BELL FARMS MASTER PLAN
Knox County, Tennessee

11-A-22-PD
TIS Version 2
9/21/2022

TRAFFIC IMPACT STUDY

Prepared for
Smithbilt Homes

Prepared by

CDM Smith

August 2022
Revised September 2022

BELL FARMS MASTER PLAN

KNOX COUNTY, TENNESSEE

TRAFFIC IMPACT STUDY

Prepared for

Smithbilt Homes
4907 Ball Road
Knoxville, Tennessee 37931

9/21/2022

July 2022
Revised September 2022

Prepared by

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Project No. 274916

EXECUTIVE SUMMARY

This study was commissioned to address any traffic impact and access of the Bell Farms Master Plan located adjacent to W Emory Road (S.R. 131), west of Clinton Highway (U.S. 25W) and east of Harrell Road in northwest Knox County. This is a Level 3 study of a mixed residential development with a commercial component. This traffic study required the collection of traffic data, generation of anticipated traffic volumes for the proposed site and development of projected traffic volumes for normal growth. This study evaluated the development's impact and determined if any mitigation measures are necessary to minimize the traffic impact, including improved roadway geometrics and traffic control devices.

The Bell Farms Master Plan includes 524 single-family units (sfu) north of W. Emory Road (S.R. 131) and 179 townhomes, 400 apartment units, and 55,550 square feet of commercial south of W. Emory Road. Also proposed south of W. Emory Road, the development would include recreational fields and park facilities. The development has two proposed streets accessing W. Emory Road (S.R. 131).

CDM Smith had peak-hour turning movement counts conducted June 14, 2022, for the following intersections:

1. Clinton Highway (U.S. 25W) & W Emory Road (S.R. 131)
2. Clinton Highway (U.S. 25W) & W Emory Road /Bill Bell Way
3. Clinton Highway (U.S. 25W) & W Beaver Creek Drive
4. Clinton Highway (U.S. 25W) & Powell Drive (S.R. 131)
5. W Emory Road (SR 131) & Harrell Road

Turning movements for Carpenter Road was obtained from the 2035 design hour volumes available from the TDOT design plans of the Harrell Road/Carpenter Road intersection and adjusted for 2022 traffic.

An automated traffic count (ATC) was also conducted adjacent to the site and determined an average weekday traffic (AWT) of 11,390. No adjustments were determined necessary for schools on summer break as an examination of this traffic count was very comparable with the TDOT station count. A comparison of the 2022 AWT conducted for this site and the TDOT traffic count conducted on February 3, 2021 is as follows:

	February 2021	June 2022
Daily Traffic	10,271	11,390
AM Peak Hour	858	916
PM Peak Hour	979	1,052

Background traffic was developed and is traffic that can be anticipated regardless of the proposed development. Traffic within the study area should continue to grow due to other development. This background traffic is projected for the purpose of establishing a baseline. In addition to the growth in traffic, planned roadway/intersection improvements were addressed.

A review of historical traffic data determined an approximate annual growth rate of 2.9-percent. Other studies in the site vicinity used a 2-percent annual growth rate. Background traffic for this study, therefore, assumes an annual compounded growth rate of 2.5-percent. Background traffic is projected for the year 2030, thereby reflecting a 21.8-percent growth. Buildout, however, will largely depend on the housing market for the Knox County area of Tennessee. In addition, the Miller Farm subdivision, with 95 single-family units located north of W. Emory Road (S.R. 131), was added to the traffic growth expected in the site vicinity.

Analyses were performed for the background conditions including the buildout of the Miller Farms subdivision. The levels of service of the signalized study intersections continue to be acceptable for the 2030 background traffic conditions. However,by 2030, the intersection of Clinton Highway (U.S. 25W) and W. Emory Road begins to approach its capacity (V/C of 0.88). Adverse traffic queuing from the northeast bound approach of W. Emory Road (S.R. 131) may begin at Clinton Highway (U.S. 25W) during the PM peak hour.

Planned improvements of the W. Emory Road (S.R. 131) and Harrell Road intersection by the Knox County and TDOT will align Harrell Road and Carpenter Road and provide signalization with left-turn lanes for W. Emory Road (S.R. 131) and right-turn lanes for all intersection approaches. These improvements provide very good levels of service.

Site traffic was determined using the publication **Trip Generation, 11th Edition**. The study generated traffic for the mixed residential and commercial development of 524 single-family units (LUC 210), 179 townhomes (LUC 215), and 400 apartments (LUC 220). The Bell Farms Master Plan includes 55,550sf of commercial use (LUC 821). Trips generated for the multi-family development were determined using local trip generation rates adopted by the Knoxville-Knox County Metropolitan Planning Commission in July 2000 for multi-family developments.

The proposed site may generate approximately 15,400 daily weekday trips. After the consideration of pass-by traffic for the commercial land use and internal site trips, approximately 13,370 new daily trips may be generated for a typical weekday. Trips generated were assigned to the study intersection. With projected traffic conditions determined with the Bell Farms

development, signalized and unsignalized capacity and level of service analyses were conducted using the **Highway Capacity Manual**. Improvements for the site access include left-and right-turn lanes and signalization of the eastern proposed street access.

Analysis of W. Emory Road (S.R. 131) 2-lane highway section, with an AWT that may exceed 20,000 by 2030, determined that westbound traffic would experience a LOS D during the morning peak hour. The PM peak hour would operate at LOS D westbound and LOS E eastbound. Given these levels of service, consideration and planning for a multi-lane (5-Lane Section) should begin as Emory Road (S.R. 131) continues to develop and traffic increases. Right-of-way should be reserved for a future 5-lane section.

With the recommendations of this report, the efficient and safe flow of traffic should be maintained with the Bell Farms Master Plan. Recommendations are as follows:

- Provide a minimum 3-lane section with a center turn lane adjacent to the site, providing for eastbound and westbound left-turn movements to the proposed site access.
- Provide a minimum 315-foot storage/deceleration for right-turn lanes from W. Emory Road (S.R. 131) to the proposed east and west access streets.
- Provide a traffic signal for the proposed eastern street intersection with W. Emory Road (S.R. 131) serving the proposed apartments and commercial components of the development.
- Signalization should include pedestrian traffic control facilitating possible movements from the northside residential to the park/recreational amenities.
- Provide pedestrian facilities, including sidewalks and crosswalks, connecting the residential and commercial uses with the park/recreational uses.
- Minimize landscaping, using low growing vegetation, and signage at the proposed site access streets to W. Emory Road (S.R. 131) to ensure a minimum 500-foot line-of-sight is provided for the safe operations of the site intersections.
- Provide for a northwest-bound double left-turn movement from Clinton Highway (U.S. 25W) to westbound W. Emory Road (S.R. 131). Improved 2 departuring lanes should be a minimum of 300 feet on W. Emory Road before transitioning to a single westbound lane.
- Provide separate left- and right-turn lanes from the proposed site intersecting streets with W. Emory Road (S.R. 131).

Roadway and intersection design should conform to the recommended standards and practices of the American Association of State Highway and Transportation Officials, the Tennessee Department of Transportation, the Institute of Transportation Engineers, and the Knox County Engineering and Public Works Department.

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INTRODUCTION

CDM Smith is pleased to submit this report to address any traffic impact and access of the Bell Farms Master Plan located on West Emory Road in northwest Knox County. This is a Level 3 study of a mixed residential development with a commercial component This traffic study required the collection of traffic data, generation of anticipated traffic volumes for the proposed site and development of projected traffic volumes for normal growth. Analyses of the resulting traffic projections were conducted to determine the capacity and levels of service for the site accesses to W. Emory Road (S.R. 131) and its intersections with Harrell Road and Clinton Highway (U.S. 25W). This study will evaluate the development's impact and determine if any mitigation measures are necessary to minimize the traffic impact including improved roadway geometrics and traffic control devices.

Project Description

The Bell Farms Master Plan includes 524 single-family units (sfu) north of W. Emory Road (S.R. 131) and 179 townhomes, 400 apartment units, and 55,550 square feet of commercial south of W. Emory Road. Also proposed south of W Emory Road, the development would include recreational fields and park facilities. The development has two proposed streets accessing W Emory Road (S.R. 131). The proposed master plan is illustrated in **Figure 1**. The current zoning of the property is agriculture, illustrated in **Figure 2**.

Site Location

The location of the proposed residential master plan is adjacent to W Emory Road (S.R. 131), west of Clinton Highway (U.S. 25W) and east of Harrell Road. **Figure 3** illustrates the site location relative to local and regional access.


SITE PLAN
Bell Farms
SITE DATA
173 - 45' Alley-Loaded Single Family Lots
229 - 55' Front-Loaded Single Family Lots
98 - 65' Front-Loaded Single Family Lots
24 - Estate Lots
179 - Townhomes
400 - Multifamily
1103 - Total Units
Open Space
N

Figure 1

ZONING
Bell Farms

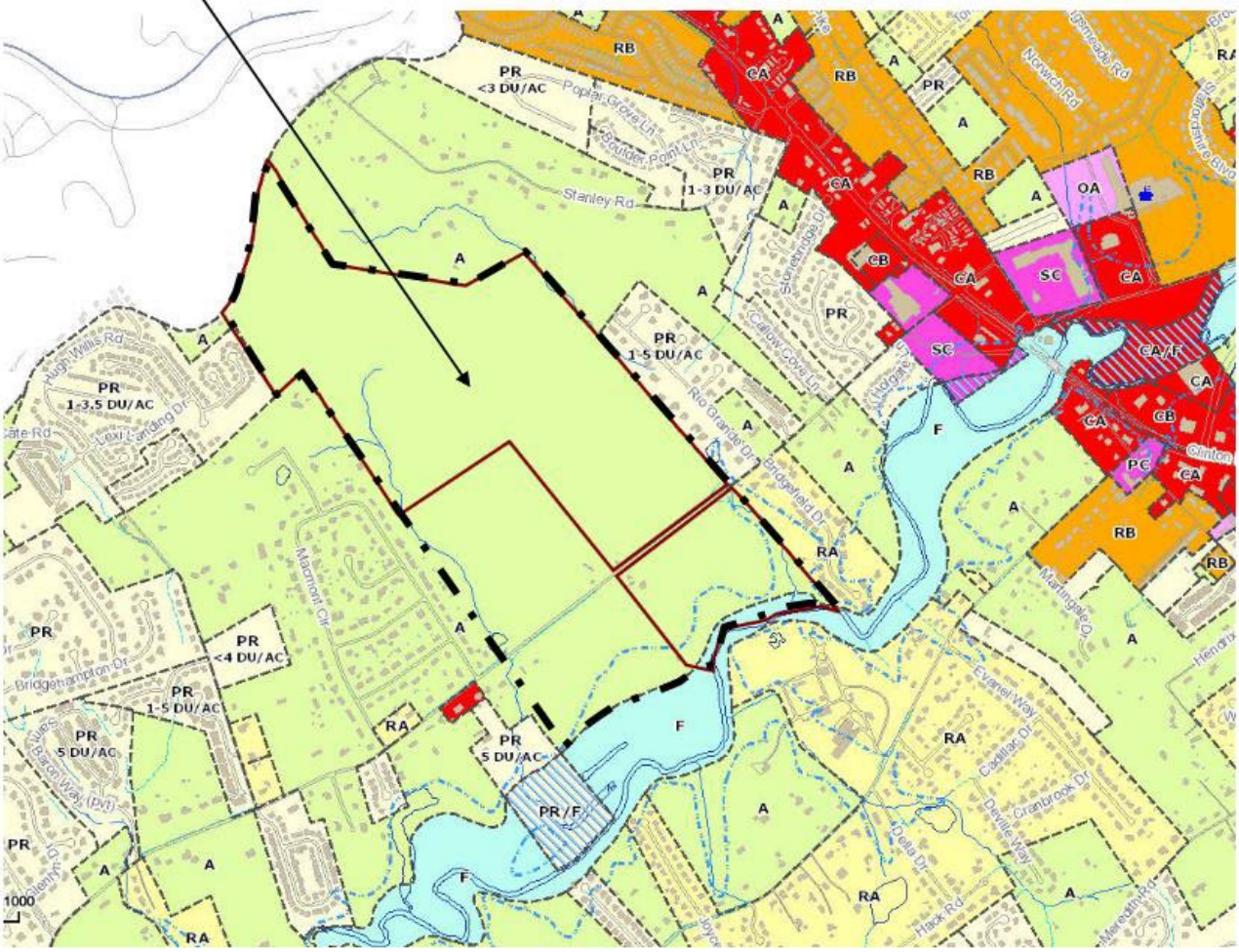

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Figure 2

VICINITY MAP
Bell Farms

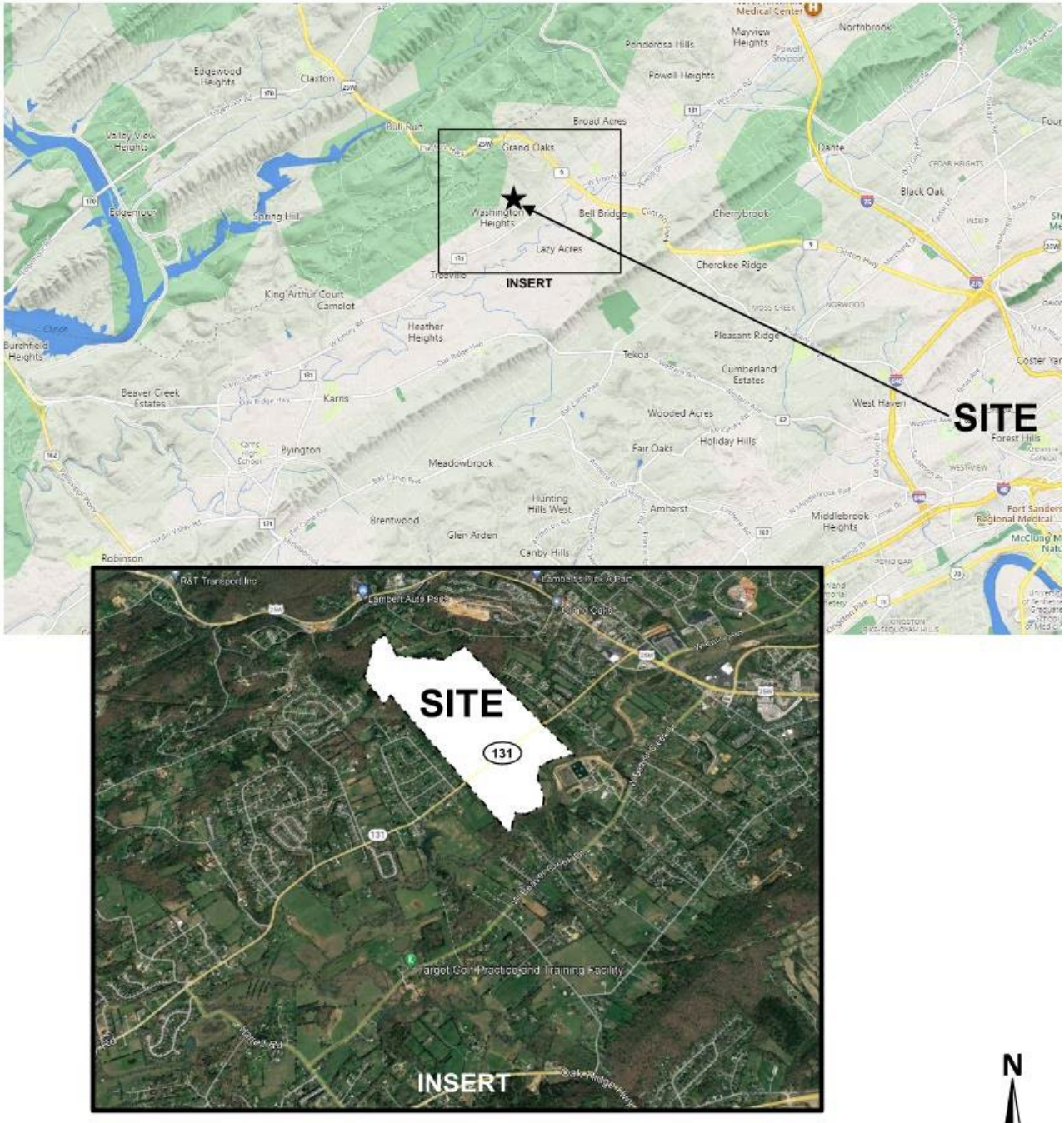


Figure 3

LOCAL AND REGIONAL ACCESS

Local Access

Local access is from W. Emory Road (S.R. 131) from two streets extending north and south into the site. W. Emory Road (S.R. 131) is a 2-lane classified Minor Arterial extending southwest becoming Karns Vally Drive and extending to Oak Ridge Highway (S.R. 62). State Route 131 turns south at Beaver Ridge Road (S.R. 131), which also extends south to Oak Ridge Highway (S.R. 62) and to Lovell Road intersecting I-40/75 and continuing to Kingston Pike (U.S. 11/70). W. Emory Road (S.R. 131) intersects with Harrell Road southwest of the site which extends south to Oak Ridge Highway. To the northeast, W. Emory Road (S.R. 131) extends to Clinton Highway (U.S. 25W) and continues through I-75, U.S 441, S.R. 33, and S.R. 331 serving north Knox County.

The roadway classifications in the site vicinity are illustrated in **Figure 4**.

Regional Access

Regional access in the site vicinity includes Oak Ridge Highway (S.R. 62), south of the site, extending west to Pellissippi Parkway (S.R. 162) and into Oak Ridge, east of Knoxville. Oak Ridge Highway (S.R. 62 is a classified Principal Arterial, a National Highway System facility. Clinton Highway (U.S. 25W), east of the site, another Principal Arterial, extends northwest to Clinton and southeast to Knoxville. Interstate 75 is located east of the site extending north into Kentucky and south to Chattanooga.

School Access

The Bell Farms development is zoned for Powell Elementary, Powell Middle School and Karns High School. The property falls within Powell Middle School's Parental Responsibility Zone (PRZ). The PRZ is determined by the measurement of the shortest route from the student's residence to the bus drop-off location of the student's zoned school. Middle and high school students who live within an area of one and one-half (1 1/2) miles from the school, by the shortest route, live in the PRZ and are not eligible for transportation service.

FUNCTIONAL CLASSIFICATION

Knox County
Bell Farms

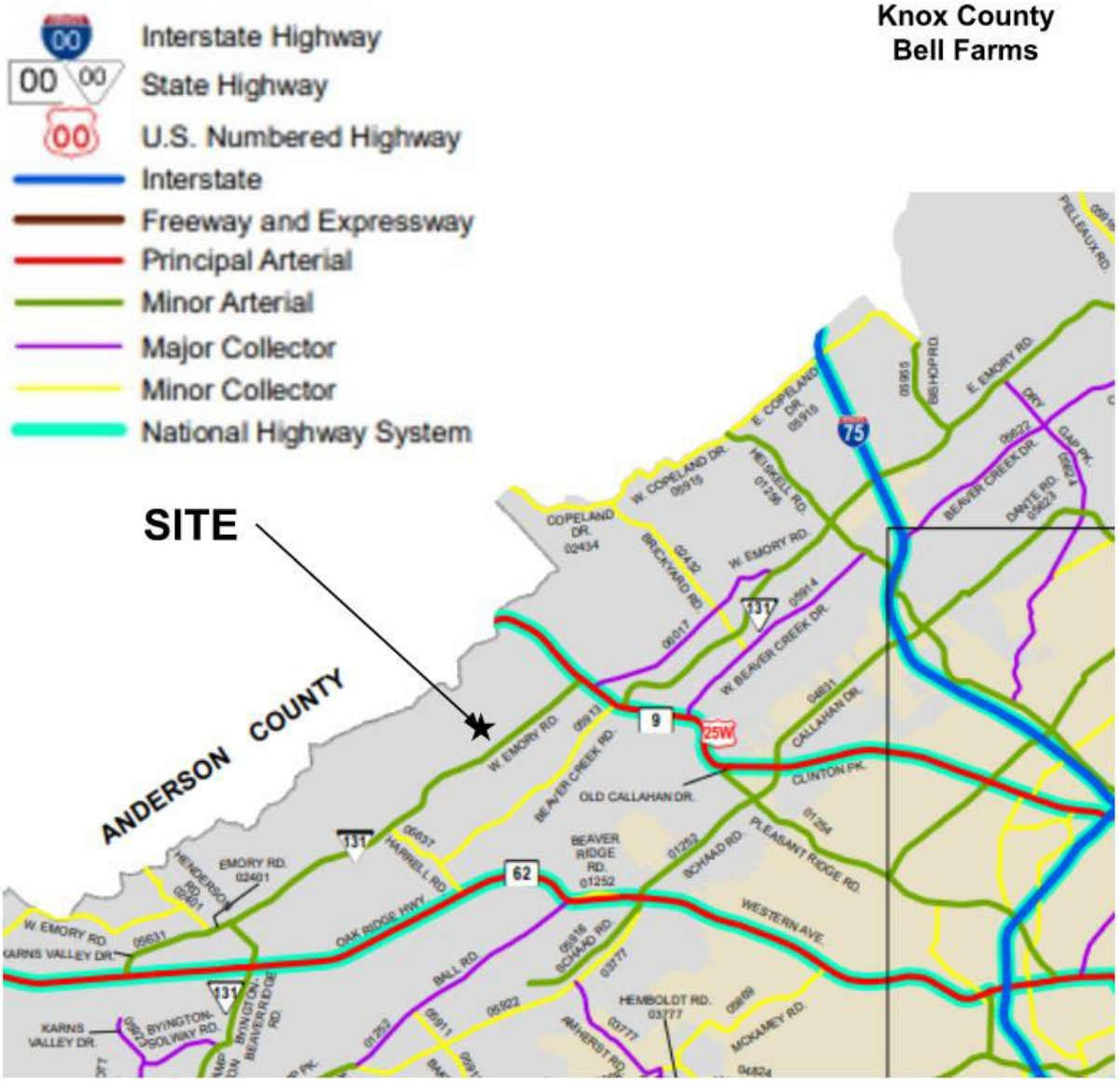


Figure 4

EXISTING TRAFFIC CONDITIONS

Existing Traffic Control and Geometry

The proposed site access is to W Emory Road (S.R. 131). The posted speed limit for W Emory Road (S.R. 131) is 40mph. Harrell Road is STOP controlled at W Emory Road (S.R. 131). **Figure 5** illustrates the intersection geometry and traffic control in the site vicinity.

No transit service and/or pedestrian/bicycle facilities are available in the site vicinity.

Existing Traffic Volumes

CDM Smith had peak-hour turning movement counts conducted June 14, 2022. The AM and PM peak hours varied between 7:00 to 8:15AM. and 4:45 to 6:00PM. Peak hours are as follows:

- Clinton Highway (US 25W) & W Emory Road (SR 131) 7:15-8:15AM, 4:45-5:45PM
- Clinton Highway (US 25W) & W Emory Road /Bill Bell Way 7:00-8:00AM, 4:45-5:45PM
- Clinton Highway (US 25W) & W Beaver Creek Drive 7:15-8:15AM, 5:00-6:00PM
- Clinton Highway (US 25W) & Powell Drive (SR 131) 7:15-8:15AM, 4:45-5:45PM
- W Emory Road (SR 131) & Harrell Road 7:15-8:15AM, 4:45-5:45PM

Turning movements for Carpenter Road were obtained from the 2035 design hour volumes available from the TDOT design plans of the Harrell Road/Carpenter Road intersection and adjusted for 2022 traffic.

Figure 6 illustrates the AM and PM peak-hour turning movement counts conducted for the Clinton Highway (U.S. 25W) intersections in the vicinity of the site. An automated traffic count (ATC) was also conducted adjacent to the site and determined an average weekday traffic (AWT) of 11,390. No adjustments were determined necessary for schools on summer break as an examination of this traffic count was very comparable with the TDOT station count. In addition, the PM peak hour is the more critical peak which is less affected by school traffic conditions. A comparison of the 2022 AWT conducted for this site and the TDOT traffic count, conducted on February 3, 2021, is as follows:

	February 2021	June 2022
Daily Traffic	10,271	11,390
AM Peak Hour	858	916
PM Peak Hour	979	1,052

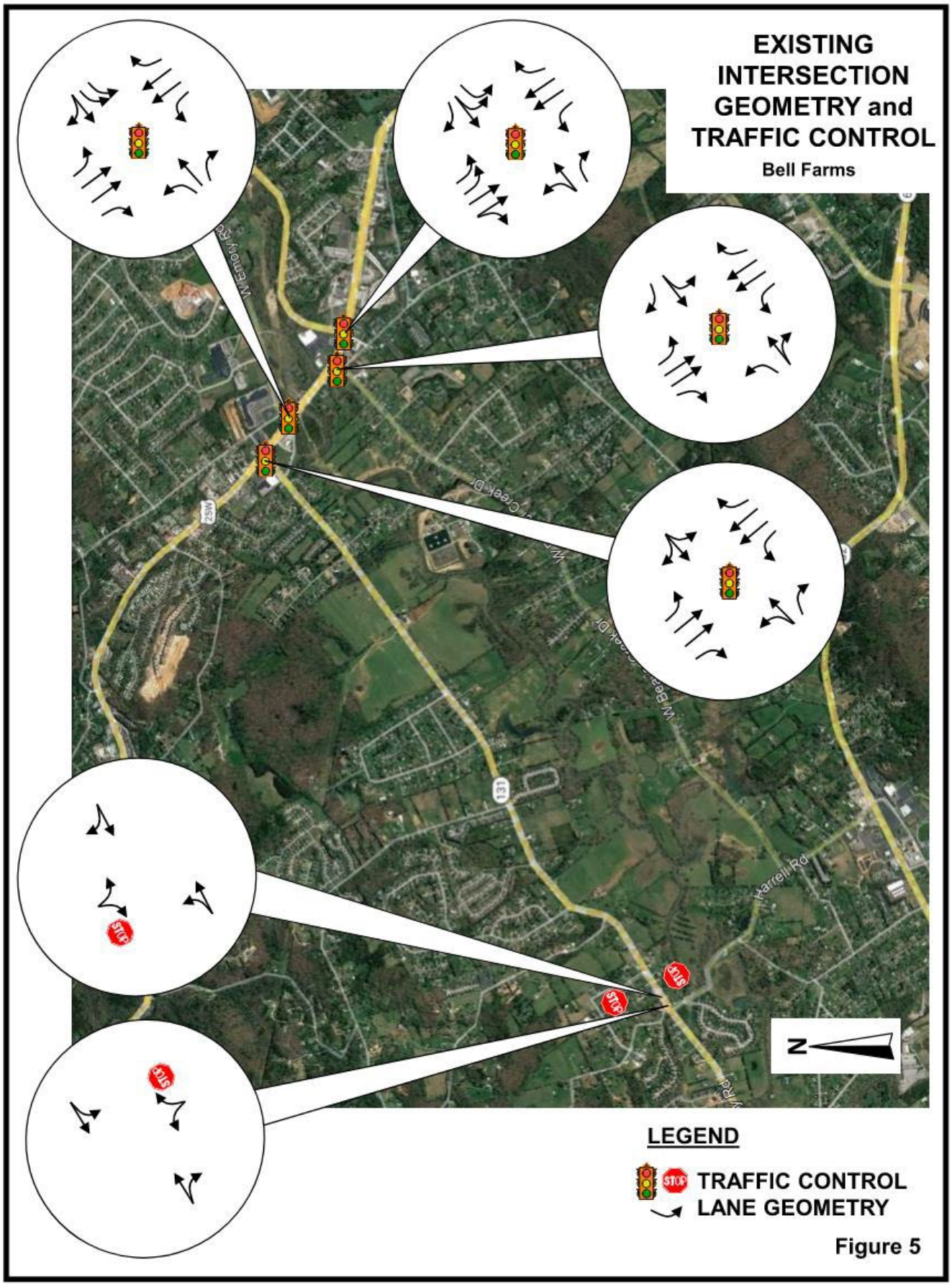

EXISTING
INTERSECTION
GEOMETRY and
TRAFFIC CONTROL
Bell Farms
W Emory Rd
Creek Dr
W Beaver Creek Dr
Farrell Rd
131
LEGEND
TRAFFIC CONTROL
LANE GEOMETRY

Figure 5

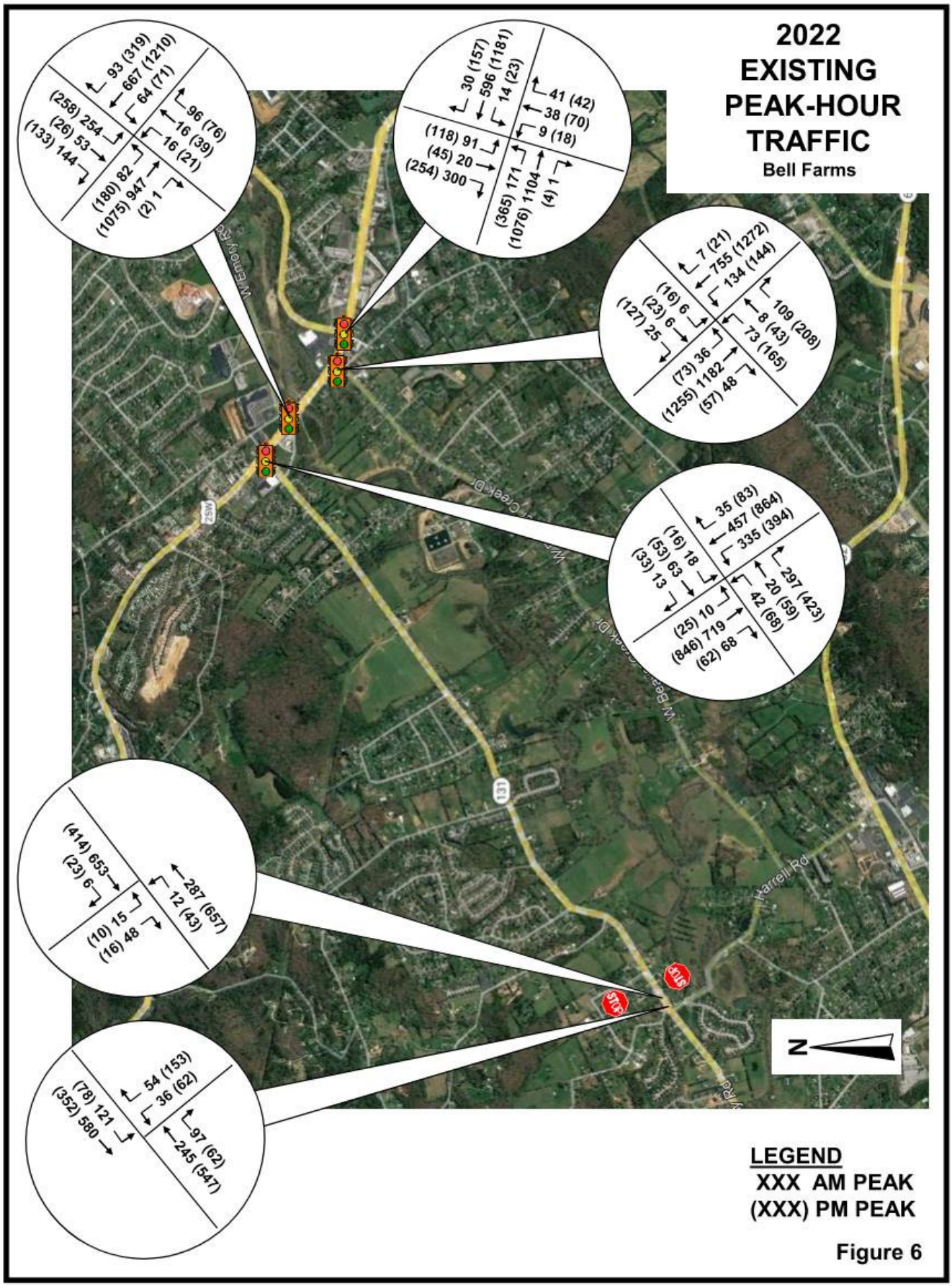

2022
EXISTING
PEAK-HOUR
TRAFFIC
Bell Farms
93 (319)
667 (1210)
64 (71)
(258) 254
(26) 53
(133) 144
96 (76)
16 (39)
16 (21)
(180) 82
(1075) 947
(2) 1
30 (157)
596 (1181)
14 (23)
41 (42)
38 (70)
9 (18)
(118) 91
(45) 20
(254) 300
(365) 171
(1076) 1104
(4) 1
7 (21)
755 (1272)
134 (144)
(16) 6
(23) 6
(127) 25
109 (208)
8 (43)
73 (165)
(73) 36
(1255) 1182
(57) 48
35 (83)
457 (864)
335 (394)
(16) 18
(53) 63
(33) 13
297 (423)
20 (59)
42 (68)
(25) 10
(846) 719
(62) 68
(414) 653
(23) 6
287 (657)
12 (43)
(10) 15
(16) 48
54 (153)
36 (62)
(78) 121
(352) 580
97 (62)
245 (547)
W Emory Rd
Karrell Rd
STOP
N
LEGEND
XXX AM PEAK
(XXX) PM PEAK

Figure 6

Existing Capacity and Level of Service

In order to evaluate the current operations of the traffic control devices, capacity and level of service were calculated using the **Highway Capacity Manual,** published by the Transportation Research Board (TRB). Signalized and unsignalized intersections are evaluated based on estimated intersection delays, which may be related to level of service (LOS).

Level of service and capacity are the measurements of an intersection's ability to accommodate traffic volumes. Levels of service for intersections range from A to F. LOS A is the best, and LOS F is failing. For signalized intersections, a LOS of A has an average estimated intersection delay of less than 10 seconds, and LOS F has an estimated delay of greater than 80 seconds. A LOS of C and D are typical design values. Within urban areas, a LOS D, with an average delay between 35 and 55 seconds is considered acceptable by the Institute of Transportation Engineers (ITE) for signalized intersections.

A second measure of performance that is particularly valuable under signalized operation is the volume-to-capacity ratio (V/C). This reflects the portion of capacity that is being utilized. Capacity ratios exceeding 0.90 can be unstable and more sensitive to increase traffic demand. With less stable conditions, an intersection is less able to absorb additional traffic demand, so relatively small increases in traffic volume can lead to significant increases in delay and possible failing conditions.

Unsignalized intersection levels of service have lower thresholds of delays. A LOS of F exceeds estimated delays of 50 seconds. For urban arterials, minor approaches may frequently experience levels of service E. A full level of service description for an unsignalized and signalized intersection is presented in **Tables 1 and 2**, respectively.

TABLE 1
LEVEL-OF-SERVICE (LOS) DESCRIPTION
FOR TWO-WAY STOP INTERSECTIONS

Level of Service	Average Control Delay per Vehicle (seconds)
A	≤ 10.0
B	> 10.0 and ≤ 15.0
C	> 15.0 and ≤ 25.0
D	> 25.0 and ≤ 35.0
E	> 35.0 and ≤ 50.0
F	> 50.0

SOURCE: Highway Capacity Manual, TRB Special Report 209

TABLE 2
LEVEL-OF-SERVICE (LOS) DESCRIPTION
FOR SIGNALIZED INTERSECTIONS

LOS	Average Control Delay per Vehicle (seconds)	Description
A	≤ 10.0	Very low delay with extremely favorable progression. Most vehicles don't stop.
B	> 10.0 and ≤ 20.0	Generally good progression. Increase number of stops from that described for LOS "A" resulting in higher delays
C	> 20.0 and ≤ 35.0	Fair progression with increased delay. Number of stopping vehicles become significant; however, many still pass through the intersection without stopping. Stable flow.
D	> 35.0 and ≤ 55.0	The influence of congestion becomes more noticeable. Longer delays resulting from unfavorable progression, longer cycles, or high V/C ratios. Approaching unstable flow.
E	> 55.0 and ≤ 80.0	Limit of acceptable delay. Long delays associated with poor progression, long cycles, or high V/C ratios.
F	> 80.0	Unacceptable operation resulting from oversaturation (flow rates exceed capacity). Poor progression, long cycles, and high V/C ratios.

SOURCE: Highway Capacity Manual, TRB Special Report 209

Analyses were conducted using Synchro Software Version 11, developed by Trafficware. The analyses conducted assume the optimization of the signalized operations for study purposes. **Table 3** presents the analyses conducted for the 2022 traffic conditions. The lane group levels of service are illustrated in **Figure 7**. Current conditions for the study signalized intersections are LOS D or better. The Harrell Road STOP approach to its intersection with W. Emory Road (S.R. 131) operates with a LOS E during the PM peak hour.

TABLE 3
2022 EXISTING
CAPACITY AND LEVEL OF SERVICE

INTERSECTION	TRAFFIC CONTROL	PEAK PERIOD	V/C	DELAY	LOS
W. Emory Road (SR 131) & Harrell Road	STOP NB	AM	0.43	51.4	D
		PM	0.71	39.6	E
W. Emory Road (SR 131) & Carpenter Road	STOP SB	AM	0.19	17.1	C
		PM	0.09	18.0	C
Clinton Higway (US 25W) & W. Emory Road (SR 131)	SIGNAL	AM	0.58	34.4	C
		PM	0.71	35.0	C
Clinton Higway (US 25W) & W. Emory Road/Bill Bell Way	SIGNAL	AM	0.56	27.7	C
		PM	0.66	25.7	C
Clinton Higway (US 25W) & W. Beaver Creek Drive	SIGNAL	AM	0.56	14.7	B
		PM	0.66	22.9	C
Clinton Higway (US 25W) & W. Powell Drive Drive (SR 131)	SIGNAL	AM	0.53	27.0	C
		PM	0.67	35.7	D

Note: Average vehicle delay estimated in seconds.

