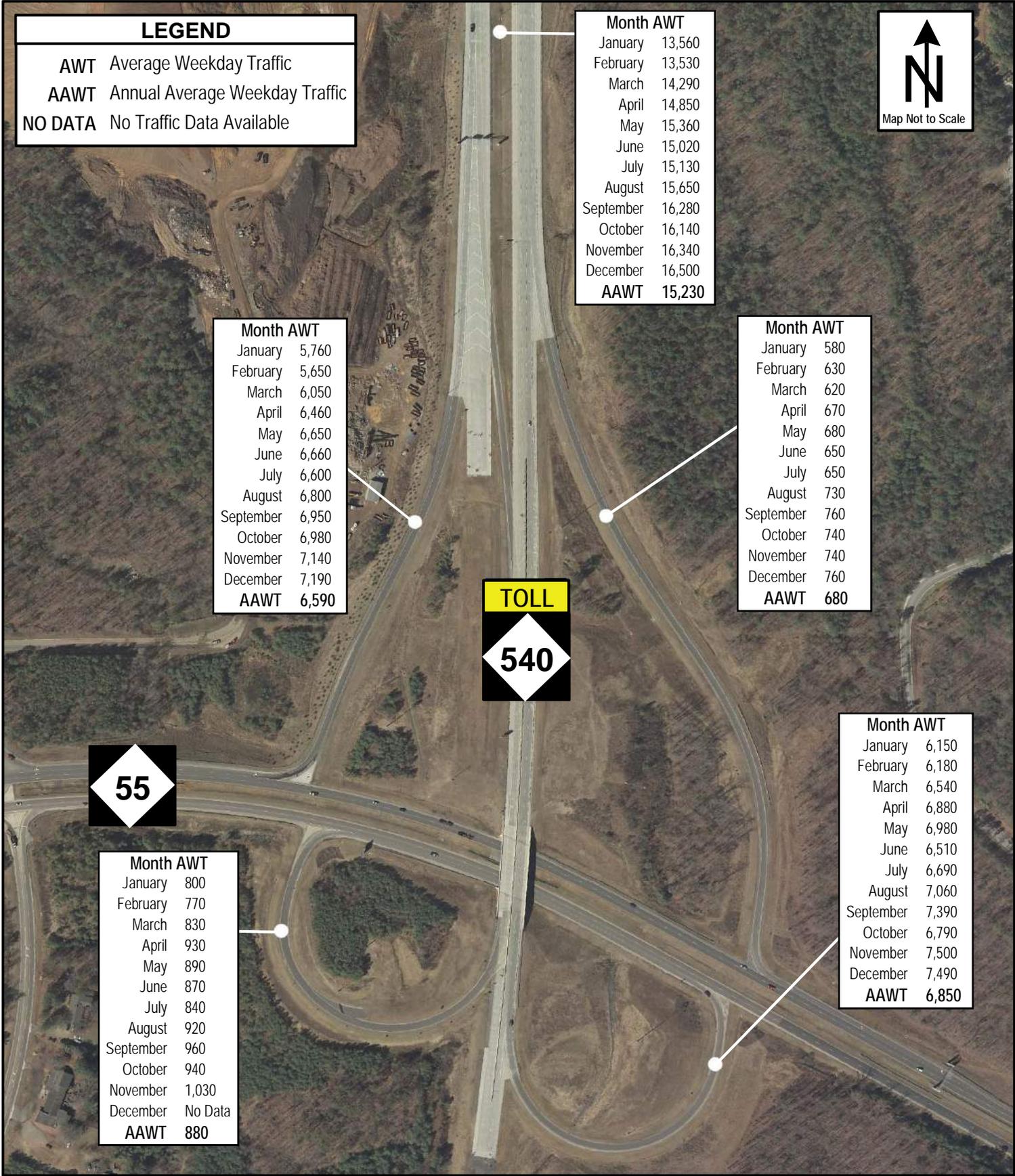
NC-540 at S. Salem St. Interchange
2015 Annual Average Weekday Traffic

Figure
11



NC-540 at US-1 Interchange
2015 Annual Average Weekday Traffic

Figure 12



NC-540 at NC-55 Bypass Interchange
2015 Annual Average Weekday Traffic

Figure 13

Toll System Statistics

TOLL SYSTEM STATISTICS

Current and historical toll system data is collected and reported through the NC Quick Pass Customer Service Center (CSC). The data provides an overview of the current toll operations on the facility and identifies any utilization trends. It also allows for comparison of historical and projected data. Transaction data is collected from the toll zones throughout the facility using an all-electronic tolling (AET) method. Toll gantries and the roadside toll vaults house the AET equipment.

Weekly, Monthly and Annual Statistics

The statistics provided in the following sections are representative of the entire Triangle Expressway facility. Weekly, monthly and annual statistics are presented in the following datasets:

- Transactions
- Classification
- Accounts
- Transponders

It should be noted that the percentages of total provided in this section might not sum to 100% due to rounding. In addition, weekly statistics are based on weeks starting Monday and ending Sunday.

Operations Statistics Report for the Triangle Expressway

2015 Fourth Quarter and Annual Report

Transactions

This section presents the volume and percentage of North Carolina Quick Pass (NCQP) users compared to Bill by Mail users. NCQP users have an established account that is identified using the vehicle's onboard transponder, whereas Bill by Mail users do not have an established account and are identified using vehicle recognition software.

Table 1 presents a summary of the total weekly transactions for NC Quick Pass and Bill by Mail users.

Table 1: Transactions, Fourth Quarter by Week

Week Ending	Transponder (NC Quick Pass)		Video (Bill by Mail)		Total
	Transactions	% of Total	Transactions	% of Total	
10/4/2015 ¹	210,067	57%	156,136	43%	366,203
10/11/2015	475,230	58%	350,141	42%	825,371
10/18/2015	483,260	57%	361,905	43%	845,165
10/25/2015	490,121	57%	367,276	43%	857,397
11/1/2015	472,031	58%	339,066	42%	811,097
11/8/2015	476,296	59%	332,262	41%	808,558
11/15/2015 ²	481,029	58%	344,674	42%	825,703
11/22/2015	488,659	58%	351,323	42%	839,982
11/29/2015 ³	349,021	53%	309,056	47%	658,077
12/6/2015	496,613	58%	362,785	42%	859,398
12/13/2015	498,971	58%	363,360	42%	862,331
12/20/2015	493,694	57%	368,942	43%	862,636
12/27/2015 ⁴	310,023	53%	276,745	47%	586,768
12/31/2015 ⁵	209,969	55%	175,133	45%	385,102

¹ Week ending consists of four days worth of data

² Week ending includes Veterans Day

³ Week ending includes Thanksgiving

⁴ Week ending includes Christmas

⁵ Week ending consists of four days worth of data and includes New Year's Eve

Table 2 presents a summary of the total monthly transactions for NC Quick Pass and Bill by Mail transactions.

Table 2: Transactions, Fourth Quarter by Month

Month	Transponder (NC Quick Pass)		Video (Bill by Mail)		Total
	Transactions	% of Total	Transactions	% of Total	
October	2,100,078	58%	1,544,218	42%	3,644,296
November	1,905,804	57%	1,417,766	43%	3,323,570
December	1,929,102	56%	1,496,820	44%	3,425,922

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Figure 14 presents the total monthly transactions and NC Quick Pass utilization during 2015.

Figure 14: 2015 Transactions

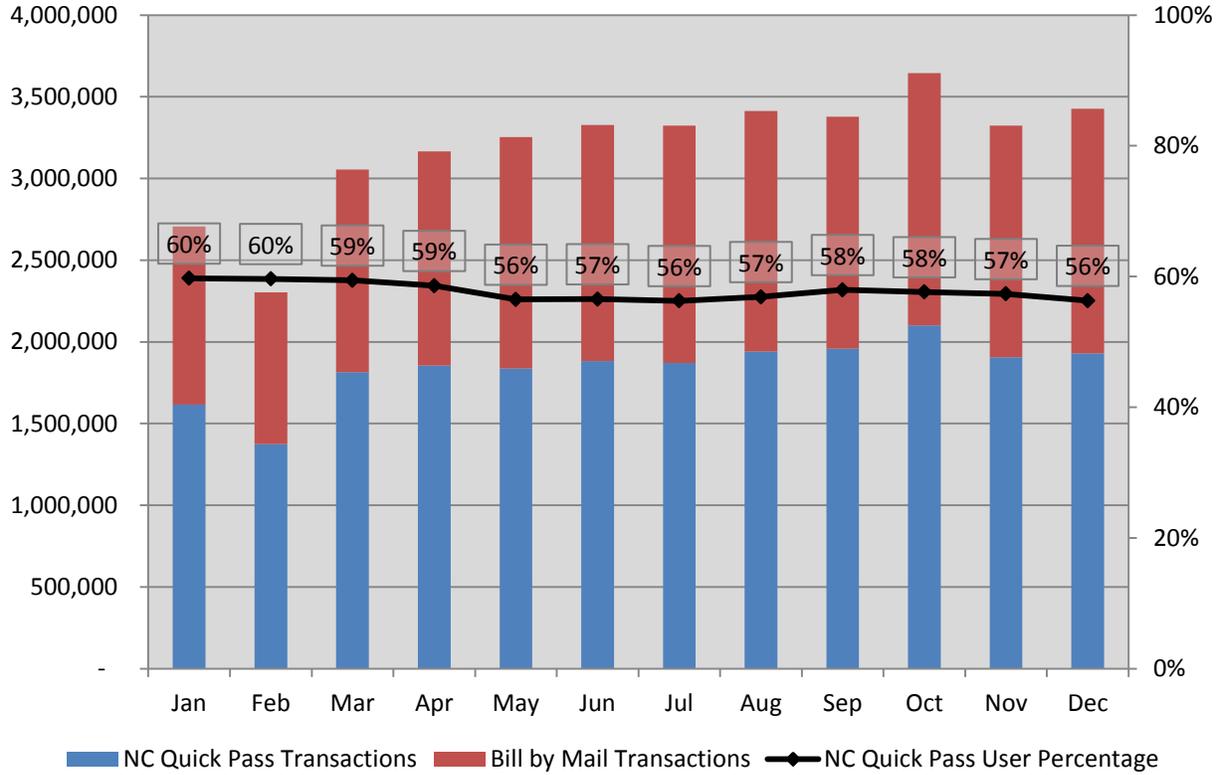


Table 3 presents a summary of the total NC Quick Pass and Bill by Mail transactions, by year. Project to date is the total number of transactions since opening the facility to toll traffic.