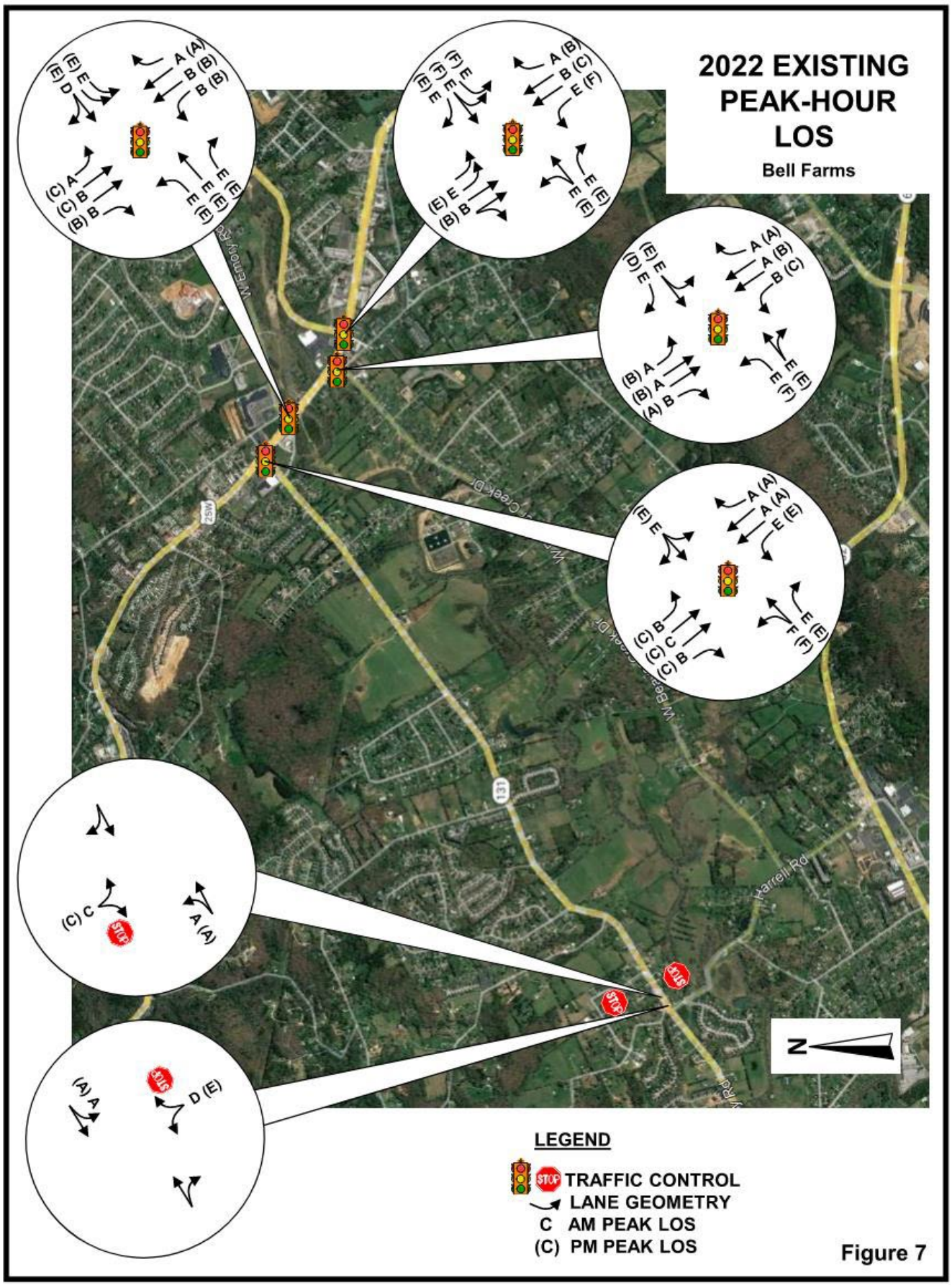

2022 EXISTING PEAK-HOUR LOS
Bell Farms
LEGEND
TRAFFIC CONTROL
LANE GEOMETRY
C AM PEAK LOS
(C) PM PEAK LOS
N

Figure 7

BACKGROUND TRAFFIC CONDITIONS

Background traffic is traffic that can be anticipated regardless of the proposed development. Traffic within the study area should continue to grow due to other development. This background traffic is projected for the purpose of establishing a baseline. In addition to the growth in traffic, planned roadway/intersection improvements are addressed.

Background Traffic Volumes

Historical traffic data was reviewed to determine traffic growth trends in the study area. Using TDOT Count Station 47 on W. Emory Road (S.R. 131) east of the site, the annual growth from 2012 reflects an annual rate of 2.9-percent. Other studies in the site vicinity used a 2-percent annual growth rate. Therefore, background traffic for this study assumes an annual compounded growth rate of 2.5-percent. Background traffic is projected for the year 2030, thereby reflecting a 21.8-percent growth (2.5-percent for 8 years) for the study intersections. Buildout, however, will largely depend on the housing market for the Knox County area of Tennessee.

The Miller Farm subdivision, with 95 single-family units located north of W. Emory Road (S.R. 131) is currently under construction. The Miller Farms trips are presented in **Table 4**.

TABLE 4. BACKGROUND TRIPS

Land Use	Land-Use Code	Units	Daily Trips	AM Peak-Hour Trips		PM Peak-Hour Trips	
				Enter	Exit	Enter	Exit
Single-Family	210	95	963	18	53	60	35

Reference: Institute of Transportation Engineers TRIP GENERATION, 11th Edition

Figure 8A illustrates the grown 2030 background traffic reflecting the 2022 existing traffic volumes increased by a factor of 1.218. **Figure 8B** illustrates the buildout assignment of the Miller Farms trips. The Miller Farms buildout trips were added to the background traffic growth to estimate the total background traffic for the study intersections and are illustrated in **Figure 9**.

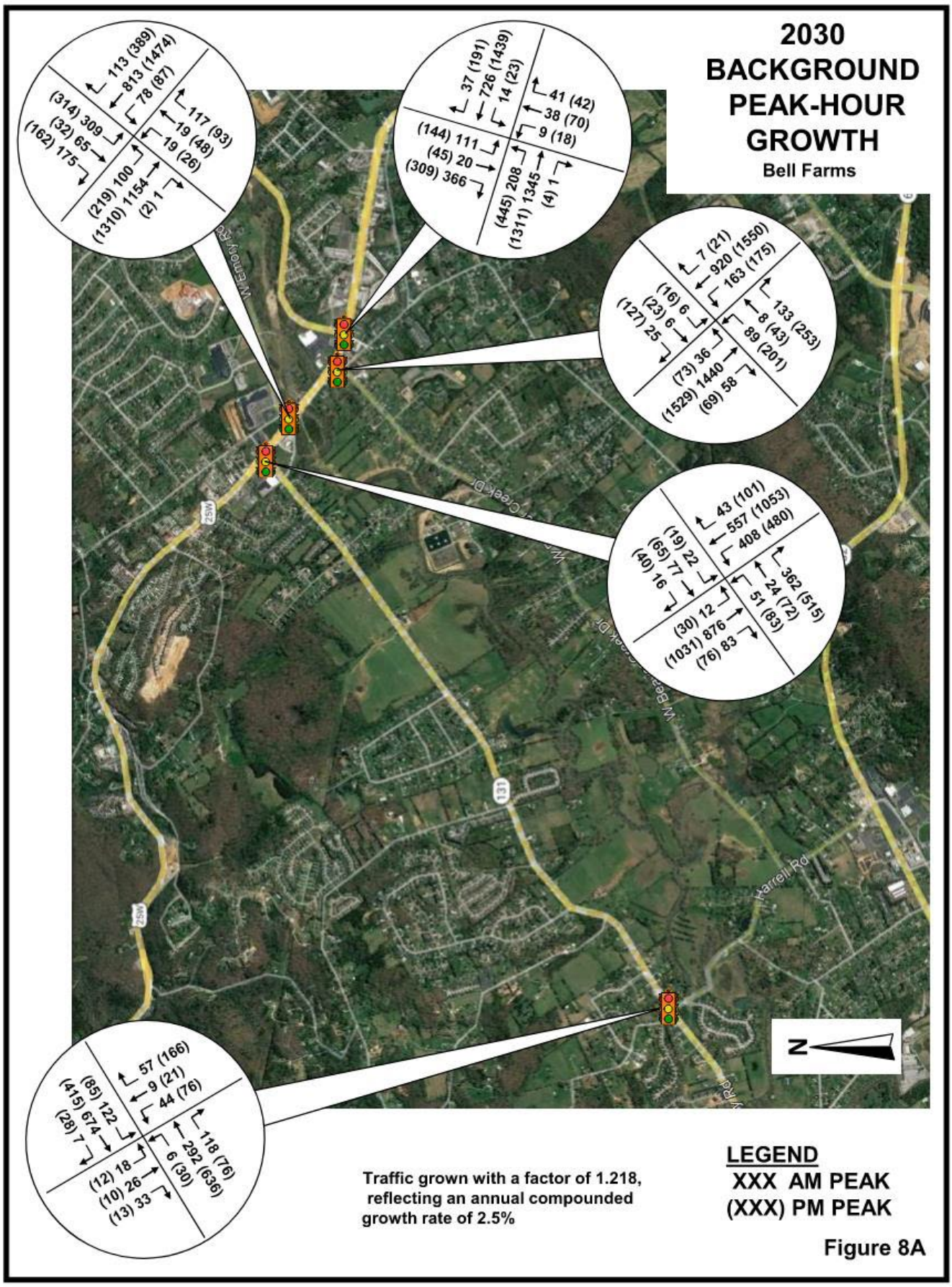

2030
BACKGROUND
PEAK-HOUR
GROWTH
Bell Farms
113 (389)
813 (1474)
78 (87)
(314) 309
(32) 65
(162) 175
117 (93)
19 (48)
19 (26)
(219) 100
(1310) 1154
(2) 1
37 (191)
726 (1439)
14 (23)
41 (42)
38 (70)
9 (18)
(144) 111
(45) 20
(309) 366
(445) 208
(1311) 1345
(4) 1
7 (21)
920 (1550)
163 (175)
(16) 6
(23) 6
(127) 25
133 (253)
8 (43)
89 (201)
(73) 36
(1529) 1440
(69) 58
43 (101)
557 (1053)
408 (480)
(19) 22
(65) 77
(40) 16
362 (515)
24 (72)
51 (83)
(30) 12
(1031) 876
(76) 83
57 (166)
9 (21)
44 (76)
(85) 122
(415) 674
(28) 7
118 (76)
6 (30)
292 (636)
(12) 18
(10) 26
(13) 33
W Emory Rd
Harrell Rd
25W
131
N
Traffic grown with a factor of 1.218,
reflecting an annual compounded
growth rate of 2.5%
LEGEND
XXX AM PEAK
(XXX) PM PEAK

Figure 8A

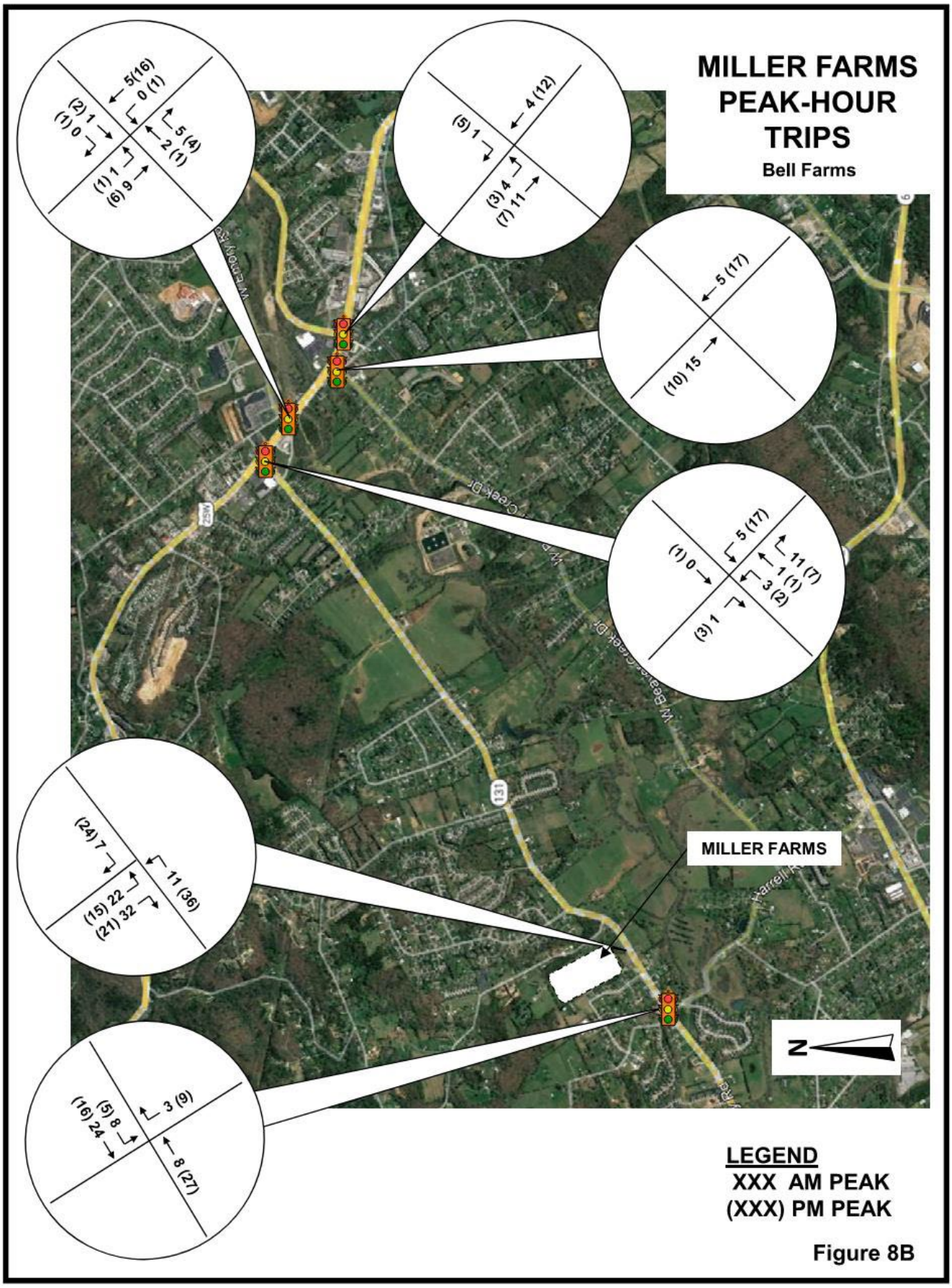

MILLER FARMS
PEAK-HOUR
TRIPS
Bell Farms
5(16)
0 (1)
(2) 1
(1) 0
5 (4)
2 (1)
(1) 1
(6) 9
4 (12)
(5) 1
(3) 4
(7) 11
5 (17)
(10) 15
5 (17)
(1) 0
11 (7)
1 (1)
3 (2)
(3) 1
(24) 7
11 (36)
(15) 22
(21) 32
3 (9)
(5) 8
(16) 24
8 (27)
MILLER FARMS
N
LEGEND
XXX AM PEAK
(XXX) PM PEAK

Figure 8B

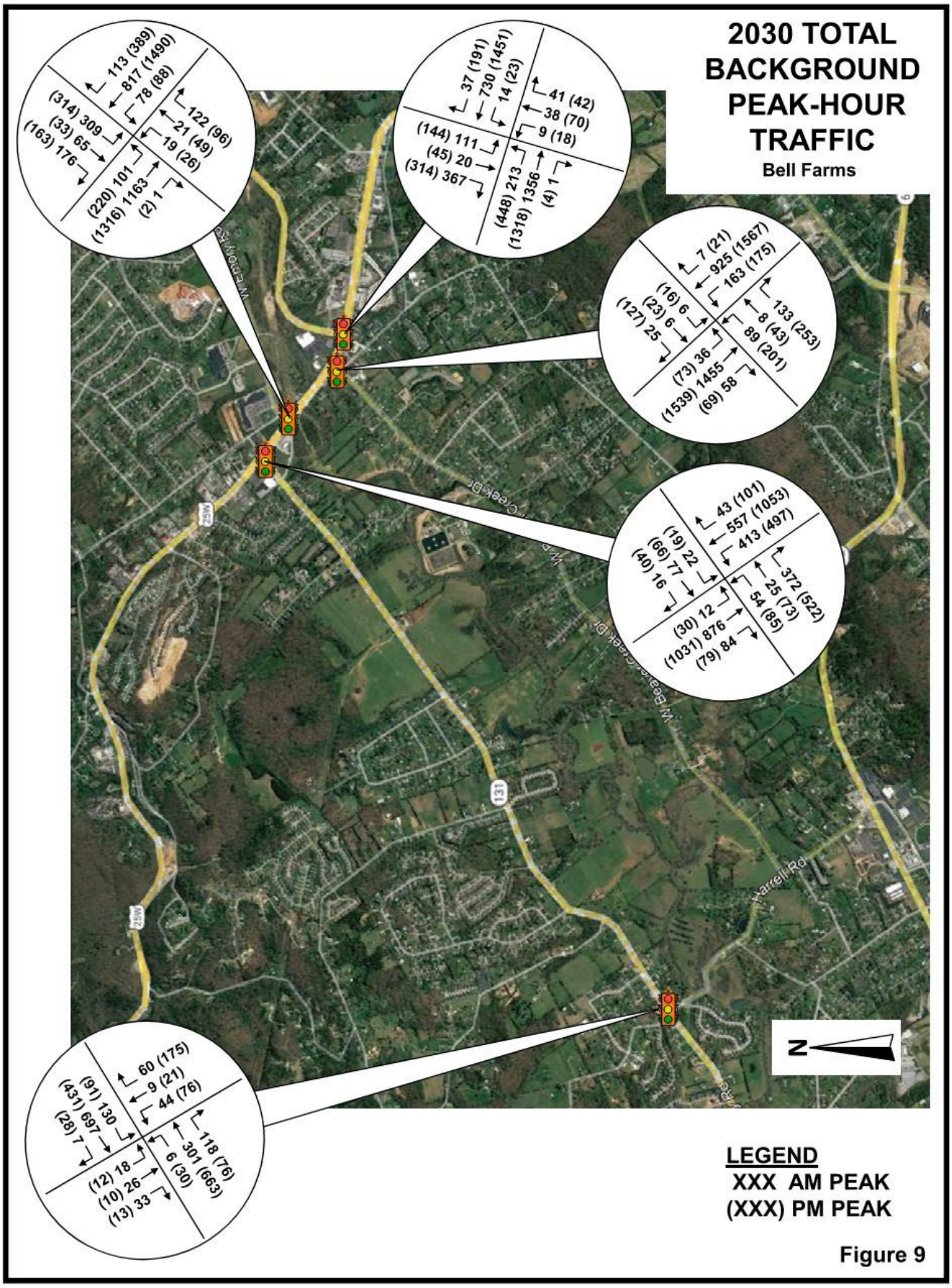

2030 TOTAL BACKGROUND PEAK-HOUR TRAFFIC
Bell Farms
113 (389)
817 (1490)
78 (88)
(314) 309
(33) 65
(163) 176
122 (96)
21 (49)
19 (26)
(220) 101
(1316) 1163
(2) 1
37 (191)
730 (1451)
14 (23)
41 (42)
38 (70)
9 (18)
(144) 111
(45) 20
(314) 367
(448) 213
(1318) 1356
(4) 1
7 (21)
925 (1567)
163 (175)
(16) 6
(23) 6
(127) 25
133 (253)
8 (43)
89 (201)
(73) 36
(1539) 1455
(69) 58
43 (101)
557 (1053)
413 (497)
(19) 22
(66) 77
(40) 16
372 (522)
25 (73)
54 (85)
(30) 12
(1031) 876
(79) 84
60 (175)
9 (21)
44 (76)
(91) 130
(431) 697
(28) 7
118 (76)
301 (663)
6 (30)
(12) 18
(10) 26
(13) 33
W Beaver Creek Dr
Farrell Rd
131
N
LEGEND
XXX AM PEAK
(XXX) PM PEAK

Figure 9

Background Capacity and Level of Service

Analyses were performed for the background conditions, including the buildout of the Miller Farms subdivision. The results of these analyses are presented in **Table 5**. The levels of service of the signalized study intersections continue to be acceptable for the 2030 background traffic conditions. The intersection of Clinton Highway (U.S. 25W) and W. Emory Road begins to approach its capacity (V/C of 0.88). Adverse traffic queuing from the northeast bound approach of W. Emory Road (S.R. 131) may begin at Clinton Highway (U.S. 25W) during the PM peak hour. An approximate queue exceeding 250 feet for the thru/left lane may impede the right-turn movement with available storage of 180 feet. The 2030 background right-turn traffic during the PM peak hour is 522 vehicles which might be better accommodated by increasing the W. Emory Road approach capacity. Mitigation of the queuing may include separate left- and double right-turn lanes from W. Emory Road.

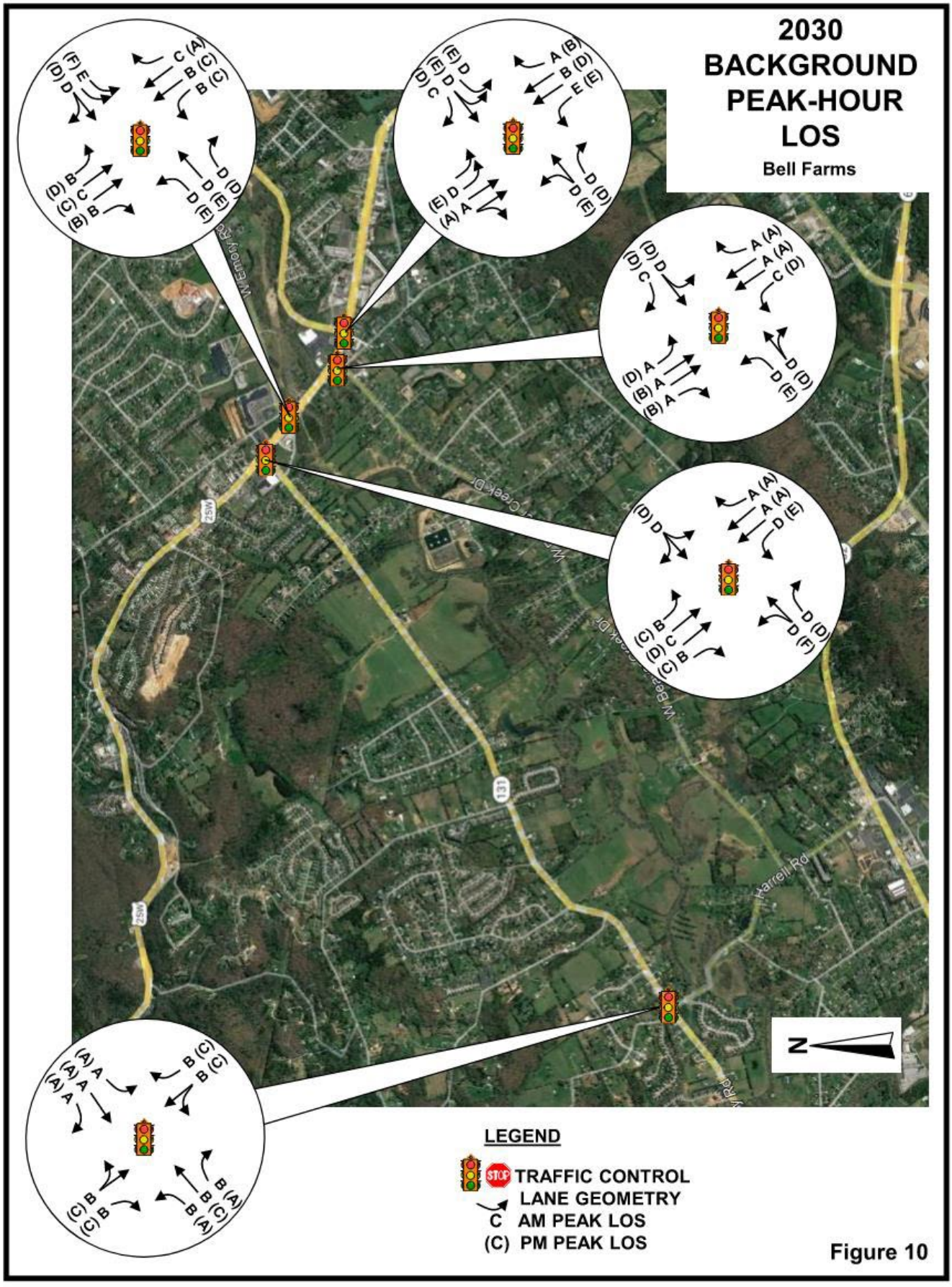
TABLE 5
2030 BACKGROUND
CAPACITY AND LEVEL OF SERVICE

INTERSECTION	TRAFFIC CONTROL	PEAK PERIOD	V/C	DELAY	LOS
W. Emory Road (SR 131) &	***SIGNAL***	**AM**	***0.72***	***10.8***	***B***
Harrell Road/Carpenter Road		**PM**	***0.70***	***16.1***	***B***
with TDOT Planned Improvements					
Clinton Higway (US 25W) &	**SIGNAL**	**AM**	**0.74**	**26.6**	**C**
W. Emory Road (SR 131)		**PM**	**0.88**	**37.5**	**D**
Clinton Higway (US 25W) &	**SIGNAL**	**AM**	**0.69**	**26.3**	**C**
W. Emory Road/Bill Bell Way		**PM**	**0.88**	**34.0**	**C**
Clinton Higway (US 25W) &	**SIGNAL**	**AM**	**0.73**	**10.7**	**B**
W. Beaver Creek Drive		**PM**	**0.83**	**19.8**	**B**
Clinton Higway (US 25W) &	**SIGNAL**	**AM**	**0.69**	**17.1**	**B**
W. Powell Drive Drive (SR 131)		**PM**	**0.86**	**34.5**	**C**

Note: Average vehicle delay estimated in seconds.

Planned improvements of the W. Emory Road (S.R. 131) and Harrell Road intersection by the Knox County and TDOT will align Harrell Road and Carpenter Road and provide signalization with left-turn lanes for W. Emory Road (S.R. 131) and right-turn lanes for all intersection approaches. These improvements provide very good levels of service.

Figure 10 illustrates the intersection lane group levels of service.


2030
BACKGROUND
PEAK-HOUR
LOS
Bell Farms
LEGEND
TRAFFIC CONTROL
LANE GEOMETRY
C AM PEAK LOS
(C) PM PEAK LOS
Figure 10

PROJECT IMPACTS

Project conditions are developed by generating traffic based on the proposed land use, distributing the trips to the transportation network, and conducting analyses for capacity and level of service.

Trip Generation

Site traffic was determined using the publication, **Trip Generation, 11th Edition**. This reference is published by the Institute of Transportation Engineers (ITE) and represents national data collected for many different land uses including industrial, residential and commercial uses. **Trip Generation** is an essential tool in calculating the traffic, which may be generated by a proposed development. The study generated traffic for the mixed residential and commercial development of 524 single-family units (LUC 210), 179 townhomes (LUC 215), and 400 apartments (LUC 220). The Bell Farms Master Plan includes 55,550sf of commercial use (LUC 821).

Trips generated for the multi-family development was determined using local trip generation rates adopted by the Knoxville-Knox County Metropolitan Planning Commission in July of 2000. Local trip rates were studied in accordance with the publication, **Trip Generation, 6th Edition**. The local trip generation rates are relatively consistent with the rates published by ITE with the excep for exiting trips for the PM peak hour, which is higher with the local rates utilized.

Some trip generation studies have included surveys addressing pass-by traffic for commercial land uses. This is traffic already on the adjacent street attracted to the proposed development. Studies conducted for pass-by traffic have suggested that a-percentage of the traffic generated by commercial retail, such as the land use at hand, may originate from the existing traffic flow; therefore, the project does not necessarily introduce all new traffic to the transportation system.

Pass-by traffic percentages differ relative to specific land uses and their densities. Some studies have shown varied results; however, the ITE publications, **Transportation and Land Development** by Virgil G. Stover and Frank J. Koepke, and **Trip Generation** have combined these studies to suggest uniform rates for given land uses. These rates range from 14-percent for hardware stores to 60-percent for neighborhood shopping centers, with gross leasable area less than 100,000 square feet. Service stations and fast-food restaurants also exhibit high pass-by rates of 58-percent and 45-percent, respectively.

With the above in mind, a 30-percent pass-by for the commercial development was assigned for the AM and PM peak hours. A 3-percent internal or a shared trip rate was assumed for the proposed development. From the trip generation calculations, the proposed site may generate approximately 15,400 daily weekday trips. After considering pass-by traffic and internal trips, approximately 13,370 new daily trips may be generated for a typical weekday. **Table 6** presents the trip generation of this proposed site.

TABLE 6. TRIP GENERATION

Land Use	Land-Use Code	Units	Daily Trips	AM Peak-Hour Trips		PM Peak-Hour Trips	
				Enter	Exit	Enter	Exit
North of W Emory Road							
Single Family (Detached)	210	524 sfu	4,631	87	249	297	174
Internal/Shared Trips		***3%***	***139***	***3***	***7***	***9***	***5***
Primary Trips			***4,492***	***84***	***242***	***288***	***169***
South of W Emory Road							
Single Family (Detached)	215	179 sfu	1,223	27	60	59	44
Knox Co Multi-Family[(1)]		400 units	3,318	42	150	153	125
Public Park	411	9 Acres	94	0	0	13	10
Soccer Complex	488	7 Fields	499	4	3	87	45
Shopping Center (40-150k)	821	55,550 sqft	5,688	122	75	262	283
TOTAL GENERATED TRIPS			**10,822**	**195**	**288**	**574**	**507**
Internal Trips		**3%**	**325**	**6**	**9**	**17**	**15**
Shopping Center Pass-By Trips		**30%**	**1,706**	**37**	**23**	**79**	**85**
Primary Trips			***8,791***	***153***	***257***	***478***	***407***
Total Site							
TOTAL PRIMARY TRIPS			***13,283***	***237***	***499***	***766***	***576***

References: Institute of Transportation Engineers-Trip Generation, 11th Edition

(1) Knoxville-Knox Co. Planning trip generation rates adopted July of 2000

Trip Distribution and Assignment

The assumed trip distribution used the traffic count data collected and knowledge of the area. The ATC conducted for Emory Road determined a 60-percent westbound directional flow during the AM peak hour and 55-percent directional flow eastbound during the PM peak hour. For the AM peak hour, the study assumed commuter traffic patterns with 60-percent of residential trips to and from the west and 40-percent to and from the east. For the PM peak hour with mixed commuter and other trip characteristics, the residential trips distribution assumed 55-percent entering and exiting eastbound and 45-percent entering and exiting westbound. The Clinton Highway corridor and the W. Emory Road corridor east of the site become more of an attraction during the PM peak hour. The commercial and park trips were assumed to be more local. The commercial trips assumed the same morning residential distribution for both AM and PM peak hours. The associated pass-by trips assumed the directional flow of the adjacent traffic. The park trips assumed a 50-percent split east and west of the site for both AM and PM peak hours. The distribution and assignment of trips are illustrated in the following figures:

Figure 11A and 11B-Single Family (North) AM and PM peak hours, respectively
Figure 12A and 12B-Townhome Single Family (South) AM and PM peak hours, respectively
Figure 13A and 13B-Apartments (South) AM and PM peak hours, respectively
Figure 14-Public Park/Recreation AM/PM peak hours
Figure 15-Commercial AM/PM peak hours
Figure 16A and 16B-Commercial Pass-by AM and PM peak hours, respectively

The residential assignment from the southern portion of the development assumes all townhome trips at the west street access and all apartment trips at the east street access. The single-family units in the northern portion of the development assume more traffic from the west street access served by the longer spine street of the subdivision. The east street access assumes an assignment more local but possibly influenced by the proposed traffic control. W. Emory Road east of Clinton Highway (U.S. 25W) was assigned 15-percent of the residential exiting trips to reflect the morning school peak hour.

Project Traffic Volumes

The project traffic volumes are determined by multiplying the trips generated by the distribution percentages. **Figure 17A** illustrates the resulting peak-hour primary trip assignments of the Bell Farms Master Plan. The pass-by trips for the eastern access street serving the commercial use parcels are illustrated in **Figure 17B**. Combining the primary and pass-by trips results in the total assigned trips for the master plan in **Figure 18.**

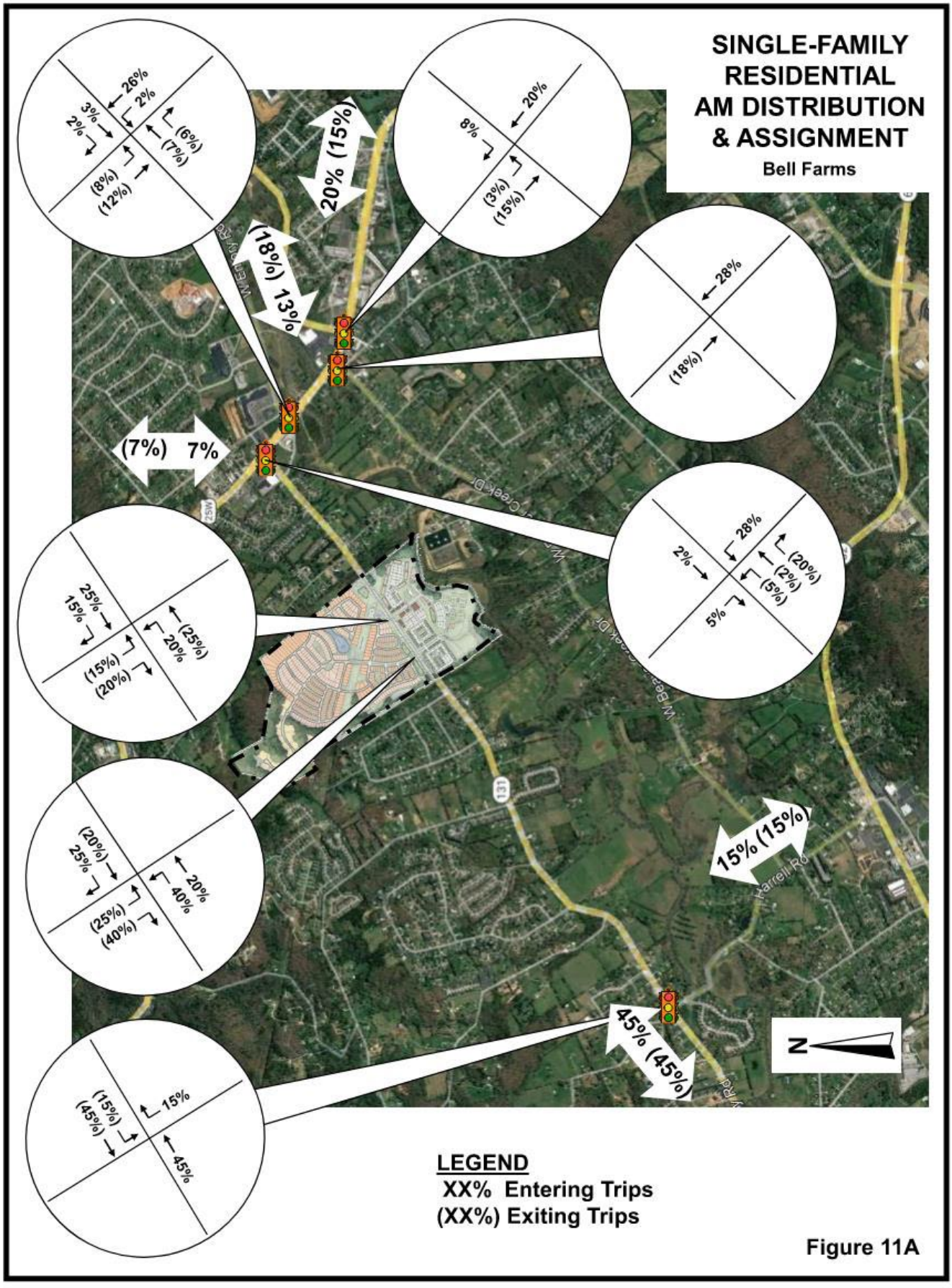

SINGLE-FAMILY
RESIDENTIAL
AM DISTRIBUTION
& ASSIGNMENT
Bell Farms
26%
2%
3%
2%
(6%)
(7%)
(8%)
(12%)
20%
8%
(3%)
(15%)
20% (15%)
(18%) 13%
28%
(18%)
(7%) 7%
25%
15%
(25%)
20%
(15%)
(20%)
28%
2%
(20%)
(2%)
(5%)
5%
(20%)
25%
20%
40%
(25%)
(40%)
15% (15%)
15%
(15%)
(45%)
45%
45% (45%)
N
LEGEND
XX% Entering Trips
(XX%) Exiting Trips

Figure 11A

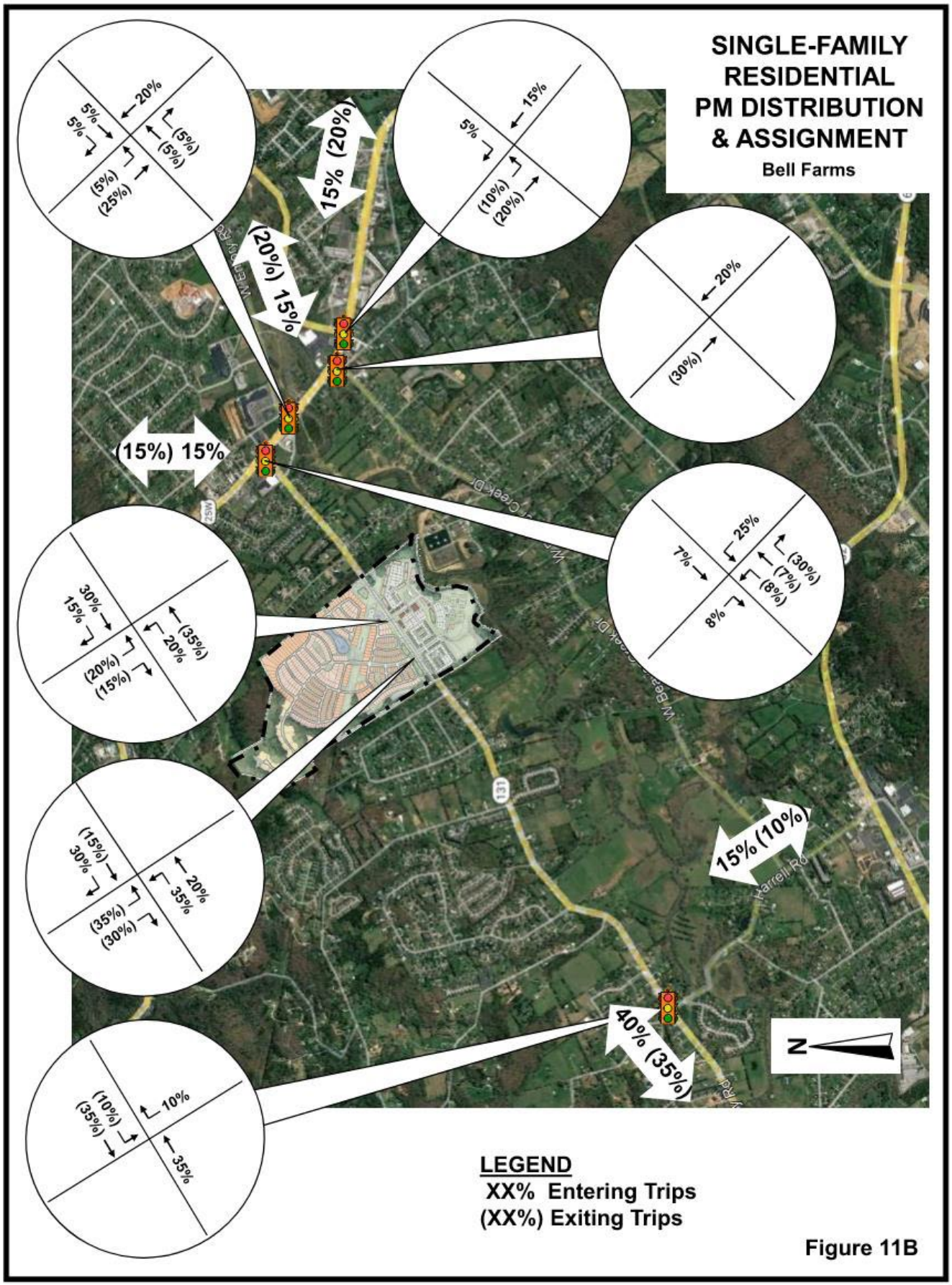

SINGLE-FAMILY
RESIDENTIAL
PM DISTRIBUTION
& ASSIGNMENT
Bell Farms
20%
5%
5%
(5%)
(5%)
(5%)
(25%)
15%
5%
(10%)
(20%)
15% (20%)
(20%) 15%
20%
(30%)
(15%) 15%
25%
7%
(30%)
(7%)
(8%)
8%
30%
15%
(35%)
20%
(20%)
(15%)
(15%)
30%
20%
35%
(35%)
(30%)
15% (10%)
Farrell Rd
10%
(10%)
(35%)
35%
40% (35%)
N
LEGEND
XX% Entering Trips
(XX%) Exiting Trips