Table 3: Transactions, by Year

Year	Transponder (NC Quick Pass)		Video (Bill by Mail)		Total
	Transactions	% of Total	Transactions	% of Total	
2012	2,803,043	49%	2,892,496	51%	5,695,539
2013	13,249,972	58%	9,792,975	42%	23,042,947
2014	17,733,089	58%	12,802,237	42%	30,535,326
2015	22,083,270	58%	16,235,360	42%	38,318,630
Project to Date	49,934,390	57%	37,264,264	43%	87,198,654

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Classification

This section presents the volume and percentage of users based on classification. The classification system used by NCTA contains three classifications, determined by the vehicle’s number of axles.

Table 4 presents a summary of the total weekly transactions for Class 1 (2-axle), Class 2 (3-axle) and Class 3 (4+axle) vehicles.

Table 4: Classification, Fourth Quarter by Week

Week Ending	Class 1 (2-axle)		Class 2 (3-axle)		Class 3 (4+axle)	
	Transactions	% of Total	Transactions	% of Total	Transactions	% of Total
10/4/2015 ¹	358,809	98%	2,282	1%	5,112	1%
10/11/2015	799,253	97%	8,250	1%	17,868	2%
10/18/2015	812,648	96%	10,592	1%	21,925	3%
10/25/2015	825,678	96%	10,051	1%	21,668	3%
11/1/2015	785,619	97%	8,338	1%	17,140	2%
11/8/2015	786,329	97%	7,196	1%	15,033	2%
11/15/2015 ²	800,606	97%	8,309	1%	16,788	2%
11/22/2015	810,463	96%	9,830	1%	19,689	2%
11/29/2015 ³	636,581	97%	7,805	1%	13,691	2%
12/6/2015	832,413	97%	8,669	1%	18,316	2%
12/13/2015	829,708	96%	10,605	1%	22,018	3%
12/20/2015	834,599	97%	8,912	1%	19,125	2%
12/27/2015 ⁴	573,072	98%	4,342	1%	9,354	2%
12/31/2015 ⁵	373,384	97%	3,677	1%	8,041	2%

¹ Week ending consists of four days worth of data

² Week ending includes Veterans Day

³ Week ending includes Thanksgiving

⁴ Week ending includes Christmas

⁵ Week ending consists of four days worth of data and includes New Year’s Eve

Table 5 presents a summary of the total monthly transactions by classification.

Table 5: Classification, Fourth Quarter by Month

Month	Class 1 (2-axle)		Class 2 (3-axle)		Class 3 (4+axle)	
	Transactions	% of Total	Transactions	% of Total	Transactions	% of Total
October	3,521,616	97%	39,309	1%	83,371	2%
November	3,221,383	97%	34,166	1%	68,021	2%
December	3,316,163	97%	35,383	1%	74,376	2%

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Figure 15 presents the total monthly percentage of transactions during 2015 for Class 1 (2-axle), Class 2 (3-axle) and Class 3 (4+axle) vehicles.

Figure 15: 2015 Classification Percentages

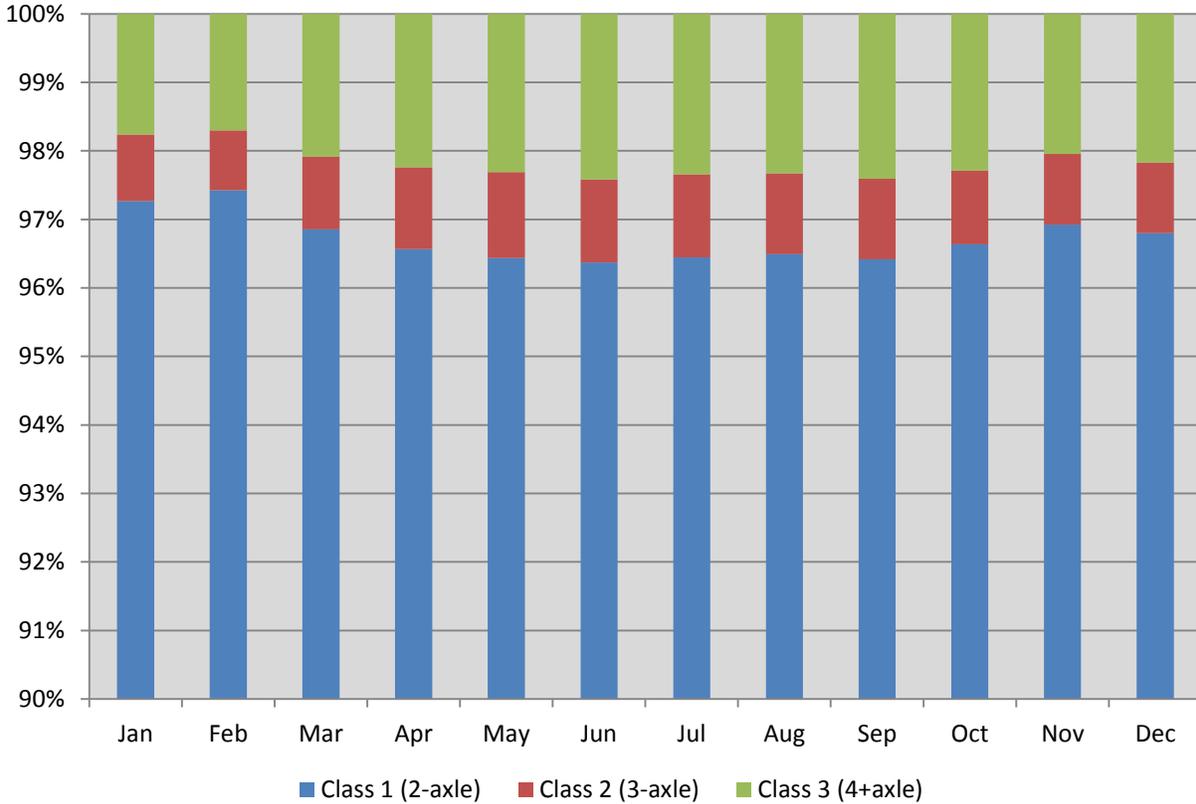


Table 6 presents a summary of the total transactions for Class 1 (2-axle), Class 2 (3-axle) and Class 3 (4+axle) vehicles, by year. Project to date is the total number of transactions since opening the facility to toll traffic.

Table 6: Classification, by Year

Year	Class 1 (2-axle)		Class 2 (3-axle)		Class 3 (4+axle)	
	Transactions	% of Total	Transactions	% of Total	Transactions	% of Total
2012	5,562,061	97%	46,935	1%	86,543	2%
2013	22,282,351	97%	267,558	1%	493,038	2%
2014	29,530,077	97%	355,721	1%	649,528	2%
2015	37,050,375	97%	426,656	1%	841,446	2%
Project to Date	94,424,864	97%	1,096,870	1%	2,070,555	2%

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Accounts

The statistics provided in this section outline the volume of accounts established and managed by the NCTA CSC.

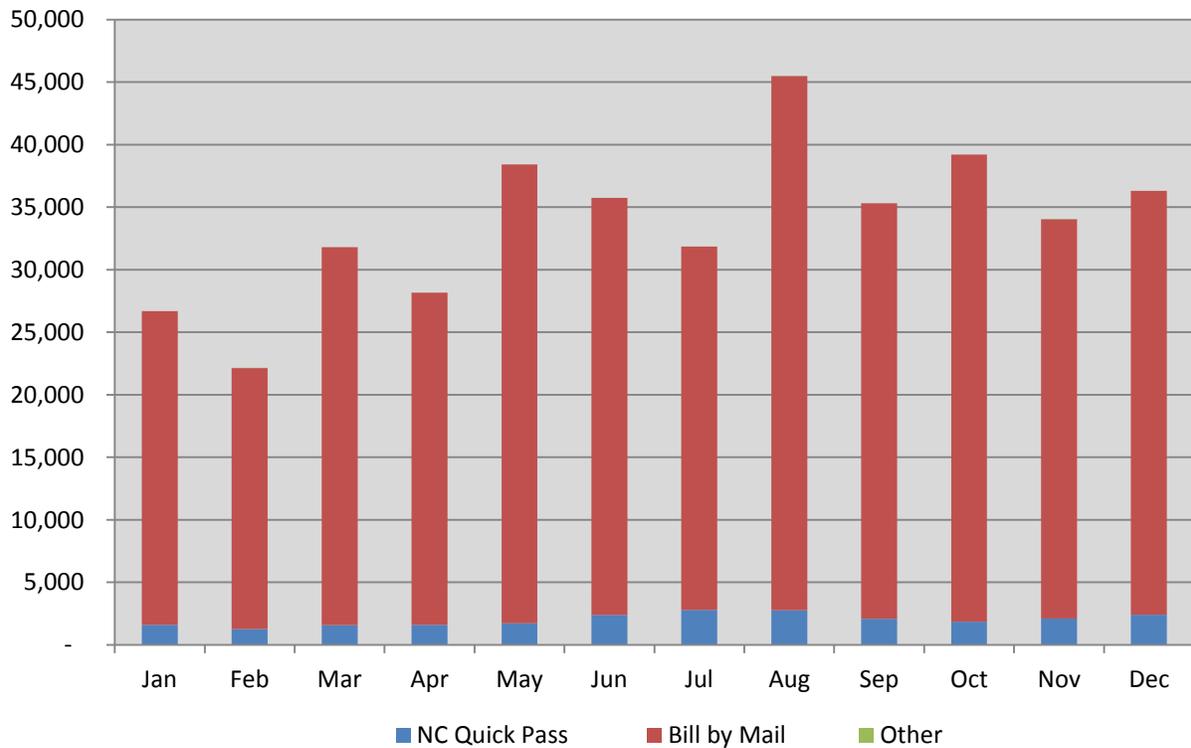
Table 7 presents a summary of the monthly established accounts being managed by the NCTA CSC. Numbers presented in parentheses represent a reduction in accounts.

Table 7: Established Accounts, Fourth Quarter by Month

Month	NC Quick Pass	Bill by Mail	Registered Video	Non-Revenue	Government	Total
October	1,862	37,333	0	0	0	39,195
November	2,125	31,925	0	1	0	34,050
December	2,428	33,877	0	0	0	36,305

Figure 16 presents the monthly established accounts managed by the NCTA CSC during 2015. The “Other” category includes registered video, non-revenue and government accounts.

Figure 16: 2015 Established Accounts



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2015 Fourth Quarter and Annual Report

Table 8 presents a summary of the total established accounts managed by the NCTA CSC, by year. Project to date is the total number of accounts established since project opening. Numbers presented in parentheses represent a reduction in accounts.

Table 8: Established Accounts, by Year

Year	NC Quick Pass	Bill by Mail	Registered Video	Non-Revenue	Government	Total
2012	27,179	359,431	5	38	18	386,610
2013	24,268	306,581	(1)	19	9	330,849
2014	18,652	342,476	2	13	3	361,128
2015	24,222	380,897	0	4	0	405,119
Project to Date	94,321	1,389,385	6	74	30	1,483,706

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Transponders

This section presents the volume of transponders sold.

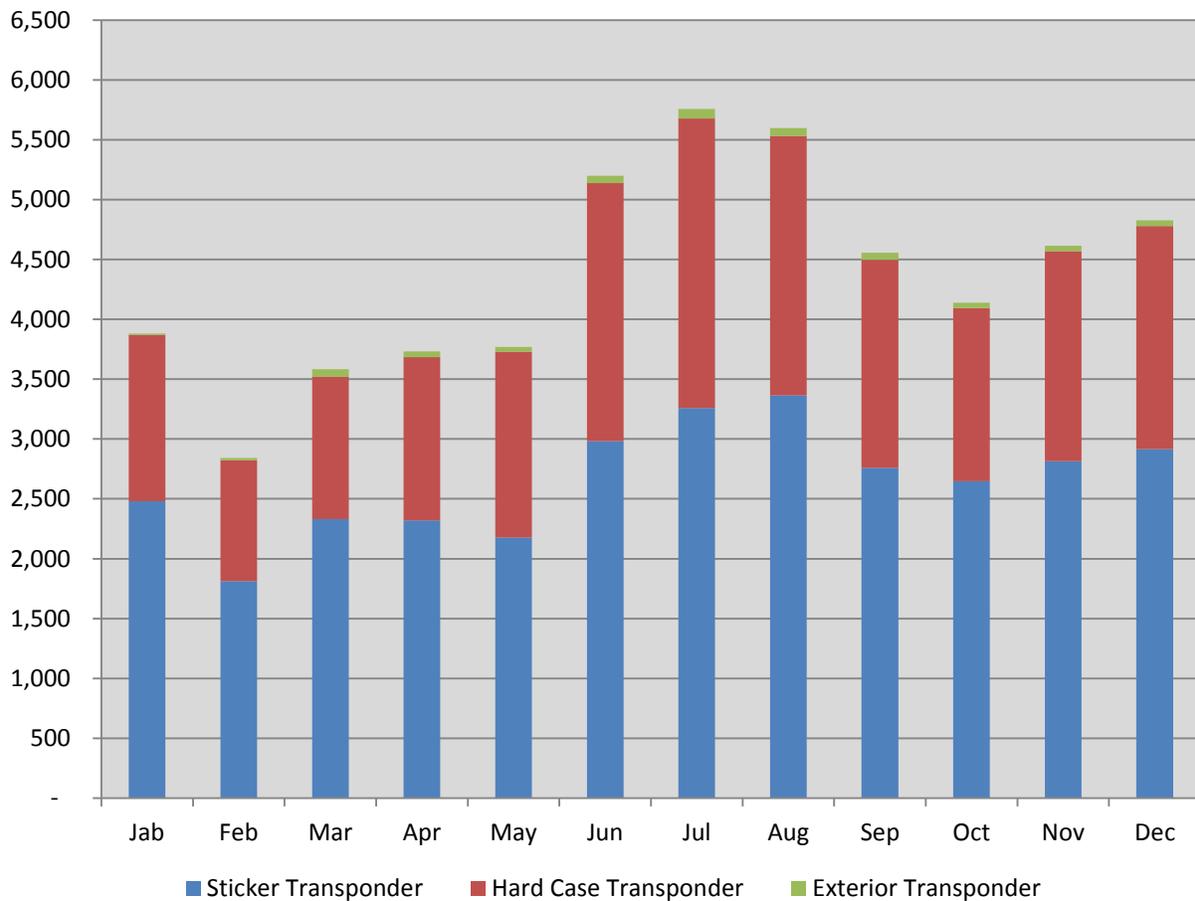
Table 9 presents a summary of the total transponders sold, by month.

Table 9: Transponders Sold, Fourth Quarter by Month

Month	Sticker Tag	Hard Case Tag	Exterior Tag	Total
October	2,647	1,445	47	4,139
November	2,815	1,753	45	4,613
December	2,916	1,862	50	4,828

Figure 17 presents monthly transponders sold during 2015.

Figure 17: Transponders Sold, 2015



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Table 10 presents a summary of the total transponders sold, by year. Transponders went on sale prior to the opening of the roadway to provide potential motorists sufficient time to establish their accounts. Project to date is the total number of transponders sold to date.

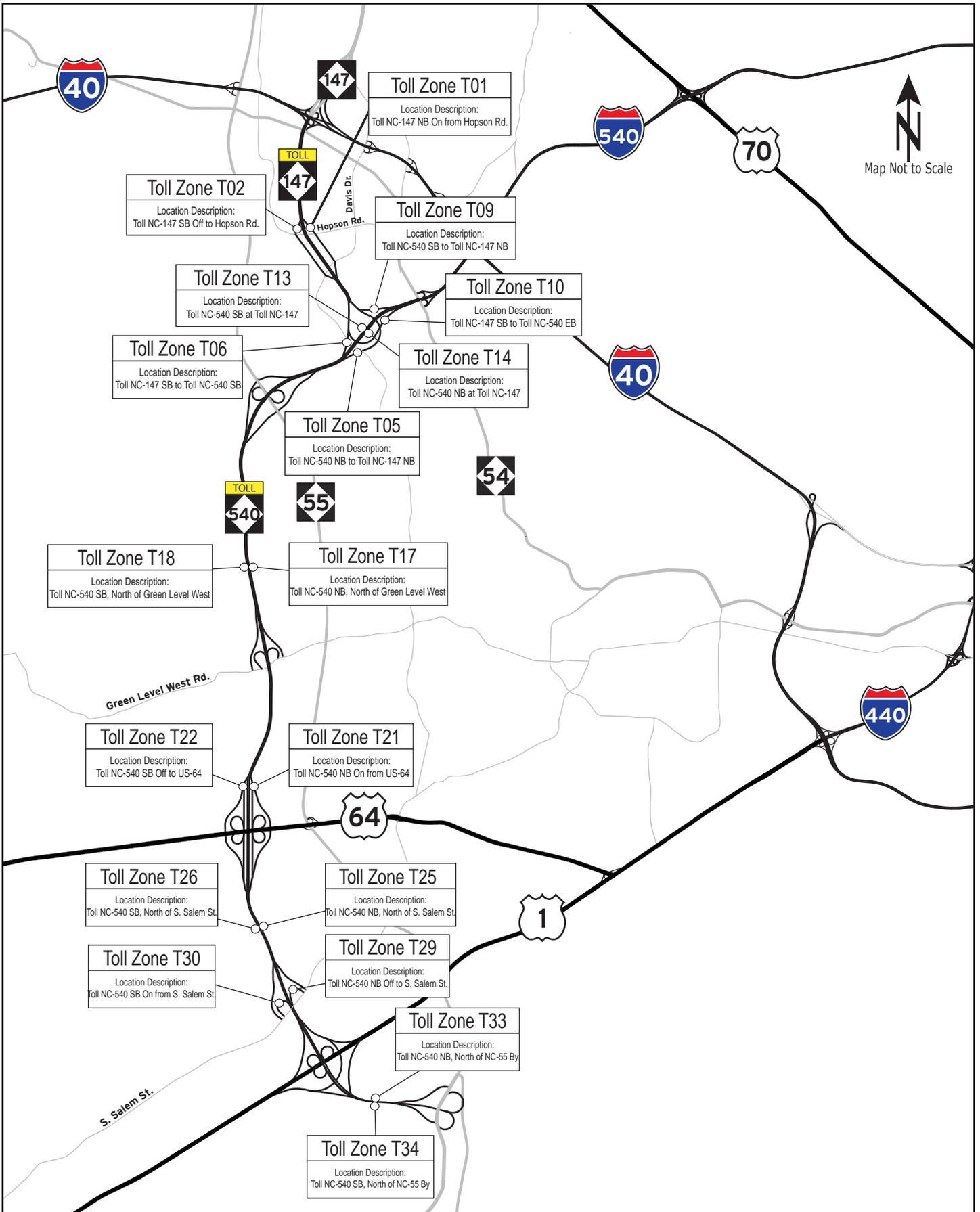
Table 10: Transponders Sold, by Year

Year	Sticker Tag	Hard Case Tag	Exterior Tag	Total
2011	7,315	2,806	200	10,321
2012	35,338	6,861	250	42,449
2013	34,784	13,980	257	49,021
2014	26,066	14,778	221	41,065
2015	31,866	20,047	588	52,501
Project to Date	135,369	58,472	1,516	195,357