Figure 11B

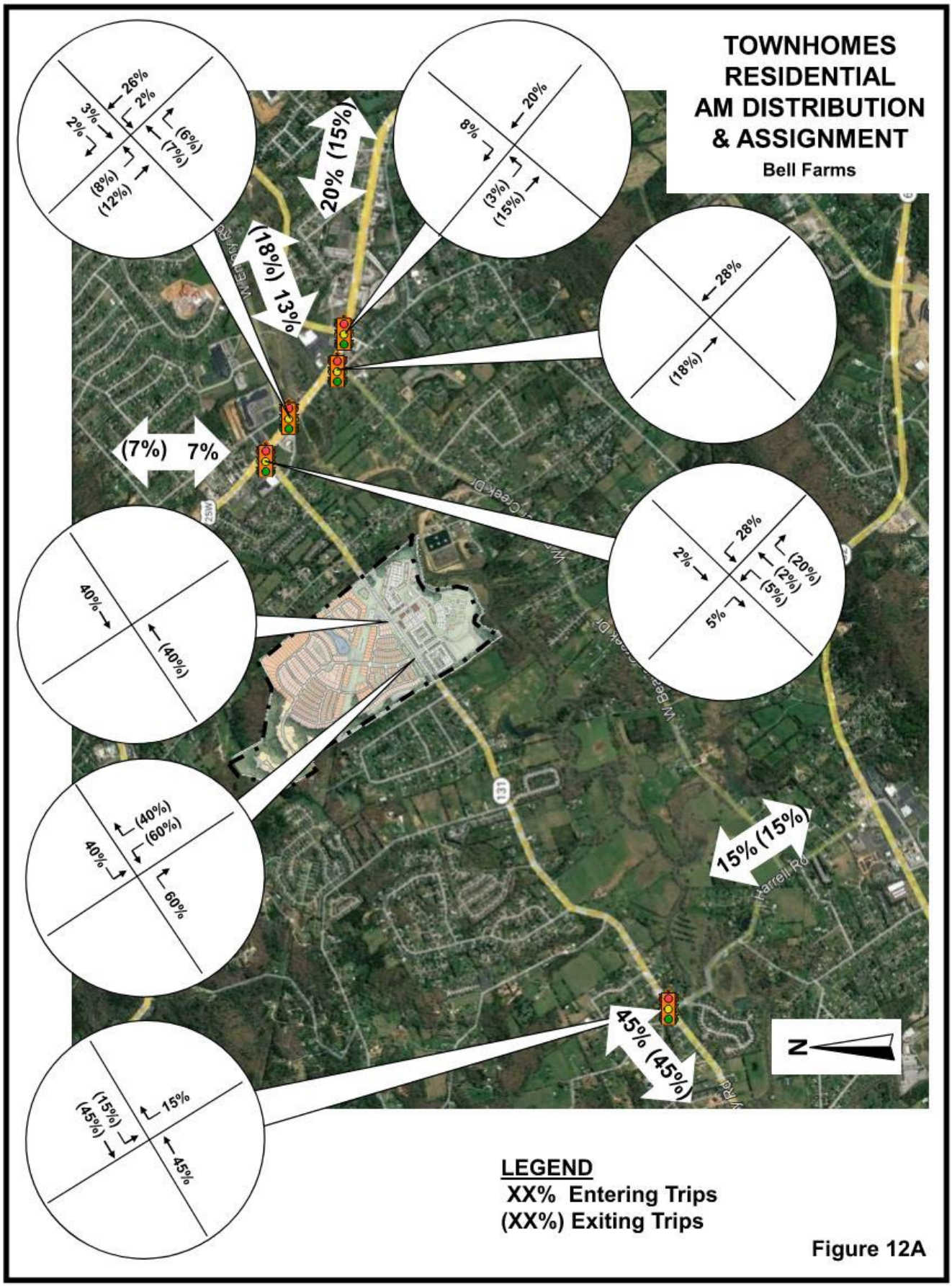

TOWNHOMES
RESIDENTIAL
AM DISTRIBUTION
& ASSIGNMENT
Bell Farms
26%
2%
3%
2%
(6%)
(7%)
(8%)
(12%)
20%
8%
(3%)
(15%)
20% (15%)
(18%) 13%
28%
(18%)
(7%) 7%
40%
(40%)
28%
2%
(20%)
(2%)
(5%)
5%
(40%)
(60%)
40%
60%
15% (15%)
Karrell Rd
15%
(15%)
(45%)
45%
45% (45%)
N
LEGEND
XX% Entering Trips
(XX%) Exiting Trips

Figure 12A

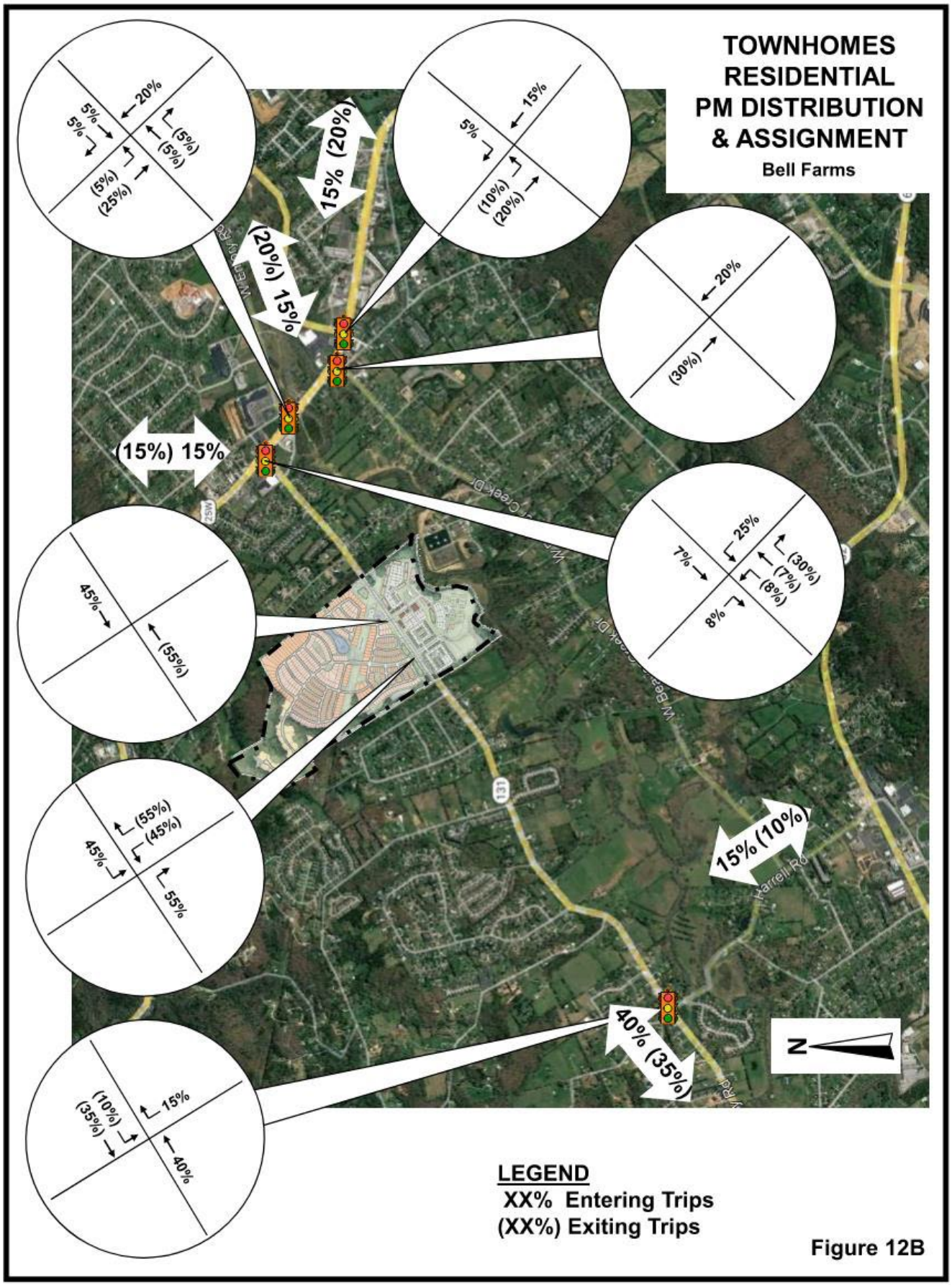

TOWNHOMES
RESIDENTIAL
PM DISTRIBUTION
& ASSIGNMENT
Bell Farms
5%
5%
20%
(5%)
(5%)
(5%)
(25%)
15%
5%
(10%)
(20%)
20%
(30%)
15% (20%)
(20%) 15%
(15%) 15%
45%
(55%)
25%
7%
(30%)
(7%)
(8%)
8%
(55%)
(45%)
45%
55%
15% (10%)
40%
(10%)
(35%)
15%
40%
40% (35%)
N
LEGEND
XX% Entering Trips
(XX%) Exiting Trips

Figure 12B

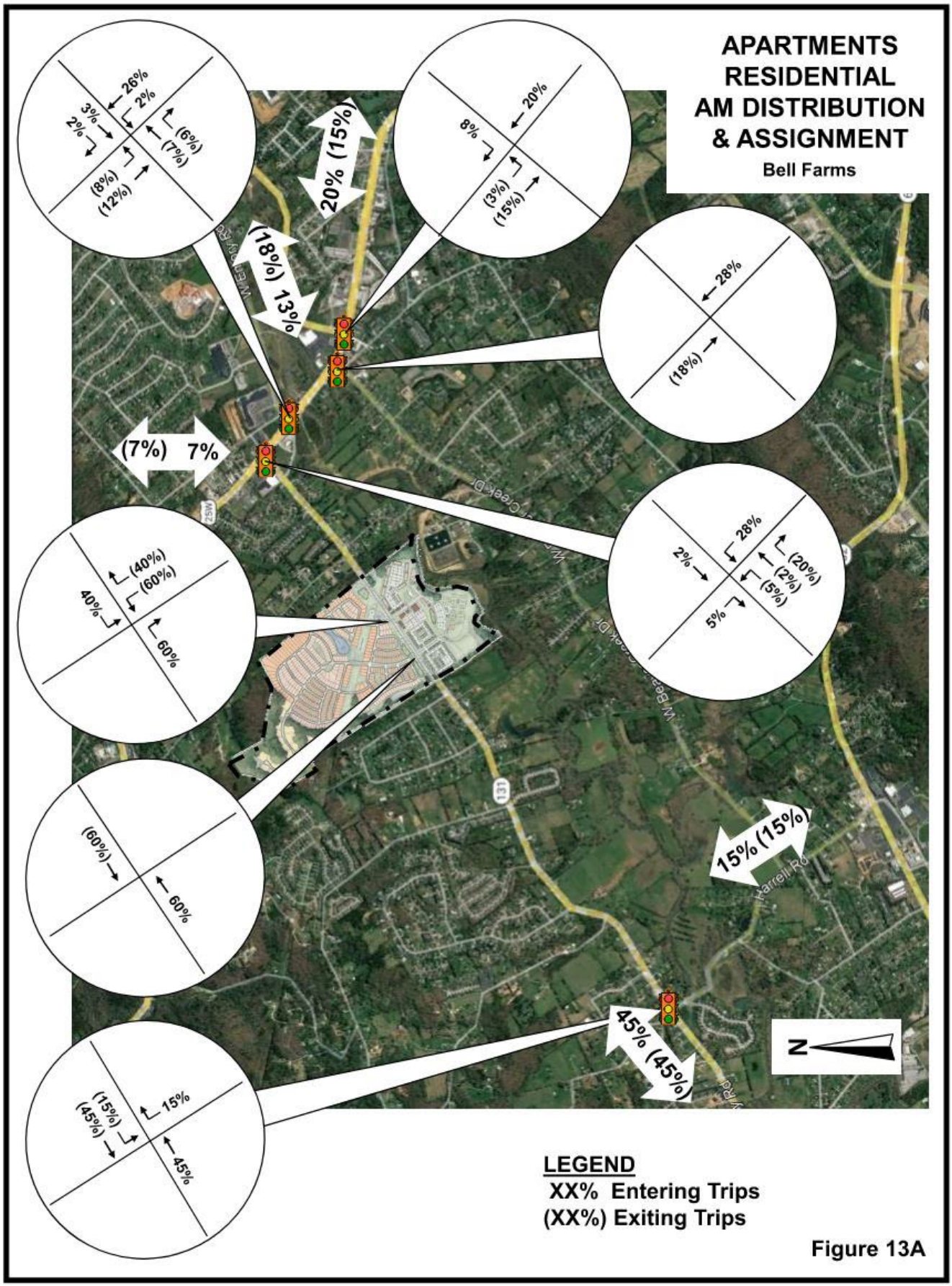

APARTMENTS
RESIDENTIAL
AM DISTRIBUTION
& ASSIGNMENT
Bell Farms
26%
2%
3%
2%
(6%)
(7%)
(8%)
(12%)
20%
8%
(3%)
(15%)
20% (15%)
(18%) 13%
28%
(18%)
(7%) 7%
(40%)
(60%)
40%
60%
28%
2%
(20%)
(2%)
(5%)
5%
(60%)
60%
15% (15%)
15%
(15%)
(45%)
45%
45% (45%)
N
LEGEND
XX% Entering Trips
(XX%) Exiting Trips

Figure 13A

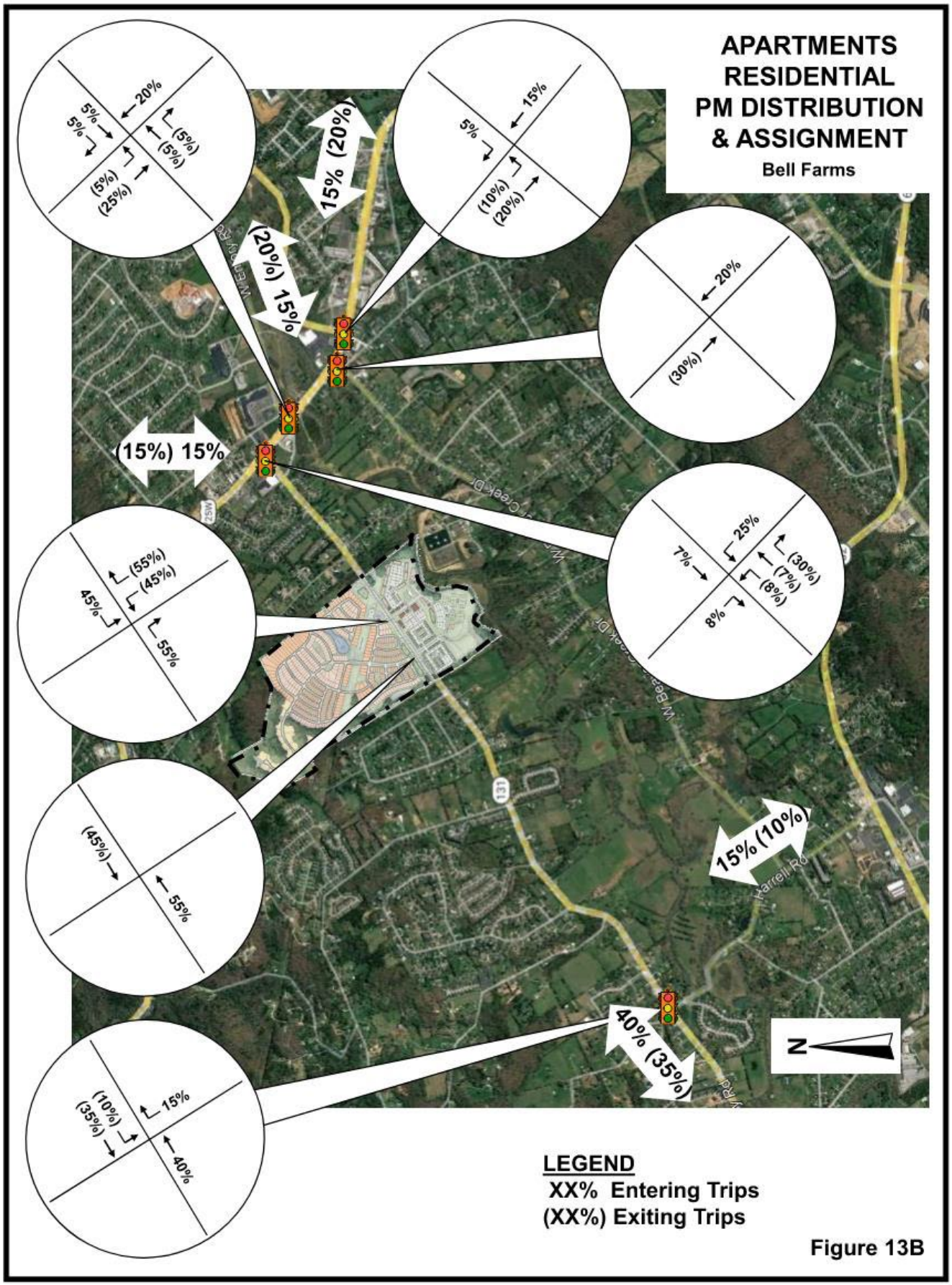

APARTMENTS
RESIDENTIAL
PM DISTRIBUTION
& ASSIGNMENT
Bell Farms
5%
5%
20%
(5%)
(5%)
(5%)
(25%)
15%
5%
(10%)
(20%)
15% (20%)
(20%) 15%
20%
(30%)
(15%) 15%
(55%)
(45%)
45%
55%
25%
7%
(30%)
(7%)
(8%)
8%
(45%)
55%
15% (10%)
Harrell Rd
40% (35%)
N
(10%)
(35%)
15%
40%
LEGEND
XX% Entering Trips
(XX%) Exiting Trips

Figure 13B

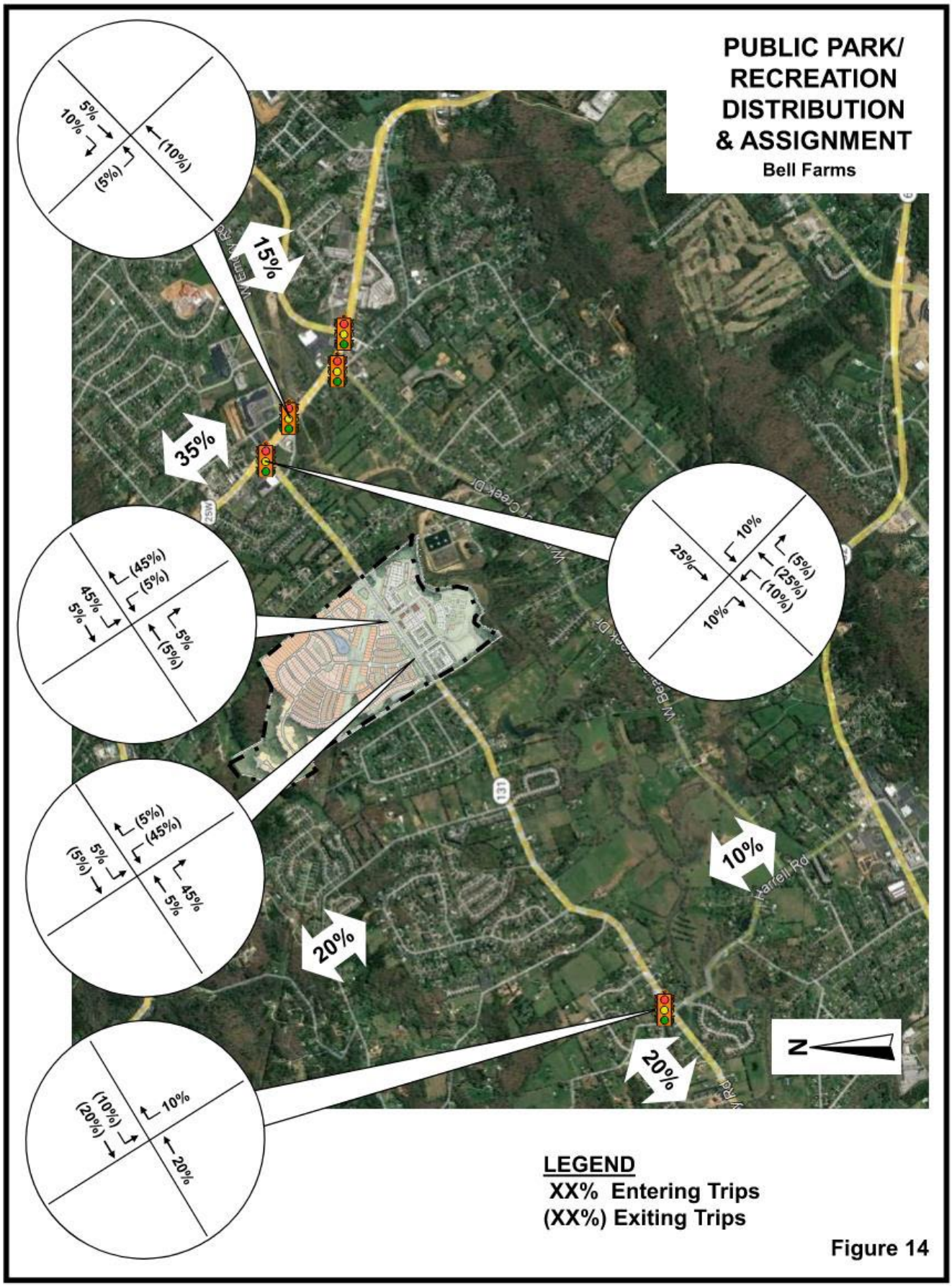

PUBLIC PARK/
RECREATION
DISTRIBUTION
& ASSIGNMENT
Bell Farms
15%
35%
20%
10%
20%
5%
10%
(5%)
(10%)
(45%)
(5%)
45%
5%
5%
(5%)
(5%)
(45%)
5%
(5%)
45%
5%
(10%)
(20%)
10%
20%
25%
10%
(5%)
(25%)
(10%)
10%
Karrell Rd
N
LEGEND
XX% Entering Trips
(XX%) Exiting Trips

Figure 14

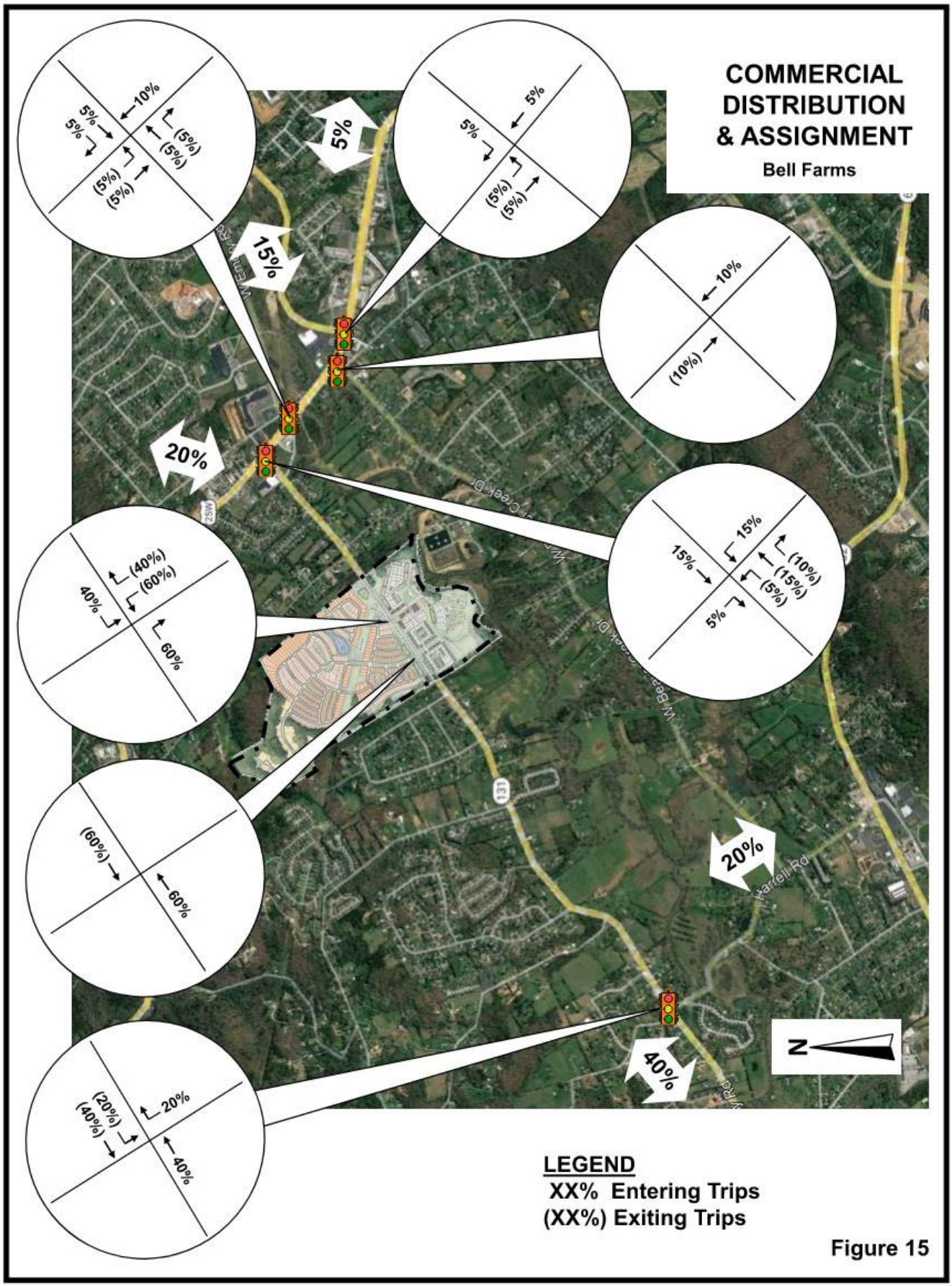
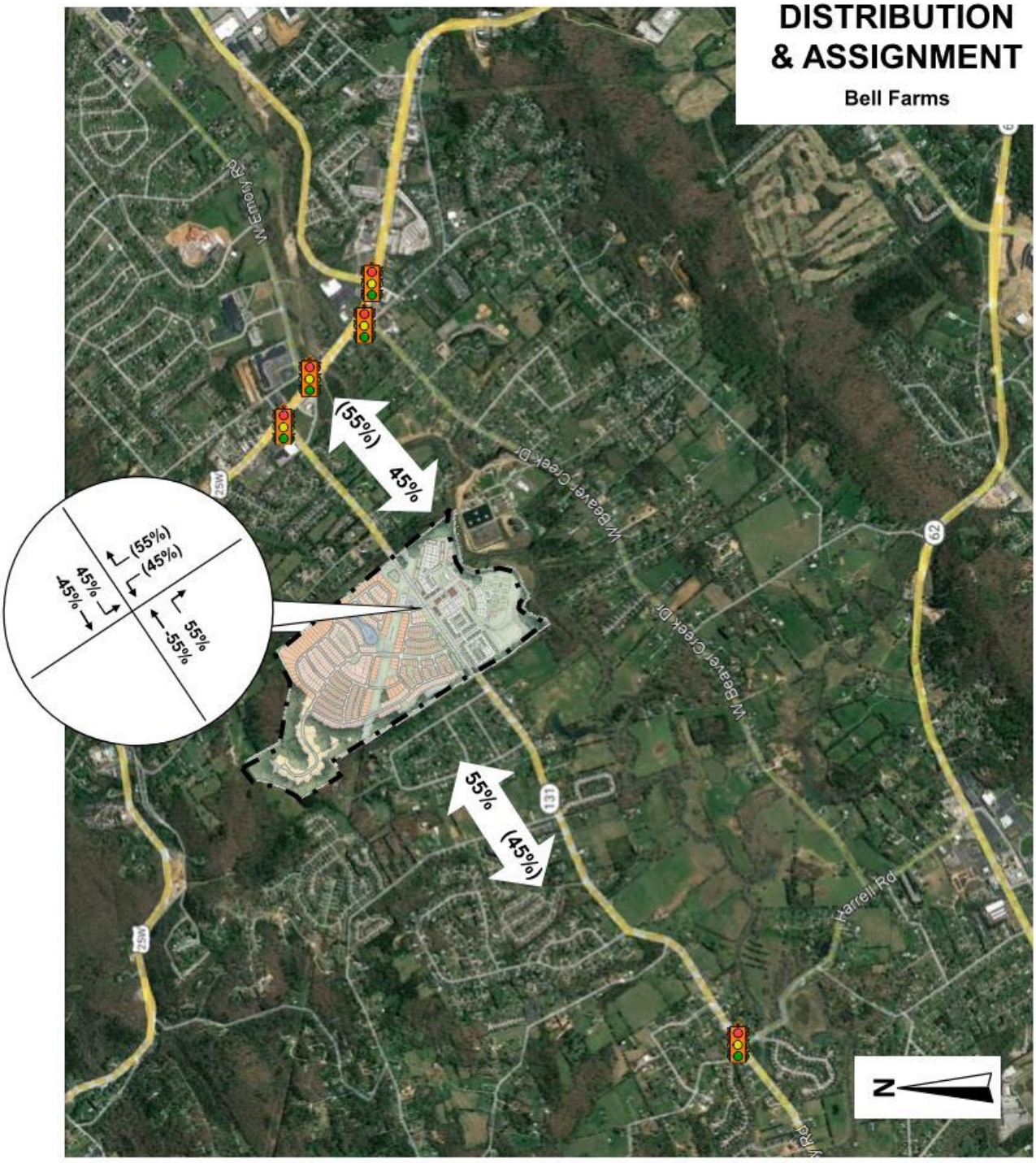

COMMERCIAL
DISTRIBUTION
& ASSIGNMENT
Bell Farms
5%
15%
20%
20%
40%
LEGEND
XX% Entering Trips
(XX%) Exiting Trips

Figure 15


AM PASS-BY
DISTRIBUTION
& ASSIGNMENT
Bell Farms
(40%) 60%
40% (60%)
(40%)
(60%)
60%
60%
40%
40%
W Beaver Creek Dr
W Emory Rd
Harrell Rd
N
LEGEND
XX% Entering Trips
(XX%) Exiting Trips

Figure 16A



LEGEND
XX% Entering Trips
(XX%) Exiting Trips

Figure 16B

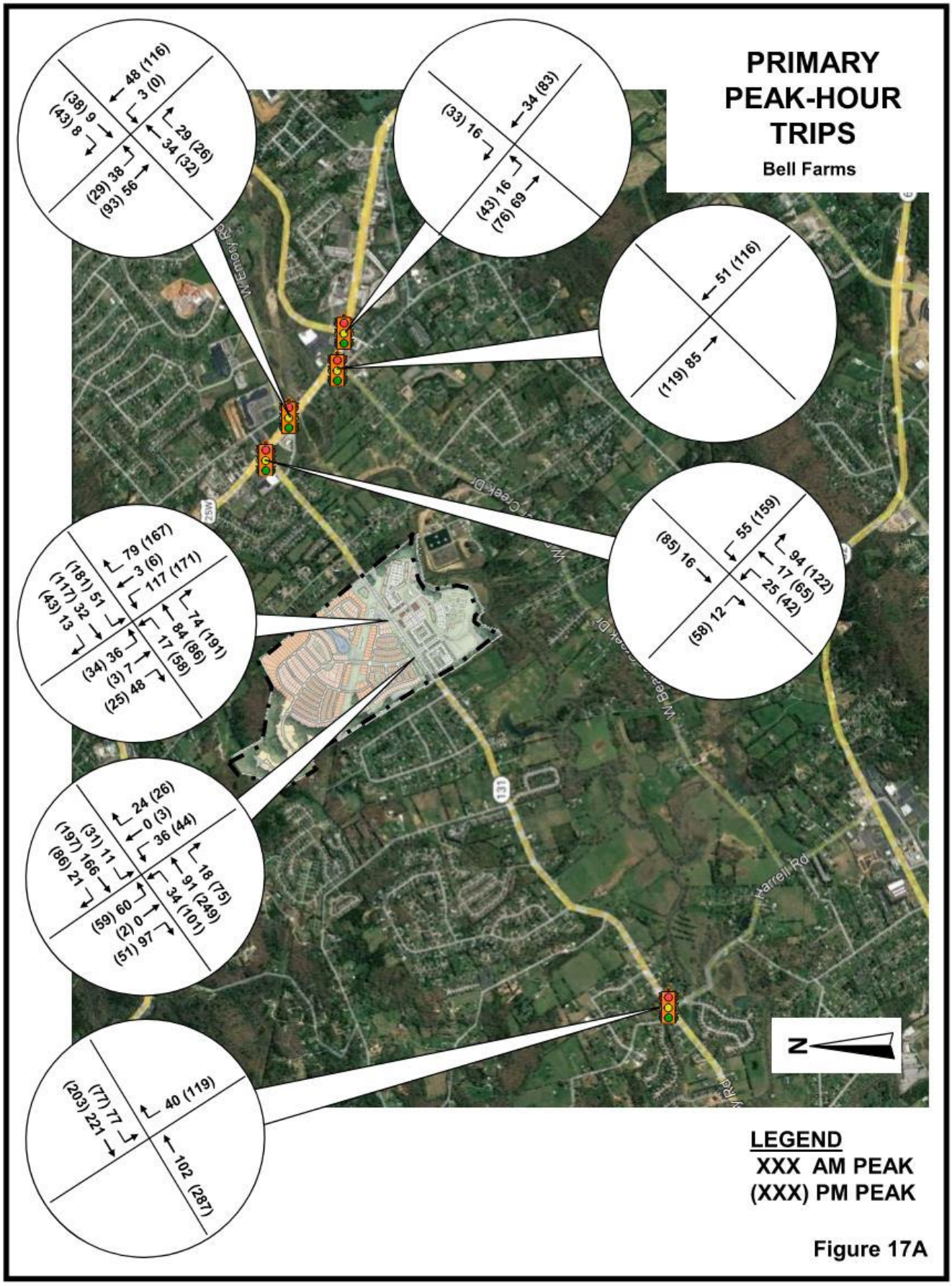

PRIMARY PEAK-HOUR TRIPS
Bell Farms
48 (116)
3 (0)
(38) 9
(43) 8
29 (26)
34 (32)
(29) 38
(93) 56
34 (83)
(33) 16
(43) 16
(76) 69
51 (116)
(119) 85
79 (167)
3 (6)
117 (171)
(181) 51
(117) 32
(43) 13
74 (191)
84 (86)
17 (58)
(34) 36
(3) 7
(25) 48
55 (159)
(85) 16
94 (122)
17 (65)
25 (42)
(58) 12
24 (26)
0 (3)
36 (44)
(31) 11
(197) 166
(86) 21
18 (75)
91 (249)
34 (101)
(59) 60
(2) 0
(51) 97
(77) 77
(203) 221
40 (119)
102 (287)
Harrell Rd
N
LEGEND
XXX AM PEAK
(XXX) PM PEAK

Figure 17A

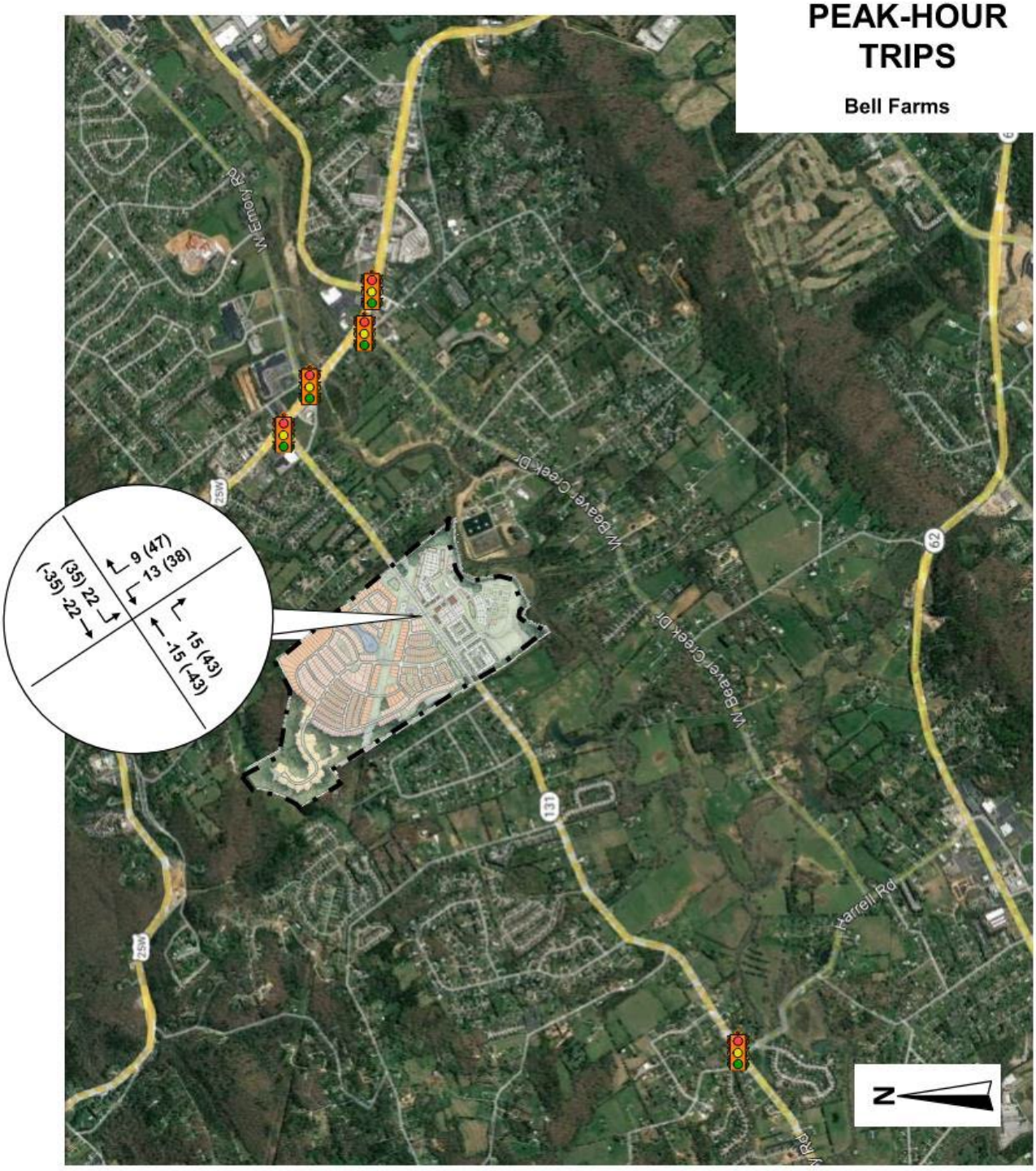

PASS-BY
PEAK-HOUR
TRIPS
Bell Farms
W Emory Rd
W Beaver Creek Dr
W Beaver Creek Dr
Harrell Rd
9 (47)
13 (38)
(35) 22
(-35) -22
15 (43)
-15 (-43)
N
LEGEND
XXX AM PEAK
(XXX) PM PEAK