Toll Zone Statistics

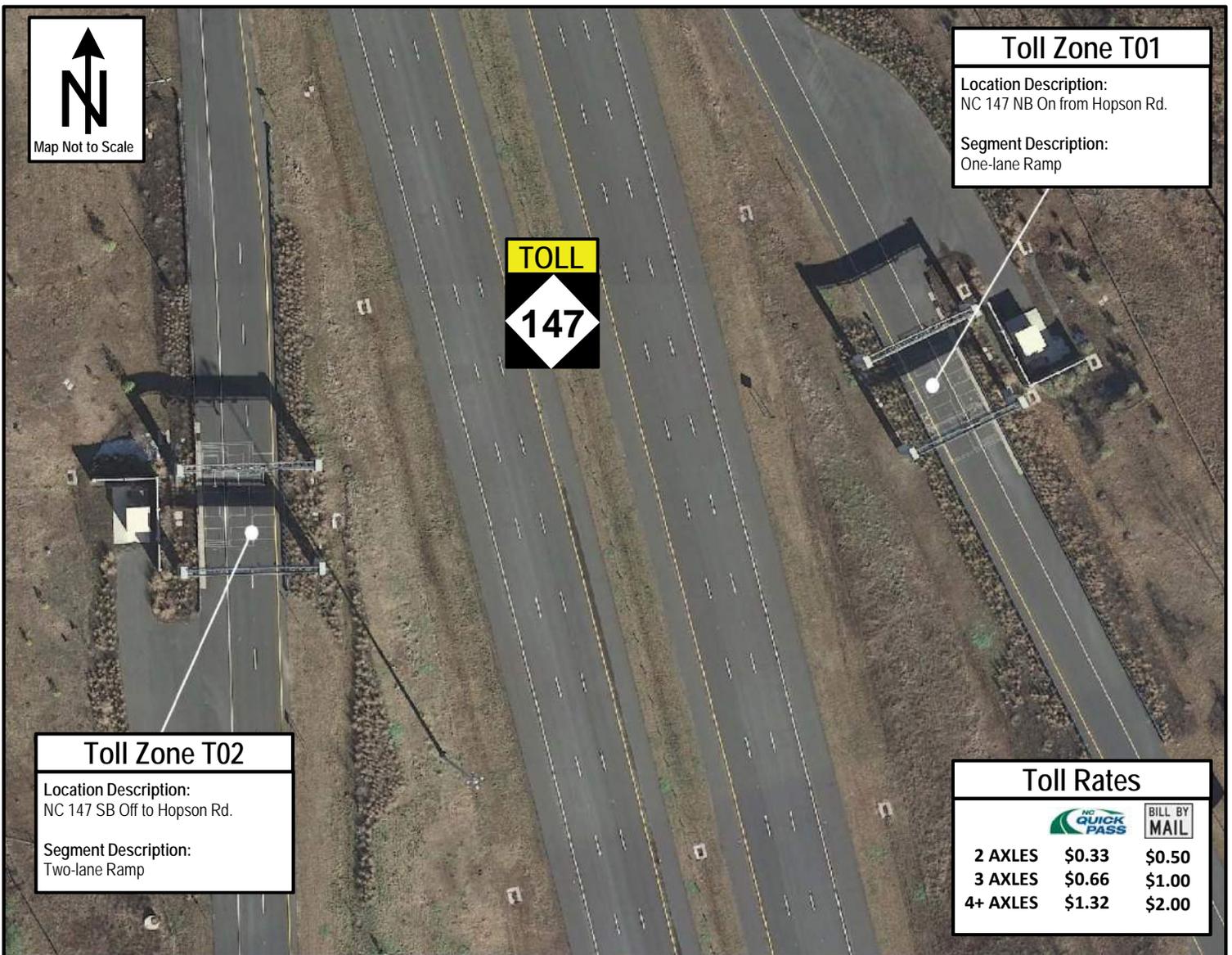
TOLL ZONE STATISTICS

The location of the toll zones along the Triangle Expressway can be seen in *Figure 18*. *Figures 19 - 27* contain visual representations of average weekday transactions recorded at toll zones along the facility.



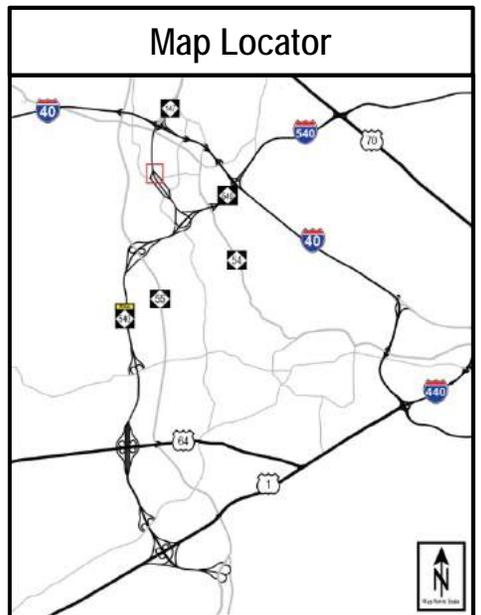
Triangle Expressway Toll Zone Map

Figure 18



Transactions by Direction		
Month	T01	T02
January	2,010	1,850
February	2,060	1,920
March	2,190	2,000
April	2,260	2,070
May	2,300	2,100
June	2,360	2,090
July	2,370	2,110
August	2,430	2,160
September	2,450	2,210
October	2,500	2,230
November	2,500	2,190
December	2,530	2,240

NC Quick Pass Percentage		
Month	T01	T02
January	61%	62%
February	61%	61%
March	60%	60%
April	60%	59%
May	58%	58%
June	57%	58%
July	57%	57%
August	58%	58%
September	58%	59%
October	58%	59%
November	58%	59%
December	58%	59%



Hopson Road Ramp Toll Zones
 2015 Average Weekday Toll Transactions

Figure 19



Toll Zone T06
Location Description:
 NC 540 SB On from NC 147 SB
Segment Description:
 Two-lane Ramp



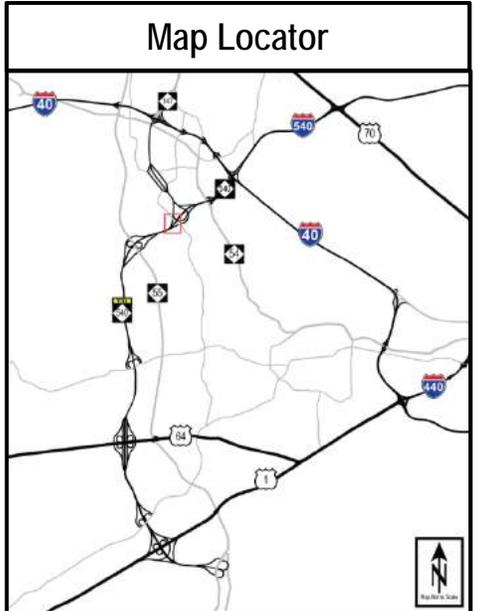
Toll Zone T05
Location Description:
 NC 147 NB On from NC 540 NB
Segment Description:
 Two-lane Ramp

Toll Rates

		
2 AXLES	\$0.90	\$1.38
3 AXLES	\$1.80	\$2.76
4+ AXLES	\$3.60	\$5.52

Transactions by Direction		
Month	T05	T06
January	5,250	5,140
February	5,480	5,220
March	5,720	5,470
April	6,090	5,850
May	6,230	5,990
June	6,270	6,050
July	6,190	5,980
August	6,330	6,170
September	6,390	6,300
October	6,580	6,420
November	6,550	6,390
December	6,590	6,480

NC Quick Pass Percentage		
Month	T05	T06
January	64%	65%
February	64%	65%
March	63%	64%
April	62%	63%
May	60%	61%
June	59%	60%
July	59%	60%
August	60%	62%
September	61%	62%
October	60%	62%
November	61%	62%
December	60%	61%



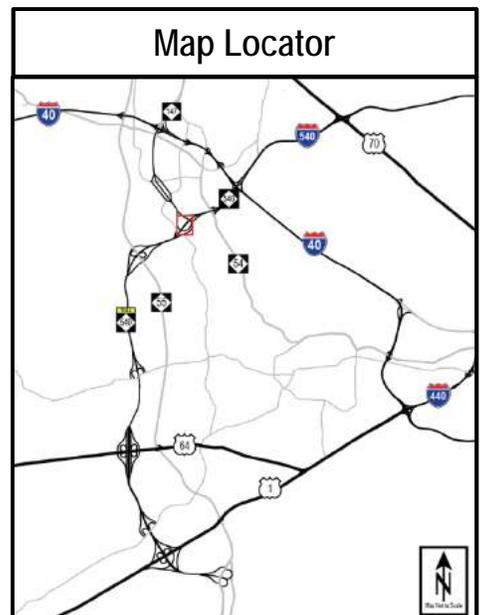
NC-147 South Ramp Toll Zones
 2015 Average Weekday Toll Transactions