Figure 17B

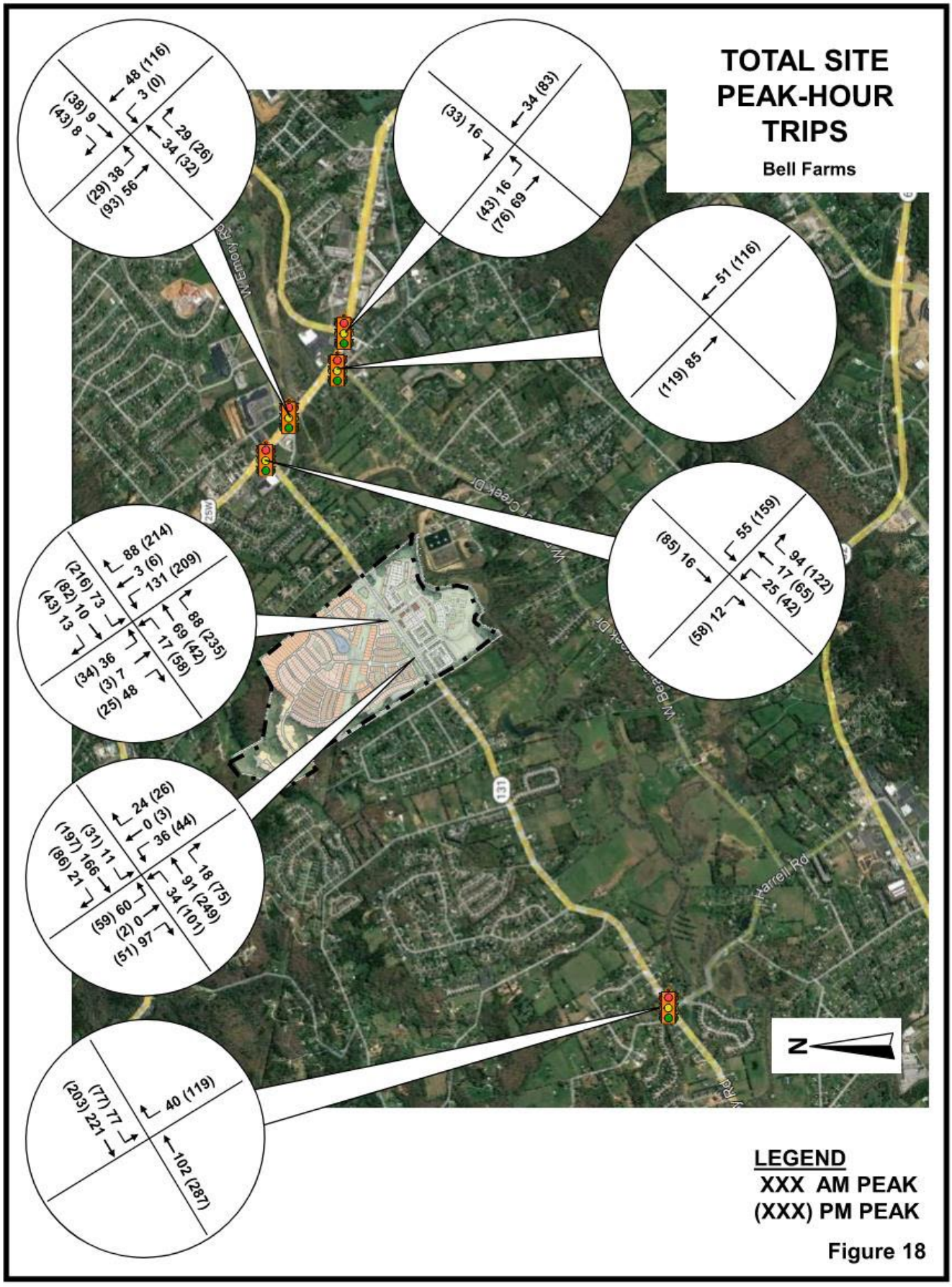

TOTAL SITE
PEAK-HOUR
TRIPS
Bell Farms
48 (116)
3 (0)
29 (26)
34 (32)
(38) 9
(43) 8
(29) 38
(93) 56
34 (83)
(33) 16
(43) 16
(76) 69
51 (116)
(119) 85
88 (214)
3 (6)
131 (209)
88 (235)
69 (42)
17 (58)
(216) 73
(82) 10
(43) 13
(34) 36
(3) 7
(25) 48
55 (159)
94 (122)
17 (65)
25 (42)
(85) 16
(58) 12
24 (26)
0 (3)
36 (44)
18 (75)
91 (249)
34 (101)
(31) 11
(197) 166
(86) 21
(59) 60
(2) 0
(51) 97
40 (119)
102 (287)
(77) 77
(203) 221
W Emory Rd
Harrell Rd
N
LEGEND
XXX AM PEAK
(XXX) PM PEAK

Figure 18

Total Projected Traffic Volumes

The Bell Farms Master Plan trips were added to the 2030 background traffic for post-development traffic volumes for the year 2030. **Figure 19** illustrates this 2030 traffic projections. Using Knox County's Access Control and Driveway Design Policy and TDOT's Highway System Access Manual (HSAM), an evaluation of the projected traffic volumes was conducted to determine left- or right-turn lane requirements for the proposed site accesses. Harmelink's nomograms, adopted by TDOT and the basis of the County's left-turn lane warrants, are used for the advancing traffic and respective opposing traffic's left-turn lane warrants. With the eastbound and westbound traffic volumes exceeding 600vph in either direction during peak hours, a right-turn volume of 20vph can warrant a right-turn lane. Therefore, from the analysis, left- and right-turn lanes are warranted. A continuous two-way left-turn lane should be provided for W. Emory Road (S.R. 131) adjacent to the site to facilitate the left-turn lanes warranted. The TDOT HSAM recommended minimum right-turn lane is 200 feet for the posted speed limit and 315 feet for a 50mph design speed assuming a constrained design condition.

Projected Signal Warrant Analyses

An evaluation of a traffic signal was conducted for the proposed East Access with W. Emory Road (S.R. 131). There are eight warrants published in the **Manual on Uniform Traffic Control Devices, 2010 Edition**. Three traffic volume warrants were examined, including the Eight-Hour Vehicular Volume (Warrant 1), Four-Hour (Warrant 2), and Peak-Hour Volume (Warrant 3B). The Eight-Hour Vehicular Volume Warrant is further subdivided into three parts: the Minimum Volume (Warrant 1A), Interruption to Continuous Traffic Flow (Warrant 1B), and Combination (Warrant 1A & B). Any part of Warrant 1 must be met for a minimum of eight hours. Warrant 2 must be met for four hours, and one hour must be met for the Peak-Hour Warrant (Warrant 3B). The volume threshold required for any of the volume warrants may be reduced with prevailing speeds in excess of 40mph. An 85th-percentile speed of 59mph determined from the ATC was used for the warrant evaluation, thereby permitting the volume threshold reduction. The warrant evaluation was limited to the exiting left-turn movements from the proposed site accesses. With the buildout of the site, the Eight-Hour warrants, Minimum Volume (Warrant 1A), Interruption (Warrant 1B), and Combination (Warrant 1C) are fully satisfied. The Four-Hour and Peak-Hour warrants are also fully satisfied. The following summarizes the warrant evaluation.

		Satisfied
Warrant 1A	Minimum Volume	12 hrs
Warrant 1B	Interruption to Continuous Traffic Flow	15 hrs
Warrant 1C	Combination of Parts A & B	14 hrs
Warrant 2	Four Hour	14 hrs
Warrant 3B	Peak-hour Volume	13 hrs

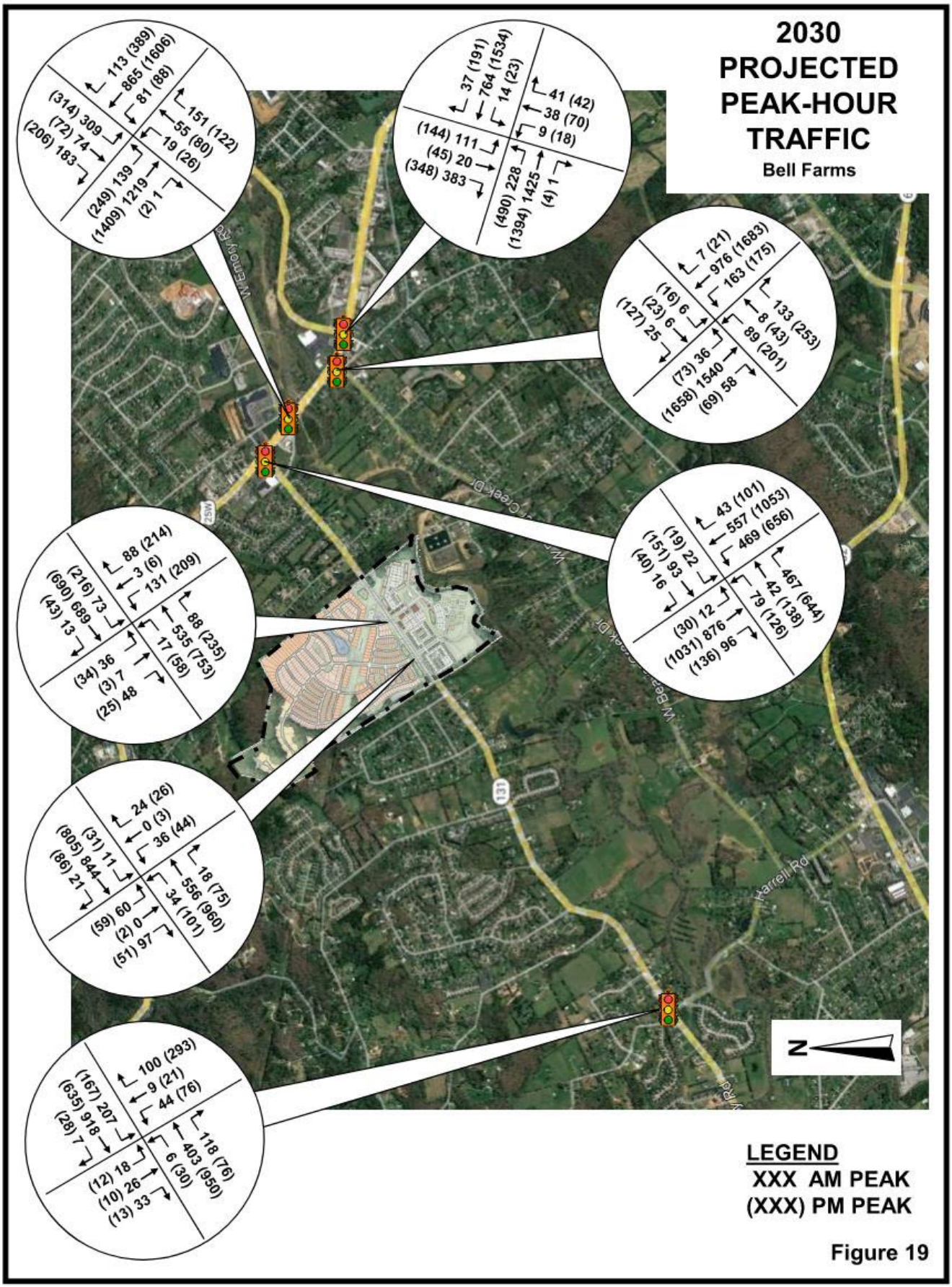

2030
PROJECTED
PEAK-HOUR
TRAFFIC
Bell Farms
113 (389)
865 (1606)
81 (88)
(314) 309
(72) 74
(206) 183
151 (122)
55 (80)
19 (26)
(249) 139
(1409) 1219
(2) 1
37 (191)
764 (1534)
14 (23)
41 (42)
38 (70)
9 (18)
(144) 111
(45) 20
(348) 383
(490) 228
(1394) 1425
(4) 1
7 (21)
976 (1683)
163 (175)
(16) 6
(23) 6
(127) 25
133 (253)
8 (43)
89 (201)
(73) 36
(1658) 1540
(69) 58
88 (214)
3 (6)
131 (209)
(216) 73
(690) 689
(43) 13
88 (235)
535 (753)
17 (58)
(34) 36
(3) 7
(25) 48
43 (101)
557 (1053)
469 (656)
(19) 22
(151) 93
(40) 16
467 (644)
42 (138)
79 (126)
(30) 12
(1031) 876
(136) 96
24 (26)
0 (3)
36 (44)
(31) 11
(805) 844
(86) 21
18 (75)
556 (960)
34 (101)
(59) 60
(2) 0
(51) 97
100 (293)
9 (21)
44 (76)
(167) 207
(635) 918
(28) 7
118 (76)
403 (950)
6 (30)
(12) 18
(10) 26
(13) 33
W Enon Rd
Harrell Rd
N
LEGEND
XXX AM PEAK
(XXX) PM PEAK

Figure 19

Projected Capacity and Level of Service

Table 7 presents the capacity and levels of service for the study intersections. Lane group levels for the projected traffic conditions are illustrated in **Figure 20**. A summary of the capacity and LOS analyses is presented in **Table 8**. With mitigation of the W. Emory Road (S.R. 131) and study intersections, a minimum LOS D can be achieved for the signalized study intersections with the development of the Bell Farms Master Plan. Mitigated lane group levels of service are illustrated in **Figure 21**.

Table 7
2030 PROJECTED
CAPACITY AND LEVEL OF SERVICE

INTERSECTION	TRAFFIC CONTROL	PEAK PERIOD	V/C	DELAY	LOS
W. Emory Road (SR 131) & Proposed East Access Street	STOP	AM	2.08/0.73	>300/149.5	F/F
		PM	12.98/8.04	>300/>300	F/F
	SIGNAL	*AM*	*0.61*	*14.2*	*B*
		PM	*0.87*	*21.4*	*C*
W. Emory Road (SR 131) & Proposed West Access Street	STOP NB/SB	AM	.82/.92	130.9/83.2	F/F
		PM	2.69/3.32	>300/>300	F/F
W. Emory Road (SR 131) & Harrell Road/Carpenter Road	SIGNAL	AM	0.83	13.3	B
		PM	0.86	26.4	C
with TDOT Planned Improvements					
Clinton Higway (US 25W) & W. Emory Road (SR 131)	SIGNAL	AM	0.83	30.5	C
		PM	1.13	74.3	E
with NB Double Left-Turn Lanes	*SIGNAL*	*AM*	*0.65*	*25.0*	*C*
		PM	*0.89*	*45.3*	*D*
Clinton Higway (US 25W) & W. Emory Road/Bill Bell Way	SIGNAL	AM	0.78	35.5	D
		PM	0.96	46.8	D
Clinton Higway (US 25W) & W. Beaver Creek Drive	SIGNAL	AM	0.77	9.4	A
		PM	0.88	20.7	C
Clinton Higway (US 25W) & W. Powell Drive Drive (SR 131)	SIGNAL	AM	0.72	17.2	B
		PM	0.89	38.5	D

Note: Average vehicle delay estimated in seconds.

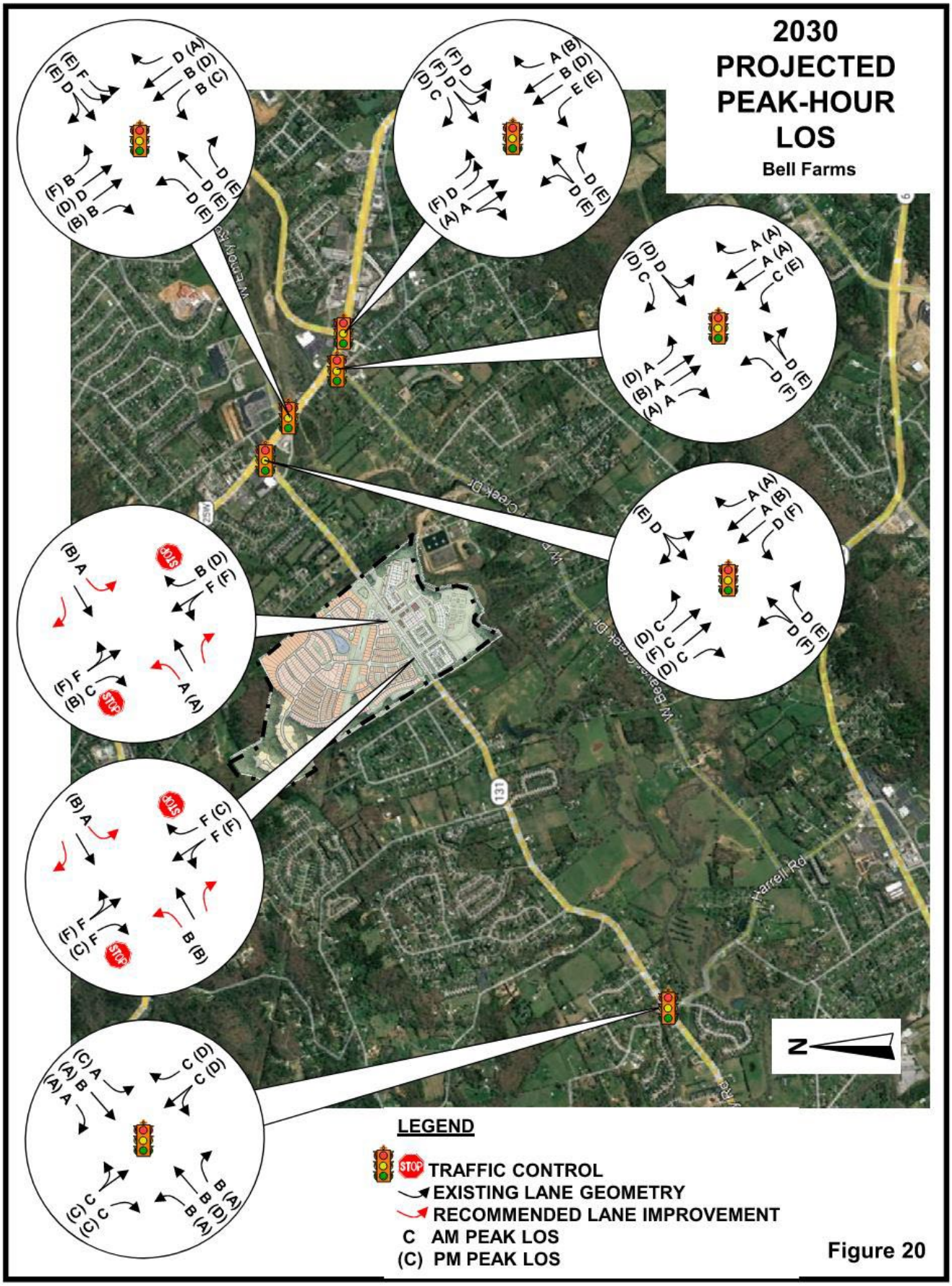
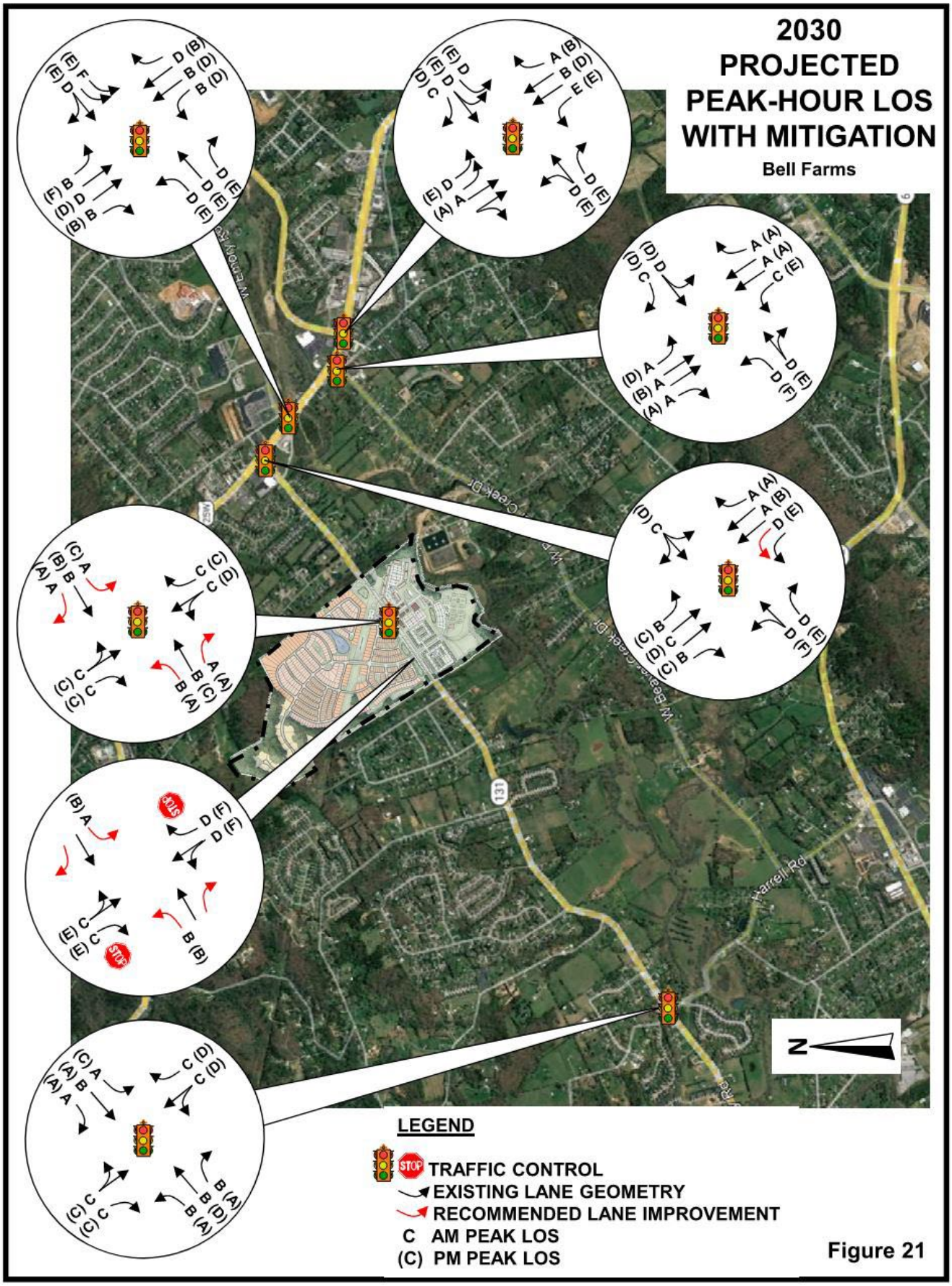

2030
PROJECTED
PEAK-HOUR
LOS
Bell Farms
LEGEND
TRAFFIC CONTROL
EXISTING LANE GEOMETRY
RECOMMENDED LANE IMPROVEMENT
C AM PEAK LOS
(C) PM PEAK LOS
N

Figure 20

TABLE 8
CAPACITY AND LEVEL OF SERVICE SUMMARY

INTERSECTION	TRAFFIC CONTROL	PEAK PERIOD	2022 TRAFFIC V/C	2022 TRAFFIC DELAY	2022 TRAFFIC LOS	2030 BACKGROUND V/C	2030 BACKGROUND DELAY	2030 BACKGROUND LOS	2030 PROJECTED V/C	2030 PROJECTED DELAY	2030 PROJECTED LOS
W. Emory Road (SR 131) & Proposed East Access Street	STOP NB/SB	AM PM							2.08/0.73 12.98/8.04	>300/149.5 >300/>300	F/F F/F
	SIGNAL	*AM* *PM*							*0.61* *0.87*	*14.2* *21.4*	*B* *C*
W. Emory Road (SR 131) & Proposed West Access Street	STOP NB/SB	AM PM							.82/.92 2.69/3.32	207.7/182.2 >300/>300	F/F F/F
W. Emory Road (SR 131) & Harrell Road	STOP NB	AM PM	0.43 0.71	51.4 39.6	D E						
W. Emory Road (SR 131) & Carpenter Road	STOP SB	AM PM	0.19 0.09	17.1 18.0	C C						
with TDOT Planned Improvements	*SIGNAL*	AM PM				*0.72* *0.70*	*10.8* *16.1*	*B* *B*	*0.83* *0.86*	*13.3* *26.4*	*B* *C*
Clinton Higway (US 25W) & W. Emory Road (SR 131)	SIGNAL	AM PM	0.58 0.71	34.4 35.0	C C	0.74 0.88	26.6 37.5	C D	0.83 1.13	30.5 74.3	C E
with NB Double Left-Turn Lanes	*SIGNAL*	*AM* *PM*							*0.65* *0.89*	*25.0* *45.3*	*C* *D*
Clinton Higway (US 25W) & W. Emory Road/Bill Bell Way	SIGNAL	AM PM	0.56 0.66	27.7 25.7	C C	0.69 0.88	26.3 34.0	C C	0.78 0.96	35.5 46.8	D D
Clinton Higway (US 25W) & W. Beaver Creek Drive	SIGNAL	AM PM	0.56 0.66	14.7 22.9	B C	0.73 0.83	10.7 19.8	B B	0.77 0.88	9.4 20.7	A C
Clinton Higway (US 25W) & W. Powell Drive Drive (SR 131)	SIGNAL	AM PM	0.53 0.67	27.0 35.7	C D	0.69 0.86	17.1 34.5	B C	0.72 0.89	17.2 38.5	B D

Note: Average vehicle delay estimated in seconds.


2030
PROJECTED
PEAK-HOUR LOS
WITH MITIGATION
Bell Farms
LEGEND
TRAFFIC CONTROL
EXISTING LANE GEOMETRY
RECOMMENDED LANE IMPROVEMENT
C AM PEAK LOS
(C) PM PEAK LOS
Figure 21

Improvements of the W. Emory Road (S.R. 131) and Harrell Road intersection, currently planned by the County and TDOT, would mitigate the project impacts.

The western proposed site street access will operate at a LOS F during peak hours, but signalization of the eastern street access should create gaps in the traffic flow and provide an alternative site egress. Signalization was not evaluated for the intersection as its left-turn movements are much lower and its spacing from the proposed signal for the eastern street is less than desirable.

The intersection of Clinton Highway (U.S. 25W) and W. Emory Road (S.R. 131) will operate over capacity (V/C of 1.13) and a LOS E during the PM peak hour. Mitigation, as illustrated in Figure 21 would include northwest-bound double left-turn lanes from Clinton Highway (U.S. 25W) to westbound W. Emory Road (S.R. 131). The double left-turn lanes can currently be accommodated from Clinton Highway (U.S. 25W) but require the development of receiving lanes on W. Emory Road (S.R. 131). Adverse traffic queues for northeast-bound approaches of W. Emory Road (S.R. 131) may occur for the Harrell Road and Clinton Highway (U.S. 25) during the PM peak hour.

W. Emory Road (S.R. 131) Capacity and Levels of Service

W. Emory Road (S.R. 131) is a 2-lane Minor Arterial with an existing AWT of 11,390. With the proposed Bell Farms Master Plan development and background traffic growth, The AWT will exceed 20,000, suggesting a 5-lane arterial section to facilitate background and planned development. Therefore, further analyses were conducted to determine the level of service that can be expected with the buildout of the Bell Farms site. A highway capacity analysis using HCS was conducted for the 2-Lane highway arterial facility. This analysis, illustrated in **Figures 22 and 23** for the AM and PM peak hours, respectively, determined that westbound traffic would experience a LOS D during the morning peak hour. The PM peak hour would operate at a LOS D westbound and LOS E eastbound. Given these levels of service and increasing traffic queues developing for the corridor, consideration and planning for a multi-lane (5-Lane Section) should begin as W. Emory Road (S.R. 131) continues to develop.


2030
PROJECTED
AM PEAK-HOUR
2-LANE LOS
Bell Farms
W Emory Rd
W Beaver Creek Dr
W Beaver Creek Dr
Harrell Rd
25W
131
62
N
LEGEND
LOS C
LOS D
LOS E

Figure 22

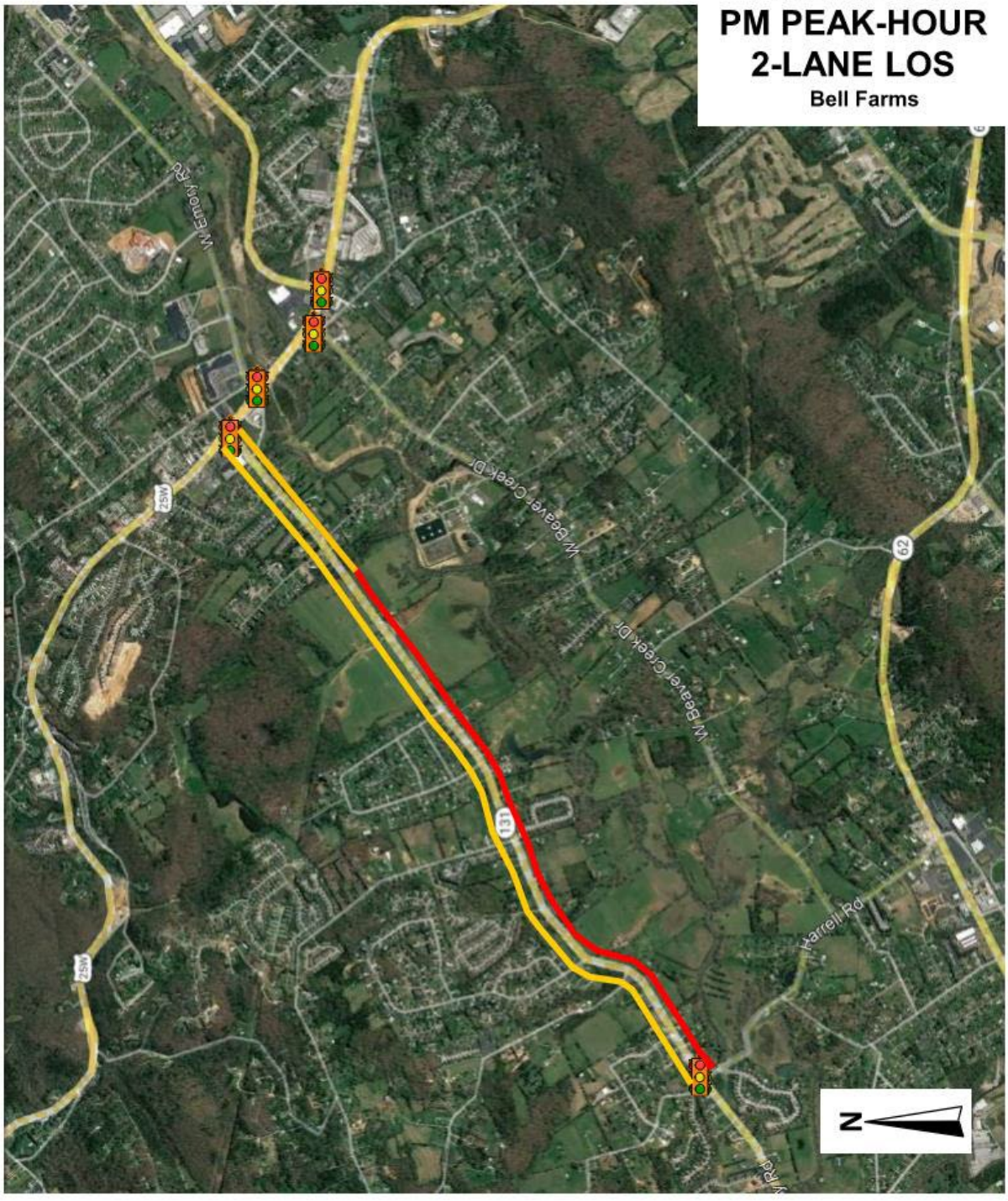

2030
PROJECTED
PM PEAK-HOUR
2-LANE LOS
Bell Farms
W Emory Rd
W Beaver Creek Dr
W Beaver Creek Dr
Karrell Rd
N
LEGEND
LOS C
LOS D
LOS E

Figure 23

W. Emory Road (S.R. 131) Design Speed and Sight Distance

With the prevailing speed of 59mph exceeding the posted speed limit of 40mph, many motorists are currently violating the posted speed. With the proposed development, W. Emory Road (S.R. 131) operating near capacity, and with signalization of the proposed east access street, speeds will be significantly reduced; therefore, lines of sight from the proposed street intersections should consider a design of 10mph above the posted speed limit to ensure an appropriate line of sight and design speed of the turn lanes. The required corner line of sight by Knox County for a 50mph design is 500 feet. This line of sight can be achieved as W Emory Road (S.R. 131) is a relatively straight and minimally rolling roadway segment; thereby, it should have unrestricted lines of sight.

RECOMMENDATIONS

The analyses and review of the traffic volumes identified the following recommendations:

- Provide a minimum 3-lane section with a center turn lane adjacent to the site, providing eastbound and westbound left-turn movements to the proposed site access.
- Provide a minimum 315-foot storage/deceleration for right-turn lanes from W. Emory Road (S.R. 131) to the proposed east and west access streets.
- Provide a traffic signal for the proposed eastern street intersection with W. Emory Road (S.R. 131), serving the development's proposed apartments and commercial components.
- Signalization should include pedestrian traffic control facilitating possible movements from the northside residential to the park/recreational amenities.
- Provide pedestrian facilities, including sidewalks and crosswalks, connecting the residential and commercial uses with the park/recreational uses.
- Minimize landscaping, using low-growing vegetation, and signage at the proposed site access streets to W. Emory Road (S.R. 131) to ensure a minimum 500-foot line-of-sight is provided for the safe operations of the site intersections.
- Provide for a northwest-bound double left-turn movement from Clinton Highway (U.S. 25W) to westbound W. Emory Road (S.R. 131). Improved 2 departuring lanes should be a minimum of 300 feet on W. Emory Road before transitioning to a single westbound lane.
- Provide separate left- and right-turn lanes from the proposed site intersecting streets with W. Emory Road (S.R. 131).

Knox County and the Tennessee Department of Transportation should begin planning for a 4- or 5-lane section for W. Emory Road (S.R. 131) between Clinton Highway to Harrell Road or Beaver Ridge Road. The right-of-way for a 5-lane section should be reserved for this future necessary improvement.

Roadway and intersection design should conform to the recommended standards and practices of the American Association of State Highway and Transportation Officials, Tennessee Department of Transportation, the Institute of Transportation Engineers, and the Knox County Engineering and Public Works Department.

CONCLUSION

The study of this proposed mixed residential and commercial development evaluated the projected traffic conditions. Background traffic was determined using a 2.5-percent annual compounded growth rate until the horizon year 2030. Planned improvements of the W. Emory Road (S.R. 131) and Harrell Road intersection by Knox County and TDOT will align Harrell Road and Carpenter Road and provide signalization with left- and right-turn lanes.

Traffic associated with the Bell Farms Master Plan development was generated and distributed to the proposed site access. The proposed site generates approximately 15,400 daily weekday trips. After considering pass-by traffic for commercial land use and internal site trips, approximately 13,370 new daily trips may be generated for a typical weekday. Using the identified turning movements for the projected traffic conditions, signalized and unsignalized capacity and level of service analyses were conducted using the **Highway Capacity Manual**. Improvement for the site access includes left-and right-turn lanes and signalization of the eastern proposed street access.

Analysis of W. Emory Road (S.R. 131) 2-lane highway section, with an AWT that may exceed 20,000, determined that westbound traffic would experience a LOS D during the morning peak hour. The PM peak hour would operate at a LOS D westbound and LOS E eastbound. Given these levels of service, consideration and planning for a multi-lane (5-Lane Section) should begin as Emory Road (S.R. 131) continues to develop and traffic increases. Right-of-way should be reserved for a future 5-lane section.

With the recommendations of this report, the efficient and safe flow of traffic should be maintained with the Bell Farms Master Plan development.