Figure
20



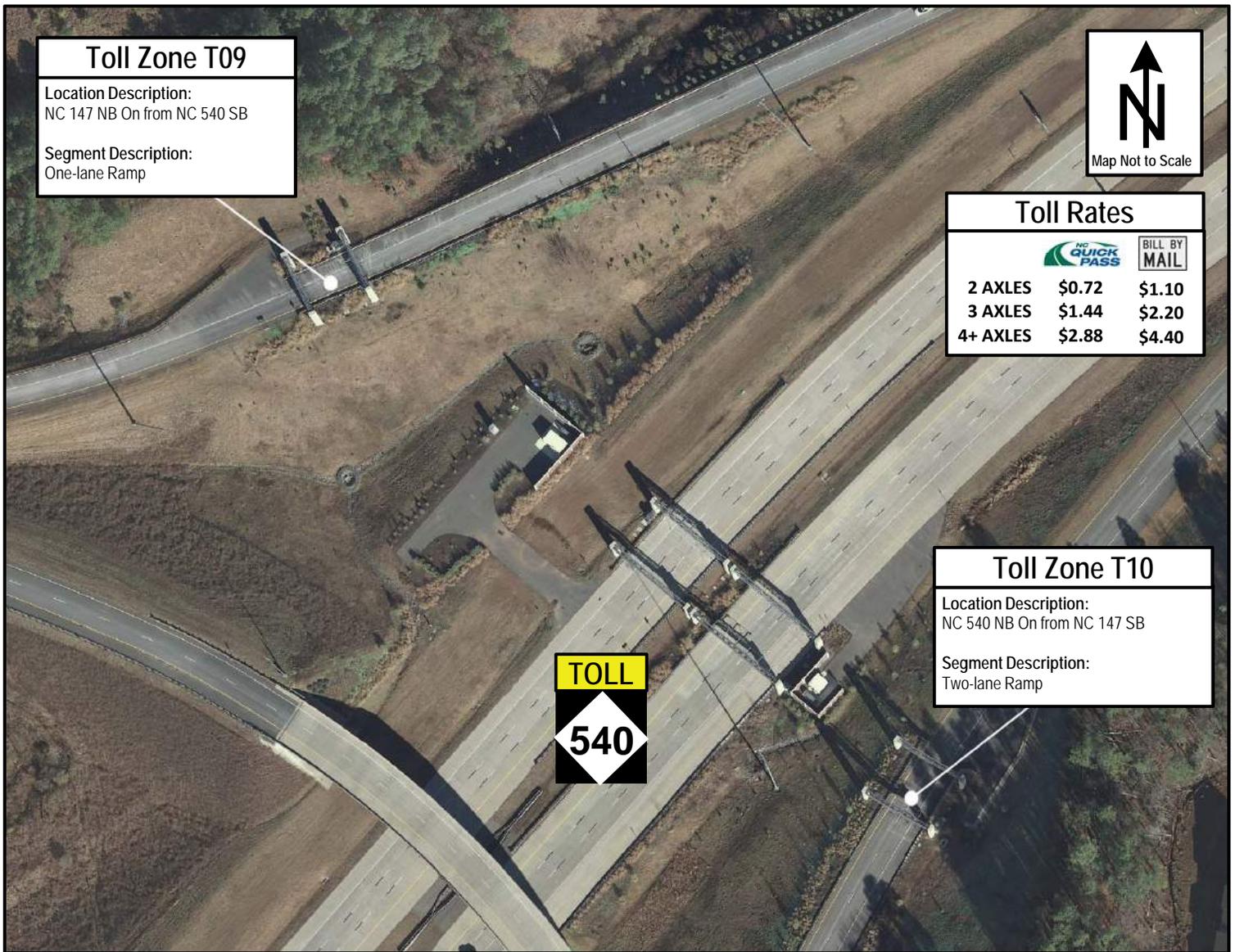
Transactions by Direction		
Month	T13	T14
January	11,740	11,780
February	11,860	12,070
March	12,740	12,920
April	13,420	13,520
May	13,940	14,030
June	13,910	13,980
July	13,620	13,640
August	14,130	14,240
September	14,330	14,510
October	14,710	14,780
November	14,620	14,730
December	15,100	15,010

NC Quick Pass Percentage		
Month	T13	T14
January	61%	61%
February	61%	62%
March	60%	61%
April	60%	60%
May	58%	59%
June	58%	58%
July	57%	58%
August	58%	59%
September	59%	60%
October	59%	60%
November	59%	60%
December	58%	59%



NC-540 Morrisville Mainline Toll Zones
 2015 Average Weekday Toll Transactions

Figure 21



Toll Zone T09
 Location Description:
 NC 147 NB On from NC 540 SB
 Segment Description:
 One-lane Ramp



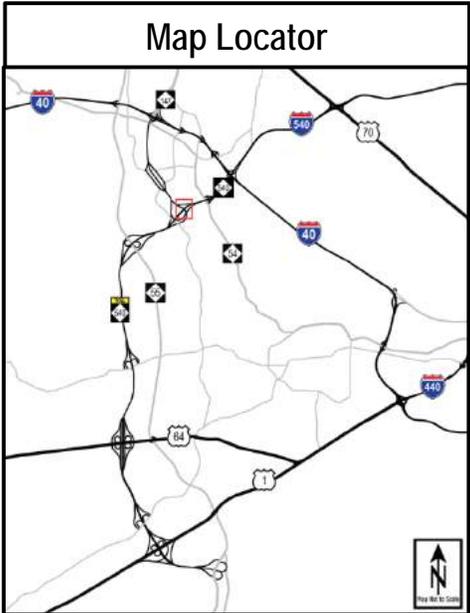
Toll Rates		
	NC QUICK PASS	BILL BY MAIL
2 AXLES	\$0.72	\$1.10
3 AXLES	\$1.44	\$2.20
4+ AXLES	\$2.88	\$4.40

Toll Zone T10
 Location Description:
 NC 540 NB On from NC 147 SB
 Segment Description:
 Two-lane Ramp



Transactions by Direction		
Month	T09	T10
January	1,460	1,750
February	1,490	1,700
March	1,570	1,890
April	1,630	2,140
May	1,780	2,170
June	1,850	2,450
July	1,770	2,400
August	1,790	2,530
September	1,800	2,500
October	1,930	2,590
November	2,000	2,640
December	1,850	2,600

NC Quick Pass Percentage		
Month	T09	T10
January	60%	61%
February	59%	61%
March	59%	59%
April	58%	56%
May	54%	56%
June	56%	54%
July	56%	55%
August	57%	56%
September	57%	57%
October	55%	56%
November	55%	57%
December	56%	57%



NC-147 North Ramp Toll Zones
 2015 Average Weekday Toll Transactions

Figure 22



Toll Zone T18
Location Description:
 NC 540 SB, North of Green Level West
Segment Description:
 Three-lane Mainline

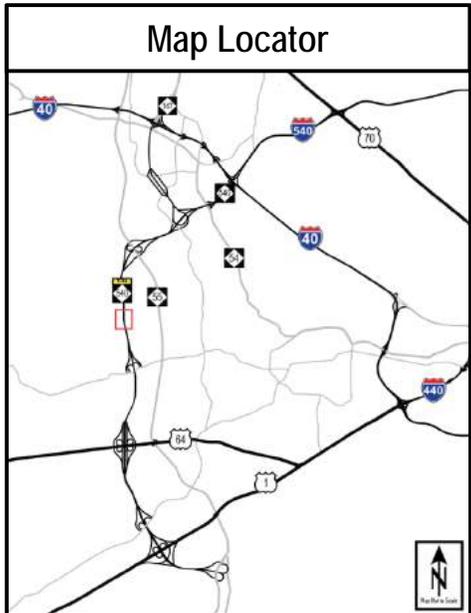
Toll Zone T17
Location Description:
 NC 540 NB, North of Green Level West
Segment Description:
 Three-lane Mainline

Toll Rates

		BILL BY MAIL
2 AXLES	\$0.72	\$1.10
3 AXLES	\$1.44	\$2.20
4+ AXLES	\$2.88	\$4.40

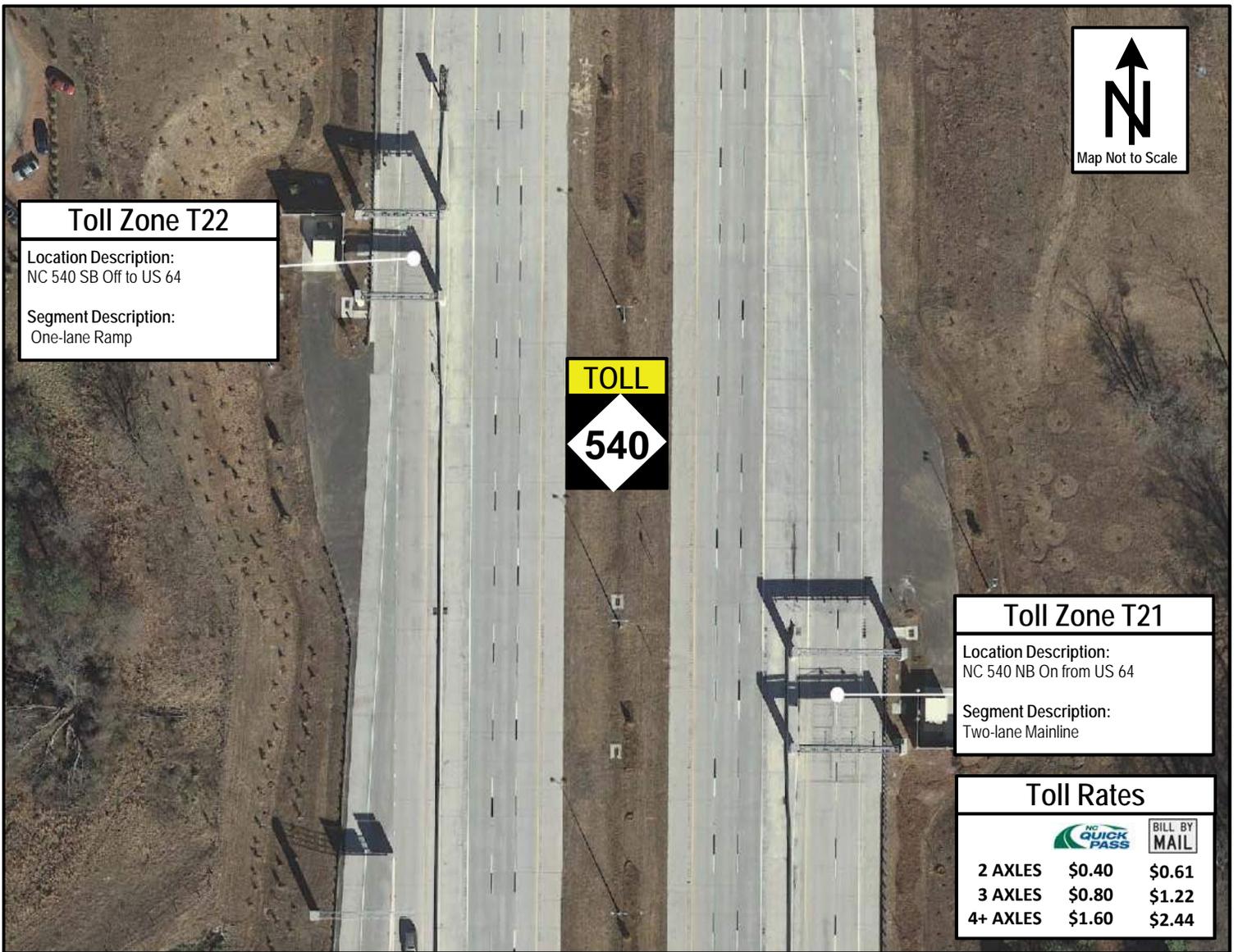
Transactions by Direction		
Month	T17	T18
January	11,630	12,040
February	11,990	12,210
March	12,700	13,040
April	13,490	13,970
May	13,990	14,500
June	14,110	14,660
July	13,890	14,590
August	14,390	14,980
September	14,700	15,300
October	15,070	15,710
November	15,150	15,760
December	15,350	16,090