APPENDIX

Trip Generation

Turn Lane Evaluations

Signal Warrant Analysis

Capacity and Level of Service Analyses

Traffic Count Data

Comment Resolution

TRIP GENERATION

TRIP GENERATION

03-Aug-22

AVERAGE

LAND USE	L.U.C	SIZE	DAILY TRAFFIC	AM PEAK ENTER	AM PEAK EXIT	AM PEAK TOTAL	PM PEAK ENTER	PM PEAK EXIT	PM PEAK TOTAL
SINGLE FAMILY (Detached)	210	524	4,941	95	271	367	310	182	493
SINGLE FAMILY (Attached)	215	179	1,289	27	59	86	58	44	102
KNOX CO MULTI-FAMILY	0	400	3,612	48	172	220	158	130	288
0	0	0	0	0	0	0	0	0	0
SHOPPING CENTER (40-150k	821	55,550	5,249	122	75	196	241	261	502
PUBLIC PARK	411	9	7	0	0	0	1	0	1
SOCCER COMPLEX	488	7	499	4	3	7	76	39	115
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
SINGLE FAMILY (Detached)	210	95	896	17	49	67	56	33	89
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
			16,493	314	629	942	900	689	1,590

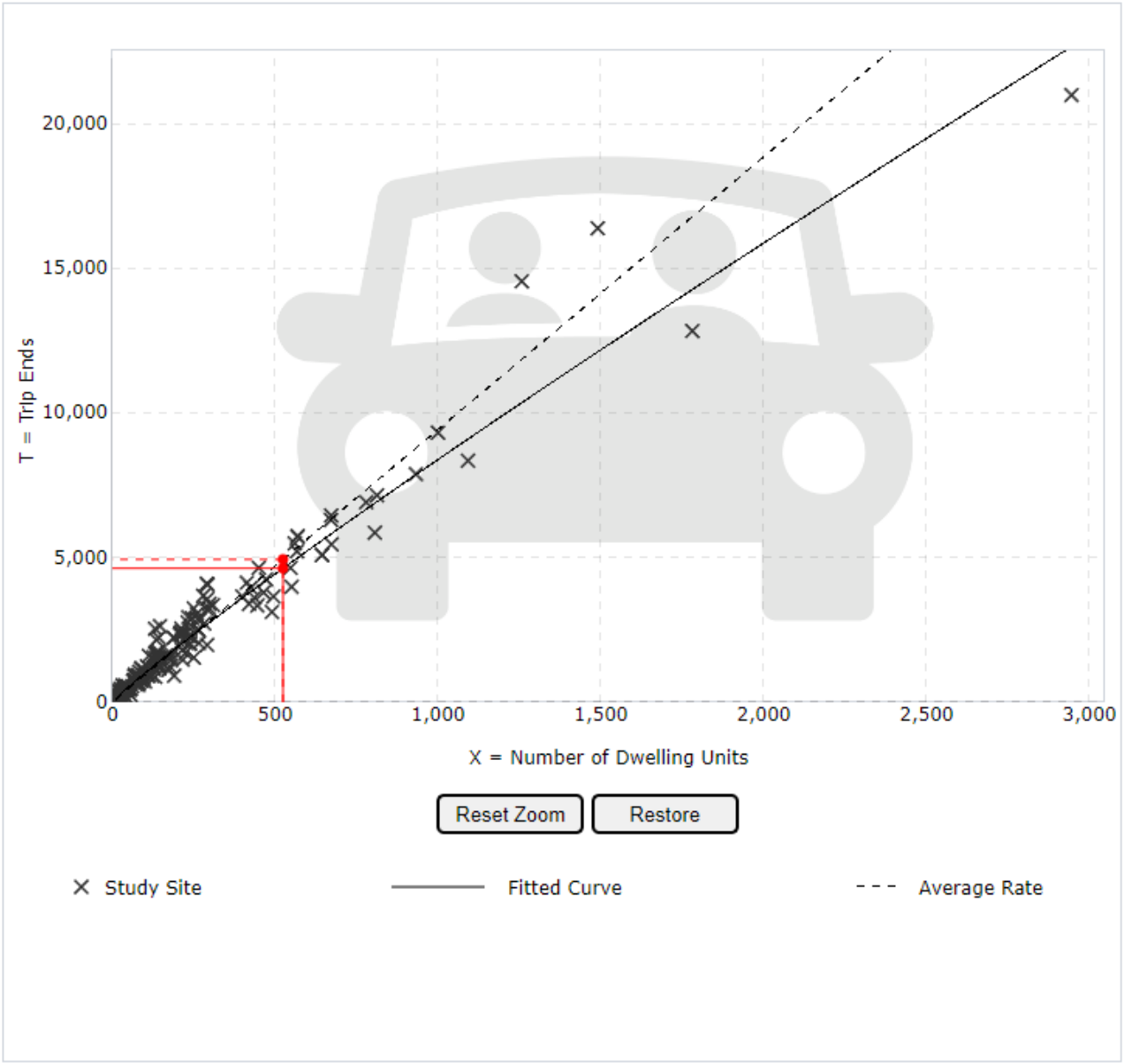
REGRESSION

LAND USE	L.U.C	SIZE	DAILY TRAFFIC	AM PEAK ENTER	AM PEAK EXIT	AM PEAK TOTAL	PM PEAK ENTER	PM PEAK EXIT	PM PEAK TOTAL
SINGLE FAMILY (Detached)	210	524	4,631	87	249	336	297	174	471
SINGLE FAMILY (Attached)	215	179	1,314	27	60	87	59	44	103
KNOX CO MULTI-FAMILY	0	400	3,318	42	150	192	153	125	278
0	0	0	0	0	0	0	0	0	0
SHOPPING CENTER (40-150k	821	55,550	5,688	N/A	N/A	N/A	262	283	545
PUBLIC PARK	411	9	94	N/A	N/A	N/A	13	10	23
SOCCER COMPLEX	488	7	N/A	N/A	N/A	N/A	87	45	133
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
SINGLE FAMILY (Detached)	210	95	963	18	53	71	60	35	95
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
			16,008	175	512	687	930	718	1,648

SATURDAY / SUNDAY

LAND USE	L.U.C	SIZE	SAT DAILY TRAFFIC	SAT PEAK ENTER	SAT PEAK EXIT	SAT PEAK TOTAL	SUN DAILY TRAFFIC	SUN PEAK ENTER	SUN PEAK EXIT	SUN PEAK TOTAL
SINGLE FAMILY (Detached)	210	524	4,787	249	212	460	4,573	225	199	424
SINGLE FAMILY (Attached)	215	179	1,920	52	56	108	1,550	N/A	N/A	173
KNOX CO MULTI-FAMILY	0	400	2,556	102	106	208	234	106	98	204
0	0	0	0	0	0	0	0	0	0	0
SHOPPING CENTER (40-150k	821	55,550	7,465	279	268	547	1,750	270	281	550
PUBLIC PARK	411	9	18	16	13	28	20	15	23	38
SOCCER COMPLEX	488	7	2,834	163	176	339	N/A	92	108	201
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
SINGLE FAMILY (Detached)	210	95	913	49	42	91	772	43	38	81
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
			20,493	909	873	1,782	8,899	750	747	1,671

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Single-Family Detached Housing (210) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
174

Avg. Num. of Dwelling Units:
246

Average Rate:
9.43

Range of Rates:
4.45 - 22.61

Standard Deviation:
2.13

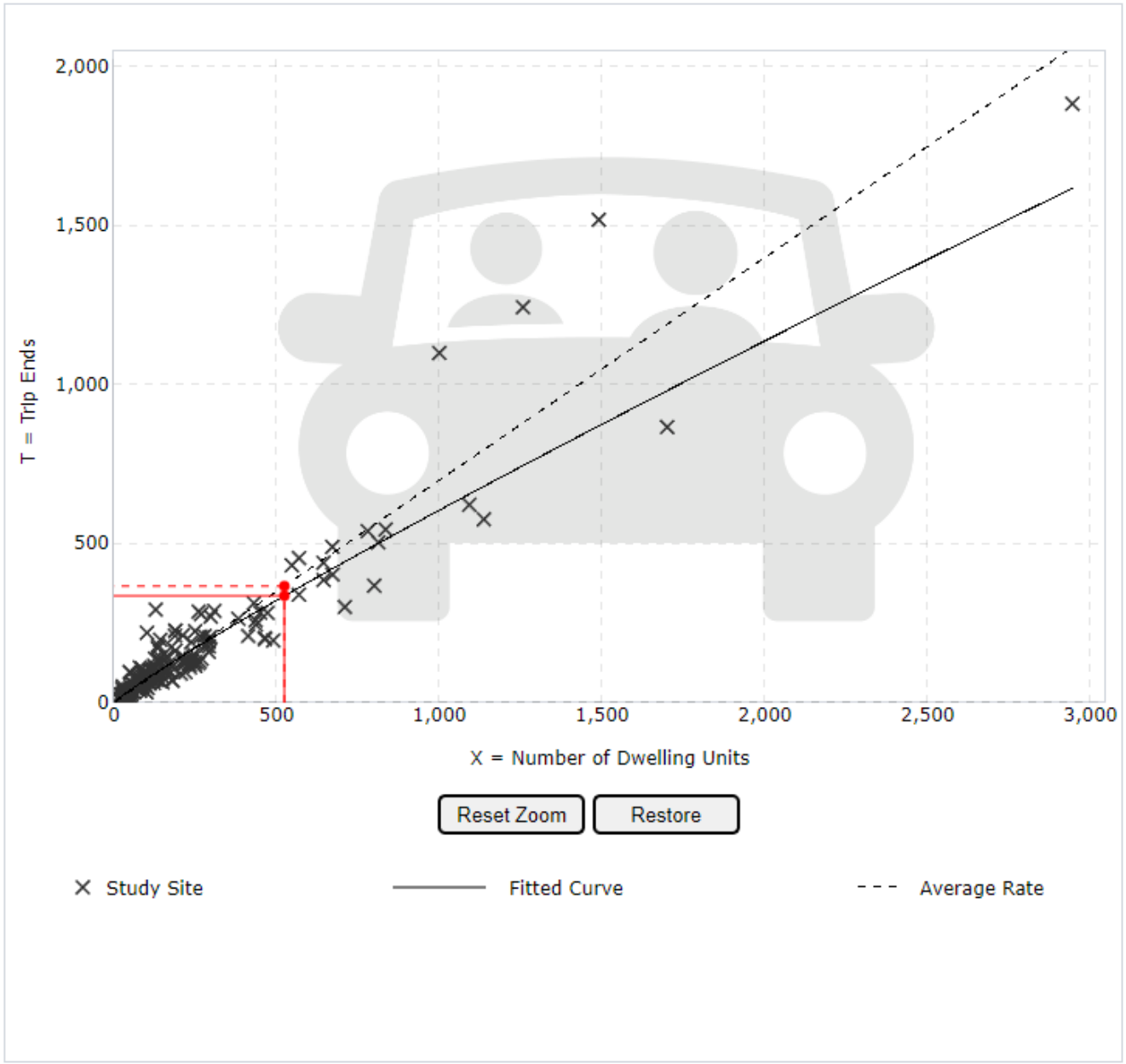
Fitted Curve Equation:
Ln(T) = 0.92 Ln(X) + 2.68

R^2:
0.95

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 4941 (Total), 2470 (Entry), 2471 (Exit)
Fitted Curve: 4631 (Total), 2315 (Entry), 2316 (Exit)

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Single-Family Detached Housing (210) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
192

Avg. Num. of Dwelling Units:
226

Average Rate:
0.70

Range of Rates:
0.27 - 2.27

Standard Deviation:
0.24

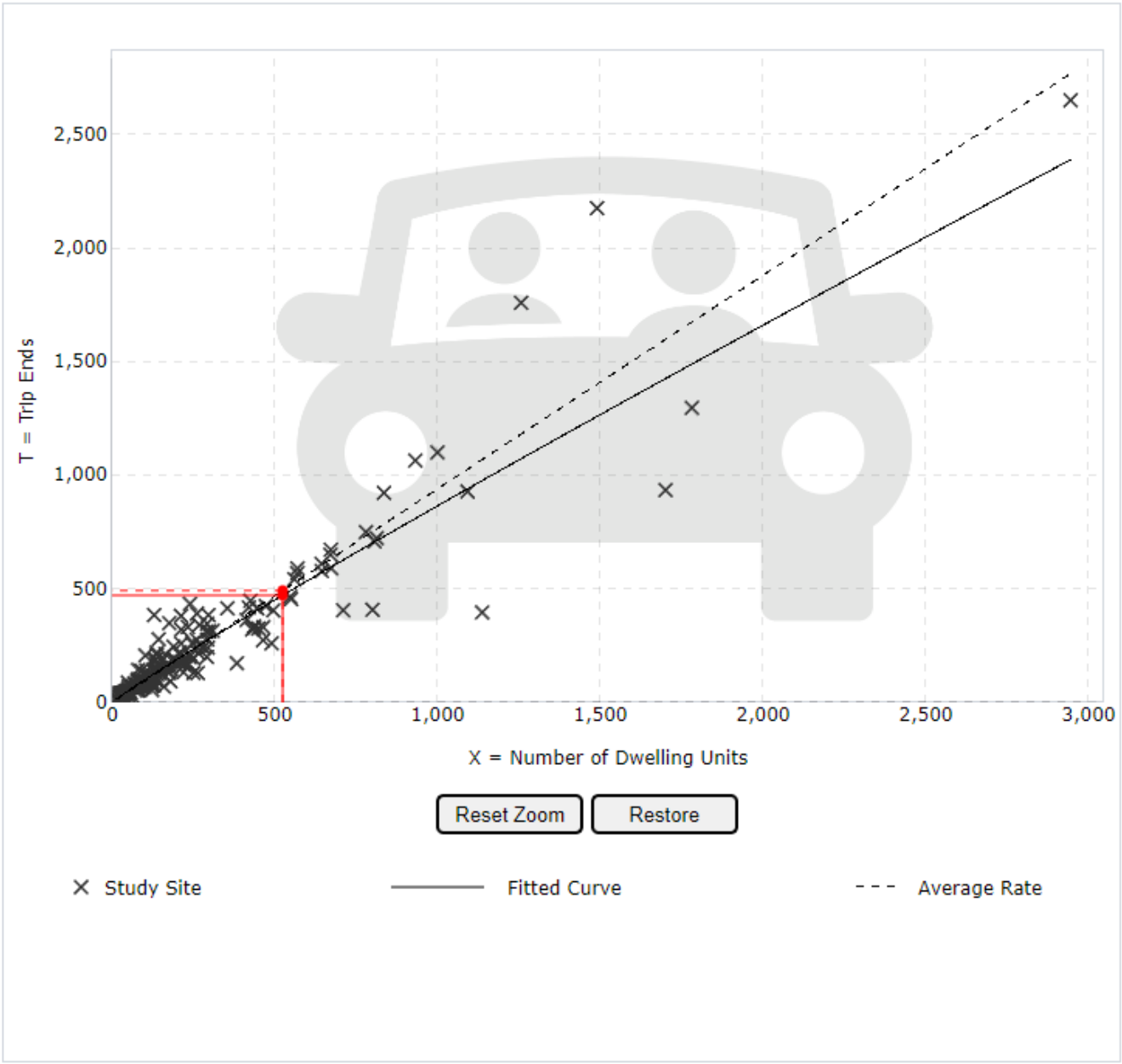
Fitted Curve Equation:
Ln(T) = 0.91 Ln(X) + 0.12

R^2:
0.90

Directional Distribution:
26% entering, 74% exiting

Calculated Trip Ends:
Average Rate: 367 (Total), 95 (Entry), 272 (Exit)
Fitted Curve: 336 (Total), 87 (Entry), 249 (Exit)

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Single-Family Detached Housing (210) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
208

Avg. Num. of Dwelling Units:
248

Average Rate:
0.94

Range of Rates:
0.35 - 2.98

Standard Deviation:
0.31

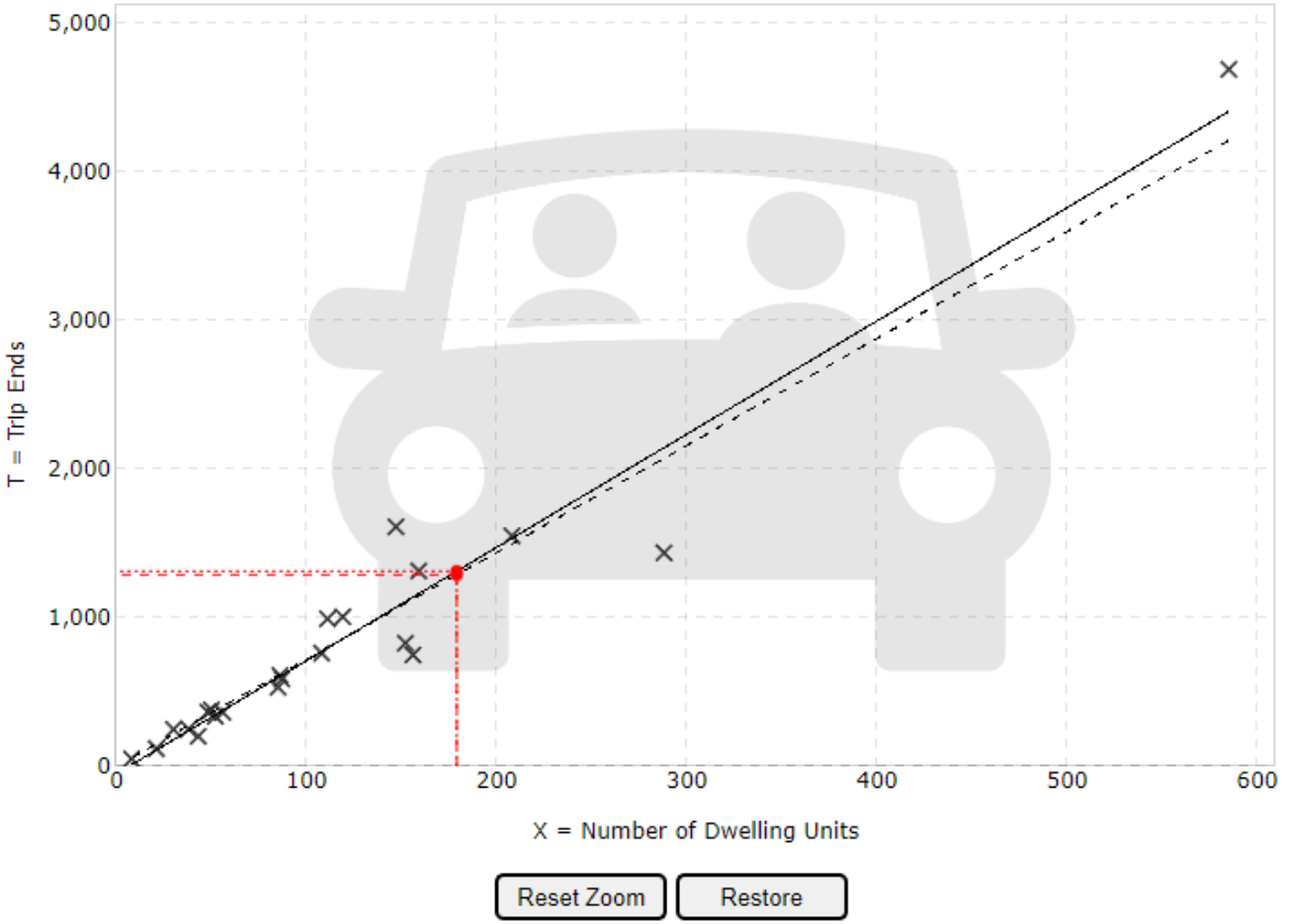
Fitted Curve Equation:
Ln(T) = 0.94 Ln(X) + 0.27

R^2:
0.92

Directional Distribution:
63% entering, 37% exiting

Calculated Trip Ends:
Average Rate: 493 (Total), 310 (Entry), 183 (Exit)
Fitted Curve: 471 (Total), 297 (Entry), 174 (Exit)

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Single-Family Attached Housing (215) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
22

Avg. Num. of Dwelling Units:
120

Average Rate:
7.20

Range of Rates:
4.70 - 10.97

Standard Deviation:
1.61

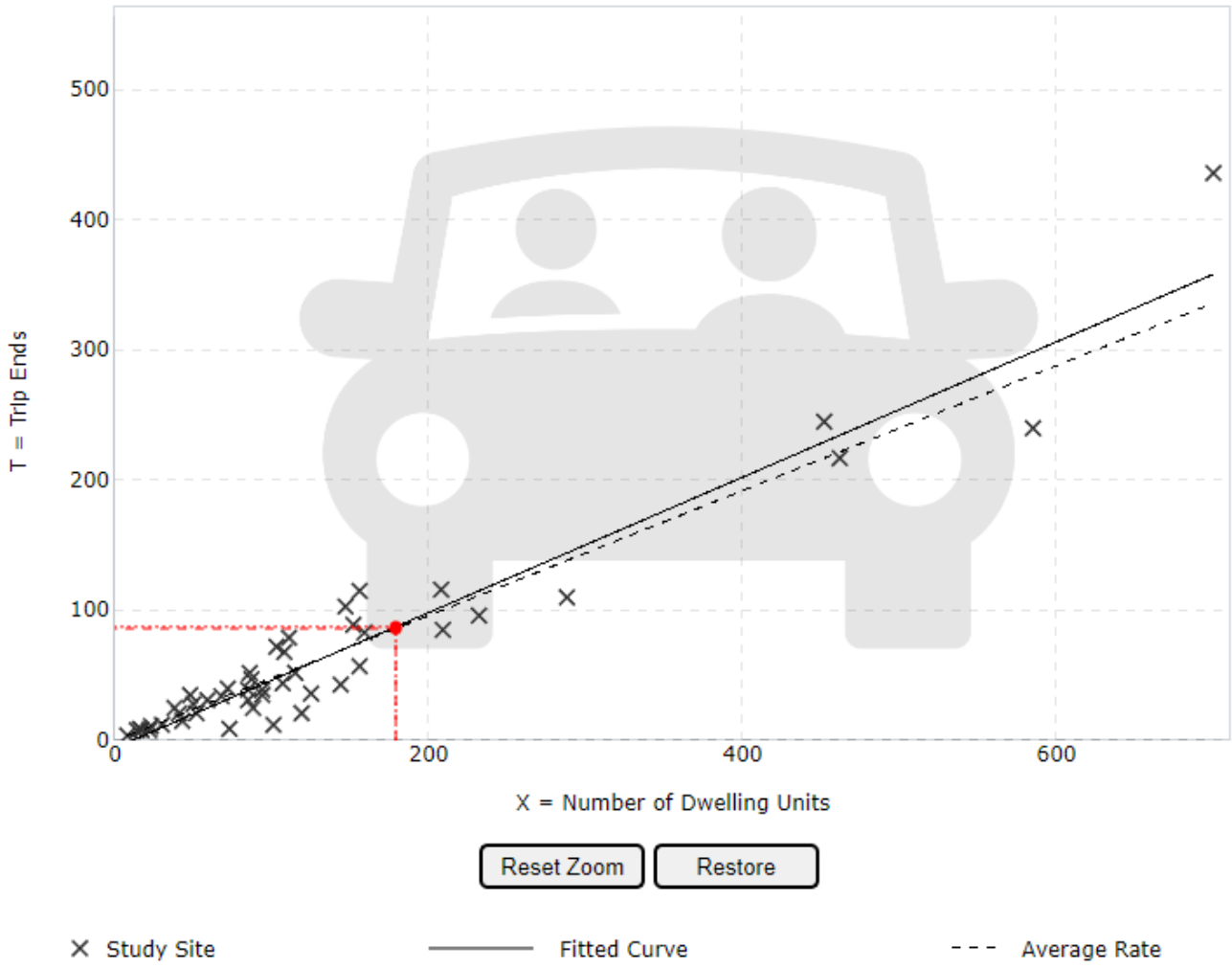
Fitted Curve Equation:
T = 7.62(X) - 50.48

R^2:
0.94

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 1289 (Total), 644 (Entry), 645 (Exit)
Fitted Curve: 1314 (Total), 657 (Entry), 657 (Exit)

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Single-Family Attached Housing (215) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
46

Avg. Num. of Dwelling Units:
135

Average Rate:
0.48

Range of Rates:
0.12 - 0.74

Standard Deviation:
0.14

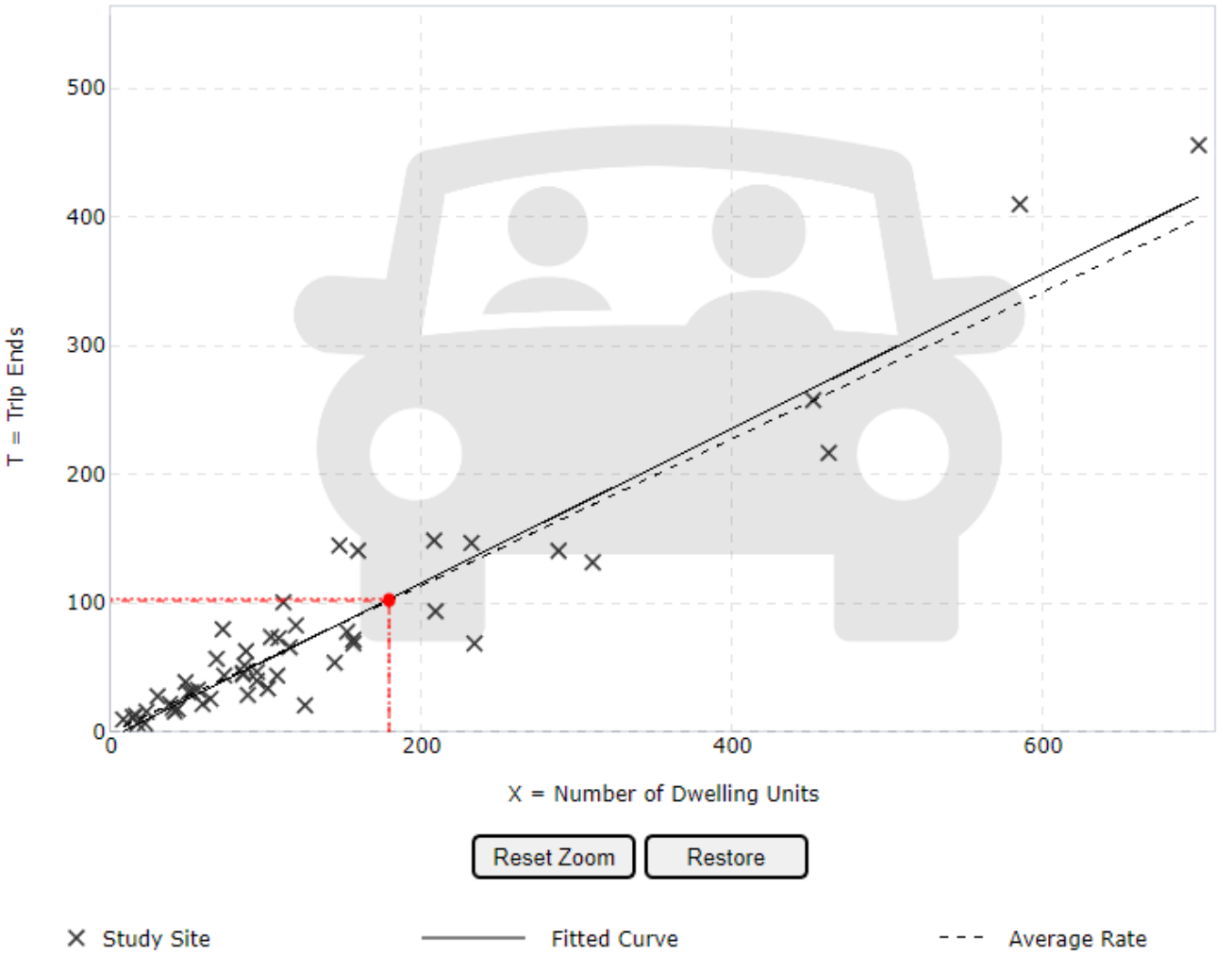
Fitted Curve Equation:
T = 0.52(X) - 5.70

R^2:
0.92

Directional Distribution:
31% entering, 69% exiting

Calculated Trip Ends:
Average Rate: 86 (Total), 27 (Entry), 59 (Exit)
Fitted Curve: 87 (Total), 27 (Entry), 60 (Exit)

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Single-Family Attached Housing (215) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
51

Avg. Num. of Dwelling Units:
136

Average Rate:
0.57

Range of Rates:
0.17 - 1.25

Standard Deviation:
0.18

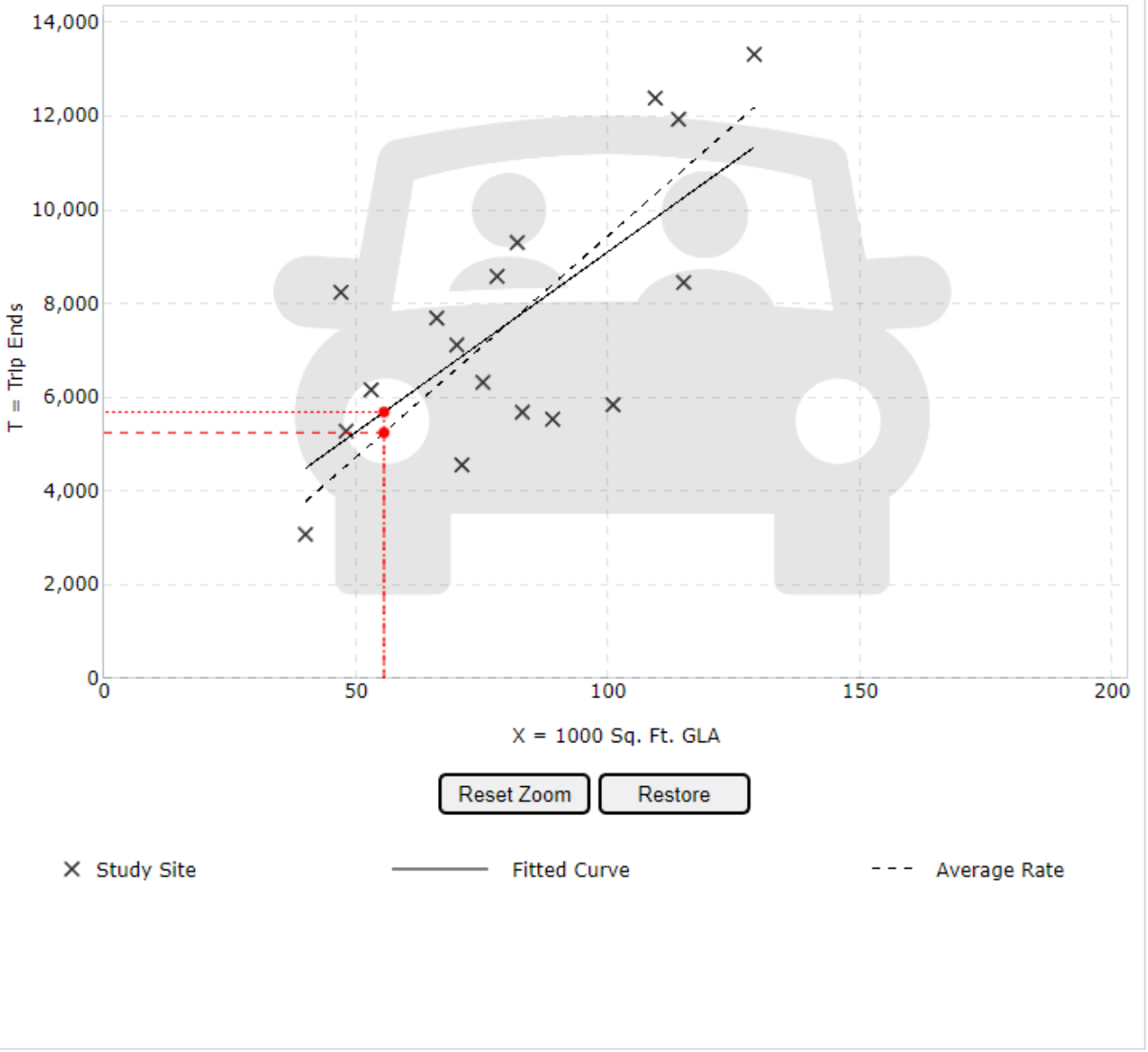
Fitted Curve Equation:
T = 0.60(X) - 3.93

R^2:
0.91

Directional Distribution:
57% entering, 43% exiting

Calculated Trip Ends:
Average Rate: 102 (Total), 58 (Entry), 44 (Exit)
Fitted Curve: 103 (Total), 59 (Entry), 44 (Exit)

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Shopping Plaza (40-150k) - Supermarket - Yes (821)
Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GLA

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
17

Avg. 1000 Sq. Ft. GLA:
81

Average Rate:
94.49

Range of Rates:
57.86 - 175.32

Standard Deviation:
26.55

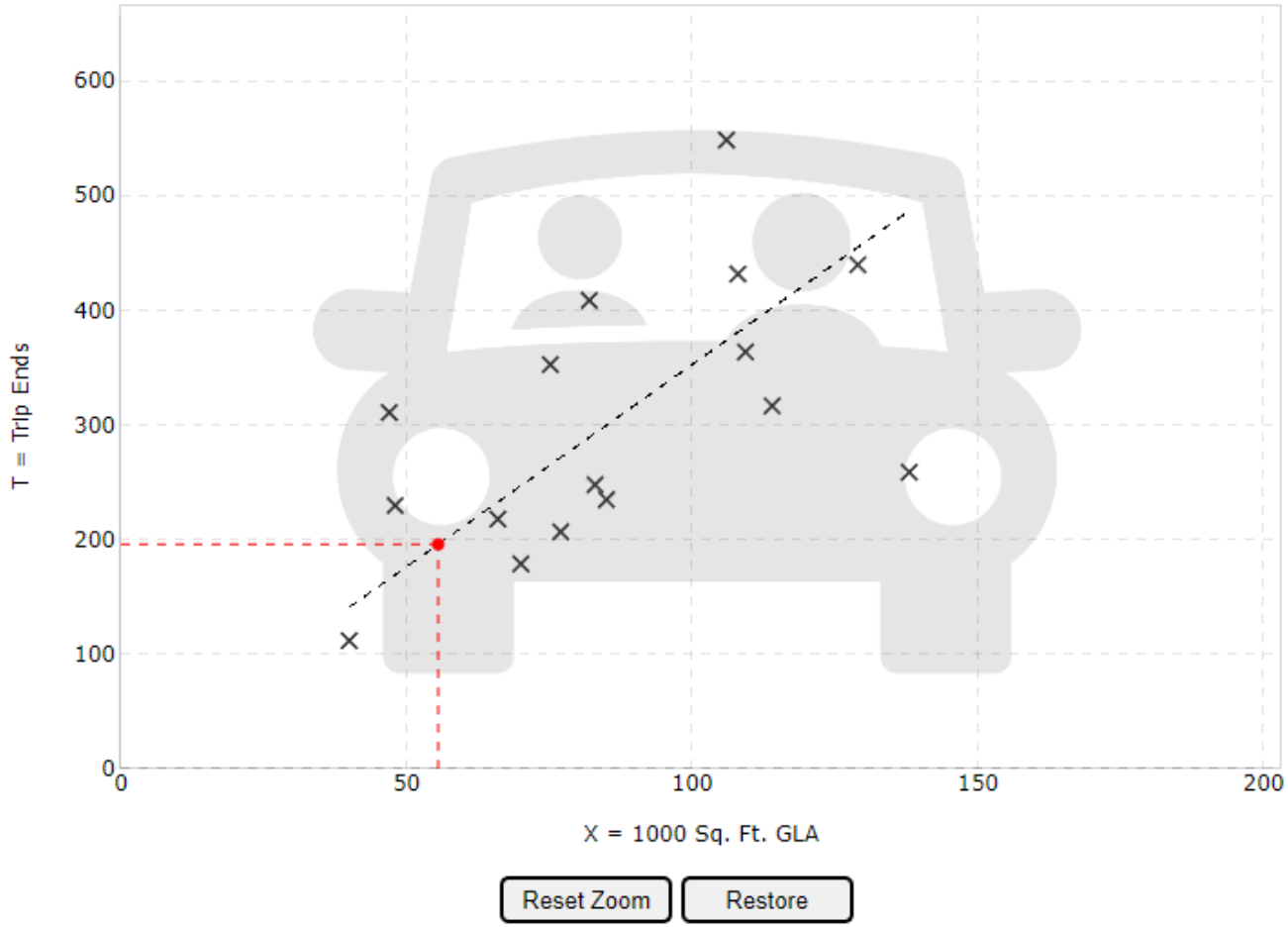
Fitted Curve Equation:
T = 76.96(X) + 1412.79

R^2:
0.50

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 5249 (Total), 2624 (Entry), 2625 (Exit)
Fitted Curve: 5688 (Total), 2844 (Entry), 2844 (Exit)

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Shopping Plaza (40-150k) - Supermarket - Yes (821)
Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GLA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
16

Avg. 1000 Sq. Ft. GLA:
86

Average Rate:
3.53

Range of Rates:
1.88 - 6.62

Standard Deviation:
1.17

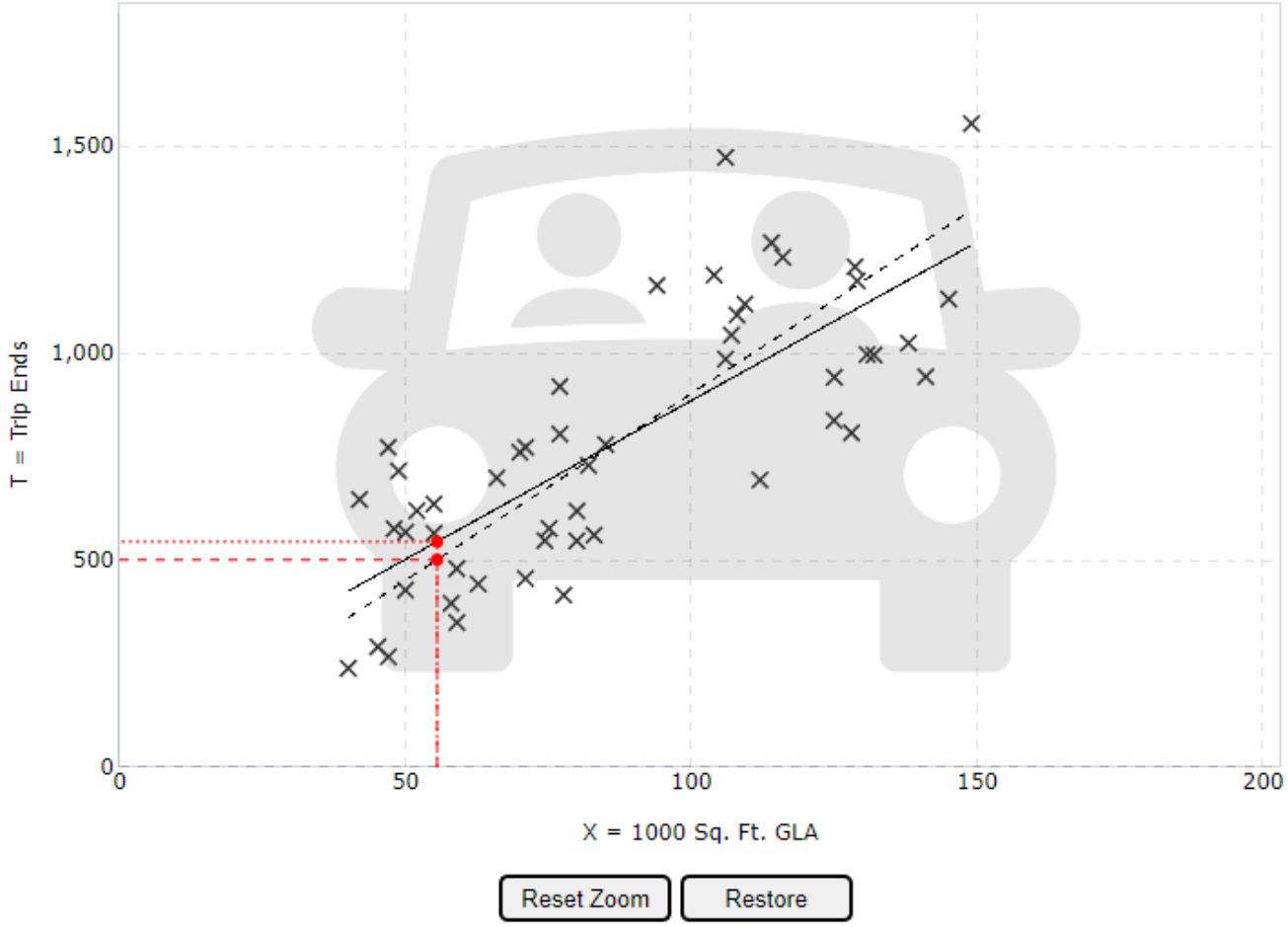
Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
62% entering, 38% exiting