NC Quick Pass Percentage		
Month	T17	T18
January	62%	62%
February	62%	62%
March	61%	62%
April	60%	60%
May	59%	58%
June	58%	58%
July	58%	58%
August	59%	59%
September	60%	60%
October	59%	59%
November	60%	59%
December	59%	58%



NC-540 Cary Mainline Toll Zones
 2015 Average Weekday Toll Transactions

Figure 23



Toll Zone T22
 Location Description:
 NC 540 SB Off to US 64
 Segment Description:
 One-lane Ramp

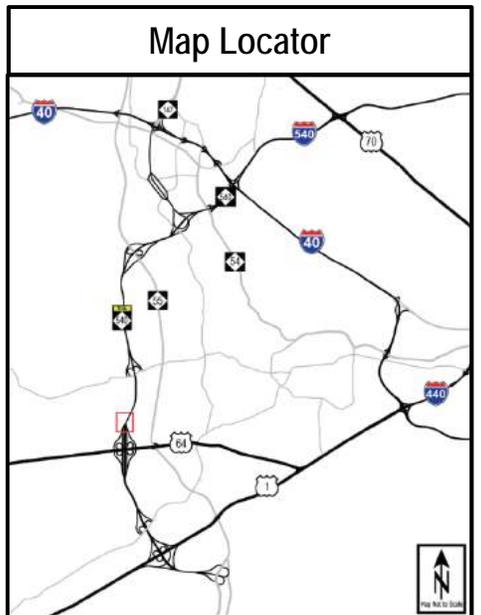
Toll Zone T21
 Location Description:
 NC 540 NB On from US 64
 Segment Description:
 Two-lane Mainline

Toll Rates

		BILL BY MAIL
2 AXLES	\$0.40	\$0.61
3 AXLES	\$0.80	\$1.22
4+ AXLES	\$1.60	\$2.44

Transactions by Direction		
Month	T21	T22
January	3,590	3,790
February	3,720	3,850
March	4,010	4,140
April	4,280	4,450
May	4,490	4,680
June	4,530	4,690
July	4,440	4,640
August	4,640	4,830
September	4,630	4,830
October	4,750	4,930
November	4,770	4,940
December	4,770	5,020

NC Quick Pass Percentage		
Month	T21	T22
January	62%	63%
February	62%	62%
March	61%	61%
April	60%	62%
May	59%	60%
June	58%	59%
July	58%	59%
August	58%	60%
September	59%	61%
October	59%	61%
November	60%	61%
December	59%	60%



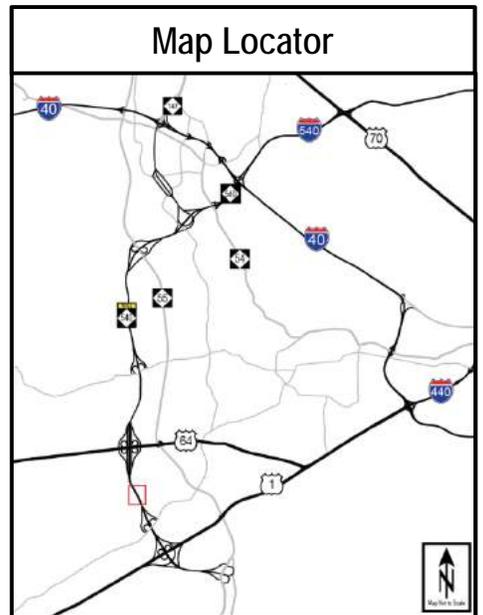
US-64 RampToll Zones
 2015 Average Weekday Toll Transactions

Figure 24



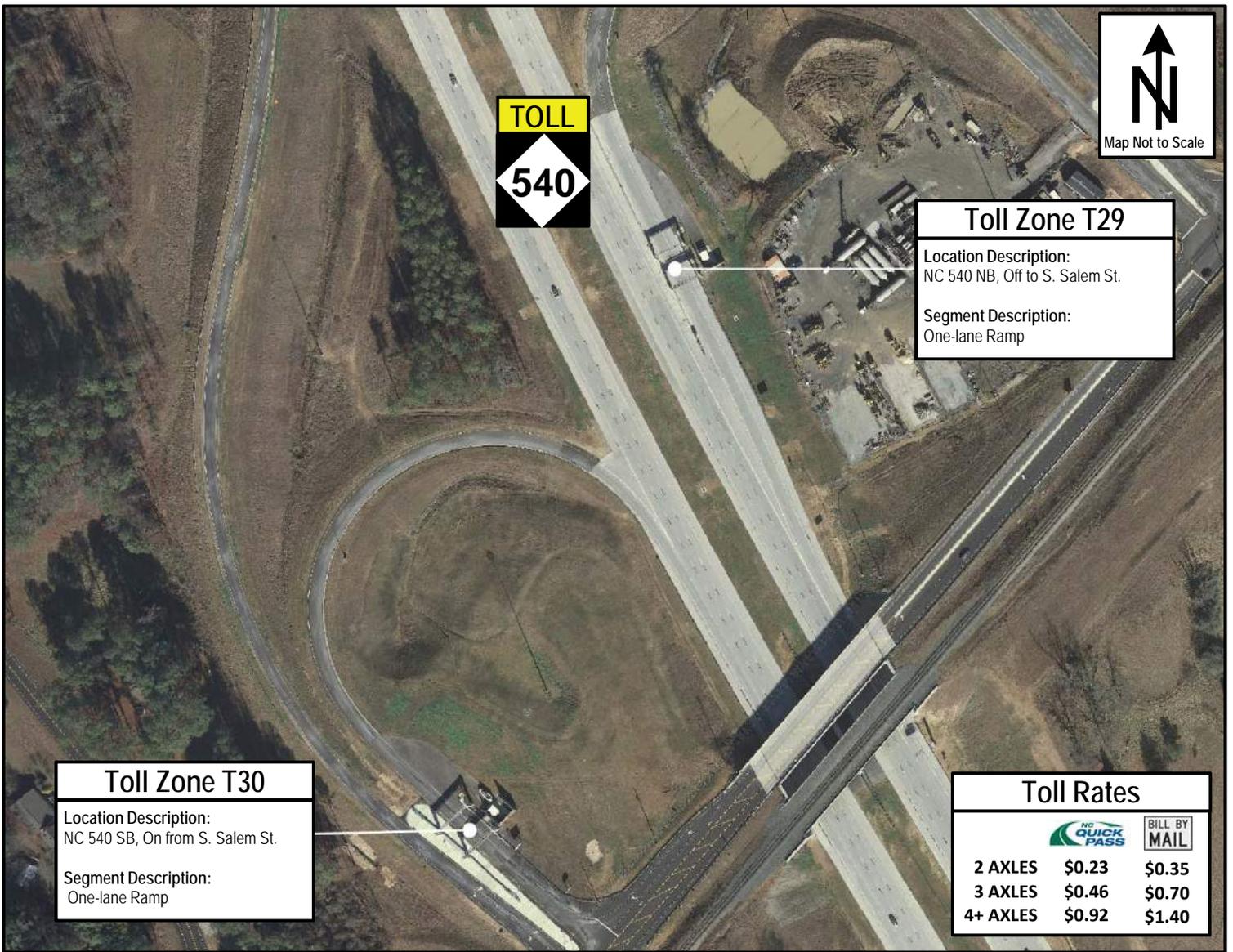
Transactions by Direction		
Month	T25	T26
January	9,500	9,340
February	9,760	9,460
March	10,370	10,160
April	11,090	11,020
May	11,580	11,480
June	11,520	11,470
July	11,380	11,480
August	11,720	11,780
September	12,030	12,050
October	12,250	12,280
November	12,310	12,330
December	12,580	12,670

NC Quick Pass Percentage		
Month	T25	T26
January	60%	61%
February	60%	60%
March	60%	60%
April	59%	59%
May	57%	57%
June	57%	57%
July	56%	56%
August	57%	57%
September	58%	58%
October	58%	58%
November	58%	58%
December	57%	57%



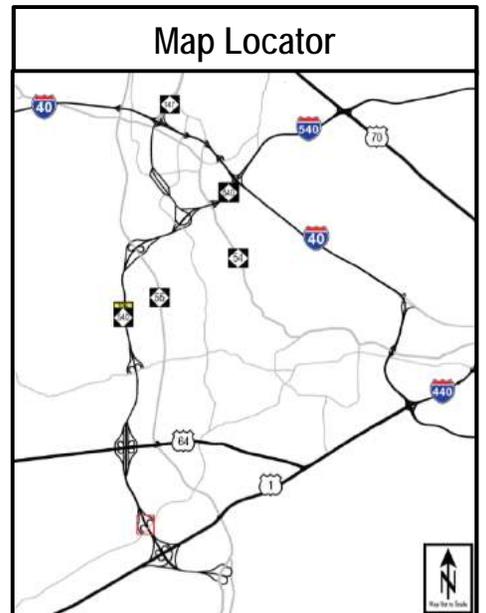
NC-540 Apex Mainline Toll Zones
2015 Average Weekday Toll Transactions

Figure 25



Transactions by Direction		
Month	T29	T30
January	880	930
February	900	950
March	950	1,010
April	1,000	1,080
May	1,070	1,140
June	950	1,060
July	950	1,060
August	1,110	1,210
September	1,250	1,330
October	1,260	1,320
November	1,180	1,280
December	1,270	1,340

NC Quick Pass Percentage		
Month	T29	T30
January	70%	72%
February	70%	72%
March	65%	71%
April	68%	70%
May	67%	69%
June	62%	67%
July	63%	67%
August	63%	67%
September	65%	68%
October	66%	66%
November	68%	67%
December	67%	66%



South Salem Street Ramp Toll Zones
 2015 Average Weekday Toll Transactions

Figure
26

Toll Zone T33
 Location Description:
 NC 540 NB, North of NC 55 Bypass
 Segment Description:
 Three-lane Mainline

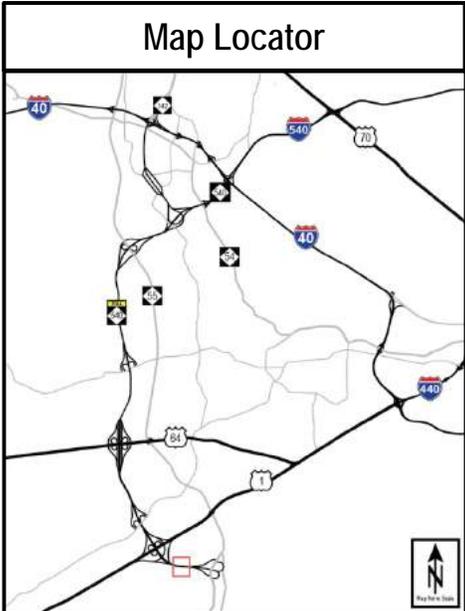


Toll Zone T34
 Location Description:
 NC 540 SB, North of NC 55 Bypass
 Segment Description:
 Two-lane Ramp

Toll Rates		
2 AXLES	\$0.38	\$0.58
3 AXLES	\$0.76	\$1.16
4+ AXLES	\$1.52	\$2.32

Transactions by Direction		
Month	T33	T34
January	6,710	6,490
February	6,910	6,500
March	7,280	6,940
April	7,670	7,440
May	7,900	7,600
June	7,800	7,580
July	7,750	7,610
August	8,020	7,840
September	8,290	7,990
October	8,290	8,070
November	8,350	8,130
December	8,470	8,320

NC Quick Pass Percentage		
Month	T33	T34
January	64%	63%
February	64%	63%
March	64%	63%
April	63%	62%
May	62%	61%
June	61%	60%
July	61%	60%
August	62%	61%
September	63%	62%
October	63%	62%
November	63%	62%
December	62%	61%



NC-540 Holly Springs Mainline Toll Zones
 2015 Average Weekday Toll Transactions

Figure 27

Roadway Safety Statistics

ROADWAY SAFETY STATISTICS

Traffic crashes are often related to deficiencies in the safety and capacity characteristics of a transportation facility. In an effort to identify these deficiencies early, and therefore reduce the likelihood of crashes on the Triangle Expressway, NCTA monitors safety conditions on the facility through quarterly crash analyses. These analyses involve the use of the Traffic Engineering Accident Analysis System (TEAAS) to collect monthly crash data along the facility, separated into four (4) segments:

- NC 147, from I 40 to NC 540
- NC 540, from I 40 to NC 55
- NC 540, from NC 55 to US 64
- NC 540, fro, US 64 to NC 55 Bypass

The data collected includes total crashes and the number of fatal and injury crashes reported along each segment. This data is analyzed over a rolling three-year period to determine the Total Crash Rate of the four segments selected, as well as for the entire facility. These Crash Rates are then compared to the Statewide Critical Crash Rates to determine the Crash Ratio or Safety Ratio of the Triangle Expressway.

Crash Rates are a function of the length of roadway, average daily traffic and number of reported crashes along a route during a specific time frame. These rates are expressed in crashes per 100 million vehicle miles traveled (MVMT). In the crash analysis conducted during the fourth quarter, the Crash Rates of the four segments selected and the entire facility were calculated based on the roadway length, the average annual daily traffic (AADT) and the number of crashes recorded from December 2012 through November 2015 for each segment. The AADT used for this quarter analysis was collected from the NCDOT 2014 Wake County AADT Map. The statewide Total Crash Rate (85.41 crashes per 100 MVMT) used for comparison purposes in this analysis was collected from the 2012-2014 NCDOT Statewide Total Crash Rates for freeway facilities, as the Triangle Expressway operates more similar to a freeway or interstate than a state route.

Critical Crash Rates are crash rates that have been statistically adjusted with a 95% level of confidence to remove the elements of chance and randomness. They are used to determine if the rate at a particular location is significantly higher than a predetermined average rate for locations with similar characteristics. The Safety Ratio is the Total Crash Rate divided by the Critical Crash Rate. A segment with a Total Crash Rate that exceeds the Critical Crash Rate indicates a Safety Ratio greater than 1.0 and a potential safety deficiency.

Table 11 provides a summary of the crash data collected and the results of the fourth quarter analysis.

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Table 11: Safety Statistics, December 2012 - November 2015

Segment	Length	AADT ¹	Total Crashes	Vehicle Exposure (MVMT)	Total Crash Rate	Statewide Crash Rate ²	Critical Crash Rate	Safety Ratio
NC 147 I 40 to NC 540	3.1	10,400	34	35.37	96.11	85.41	87.98	1.09
NC 540 I 40 to NC 55	2.8	25,600	51	78.35	65.09	85.41	87.13	0.75
NC 540 NC 55 to US 64	6.7	18,600	62	136.03	45.58	85.41	86.72	0.53
NC 540 US 64 to NC 55 Bypass	5.9	13,500	40	86.64	46.17	85.41	87.05	0.53
Triangle Expressway	18.5	17,000	187	343.28	54.47	85.41	86.23	0.63

¹ AADT provided from NCDOT 2014 AADT Maps, Wake County

² Statewide Crash Rate for Interstate Facilities Applied

Roadway Operations Statistics

ROADWAY OPERATIONS STATISTICS

Operations statistics are collected by State Highway Patrol (SHP) and Incident Management Assistance Patrol (IMAP) for the NCTA Toll Safety Patrol program. This program provides one Highway Patrol officer and one IMAP responder to the facility during working hours, Monday through Friday. This section also presents response times and traffic information for incidents that occurred during 2015.

The NCTA manages traffic and activities along the Triangle Expressway at the state-of-the-art Traffic Management Center located in the North Carolina National Guard's Joint Force Headquarters in Raleigh.

Highly trained operators monitor the entire length of the Triangle Expressway via closed-circuit TV, microwave speed detectors and interoperable 800MHz radio dispatch from local 911 and statewide Highway Patrol communications, as well as the Turnpike Authority's security cameras and Roadway Weather Information System.

More than 200 cameras are located along the Expressway to monitor traffic operations, ensure security of the toll gantries and capture license plate images used for toll collection operations. Operators monitor the roadside technology and toll facilities, and are able to quickly dispatch appropriate personnel to address any equipment issues or roadway traffic incidents.

Roadway updates are provided to motorists via 10 full-color Dynamic Message Boards (the first full-color message boards in the state), as well as through NCDOT's 511 system and Traveler Information Management System (TIMS) website.

SHP and IMAP personal can be dispatched to respond to any incidents that occur, ranging from disabled motorists and debris to major traffic wrecks that could be detrimental to both motorist safety and toll collection.

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Table 12 and Table 13 present State Highway Patrol operating statistics during 2015. “Chargeable Activities” are those SHP activities involving fines. It should be noted that the “Other Violations” category includes chargeable activities such as drug violations, reckless driving, load and equipment violation, driver’s license violation, vehicle registration violation and littering.