Calculated Trip Ends:
Average Rate: 196 (Total), 121 (Entry), 75 (Exit)

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Shopping Plaza (40-150k) - Supermarket - Yes (821)
Click for Description and Data Plots

Independent Variable:
1000 Sq. Ft. GLA

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
51

Avg. 1000 Sq. Ft. GLA:
87

Average Rate:
9.03

Range of Rates:
5.35 - 16.45

Standard Deviation:
2.37

Fitted Curve Equation:
T = 7.67(X) + 118.86

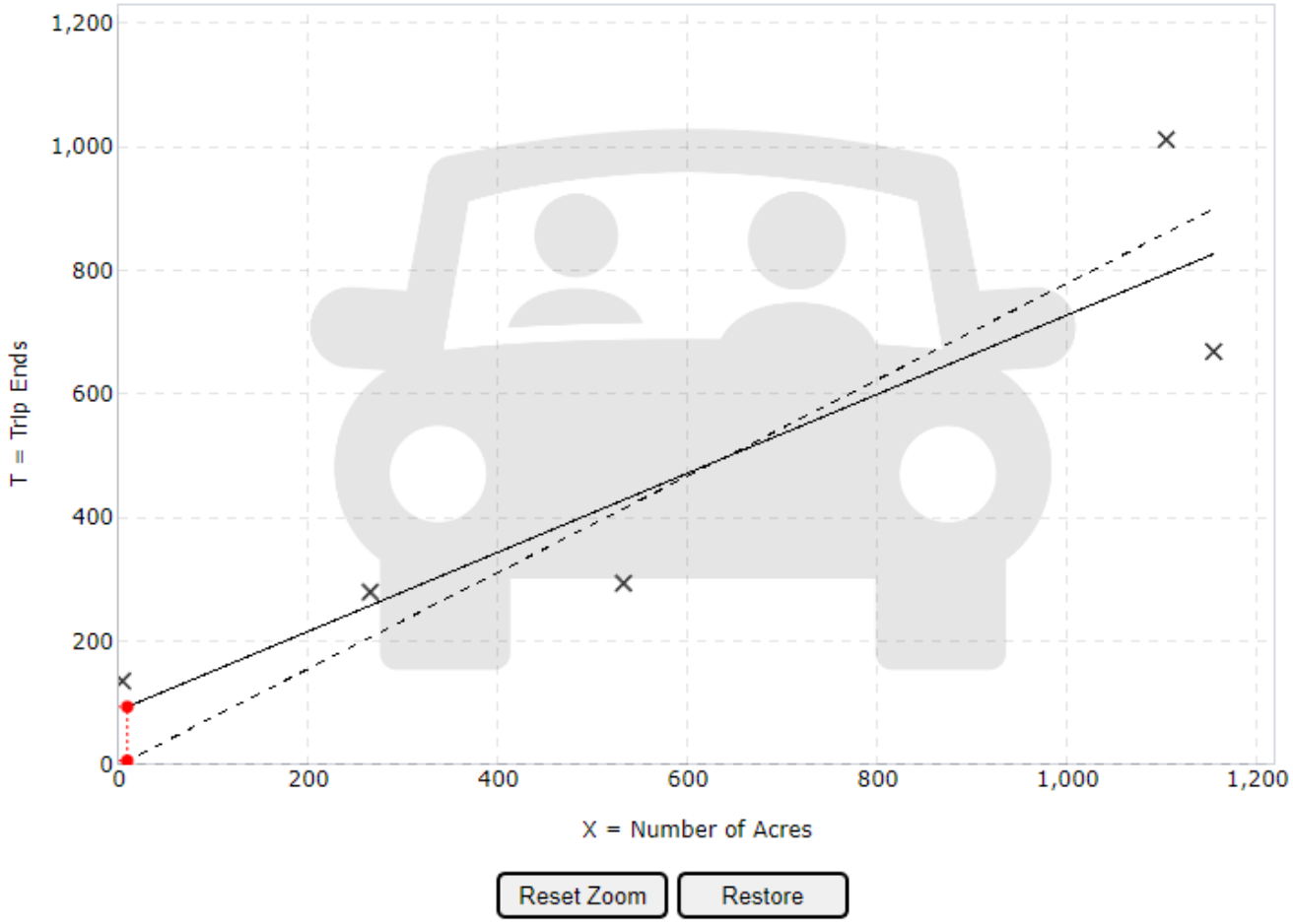
R^2:
0.62

Directional Distribution:
48% entering, 52% exiting

Calculated Trip Ends:
Average Rate: 502 (Total), 241 (Entry), 261 (Exit)
Fitted Curve: 545 (Total), 262 (Entry), 283 (Exit)

Data Plot and Equation

Caution – Small Sample Size



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Public Park (411) Click for Description and Data Plots

Independent Variable:
Acres

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
5

Avg. Num. of Acres:
612

Average Rate:
0.78

Range of Rates:
0.55 - 34.00

Standard Deviation:
1.36

Fitted Curve Equation:
T = 0.64(X) + 88.46

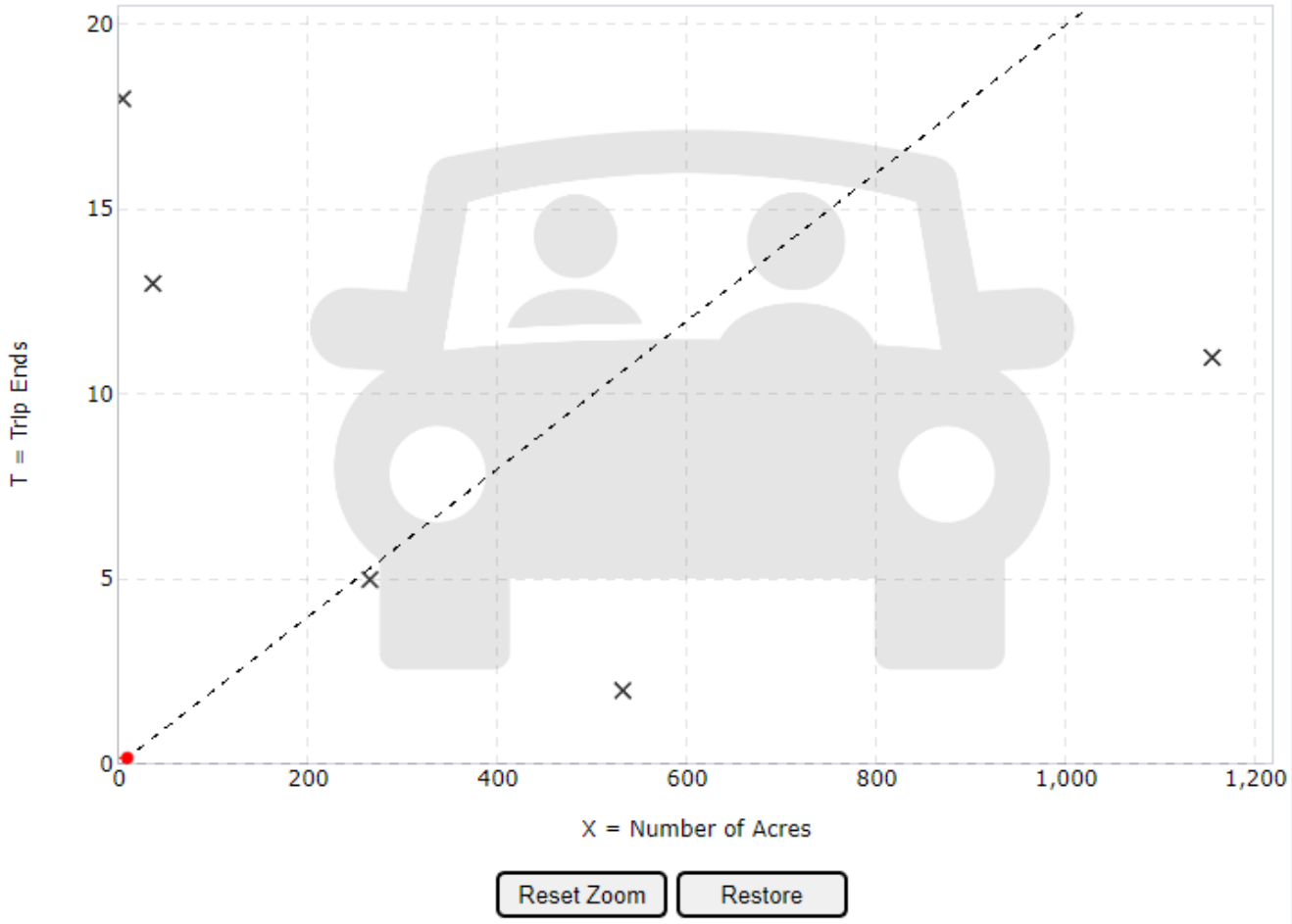
R^2:
0.82

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 7 (Total), 3 (Entry), 4 (Exit)
Fitted Curve: 94 (Total), 47 (Entry), 47 (Exit)

Data Plot and Equation

Caution – Small Sample Size



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Public Park (411) Click for Description and Data Plots

Independent Variable:
Acres

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
5

Avg. Num. of Acres:
398

Average Rate:
0.02

Range of Rates:
0.00 - 4.50

Standard Deviation:
0.23

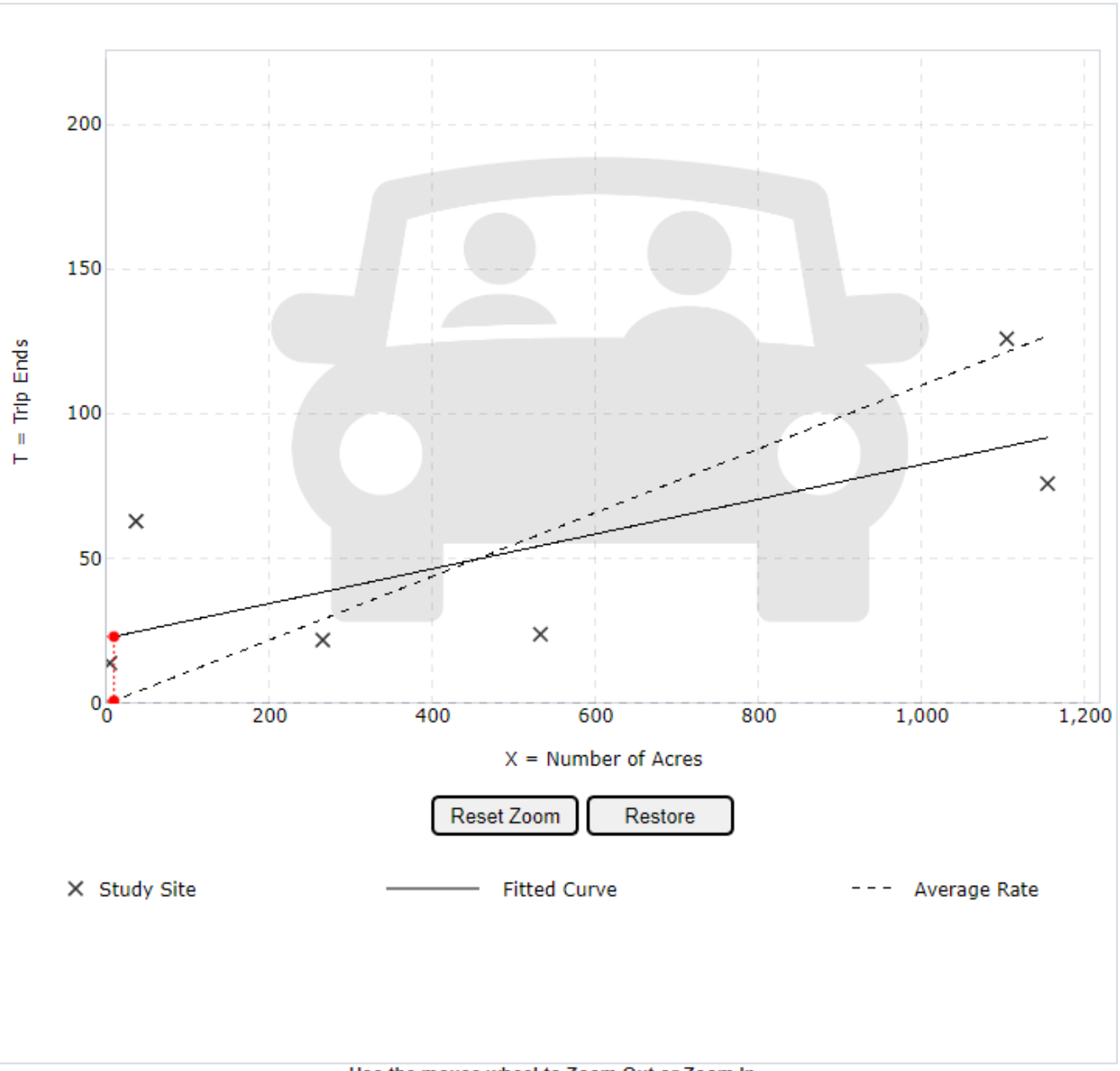
Fitted Curve Equation:
Not Given

R^2:
****

Directional Distribution:
59% entering, 41% exiting

Calculated Trip Ends:
Average Rate: 0 (Total), 0 (Entry), 0 (Exit)

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Public Park (411) Click for Description and Data Plots

Independent Variable:
Acres

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
6

Avg. Num. of Acres:
516

Average Rate:
0.11

Range of Rates:
0.05 - 3.50

Standard Deviation:
0.24

Fitted Curve Equation:
T = 0.06(X) + 22.60

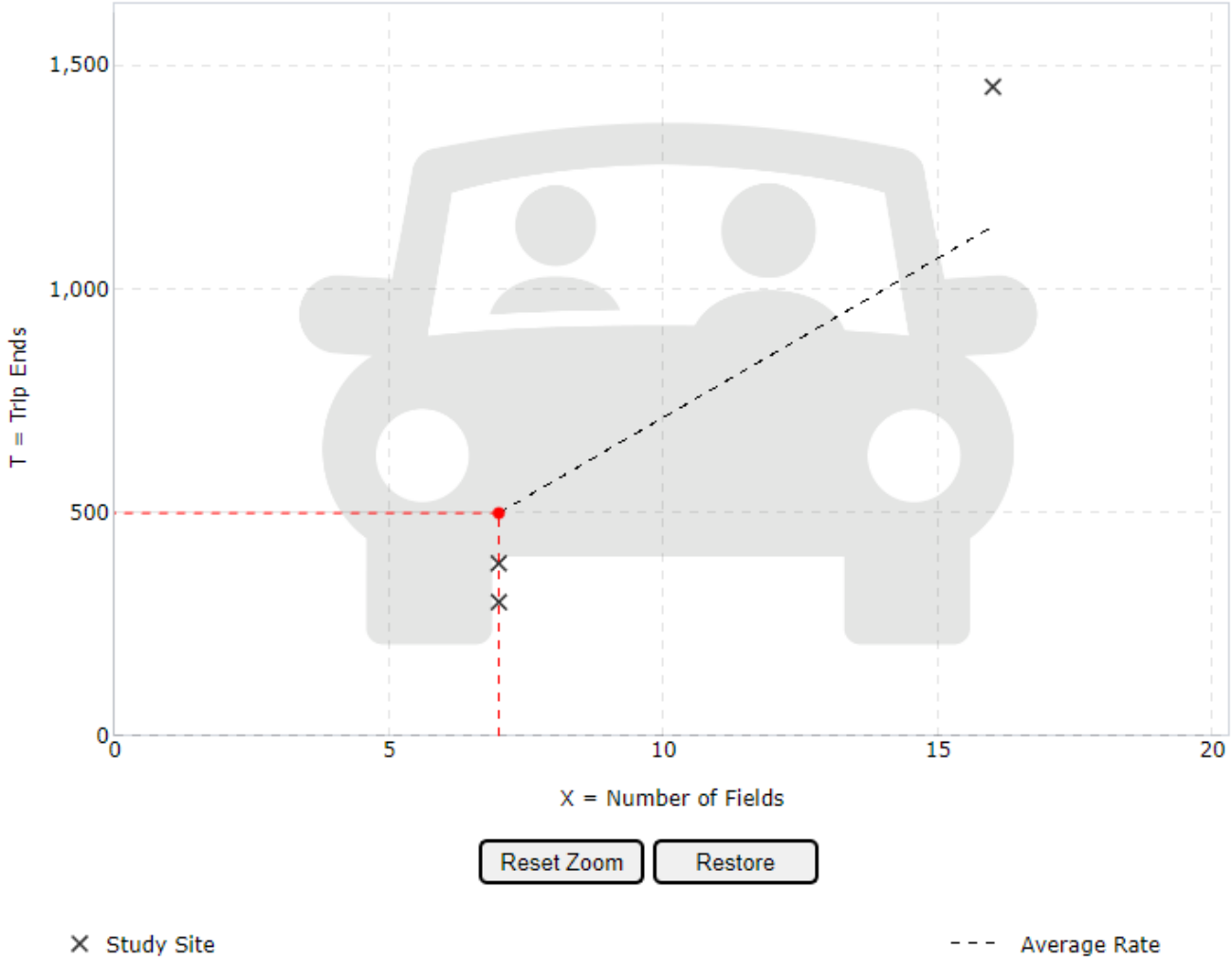
R^2:
0.53

Directional Distribution:
55% entering, 45% exiting

Calculated Trip Ends:
Average Rate: 1 (Total), 1 (Entry), 0 (Exit)
Fitted Curve: 23 (Total), 13 (Entry), 10 (Exit)

Data Plot and Equation

Caution – Small Sample Size



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Soccer Complex (488) Click for Description and Data Plots

Independent Variable:
Fields

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
3

Avg. Num. of Fields:
10

Average Rate:
71.33

Range of Rates:
42.86 - 90.81

Standard Deviation:
26.03

Fitted Curve Equation:
Not Given

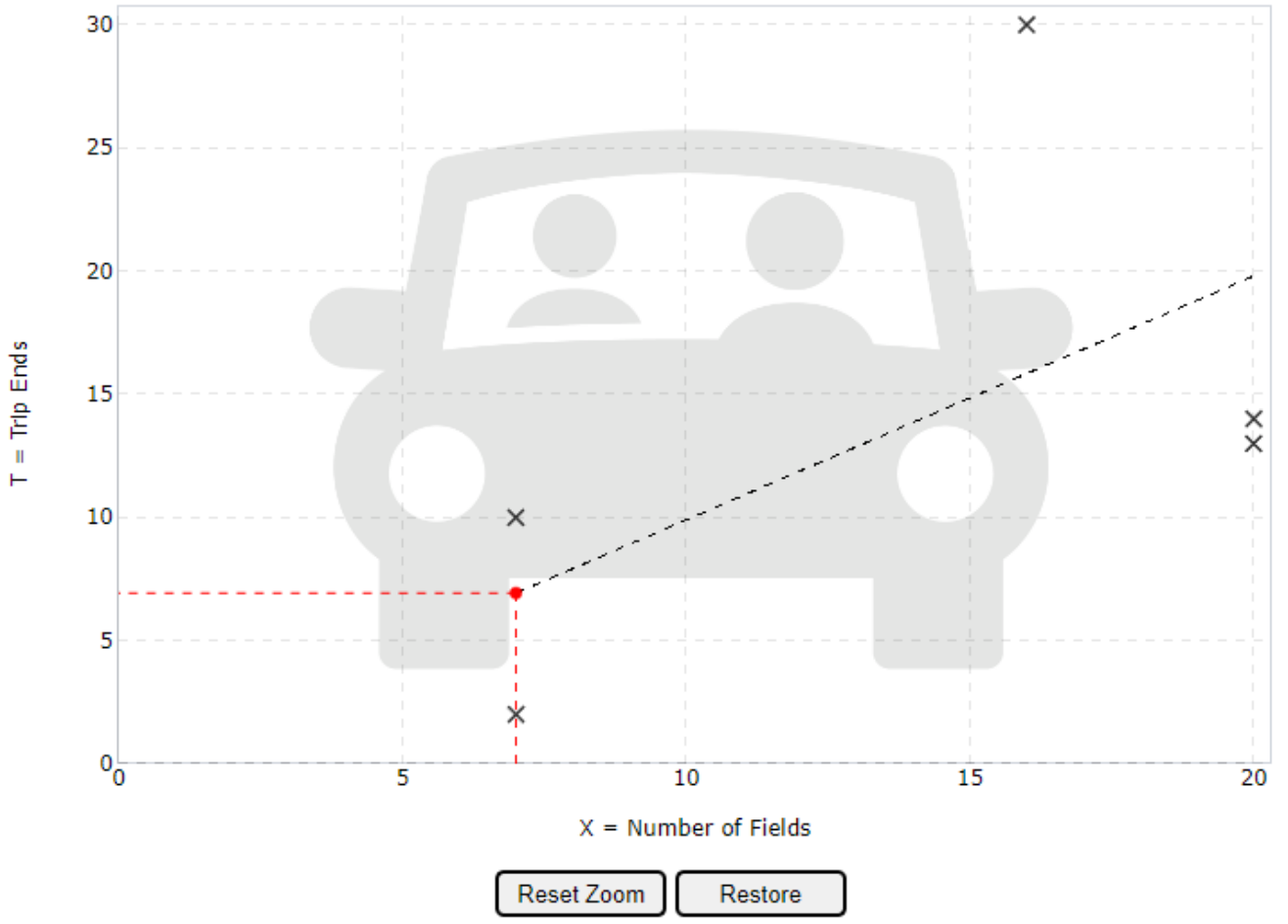
R^2:
****

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 499 (Total), 249 (Entry), 250 (Exit)

Data Plot and Equation

Caution – Small Sample Size



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Soccer Complex (488) Click for Description and Data Plots

Independent Variable:
Fields

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
5

Avg. Num. of Fields:
14

Average Rate:
0.99

Range of Rates:
0.29 - 1.88

Standard Deviation:
0.62

Fitted Curve Equation:
Not Given

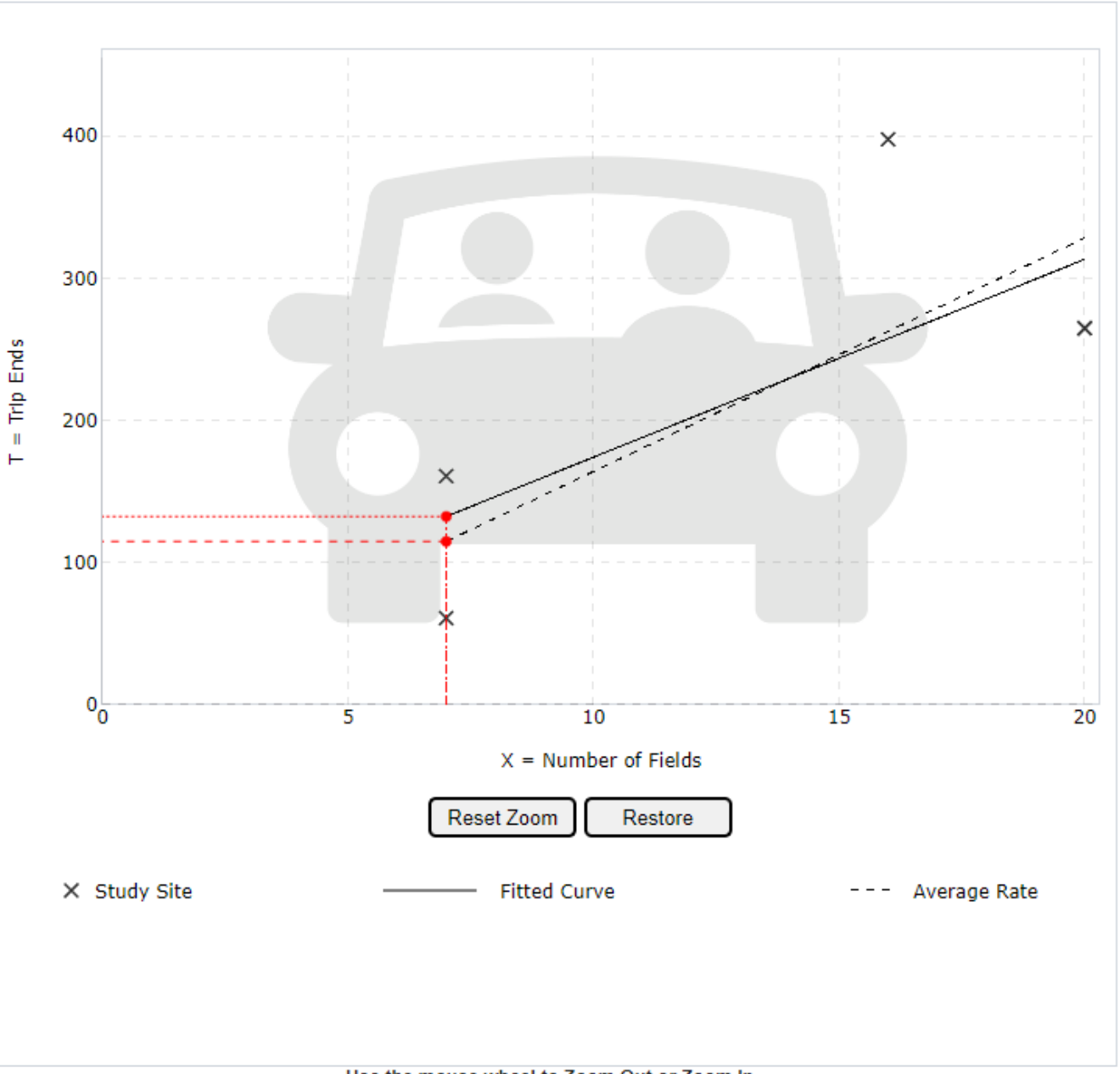
R^2:
****

Directional Distribution:
61% entering, 39% exiting

Calculated Trip Ends:
Average Rate: 7 (Total), 4 (Entry), 3 (Exit)

Data Plot and Equation

Caution – Small Sample Size



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Soccer Complex (488) Click for Description and Data Plots

Independent Variable:
Fields

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
5

Avg. Num. of Fields:
14

Average Rate:
16.43

Range of Rates:
8.71 - 24.88

Standard Deviation:
6.36

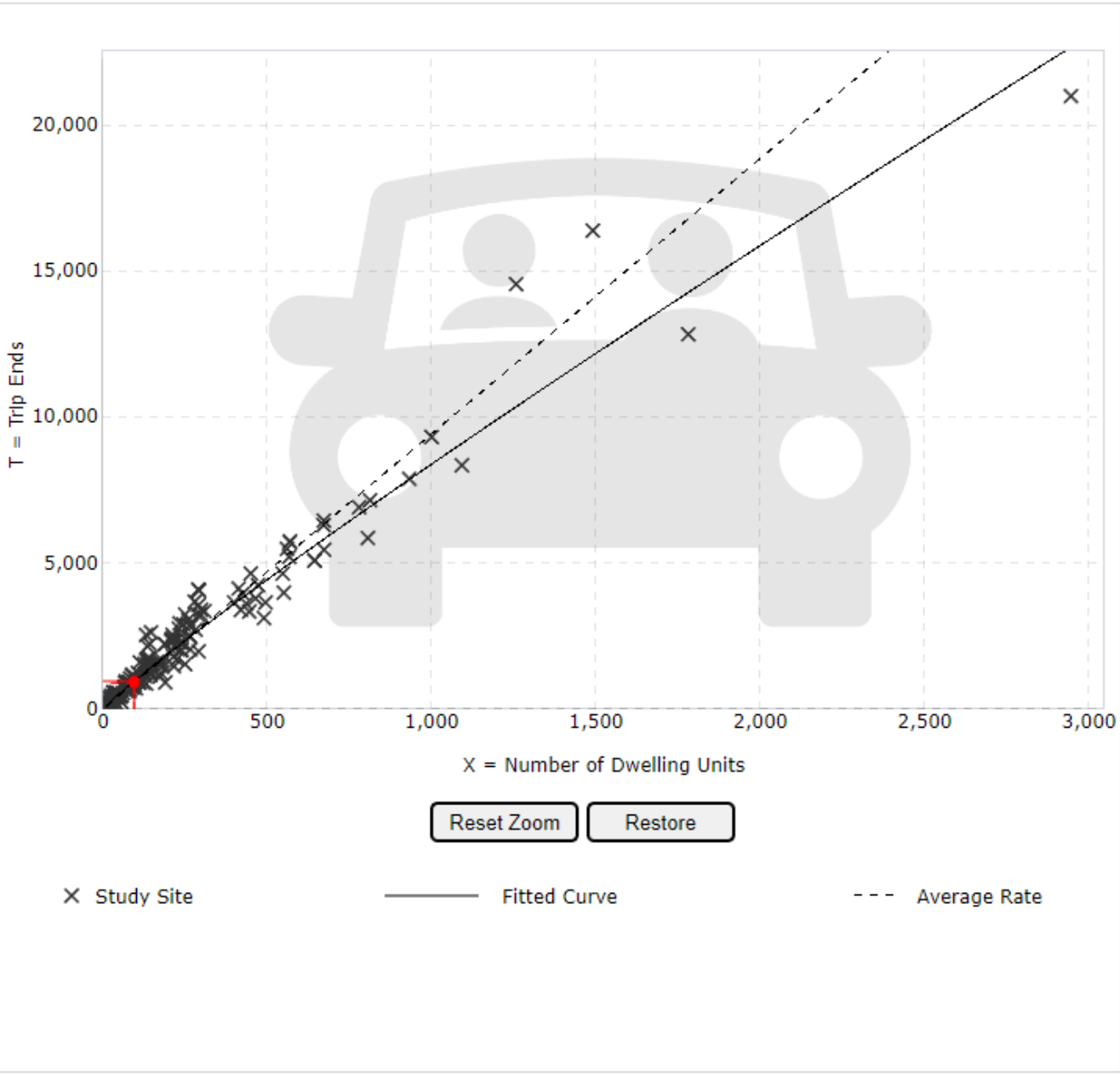
Fitted Curve Equation:
T = 13.92(X) + 35.13

R^2:
0.53

Directional Distribution:
66% entering, 34% exiting

Calculated Trip Ends:
Average Rate: 115 (Total), 76 (Entry), 39 (Exit)
Fitted Curve: 133 (Total), 87 (Entry), 46 (Exit)

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Single-Family Detached Housing (210) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
174

Avg. Num. of Dwelling Units:
246

Average Rate:
9.43

Range of Rates:
4.45 - 22.61

Standard Deviation:
2.13

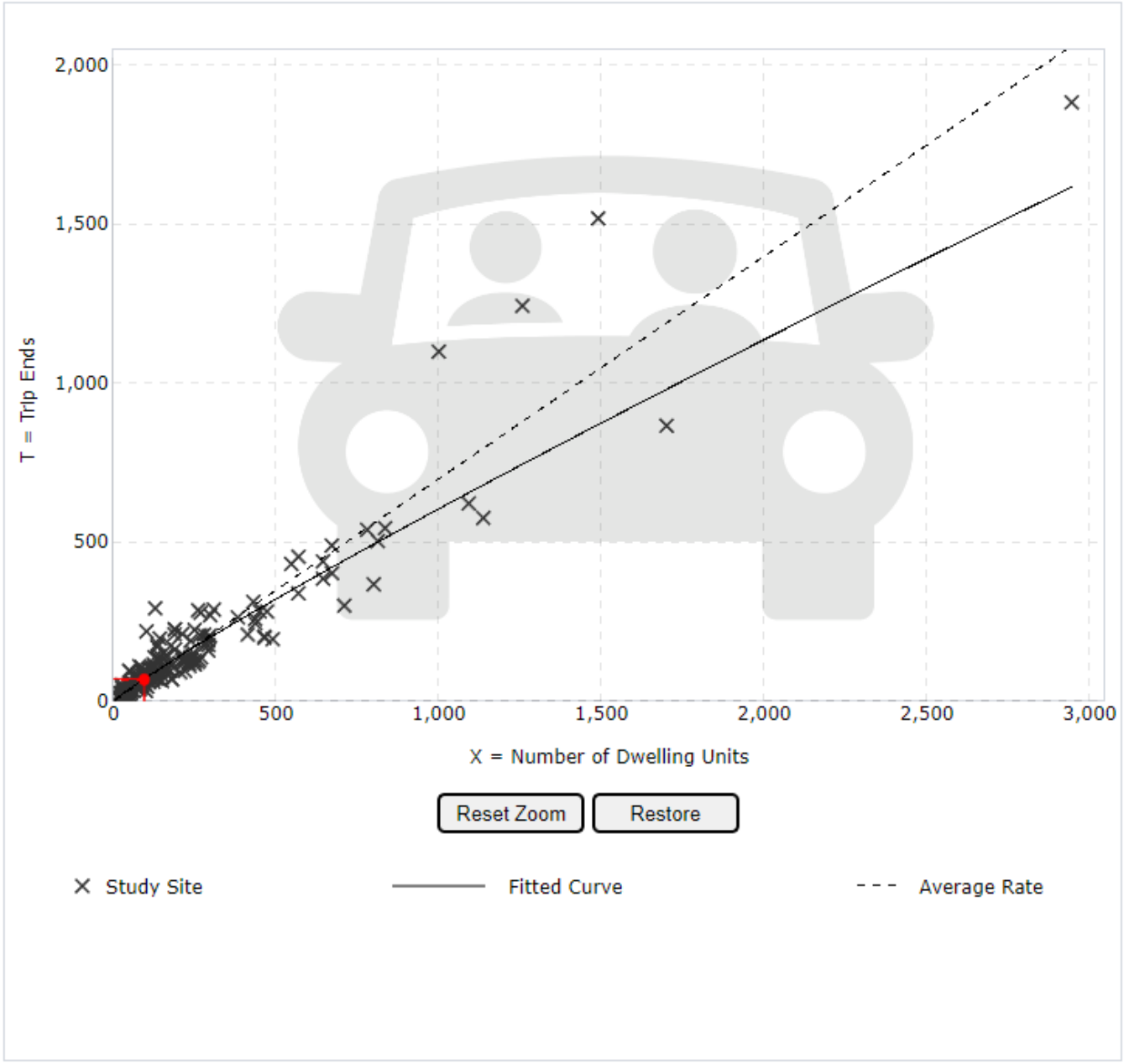
Fitted Curve Equation:
$Ln(T) = 0.92\ Ln(X) + 2.68$

R^2:
0.95

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 896 (Total), 448 (Entry), 448 (Exit)
Fitted Curve: 963 (Total), 481 (Entry), 482 (Exit)

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Single-Family Detached Housing (210) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
192

Avg. Num. of Dwelling Units:
226

Average Rate:
0.70

Range of Rates:
0.27 - 2.27

Standard Deviation:
0.24

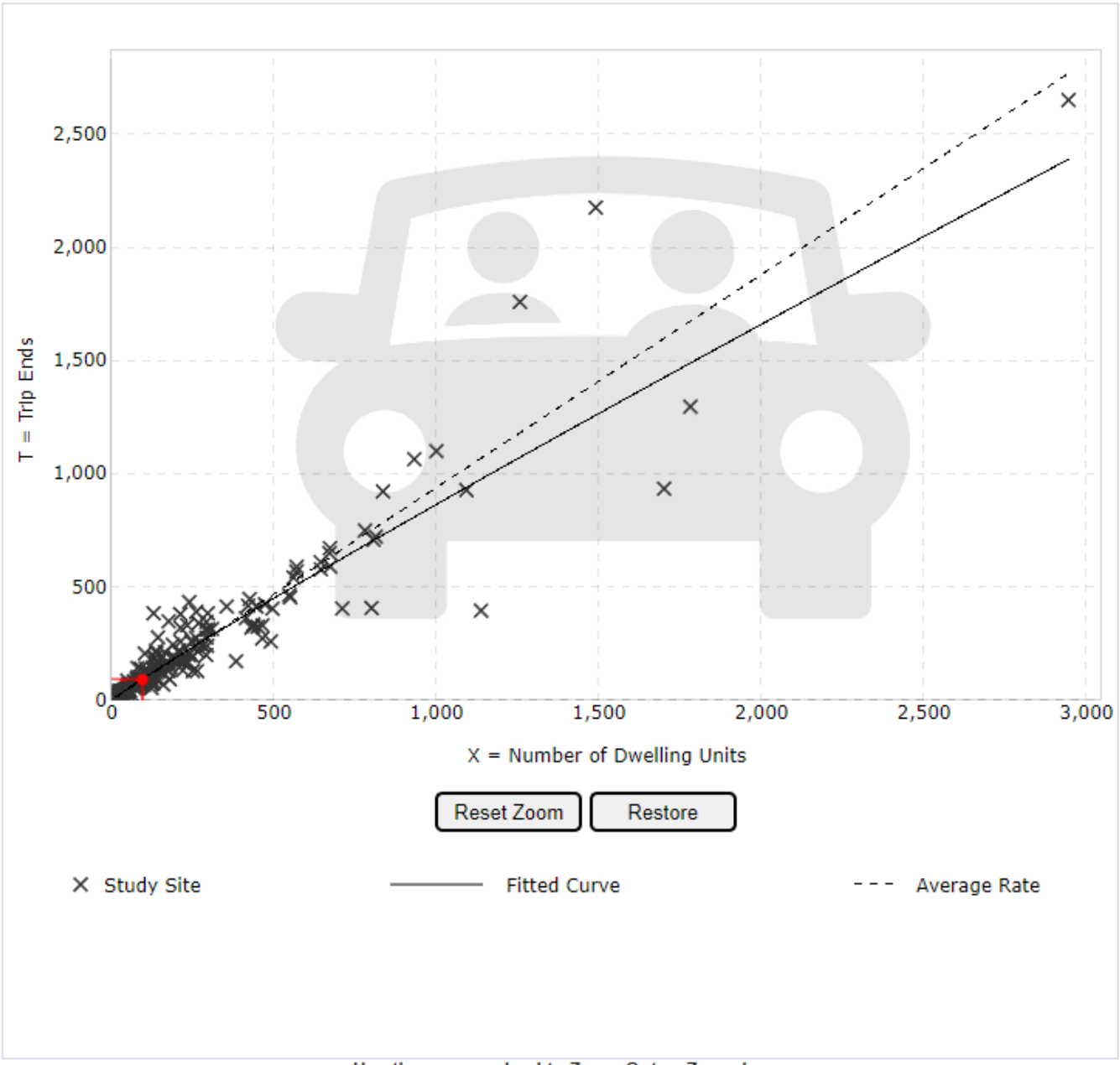
Fitted Curve Equation:
Ln(T) = 0.91 Ln(X) + 0.12

R^2:
0.90

Directional Distribution:
26% entering, 74% exiting

Calculated Trip Ends:
Average Rate: 67 (Total), 17 (Entry), 50 (Exit)
Fitted Curve: 71 (Total), 18 (Entry), 53 (Exit)

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Single-Family Detached Housing (210) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
208

Avg. Num. of Dwelling Units:
248

Average Rate:
0.94

Range of Rates:
0.35 - 2.98

Standard Deviation:
0.31

Fitted Curve Equation:
Ln(T) = 0.94 Ln(X) + 0.27

R^2:
0.92

Directional Distribution:
63% entering, 37% exiting

Calculated Trip Ends:
Average Rate: 89 (Total), 56 (Entry), 33 (Exit)
Fitted Curve: 95 (Total), 60 (Entry), 35 (Exit)

KNOXVILLE-KNOX COUNTY
MPC
METROPOLITAN PLANNING COMMISSION
TENNESSEE

MEMORANDUM

To: Traffic Impact Study Reviewers and Preparers (see attached list)

From: Mike Conger MDC

Date: August 14, 2000

Subject: Local Trip Generation Rates for Multi-Family Residential Uses

---

Attached please find a summary of the final report with data plots for the Knox County Local Apartment Trip Generation Study. As you will recall, this report was discussed when the traffic impact study group last convened this past February. A consensus was reached at that meeting that the trip generation rates developed in the local study should be used for new apartment complexes and any other "multi-family" residential uses that are being proposed.