Table 12: SHP Chargeable Activities

Chargeable Activities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Speed Violations	51	22	56	33	51	79	58	43	52	77	44	63	629
Alcohol Violations	0	0	0	0	0	0	0	2	0	0	0	1	3
Seat Belt Violations	8	1	9	11	11	12	16	8	8	1	5	4	94
Child Restraint Violations	0	0	0	0	1	0	0	0	2	0	0	0	3
Other Violations	35	27	41	31	40	50	48	37	34	32	29	65	469
Total Charges	94	50	106	75	103	141	122	90	96	110	78	133	1,198

Table 13: SHP Non-Chargeable Activities

Non-Chargeable Activities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Warnings	72	81	61	55	53	66	37	42	61	79	46	51	704
Vehicles Towed	0	0	0	0	0	0	0	0	0	0	0	0	0
Crashes Investigated	3	0	4	5	3	3	4	2	3	7	6	5	45
Total	75	81	65	60	56	69	41	44	64	86	52	56	749

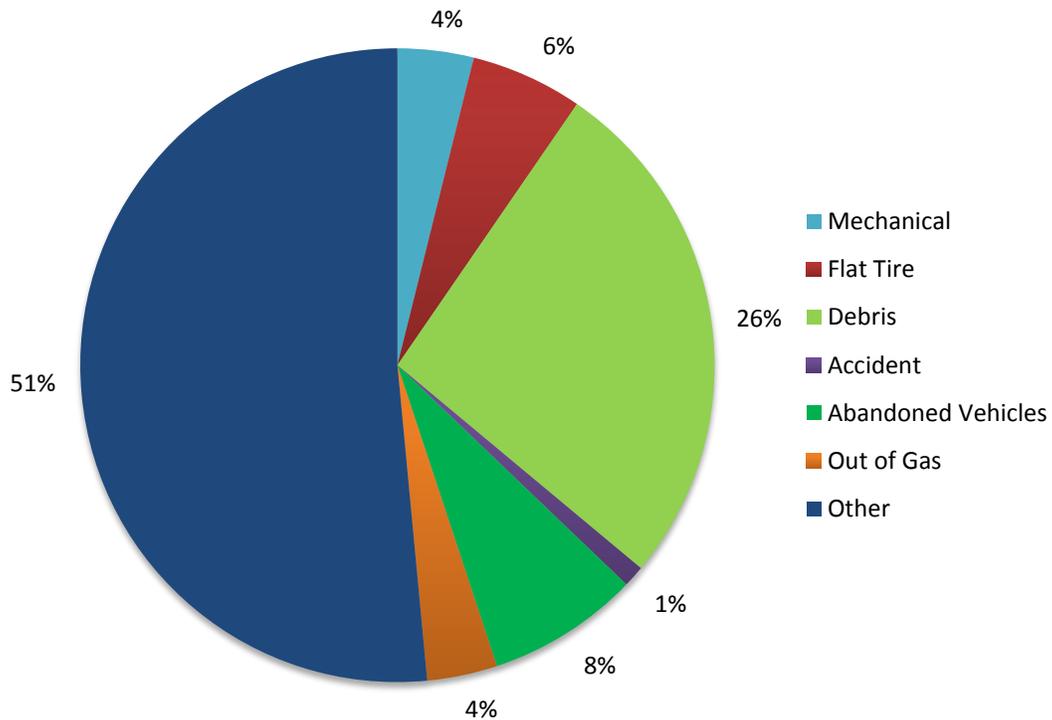
The IMAP assists with stranded motorists and incident clearance, thereby maintaining the flow of traffic along the roadway. Table 14 and Figure 28 present the monthly breakdown of IMAP assists, by type, for the Triangle Expressway during 2015. The “other” category includes the reporting categories of traffic control, assist other unit, secured load, called for assistance, directions, transported motorist, unable to locate, welfare check, and no assistance. It should be noted that welfare check data is not included in the “other” category for the months of January through March.

Operations Statistics Report for the Triangle Expressway
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Table 14: IMAP Assistance

Assist Type	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Total
Mechanical	3	5	9	7	8	7	1	4	3	1	3	2	53
Flat Tire	5	4	7	9	7	13	9	11	5	2	5	1	78
Debris	32	39	65	57	35	41	25	19	16	17	11	5	362
Accident	0	3	4	1	1	0	0	2	1	1	1	1	15
Abandoned Vehicles	4	8	15	11	4	12	13	7	14	8	4	6	106
Out of Gas	7	4	4	8	5	9	0	2	1	5	1	3	49
Other	82	67	37	130	114	57	36	48	41	43	33	16	704
Total Assist	133	130	141	223	174	139	84	93	81	77	58	34	1367

Figure 28: 2015 IMAP Assistance by Type



Operations Statistics Report for the Triangle Expressway

2015 Fourth Quarter and Annual Report

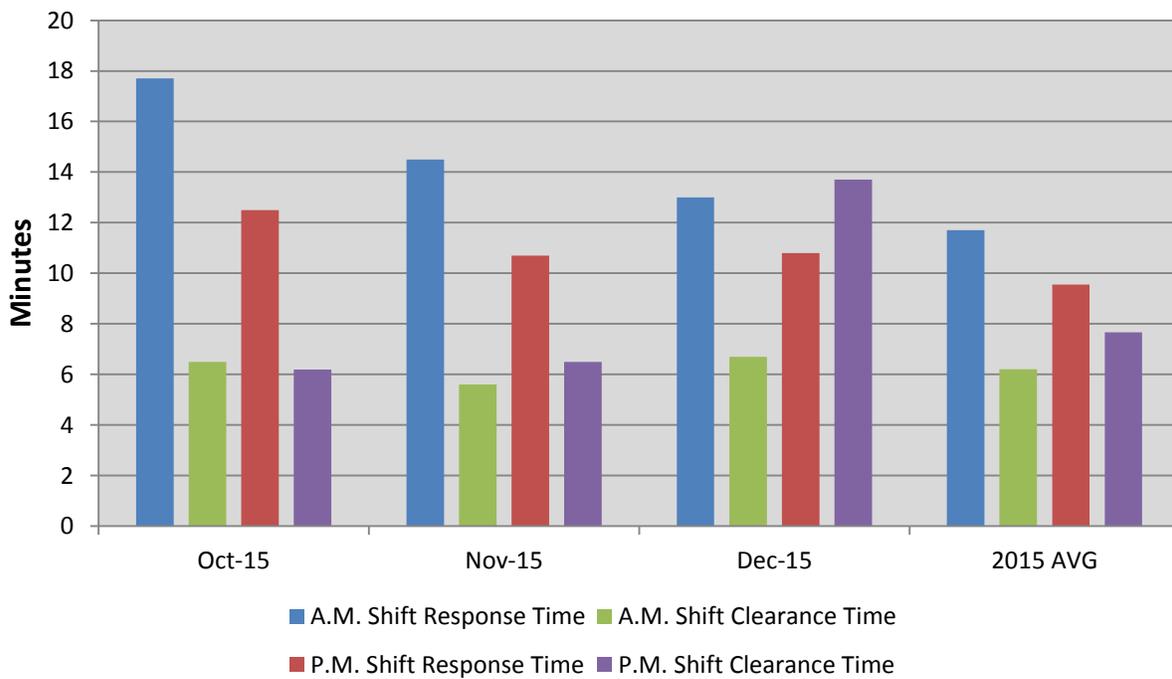
The response and clearance times for all IMAP assists are logged by IMAP and provided to the NCTA. Response time is the time from which responders receive a call to the time they arrive on the scene. Clearance time is the time it takes the responders to clear the incident and return the roadway to normal operation. The IMAP staff's AM shift occurs from 6AM to 2PM and the PM shift occurs from 2PM to 10PM. Shift response times may differ due to the number of drivers on duty and their coverage areas.

Table 15 and Figure 29 present the average IMAP assistance response and clearance times, in minutes, for the Triangle Expressway.

Table 15: Average IMAP Assistance Response and Clearance Times (in Minutes)

Response Type	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	2015 Average
A.M. Shift Response	19	9	8	6	7	6	7	15	19	18	15	13	12
A.M. Shift Clearance	6	6	6	7	6	5	9	5	6	7	6	7	6
P.M. Shift Response	10	9	6	6	6	6	11	11	14	13	11	11	10
P.M. Shift Clearance	9	9	6	6	7	7	7	6	8	6	7	14	8

Figure 29: Average IMAP Assistance Response and Clearance Times (in Minutes)



Roadway Maintenance Statistics

ROADWAY MAINTENANCE STATISTICS

This section outlines the NCTA Maintenance Rating Program (MRP), which is a maintenance evaluation program for roadway features and toll facilities. MRP is a comprehensive planning, measuring, and managing process that provides a means for communicating to managers, stakeholders and key customers the impacts of policy and budget decisions on program service delivery.

Using outcome-based performance measures and the service level scale (0 through 100), the inspection results are rated against established threshold criteria. The program analysis is accomplished through the use of sampling procedures that capture the level of service being provided for individual asset features. Over time, these ratings will then be charted to identify work needs and subsequent necessary actions. The evaluations are based on the establishment of threshold conditions that quantify the maximum defect allowed to exist for a characteristic before it is considered unacceptable. The NCTA performance standards, threshold criteria and maintenance rating program were developed through a collaborative effort by NCTA managers, NCDOT maintenance staff, and consultants.

Using field survey information, a maintenance matrix can be developed to show the ties between maintenance activities and the characteristics of various roadway features. The purpose of this evaluation is to provide information that will be used to schedule and prioritize routine maintenance activities and provide uniform maintenance conditions that meet established objectives.

Assessment Schedule

As part of the NCTA MRP, a “baseline” assessment was scheduled to be completed for each newly opened roadway section, soon after opening to toll collection. The baseline assessments included complete inventory data collection and assessment on 100% of the roadway assets.

After the initial baseline assessment was completed, future assessments for that segment switched over to a statistical sampling assessment. Inspections are performed during the months of February, May, August, and November to account for dynamic seasonal changes to assets. These inspections are accomplished through the use of statistically valid, random sampling procedures that capture the level of service for individual assets with a 95% confidence level in sampling.

Assessment Results

Table 16 presents the quarterly and 2015 Annual MRP Assessment rating. It is important to note that the Quarterly Ratings are only representative of the samples inspected during each quarter. Therefore, they are not a statistically valid representation of the assets' conditions; only the 2015 Annual Rating will provide a 95% confidence level in statistical sampling.

Table 16: MRP Assessment Results

Element	Q1 2015 RATING	Q2 2015 RATING	Q3 2015 RATING	Q4 2015 RATING	2015 ANNUAL RATING
Road Surface	98.8	97.6	98.9	97.9	98.3
Unpaved Shoulders	100.0	96.6	100.0	97.8	98.6
Drainage	93.0	93.4	93.5	83.8	90.9
Roadside	88.1	86.6	86.3	90.5	87.9
Traffic Control Devices	84.4	96.8	89.0	92.2	90.6
Overall MRP Performance Rating	92.0	94.7	93.1	92.8	93.2