The MPC voted at its July 2000 meeting to officially amend the Traffic Impact Study Guidelines with language which reads that "trip generation rates for proposed uses shall be calculated using the latest edition of the ITE Trip Generation Manual, or using local data when it is available". This amendment allows the full implementation of the new rates, and they should be used for future proposed multi-family developments unless it can be demonstrated otherwise.

Thanks for your assistance and cooperation in this matter, if there are any questions or comments, please let me know.

Suite 403 • City County Building
400 Main Street
Knoxville, Tennessee 37902
865 • 215 • 2500
FAX • 215 • 2068
www • knoxmpc • org

MULTI-FAMILY RESIDENTIAL (400 UNITS)-Knoxville-Knox County Planning 2000

DAILY TRIPS

$T=15.193(X)^{0.899}$

$T=15.193(400)^{0.899}$

T=3,318

AM PEAK HOUR OF ADJACENT STREET

$T=0.758(X)^{0.924}$

$T=0.758(400)^{0.924}$

T=192

PM PEAK HOUR OF ADJACENT STREET

$T=0.669(X)+10.069$

$T=0.669(400)+10.069$

T=278

TURN LANE ANALYSIS

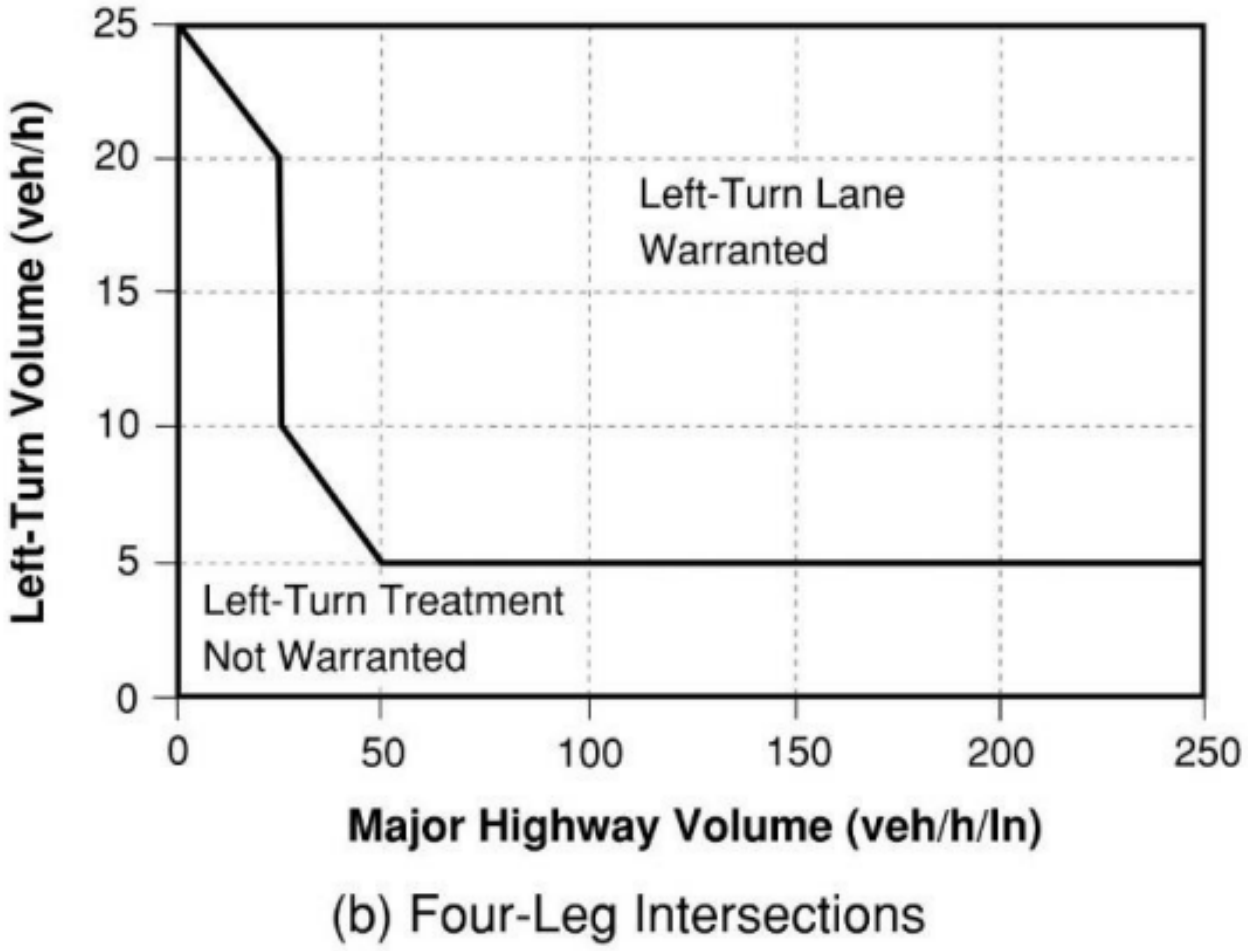


Figure 3-17: Left-Turn Lane Warrant for Four-Lane Rural Roadways (Unsignalized)

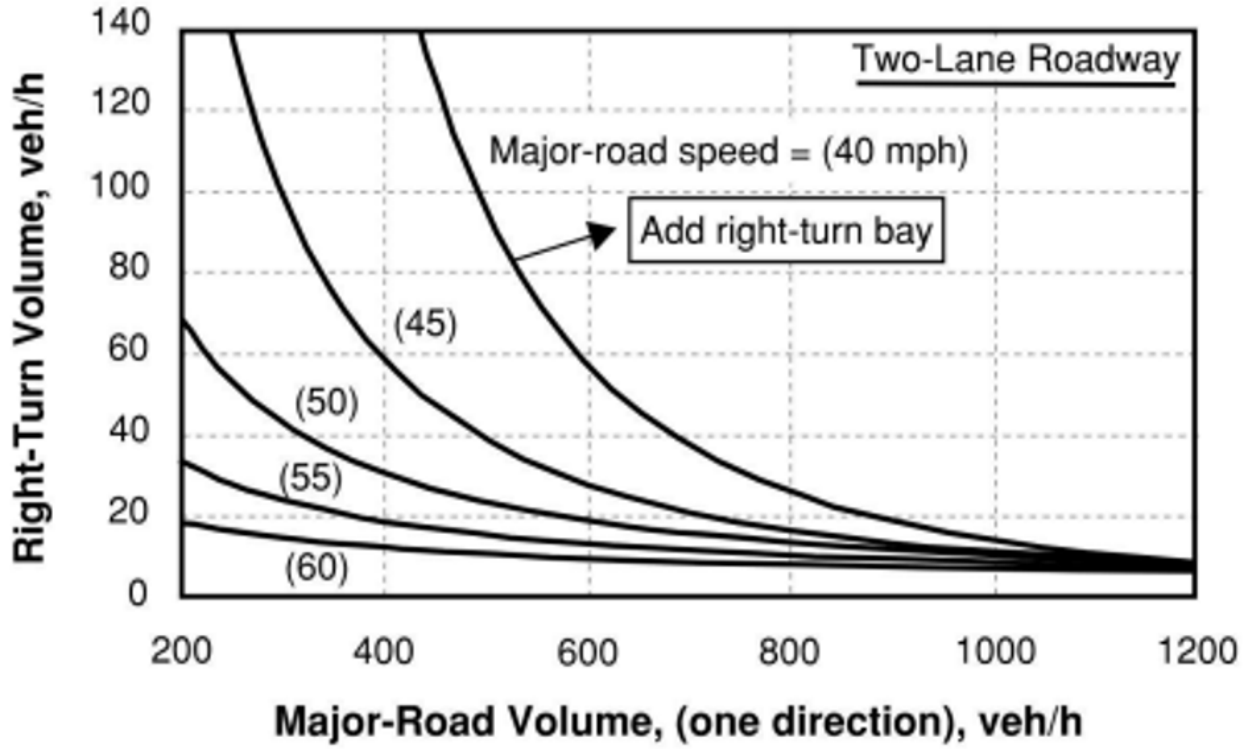
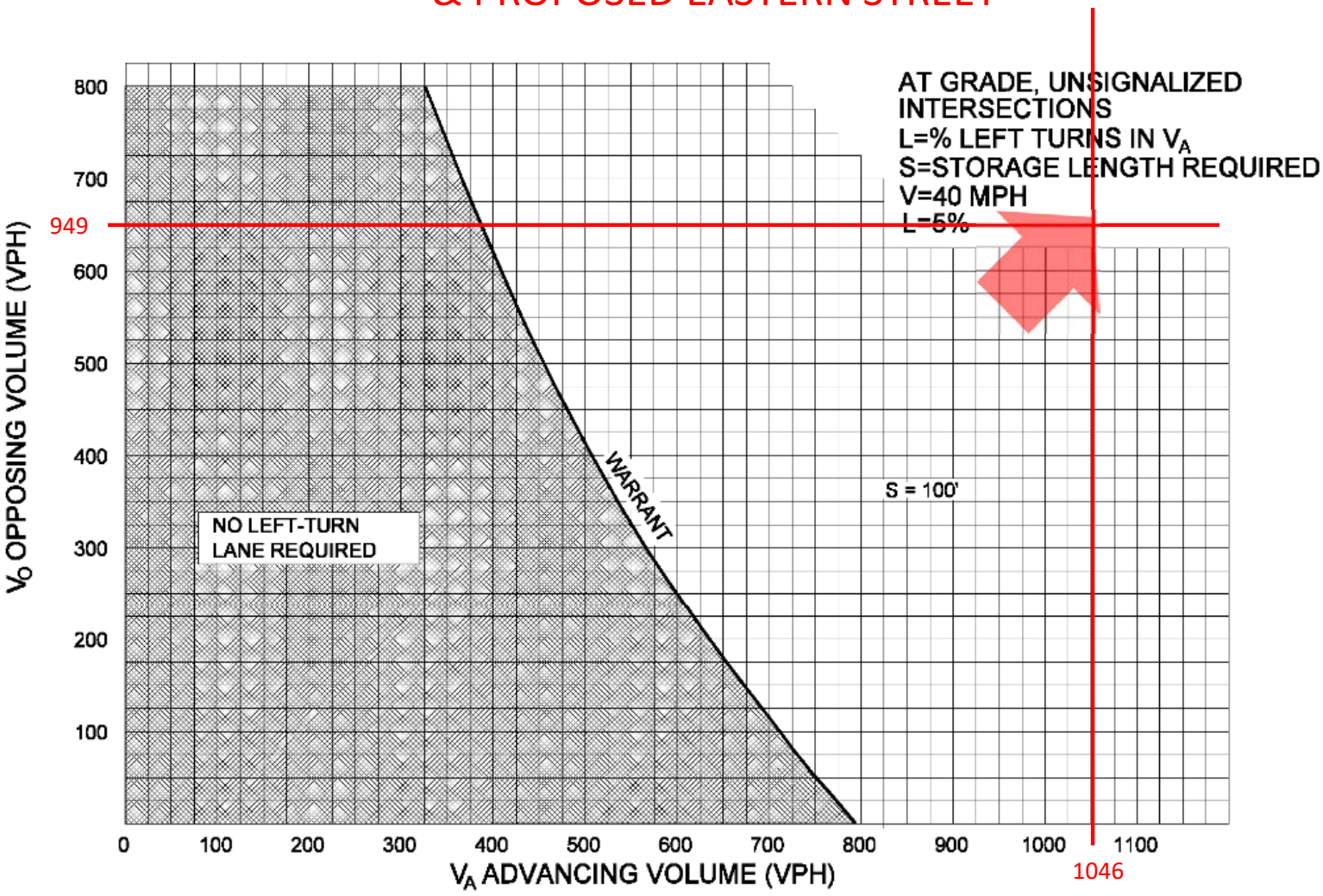
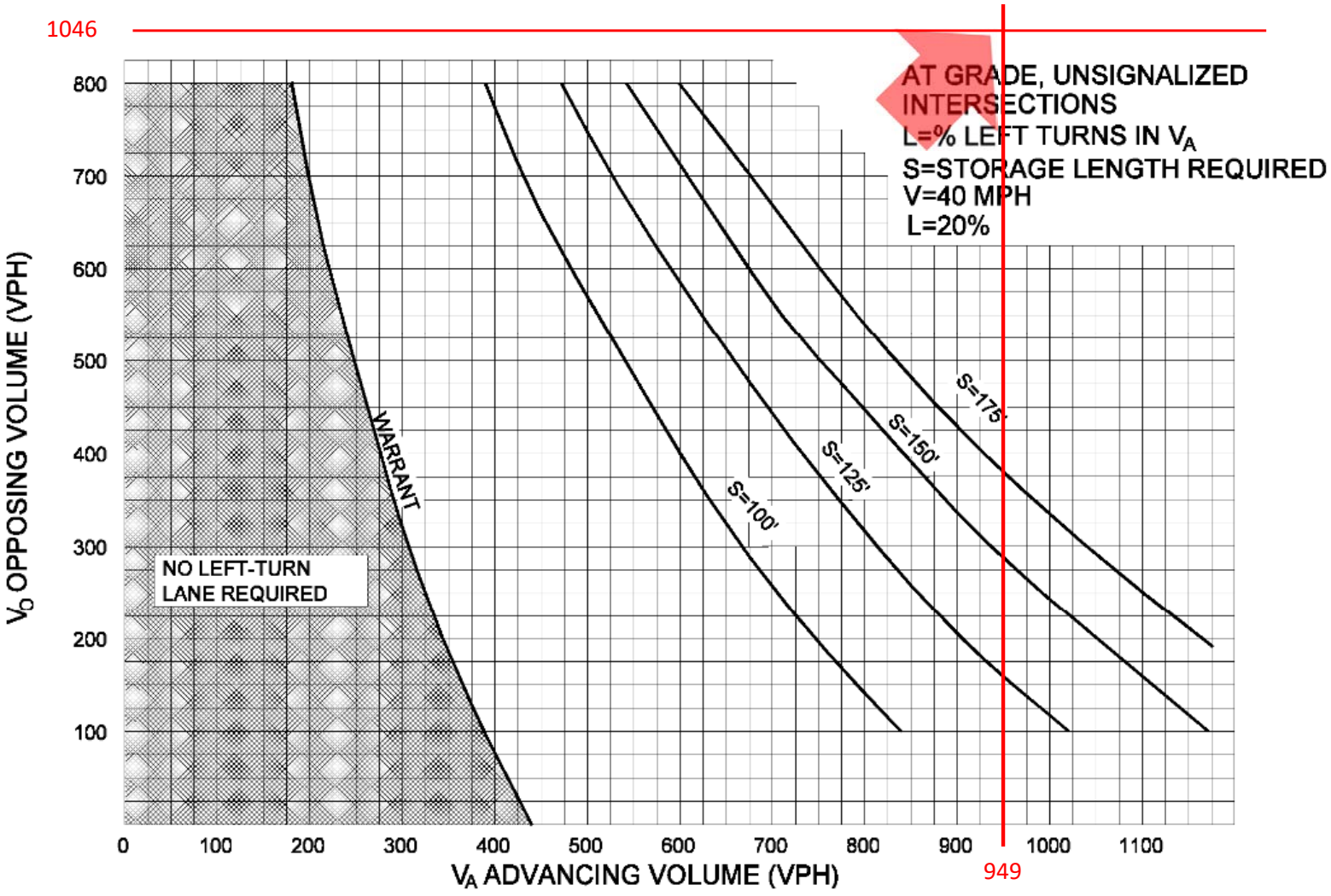


Figure 3-18: Right-Turn Lane Warrant along Two-Lane Roadway (Unsignalized Intersection with Two-Way Stop-Control)[24]

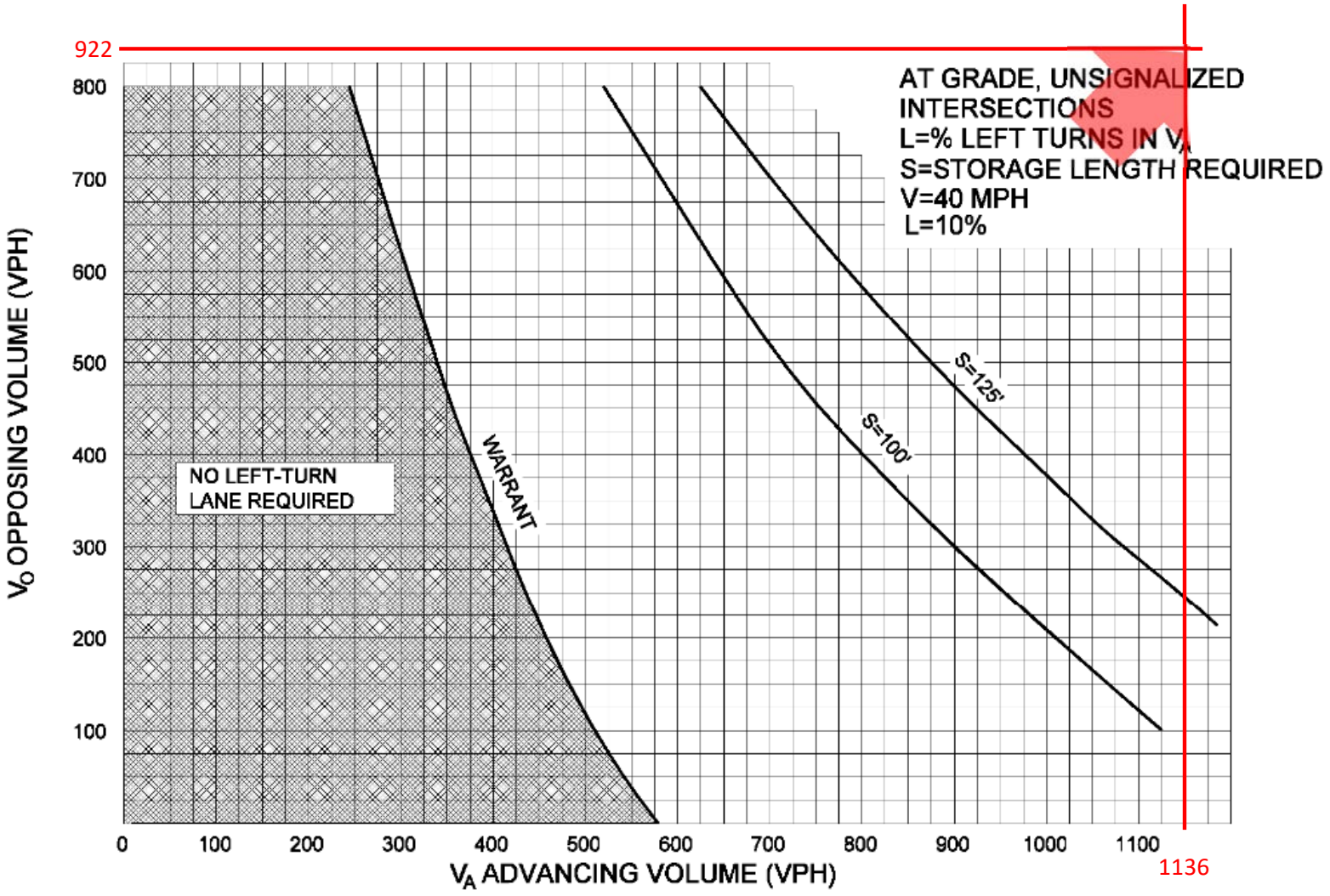
W EMORY ROAD (SR 131)
EASTBOUND
& PROPOSED EASTERN STREET



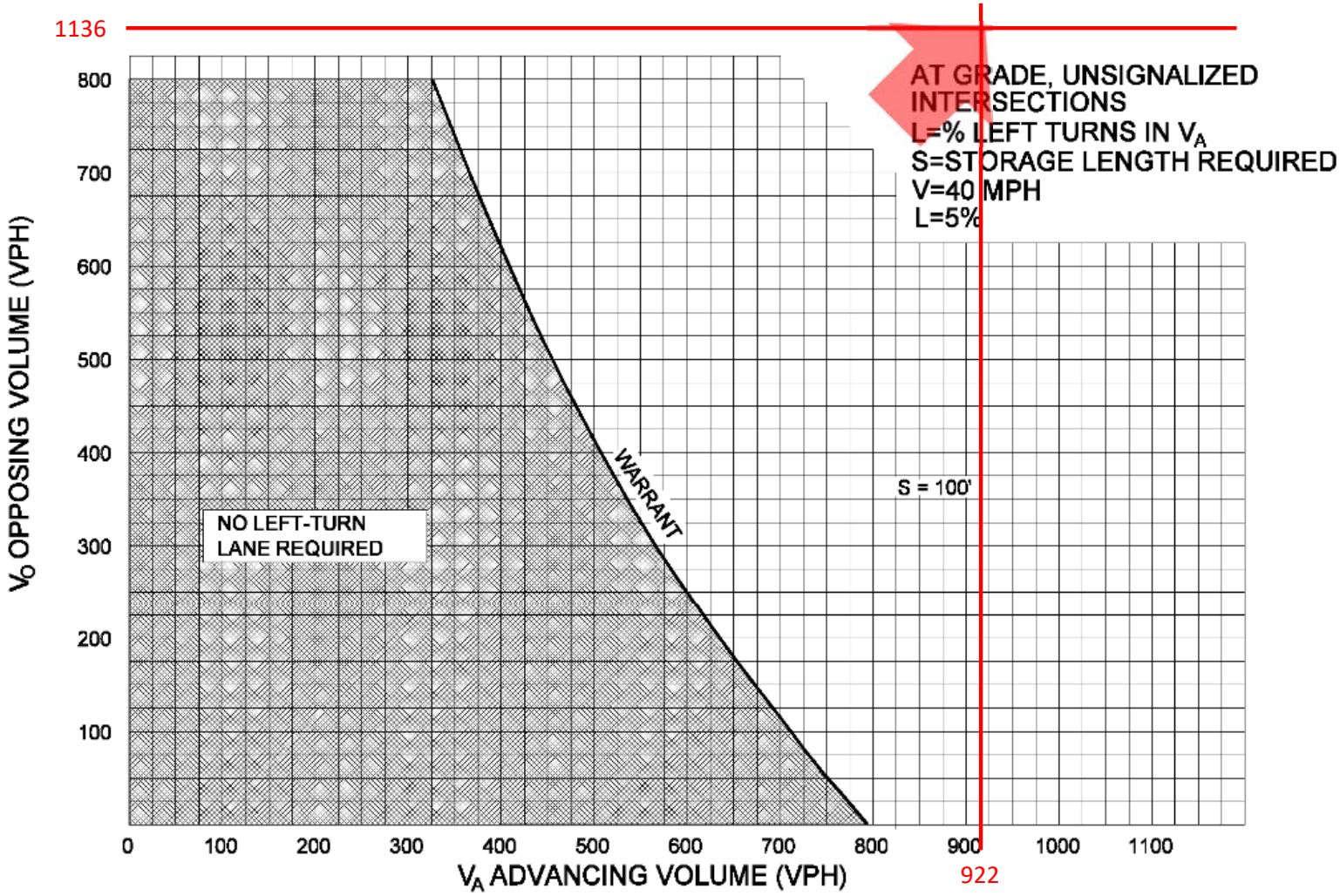
W EMORY ROAD (SR 131)
WESTBOUND
& PROPOSED EASTERN STREET



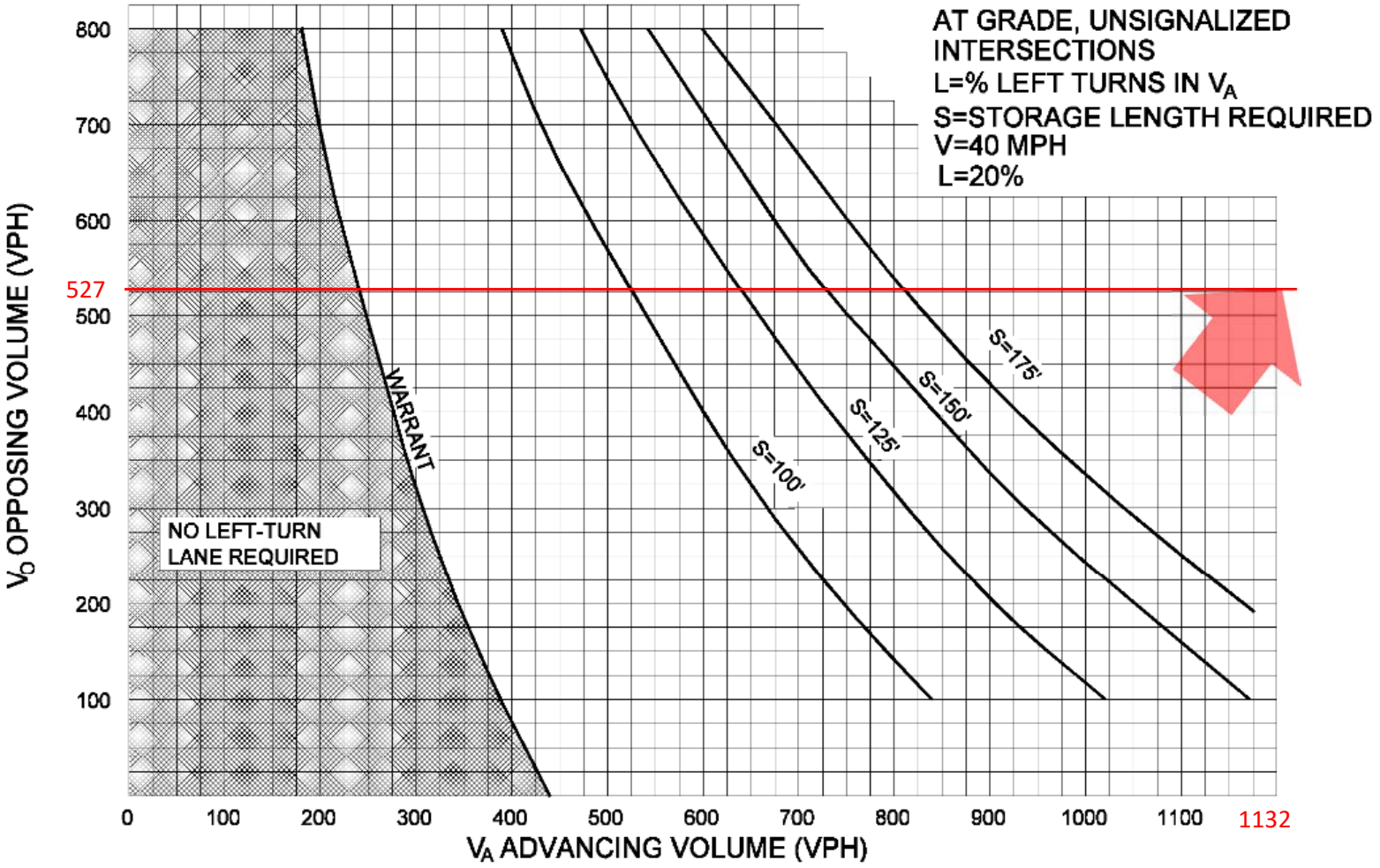
W EMORY ROAD (SR 131)
EASTBOUND
& PROPOSED WESTERN STREET

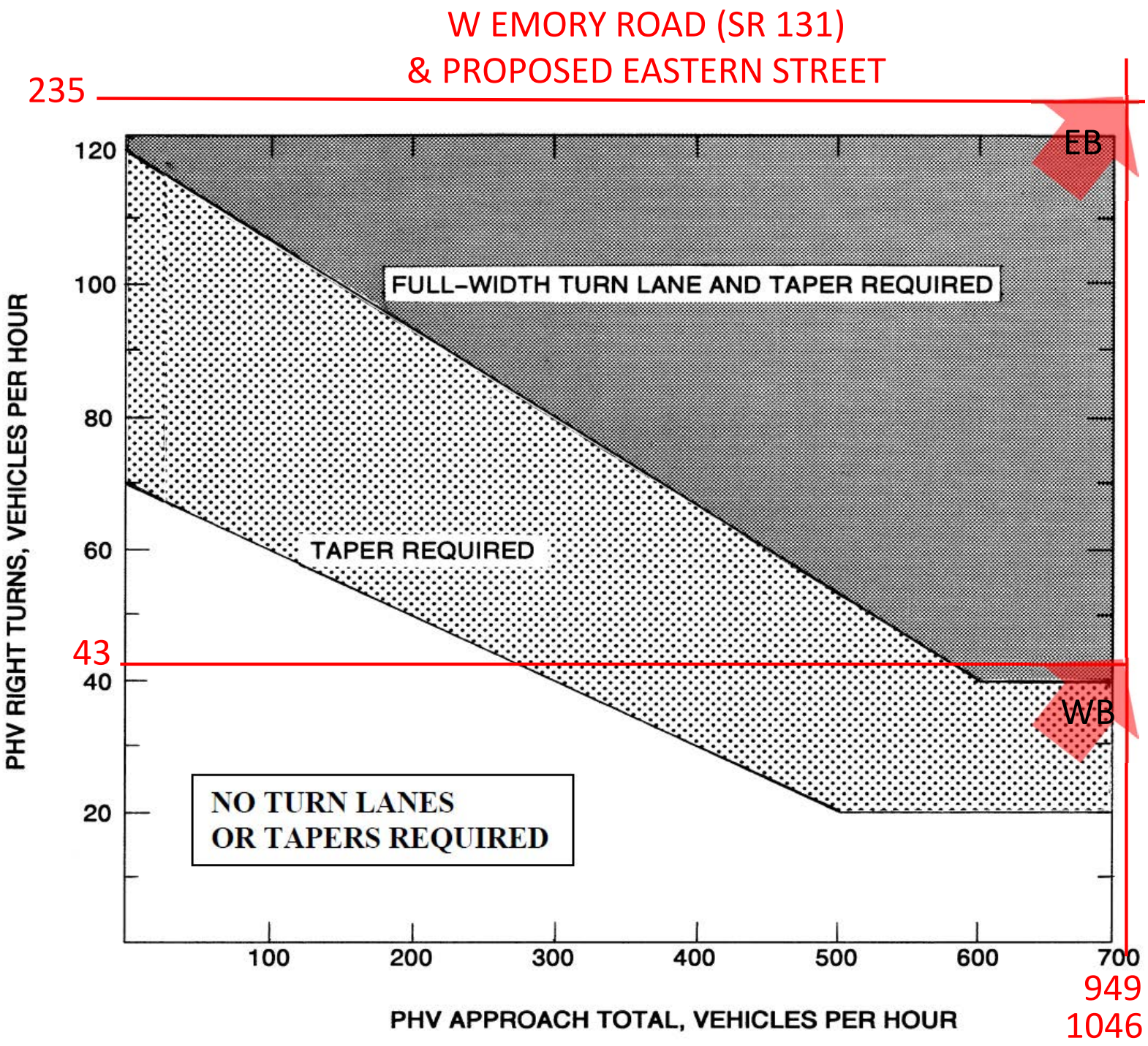


W EMORY ROAD (SR 131)
WESTBOUND
& PROPOSED WESTERN STREET



W EMORY ROAD (SR 131)
WESTBOUND
& HARRELL ROAD

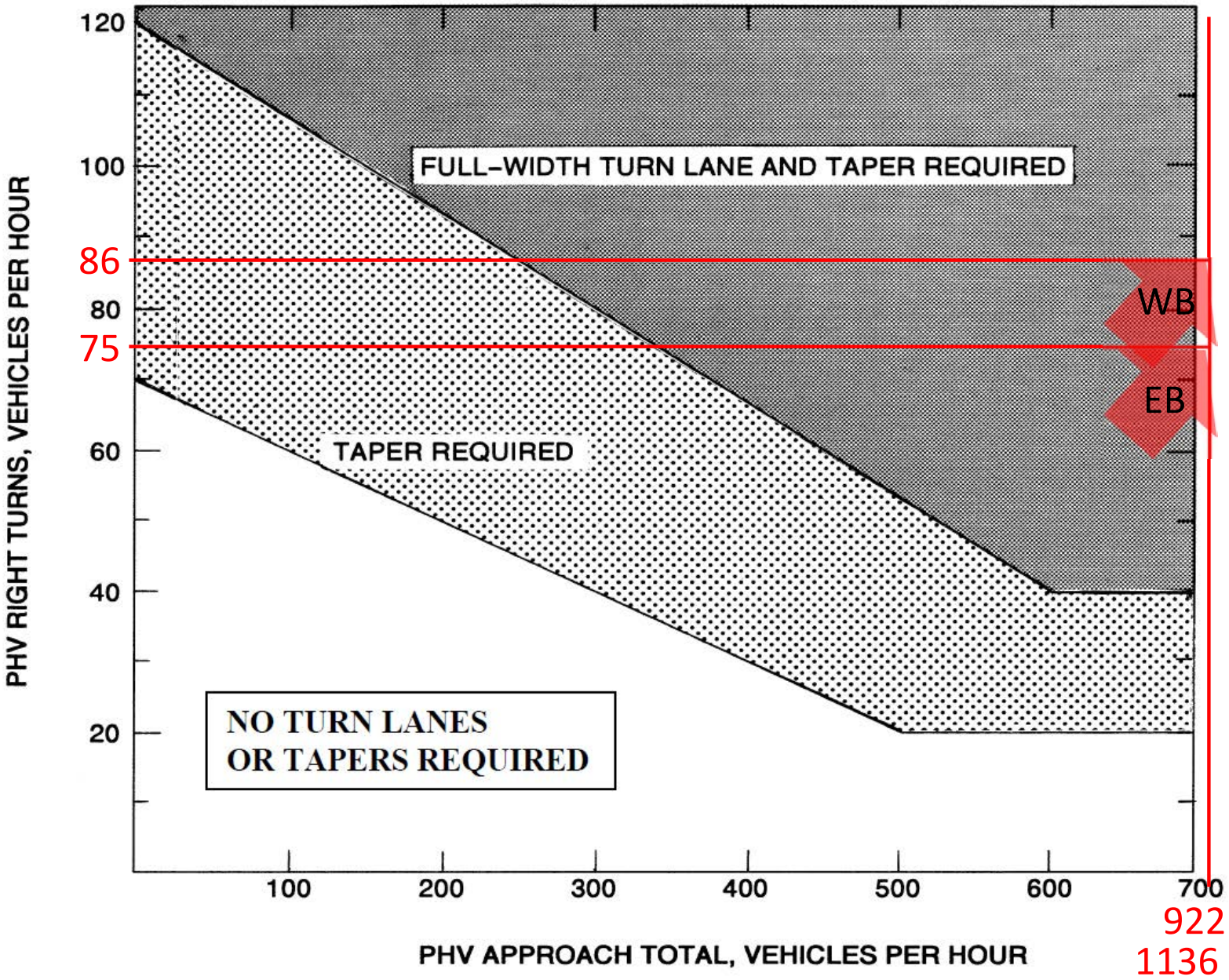




GUIDELINES FOR RIGHT TURN TREATMENT (2-LANE HIGHWAY)

NCHRPR 279 INTERSECTION CHANNELIZATION DESIGN GUIDE,
Virginia Highway and Transportation Research council Report March 1981

W EMORY ROAD (SR 131)
& PROPOSED WESTERN STREET



GUIDELINES FOR RIGHT TURN TREATMENT (2-LANE HIGHWAY)

TABLE 5A

LEFT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH

(If the left-turn volume exceeds the table value a left -turn lane is needed)

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149 150 - 199	250 200	180 140	140 105	110 90	80 70	70 60
200 - 249 250 - 299	160 130	115 100	85 75	75 65	65 60	55 50
300 - 349 350 - 399	110 100	90 80	70 65	60 55	55 50	45 40
400 - 449 450 - 499	90 80	70 65	60 55	50 45	45 40	35 30
500 - 549 550 - 599	70 65	60 55	45 40	35 35	35 30	25 25
600 - 649 650 - 699	60 55	45 35	35 35	30 30	25 25	25 20
700 - 749 750 or More	50 45	35 35	30 25	25 25	20 20	20 20

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	=/ > 600
100 - 149 150 - 199	70 60	60 55	50 45	45 40	40 35	35 30
200 - 249 250 - 299	55 50	50 45	40 35	35 30	30 30	30 30
300 - 349 350 - 399	45 40	40 35	35 30	30 25	25 25	25 20
400 - 449 450 - 499	35 30	30 25	30 25	25 20	20 20	20 20
500 - 549 550 - 599	25 25	25 20	20 20	20 20	20 20	15 15
600 - 649 650 - 699	25 20	20 20	20 20	20 20	20 20	15 15
700 - 749 750 or More	20 20	20 20	20 20	15 15	15 15	15 15

* Or through volume only if a right-turn lane exists

TABLE 5B

RIGHT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	< 100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25 25 - 49 50 - 99						
100 - 149 150 - 199						
200 - 249 250 - 299					Yes	Yes Yes
300 - 349 350 - 399			Yes	Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499		Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600
Fewer Than 25 25 - 49 50 - 99				Yes	Yes Yes	Yes Yes
100 - 149 150 - 199		Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
200 - 249 250 - 299	Yes Yes		Yes Yes	Yes Yes	Yes Yes	Yes Yes
300 - 349 350 - 399	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499	Yes Yes		Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes Yes		Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

WB East Access St 43vph

EB/WB West Access St 75vph/86vph

EB East Access St 235vph

* Or through volume only if a left-turn lane exists.

SIGNAL WARRANT ANALYSIS

INTERSECTION: **W Emory Road (SR 131) & Proposed East Site Access-LT Movements**
JOB NUMBER: **273868**
DATE: 06/28/2022

			PEDESTRIAN GAPS/HOUR :	28	
			ESTABLISHED SCHOOL CROSSING, MINIMUM 20 Xing (YES/NO):	NO	
85TH PERCENTILE SPEED:	59		NEAREST SIGNALIZED INTERSECTION:	0	
POPULATION:	350,000		IMPROVE PROGRESSION-PLATOONING (YES/NO):	NO	
NUMBER OF APPROACHES:	4		MAJOR ROUTES (YES/NO):	NO	
LANES ON MAIN STREET:	1		WARRANTS IN 5 YRS (YES/NO):	NO	
MINOR STREET APPROACH LANES:	1				
			ALTERNATIVES TO A SIGNAL EXPLORED:	NO	
PEDESTRIANS:	N/A		NUMBER OF ACCIDENTS:	0	
			PEAK HOUR DELAY (VEH-HR):	0	
			PROXIMITY OF RR ON MINOR APPROACH TO MAJOR STREET:	0	
			RAIL TRAFFIC FREQUENCY:	0	0
			MINOR APPROACH HIGH-OCCCUPACY BUSES :	0.0%	0
EXISTING OR PROPOSED SIGNAL SYSTEM (YES/NO):	N/A		TRACTOR-TRAILER PERCENTAGE	0.0%	0

	MAIN STREET			MINOR STREET											
HOUR	MAIN STREET VOLUME	PERCENT OF WARRANT 1A 350	PERCENT OF WARRANT 1B 525	MINOR STREET VOLUME	MINIMUM VOLUME WARRANT 1A 105		INTERRUPTION WARRANT 1B 53		COMBINATION WARRANT A&B 1A	1B	4-HOUR WARRANT 2		PEAK HOUR WARRANT 3B	
24-1	0	0%	0%	0	0%	NO	0%	NO	NO	NO	0%	NO	0%	NO
1-2	0	0%	0%	0	0%	NO	0%	NO	NO	NO	0%	NO	0%	NO
2-3	0	0%	0%	0	0%	NO	0%	NO	NO	NO	0%	NO	0%	NO
3-4	0	0%	0%	0	0%	NO	0%	NO	NO	NO	0%	NO	0%	NO
4-5	0	0%	0%	0	0%	NO	0%	NO	NO	NO	0%	NO	0%	NO
5-6	0	0%	0%	0	0%	NO	0%	NO	NO	NO	0%	NO	0%	NO
6-7	0	0%	0%	0	0%	NO	0%	NO	NO	NO	0%	NO	0%	NO
7-8	1,295	370%	247%	101	97%	YES/NO	193%	YES	YES	YES	169%	YES	135%	YES
8-9	1,013	289%	193%	131	125%	YES	249%	YES	YES	YES	218%	YES	177%	YES
9-10	923	264%	176%	87	82%	NO	165%	YES	YES	YES	144%	YES	97%	YES/NO
10-11	933	267%	178%	131	125%	YES	250%	YES	YES	YES	219%	YES	151%	YES
11-12	1,028	294%	196%	162	154%	YES	308%	YES	YES	YES	270%	YES	225%	YES
12-13	1,043	298%	199%	161	154%	YES	307%	YES	YES	YES	269%	YES	230%	YES
13-14	1,066	305%	203%	151	143%	YES	287%	YES	YES	YES	251%	YES	201%	YES
14-15	1,123	321%	214%	155	148%	YES	295%	YES	YES	YES	258%	YES	207%	YES
15-16	1,321	377%	252%	182	173%	YES	346%	YES	YES	YES	303%	YES	242%	YES
16-17	1,658	474%	316%	201	191%	YES	382%	YES	YES	YES	335%	YES	268%	YES
17-18	1,935	553%	369%	210	200%	YES	401%	YES	YES	YES	351%	YES	281%	YES
18-19	1,522	435%	290%	195	186%	YES	372%	YES	YES	YES	326%	YES	261%	YES
19-20	1,144	327%	218%	136	130%	YES	259%	YES	YES	YES	227%	YES	182%	YES
20-21	938	268%	179%	105	100%	YES	201%	YES	YES	YES	176%	YES	122%	YES
21-22	708	202%	135%	60	57%	NO	114%	YES	NO	YES	89%	NO	42%	NO
22-23	477	136%	91%	56	53%	NO	106%	YES/NO	NO	YES	42%	NO	24%	NO
23-24	0	0%	0%	0	0%	NO	0%	NO	NO	NO	0%	NO	0%	NO

SUMMARY

WARRANT		WARRANT DESCRIPTION	WARRANT OBTAINED?	HOURS 100%	HOURS >90%	PRIORITY POINTS
1	A	MINIMUM VOLUME:	YES	12	1	132
	B	INTERUPTION:	YES	15	1	150
	A & B	COMBINATION:	YES	14	N/A	126
2		FOUR-HOUR:	YES	14	0	224
3	A	PEAK HOUR DELAY:	N/A	N/A	N/A	0
	B	PEAK HOUR VOLUME:	YES	13	1	728
4	No data collected	MINIMUM PED. VOLUMES:	N/A	N/A	N/A	N/A
5		SCHOOL CROSSING:	NO	N/A	N/A	0
6		CORD. SIGNAL SYSTEM:	NO	N/A	N/A	0
7		ACCIDENT EXPERIENCE:	NO	16	N/A	0
8		ROADWAY NETWORK:	NO	14	N/A	0
9		INTERSECTION NEAR A GRADE CROSS	N/A	0	0	0
				PRIORITY		1360

SYNCHRO ANALYSIS REPORTS

SYNCHRO ANALYSIS REPORTS
Existing 2022
AM Peak Hour

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NET	NER	SWT
Lane Group Flow (vph)	11	790	75	381	519	40	72	345	111
v/c Ratio	0.02	0.42	0.09	0.86	0.18	0.03	0.70	0.74	0.65
Control Delay	21.8	23.6	6.9	70.5	3.3	1.1	94.7	15.8	76.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.8	23.6	6.9	70.5	3.3	1.1	94.7	15.8	76.0
Queue Length 50th (ft)	5	233	5	346	46	0	67	0	97
Queue Length 95th (ft)	19	352	38	423	73	8	114	73	145
Internal Link Dist (ft)		867			267		507		379
Turn Bay Length (ft)	100		75	200		125		200	
Base Capacity (vph)	451	1864	864	525	2883	1297	325	729	525
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.42	0.09	0.73	0.18	0.03	0.22	0.47	0.21

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	10	719	68	335	457	35	42	20	297	18	63	13
Future Volume (vph)	10	719	68	335	457	35	42	20	297	18	63	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	5.5	6.5	6.5		6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97	1.00		0.99	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1801	1583		1812	
Flt Permitted	0.46	1.00	1.00	0.95	1.00	1.00		0.56	1.00		0.92	
Satd. Flow (perm)	857	3539	1583	1770	3539	1583		1049	1583		1681	
Peak-hour factor, PHF	0.91	0.91	0.91	0.88	0.88	0.88	0.86	0.86	0.86	0.84	0.84	0.84
Adj. Flow (vph)	11	790	75	381	519	40	49	23	345	21	75	15
RTOR Reduction (vph)	0	0	30	0	0	7	0	0	311	0	5	0
Lane Group Flow (vph)	11	790	45	381	519	33	0	72	34	0	106	0
Turn Type	Perm	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		6		5	2			8			4	
Permitted Phases	6		6			2	8		8	4		
Actuated Green, G (s)	76.4	76.4	76.4	36.3	118.2	118.2		14.3	14.3		14.3	
Effective Green, g (s)	76.4	76.4	76.4	36.3	118.2	118.2		14.3	14.3		14.3	
Actuated g/C Ratio	0.53	0.53	0.53	0.25	0.82	0.82		0.10	0.10		0.10	
Clearance Time (s)	6.5	6.5	6.5	5.5	6.5	6.5		6.0	6.0		6.0	
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)	451	1864	834	443	2884	1290		103	156		165	
v/s Ratio Prot		c0.22		c0.22	0.15							
v/s Ratio Perm	0.01		0.03			0.02		c0.07	0.02		0.06	
v/c Ratio	0.02	0.42	0.05	0.86	0.18	0.03		0.70	0.22		0.64	
Uniform Delay, d1	16.4	20.9	16.7	51.9	2.9	2.5		63.3	60.2		62.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	0.1	0.7	0.1	15.5	0.1	0.0		18.7	0.7		7.9	
Delay (s)	16.5	21.6	16.8	67.5	3.0	2.6		82.0	60.9		70.8	
Level of Service	B	C	B	E	A	A		F	E		E	
Approach Delay (s)		21.1			29.1			64.5			70.8	
Approach LOS		C			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	34.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

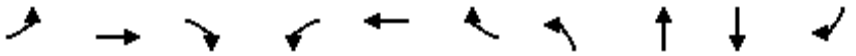
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	93	1076	1	78	813	113	19	19	114	314	243
v/c Ratio	0.20	0.50	0.00	0.23	0.37	0.09	0.19	0.14	0.48	0.69	0.78
Control Delay	9.1	19.0	0.0	9.3	14.0	1.1	69.6	64.1	10.0	68.1	56.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.1	19.0	0.0	9.3	14.0	1.1	69.6	64.1	10.0	68.1	56.5
Queue Length 50th (ft)	27	312	0	21	171	1	17	17	0	147	153
Queue Length 95th (ft)	56	432	0	41	216	11	43	41	15	173	203
Internal Link Dist (ft)		330			1378			508			852
Turn Bay Length (ft)	275			100		100	75		75	125	
Base Capacity (vph)	545	2182	1154	361	2177	1278	110	205	257	455	339
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.49	0.00	0.22	0.37	0.09	0.17	0.09	0.44	0.69	0.72

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	82	947	1	64	667	93	16	16	96	254	53	144
Future Volume (vph)	82	947	1	64	667	93	16	16	96	254	53	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	7.0	6.0	5.5	7.0	6.0	6.0	6.0	5.5	6.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	3433	1658	
Flt Permitted	0.30	1.00	1.00	0.20	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	566	3539	1583	374	3539	1583	1770	1863	1583	3433	1658	
Peak-hour factor, PHF	0.88	0.88	0.88	0.82	0.82	0.82	0.84	0.84	0.84	0.81	0.81	0.81
Adj. Flow (vph)	93	1076	1	78	813	113	19	19	114	314	65	178
RTOR Reduction (vph)	0	0	0	0	0	26	0	0	107	0	68	0
Lane Group Flow (vph)	93	1076	1	78	813	87	19	19	7	314	175	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA	Over	Prot	NA	
Protected Phases	1	6	7	5	2	3	7		5	3	8	
Permitted Phases	6		6	2		2		4				
Actuated Green, G (s)	94.2	85.7	90.7	95.2	86.7	105.9	5.0	7.1	8.5	19.2	21.3	
Effective Green, g (s)	94.2	85.7	90.7	95.2	86.7	105.9	5.0	7.1	8.5	19.2	21.3	
Actuated g/C Ratio	0.65	0.59	0.63	0.66	0.60	0.73	0.03	0.05	0.06	0.13	0.15	
Clearance Time (s)	4.5	7.0	6.0	5.5	7.0	6.0	6.0	6.0	5.5	6.0	6.0	
Vehicle Extension (s)	2.5	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	438	2091	990	327	2116	1156	61	91	92	454	243	
v/s Ratio Prot	0.01	c0.30	0.00	c0.01	0.23	0.01	0.01		0.00	c0.09	c0.11	
v/s Ratio Perm	0.13		0.00	0.14		0.04		0.01				
v/c Ratio	0.21	0.51	0.00	0.24	0.38	0.07	0.31	0.21	0.07	0.69	0.72	
Uniform Delay, d1	9.8	17.4	10.2	10.8	15.2	5.6	68.3	66.3	64.5	60.1	59.0	
Progression Factor	1.00	1.00	1.00	0.92	0.85	0.67	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.9	0.0	0.4	0.5	0.0	2.9	1.1	0.3	4.5	9.8	
Delay (s)	10.0	18.3	10.2	10.3	13.4	3.7	71.2	67.4	64.9	64.6	68.8	
Level of Service	A	B	B	B	B	A	E	E	E	E	E	
Approach Delay (s)		17.7			12.1			66.0			66.4	
Approach LOS		B			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	27.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	24.5
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		

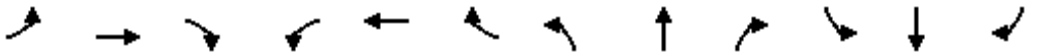
c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	41	1359	55	163	921	9	90	145	18	38
v/c Ratio	0.10	0.56	0.05	0.43	0.35	0.01	0.68	0.53	0.15	0.15
Control Delay	8.4	10.0	2.1	18.3	7.7	0.0	86.8	18.1	60.5	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Total Delay	8.4	10.0	2.1	18.3	8.3	0.0	86.8	18.1	60.5	1.2
Queue Length 50th (ft)	12	222	3	41	154	0	84	9	16	0
Queue Length 95th (ft)	m18	195	m8	68	193	0	125	54	30	0
Internal Link Dist (ft)		1378			451			168	267	
Turn Bay Length (ft)	250		50	75		50				75
Base Capacity (vph)	427	2437	1112	402	2631	1193	268	418	240	400
Starvation Cap Reductn	0	0	0	0	1173	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.56	0.05	0.41	0.63	0.01	0.34	0.35	0.07	0.10

Intersection Summary

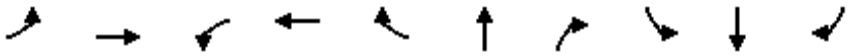
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	1182	48	134	755	7	73	8	109	6	6	25
Future Volume (vph)	36	1182	48	134	755	7	73	8	109	6	6	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5	6.5	5.5	6.5	6.5	6.0	6.0			6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.98	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1603			1817	1583
Flt Permitted	0.27	1.00	1.00	0.17	1.00	1.00	0.75	1.00			0.67	1.00
Satd. Flow (perm)	495	3539	1583	324	3539	1583	1389	1603			1245	1583
Peak-hour factor, PHF	0.87	0.87	0.87	0.82	0.82	0.82	0.81	0.81	0.81	0.66	0.66	0.66
Adj. Flow (vph)	41	1359	55	163	921	9	90	10	135	9	9	38
RTOR Reduction (vph)	0	0	18	0	0	2	0	122	0	0	0	34
Lane Group Flow (vph)	41	1359	37	163	921	7	90	23	0	0	18	4
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6		6	2		2	8			4		4
Actuated Green, G (s)	98.8	98.8	98.8	107.7	106.7	106.7	13.9	13.9			13.9	13.9
Effective Green, g (s)	98.8	98.8	98.8	107.7	106.7	106.7	13.9	13.9			13.9	13.9
Actuated g/C Ratio	0.68	0.68	0.68	0.74	0.74	0.74	0.10	0.10			0.10	0.10
Clearance Time (s)	5.5	6.5	6.5	5.5	6.5	6.5	6.0	6.0			6.0	6.0
Vehicle Extension (s)	2.0	5.0	5.0	2.0	5.0	5.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	393	2411	1078	383	2604	1164	133	153			119	151
v/s Ratio Prot	0.00	c0.38		c0.04	0.26			0.01				
v/s Ratio Perm	0.07		0.02	0.27		0.00	c0.06				0.01	0.00
v/c Ratio	0.10	0.56	0.03	0.43	0.35	0.01	0.68	0.15			0.15	0.02
Uniform Delay, d1	8.2	11.9	7.5	14.9	6.8	5.1	63.4	60.1			60.1	59.4
Progression Factor	0.90	0.73	1.50	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	0.0	0.8	0.1	0.3	0.4	0.0	10.2	0.2			0.2	0.0
Delay (s)	7.4	9.5	11.4	15.2	7.2	5.1	73.6	60.3			60.4	59.4
Level of Service	A	A	B	B	A	A	E	E			E	E
Approach Delay (s)		9.5			8.4			65.4			59.7	
Approach LOS		A			A			E			E	

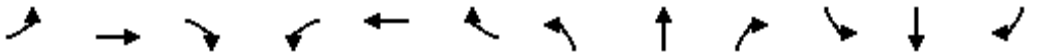
Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	192	1241	17	736	37	53	47	58	58	313
v/c Ratio	0.68	0.48	0.22	0.32	0.03	0.48	0.22	0.53	0.52	0.60
Control Delay	83.2	11.5	79.6	13.5	0.0	86.4	2.3	89.5	88.5	14.2
Queue Delay	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Total Delay	83.2	12.5	79.6	13.5	0.0	86.4	2.3	89.5	88.5	14.7
Queue Length 50th (ft)	102	296	18	170	0	55	0	63	63	33
Queue Length 95th (ft)	142	420	41	221	0	100	0	114	114	127
Internal Link Dist (ft)		451		2286		401			247	
Turn Bay Length (ft)	225		200		200			125		
Base Capacity (vph)	590	2589	121	2333	1220	161	257	147	150	634
Starvation Cap Reductn	0	999	0	0	0	0	0	0	0	86
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.78	0.14	0.32	0.03	0.33	0.18	0.39	0.39	0.57

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	171	1104	1	14	596	30	9	38	41	91	20	300
Future Volume (vph)	171	1104	1	14	596	30	9	38	41	91	20	300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5		4.0	6.5	6.0		6.0	6.0	6.0	6.0	5.5
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	1.00
Satd. Flow (prot)	3433	3539		1770	3539	1583		1845	1583	1681	1715	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	1.00
Satd. Flow (perm)	3433	3539		1770	3539	1583		1845	1583	1681	1715	1583
Peak-hour factor, PHF	0.89	0.89	0.89	0.81	0.81	0.81	0.88	0.88	0.88	0.96	0.96	0.96
Adj. Flow (vph)	192	1240	1	17	736	37	10	43	47	95	21	312
RTOR Reduction (vph)	0	0	0	0	0	10	0	0	45	0	0	235
Lane Group Flow (vph)	192	1241	0	17	736	27	0	53	2	58	58	78
Turn Type	Prot	NA		Prot	NA	pm+ov	Split	NA	Perm	Split	NA	pm+ov
Protected Phases	5	2		1	6	3	4	4		3	3	5
Permitted Phases						6			4			3
Actuated Green, G (s)	13.2	114.2		4.8	104.3	114.7		8.1	8.1	10.4	10.4	23.6
Effective Green, g (s)	13.2	114.2		4.8	104.3	114.7		8.1	8.1	10.4	10.4	23.6
Actuated g/C Ratio	0.08	0.71		0.03	0.65	0.72		0.05	0.05	0.07	0.07	0.15
Clearance Time (s)	5.5	6.5		4.0	6.5	6.0		6.0	6.0	6.0	6.0	5.5
Vehicle Extension (s)	2.0	5.0		3.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	283	2525		53	2306	1134		93	80	109	111	233
v/s Ratio Prot	c0.06	c0.35		0.01	0.21	0.00		c0.03		c0.03	0.03	0.03
v/s Ratio Perm						0.02			0.00			0.02
v/c Ratio	0.68	0.49		0.32	0.32	0.02		0.57	0.03	0.53	0.52	0.33
Uniform Delay, d1	71.3	10.1		76.0	12.2	6.5		74.2	72.2	72.4	72.4	61.1
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.0	0.7		3.5	0.4	0.0		4.7	0.1	2.5	2.0	0.3
Delay (s)	76.3	10.8		79.5	12.6	6.5		79.0	72.3	74.9	74.4	61.5
Level of Service	E	B		E	B	A		E	E	E	E	E
Approach Delay (s)		19.6			13.8			75.8			65.0	
Approach LOS		B			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	59.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	3.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	245	97	121	580	36	54
Future Vol, veh/h	245	97	121	580	36	54
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	76	76	87	87	75	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	322	128	139	667	48	72

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	450	0	1331	386
Stage 1	-	-	-	-	386	-
Stage 2	-	-	-	-	945	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1110	-	170	662
Stage 1	-	-	-	-	687	-
Stage 2	-	-	-	-	378	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1110	-	136	662
Mov Cap-2 Maneuver	-	-	-	-	136	-
Stage 1	-	-	-	-	687	-
Stage 2	-	-	-	-	303	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.5	30.2
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	260	-	-	1110	-
HCM Lane V/C Ratio	0.462	-	-	0.125	-
HCM Control Delay (s)	30.2	-	-	8.7	0
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	2.3	-	-	0.4	-

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	12	287	653	6	15	48
Future Vol, veh/h	12	287	653	6	15	48
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	312	710	7	16	52

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	717	0	-	0	1052	714
Stage 1	-	-	-	-	714	-
Stage 2	-	-	-	-	338	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	884	-	-	-	251	431
Stage 1	-	-	-	-	485	-
Stage 2	-	-	-	-	722	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	884	-	-	-	246	431
Mov Cap-2 Maneuver	-	-	-	-	246	-
Stage 1	-	-	-	-	476	-
Stage 2	-	-	-	-	722	-

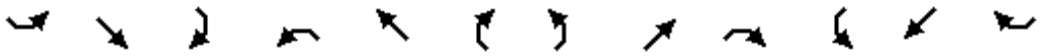
Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	17.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	884	-	-	-	366
HCM Lane V/C Ratio	0.015	-	-	-	0.187
HCM Control Delay (s)	9.1	0	-	-	17.1
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.7

SYNCHRO ANALYSIS REPORTS
Existing 2022
PM Peak Hour

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NET	NER	SWT
Lane Group Flow (vph)	26	872	64	433	949	91	148	492	140
v/c Ratio	0.10	0.56	0.09	0.87	0.35	0.07	0.85	0.75	0.55
Control Delay	31.7	34.2	7.5	67.6	6.7	2.1	95.8	11.8	56.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.7	34.2	7.5	67.6	6.7	2.1	95.8	11.8	56.4
Queue Length 50th (ft)	14	321	0	389	137	5	137	0	108
Queue Length 95th (ft)	44	473	35	491	216	23	196	72	130
Internal Link Dist (ft)		867			267		507		379
Turn Bay Length (ft)	100		75	200		125		200	
Base Capacity (vph)	248	1564	735	540	2693	1221	355	830	502
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.56	0.09	0.80	0.35	0.07	0.42	0.59	0.28

Intersection Summary



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	25	846	62	394	864	83	68	59	423	16	53	33
Future Volume (vph)	25	846	62	394	864	83	68	59	423	16	53	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	5.5	6.5	6.5		6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97	1.00		0.99	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1814	1583		1768	
Flt Permitted	0.30	1.00	1.00	0.95	1.00	1.00		0.62	1.00		0.89	
Satd. Flow (perm)	562	3539	1583	1770	3539	1583		1148	1583		1581	
Peak-hour factor, PHF	0.97	0.97	0.97	0.91	0.91	0.91	0.86	0.86	0.86	0.73	0.73	0.73
Adj. Flow (vph)	26	872	64	433	949	91	79	69	492	22	73	45
RTOR Reduction (vph)	0	0	36	0	0	17	0	0	417	0	14	0
Lane Group Flow (vph)	26	872	28	433	949	74	0	148	75	0	126	0
Turn Type	Perm	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		6		5	2			8			4	
Permitted Phases	6		6			2	8		8	4		
Actuated Green, G (s)	64.1	64.1	64.1	40.7	110.3	110.3		22.2	22.2		22.2	
Effective Green, g (s)	64.1	64.1	64.1	40.7	110.3	110.3		22.2	22.2		22.2	
Actuated g/C Ratio	0.44	0.44	0.44	0.28	0.76	0.76		0.15	0.15		0.15	
Clearance Time (s)	6.5	6.5	6.5	5.5	6.5	6.5		6.0	6.0		6.0	
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)	248	1564	699	496	2692	1204		175	242		242	
v/s Ratio Prot		c0.25		c0.24	0.27							
v/s Ratio Perm	0.05		0.02			0.05		c0.13	0.05		0.08	
v/c Ratio	0.10	0.56	0.04	0.87	0.35	0.06		0.85	0.31		0.52	
Uniform Delay, d1	23.7	30.0	23.0	49.7	5.7	4.4		59.7	54.6		56.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	0.8	1.4	0.1	15.5	0.4	0.1		29.5	0.7		1.9	
Delay (s)	24.5	31.4	23.1	65.2	6.0	4.5		89.2	55.3		58.4	
Level of Service	C	C	C	E	A	A		F	E		E	
Approach Delay (s)		30.7			23.3			63.2			58.4	
Approach LOS		C			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	35.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	194	1156	2	75	1274	336	28	53	103	319	196
v/c Ratio	0.62	0.55	0.00	0.25	0.65	0.28	0.27	0.42	0.44	0.72	0.51
Control Delay	20.2	20.2	0.0	9.0	17.7	1.9	71.3	74.2	7.5	69.9	20.2
Queue Delay	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.2	20.6	0.0	9.0	17.7	1.9	71.3	74.2	7.5	69.9	20.2
Queue Length 50th (ft)	60	351	0	17	245	12	26	49	0	150	39
Queue Length 95th (ft)	131	447	0	m30	304	40	49	77	0	181	91
Internal Link Dist (ft)		330			1378			508			852
Turn Bay Length (ft)	275			100		100	75		75	125	
Base Capacity (vph)	341	2104	1137	324	2001	1212	112	205	257	446	399
Starvation Cap Reductn	0	428	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.69	0.00	0.23	0.64	0.28	0.25	0.26	0.40	0.72	0.49

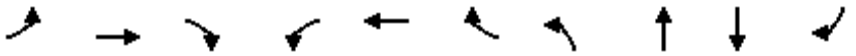
Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	180	1075	2	71	1210	319	21	39	76	258	26	133
Future Volume (vph)	180	1075	2	71	1210	319	21	39	76	258	26	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	7.0	6.0	5.5	7.0	6.0	6.0	6.0	5.5	6.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	3433	1629	
Flt Permitted	0.12	1.00	1.00	0.19	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	225	3539	1583	347	3539	1583	1770	1863	1583	3433	1629	
Peak-hour factor, PHF	0.93	0.93	0.93	0.95	0.95	0.95	0.74	0.74	0.74	0.81	0.81	0.81
Adj. Flow (vph)	194	1156	2	75	1274	336	28	53	103	319	32	164
RTOR Reduction (vph)	0	0	1	0	0	61	0	0	97	0	126	0
Lane Group Flow (vph)	194	1156	1	75	1274	275	28	53	6	319	70	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA	Over	Prot	NA	
Protected Phases	1	6	7	5	2	3	7		5	3	8	
Permitted Phases	6		6	2		2		4				
Actuated Green, G (s)	97.7	83.8	89.2	86.8	78.4	97.3	5.4	9.4	8.4	18.9	22.9	
Effective Green, g (s)	97.7	83.8	89.2	86.8	78.4	97.3	5.4	9.4	8.4	18.9	22.9	
Actuated g/C Ratio	0.67	0.58	0.62	0.60	0.54	0.67	0.04	0.06	0.06	0.13	0.16	
Clearance Time (s)	4.5	7.0	6.0	5.5	7.0	6.0	6.0	6.0	5.5	6.0	6.0	
Vehicle Extension (s)	2.5	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	309	2045	973	290	1913	1062	65	120	91	447	257	
v/s Ratio Prot	c0.06	0.33	0.00	0.01	c0.36	0.03	0.02		0.00	c0.09	0.04	
v/s Ratio Perm	0.36		0.00	0.14		0.14		c0.03				
v/c Ratio	0.63	0.57	0.00	0.26	0.67	0.26	0.43	0.44	0.07	0.71	0.27	
Uniform Delay, d1	17.7	19.2	10.7	13.7	23.9	9.5	68.3	65.3	64.6	60.5	53.7	
Progression Factor	1.00	1.00	1.00	0.82	0.67	0.42	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.4	1.1	0.0	0.4	1.5	0.1	4.5	2.6	0.3	5.3	0.6	
Delay (s)	21.2	20.3	10.7	11.6	17.5	4.1	72.8	67.9	64.9	65.8	54.3	
Level of Service	C	C	B	B	B	A	E	E	E	E	D	
Approach Delay (s)		20.4			14.5			67.0			61.4	
Approach LOS		C			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	25.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	24.5
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

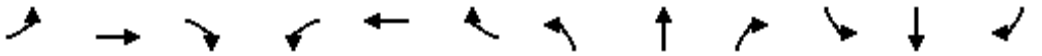
c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	79	1364	62	160	1413	23	179	273	49	159
v/c Ratio	0.35	0.60	0.06	0.49	0.60	0.02	0.85	0.72	0.39	0.42
Control Delay	15.1	13.1	2.0	27.6	15.8	0.0	91.5	36.6	62.5	10.9
Queue Delay	0.0	0.0	0.0	0.0	3.2	0.0	0.0	0.0	0.0	0.0
Total Delay	15.1	13.1	2.0	27.6	19.1	0.0	91.5	36.6	62.5	10.9
Queue Length 50th (ft)	27	252	3	52	374	0	165	113	42	2
Queue Length 95th (ft)	m45	280	m10	92	497	0	248	210	73	42
Internal Link Dist (ft)		1378			451			168	267	
Turn Bay Length (ft)	250		50	75		50				75
Base Capacity (vph)	238	2259	1036	357	2344	1070	260	434	155	432
Starvation Cap Reductn	0	0	0	0	805	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.60	0.06	0.45	0.92	0.02	0.69	0.63	0.32	0.37

Intersection Summary

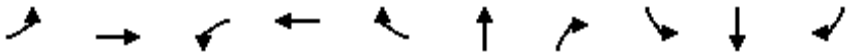
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	1255	57	144	1272	21	165	43	208	16	23	127
Future Volume (vph)	73	1255	57	144	1272	21	165	43	208	16	23	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5	6.5	5.5	6.5	6.5	6.0	6.0			6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.88			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.98	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1631			1825	1583
Flt Permitted	0.11	1.00	1.00	0.17	1.00	1.00	0.73	1.00			0.43	1.00
Satd. Flow (perm)	213	3539	1583	308	3539	1583	1351	1631			806	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.90	0.90	0.90	0.92	0.92	0.92	0.80	0.80	0.80
Adj. Flow (vph)	79	1364	62	160	1413	23	179	47	226	20	29	159
RTOR Reduction (vph)	0	0	22	0	0	8	0	125	0	0	0	132
Lane Group Flow (vph)	79	1364	40	160	1413	15	179	148	0	0	49	27
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6		6	2		2	8			4		4
Actuated Green, G (s)	92.6	92.6	92.6	97.0	96.0	96.0	22.7	22.7			22.7	22.7
Effective Green, g (s)	92.6	92.6	92.6	97.0	96.0	96.0	22.7	22.7			22.7	22.7
Actuated g/C Ratio	0.64	0.64	0.64	0.67	0.66	0.66	0.16	0.16			0.16	0.16
Clearance Time (s)	5.5	6.5	6.5	5.5	6.5	6.5	6.0	6.0			6.0	6.0
Vehicle Extension (s)	2.0	5.0	5.0	2.0	5.0	5.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	225	2260	1010	324	2343	1048	211	255			126	247
v/s Ratio Prot	0.02	c0.39		0.04	c0.40			0.09				
v/s Ratio Perm	0.20		0.03	0.29		0.01	c0.13				0.06	0.02
v/c Ratio	0.35	0.60	0.04	0.49	0.60	0.01	0.85	0.58			0.39	0.11
Uniform Delay, d1	14.9	15.4	9.7	23.7	13.8	8.4	59.5	56.7			54.9	52.5
Progression Factor	1.06	0.73	0.90	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	0.3	1.0	0.1	0.4	1.2	0.0	24.9	2.2			0.7	0.1
Delay (s)	16.0	12.3	8.8	24.1	14.9	8.4	84.4	58.9			55.6	52.5
Level of Service	B	B	A	C	B	A	F	E			E	D
Approach Delay (s)		12.3			15.8			69.0			53.3	
Approach LOS		B			B			E			D	

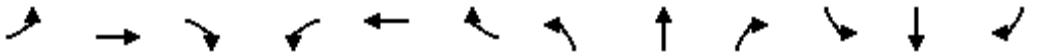
Intersection Summary			
HCM 2000 Control Delay	22.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	73.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	392	1161	24	1218	162	100	48	99	103	314
v/c Ratio	0.82	0.49	0.29	0.64	0.15	0.67	0.19	0.68	0.69	0.59
Control Delay	80.8	15.9	81.2	29.4	2.3	91.7	1.7	92.8	93.0	28.5
Queue Delay	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7
Total Delay	80.8	16.9	81.2	29.4	2.3	91.7	1.7	92.8	93.0	33.2
Queue Length 50th (ft)	208	324	25	460	7	104	0	107	111	144
Queue Length 95th (ft)	259	467	58	648	27	162	0	154	158	185
Internal Link Dist (ft)		451		2286		401			247	
Turn Bay Length (ft)	225		200		200			125		
Base Capacity (vph)	590	2401	121	1957	1060	173	267	162	166	578
Starvation Cap Reductn	0	897	0	0	0	0	0	0	0	193
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.77	0.20	0.62	0.15	0.58	0.18	0.61	0.62	0.82

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	365	1076	4	23	1181	157	18	70	42	118	45	254
Future Volume (vph)	365	1076	4	23	1181	157	18	70	42	118	45	254
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5		4.0	6.5	6.0		6.0	6.0	6.0	6.0	5.5
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.98	1.00
Satd. Flow (prot)	3433	3537		1770	3539	1583		1844	1583	1681	1730	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.98	1.00
Satd. Flow (perm)	3433	3537		1770	3539	1583		1844	1583	1681	1730	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.97	0.97	0.97	0.88	0.88	0.88	0.81	0.81	0.81
Adj. Flow (vph)	392	1157	4	24	1218	162	20	80	48	146	56	314
RTOR Reduction (vph)	0	0	0	0	0	47	0	0	44	0	0	121
Lane Group Flow (vph)	392	1161	0	24	1218	115	0	100	4	99	103	193
Turn Type	Prot	NA		Prot	NA	pm+ov	Split	NA	Perm	Split	NA	pm+ov
Protected Phases	5	2		1	6	3	4	4		3	3	5
Permitted Phases						6			4			3
Actuated Green, G (s)	22.4	105.2		5.3	86.6	100.5		13.1	13.1	13.9	13.9	36.3
Effective Green, g (s)	22.4	105.2		5.3	86.6	100.5		13.1	13.1	13.9	13.9	36.3
Actuated g/C Ratio	0.14	0.66		0.03	0.54	0.63		0.08	0.08	0.09	0.09	0.23
Clearance Time (s)	5.5	6.5		4.0	6.5	6.0		6.0	6.0	6.0	6.0	5.5
Vehicle Extension (s)	2.0	5.0		3.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	480	2325		58	1915	994		150	129	146	150	359
v/s Ratio Prot	c0.11	0.33		0.01	c0.34	0.01		c0.05		0.06	c0.06	0.08
v/s Ratio Perm						0.06			0.00			0.05
v/c Ratio	0.82	0.50		0.41	0.64	0.12		0.67	0.03	0.68	0.69	0.54
Uniform Delay, d1	66.8	14.0		75.8	25.7	11.9		71.3	67.6	70.9	70.9	54.5
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.8	0.8		4.7	1.6	0.0		8.4	0.0	9.4	9.9	0.8
Delay (s)	76.6	14.7		80.6	27.3	12.0		79.7	67.6	80.3	80.9	55.3
Level of Service	E	B		F	C	B		E	E	F	F	E
Approach Delay (s)		30.4			26.4			75.8			65.2	
Approach LOS		C			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	35.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	70.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	7.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	547	62	78	352	62	153
Future Vol, veh/h	547	62	78	352	62	153
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	629	71	83	374	66	163

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	700	0	1205	665
Stage 1	-	-	-	-	665	-
Stage 2	-	-	-	-	540	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	897	-	203	460
Stage 1	-	-	-	-	511	-
Stage 2	-	-	-	-	584	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	897	-	179	460
Mov Cap-2 Maneuver	-	-	-	-	179	-
Stage 1	-	-	-	-	511	-
Stage 2	-	-	-	-	516	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.7	41
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	317	-	-	897	-
HCM Lane V/C Ratio	0.722	-	-	0.093	-
HCM Control Delay (s)	41	-	-	9.4	0
HCM Lane LOS	E	-	-	A	A
HCM 95th %tile Q(veh)	5.3	-	-	0.3	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	43	657	414	23	10	16
Future Vol, veh/h	43	657	414	23	10	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	47	714	450	25	11	17

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	475	0	-	0	1271	463
Stage 1	-	-	-	-	463	-
Stage 2	-	-	-	-	808	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1087	-	-	-	185	599
Stage 1	-	-	-	-	634	-
Stage 2	-	-	-	-	438	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1087	-	-	-	172	599
Mov Cap-2 Maneuver	-	-	-	-	172	-
Stage 1	-	-	-	-	588	-
Stage 2	-	-	-	-	438	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	18
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1087	-	-	-	306
HCM Lane V/C Ratio	0.043	-	-	-	0.092
HCM Control Delay (s)	8.5	0	-	-	18
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

SYNCHRO ANALYSIS REPORTS
Background 2030
AM Peak Hour

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NET	NER	SWT
Lane Group Flow (vph)	13	952	91	449	605	47	86	404	125
v/c Ratio	0.04	0.70	0.14	0.89	0.23	0.04	0.53	0.73	0.57
Control Delay	20.6	27.8	4.2	51.1	4.4	1.4	47.9	12.3	44.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.6	27.8	4.2	51.1	4.4	1.4	47.9	12.3	44.6
Queue Length 50th (ft)	5	250	0	233	49	0	46	0	63
Queue Length 95th (ft)	18	331	26	#396	74	9	92	85	117
Internal Link Dist (ft)		867			267		507		379
Turn Bay Length (ft)	100		75	200		125		200	
Base Capacity (vph)	303	1361	672	544	2592	1172	198	587	265
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.70	0.14	0.83	0.23	0.04	0.43	0.69	0.47

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	12	876	84	413	557	43	54	25	372	22	77	16
Future Volume (vph)	12	876	84	413	557	43	54	25	372	22	77	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	5.5	6.5	6.5		6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97	1.00		0.99	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1801	1583		1811	
Flt Permitted	0.42	1.00	1.00	0.95	1.00	1.00		0.69	1.00		0.91	
Satd. Flow (perm)	788	3539	1583	1770	3539	1583		1277	1583		1669	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	952	91	449	605	47	59	27	404	24	84	17
RTOR Reduction (vph)	0	0	56	0	0	13	0	0	352	0	6	0
Lane Group Flow (vph)	13	952	35	449	605	34	0	86	52	0	119	0
Turn Type	Perm	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		6		5	2			8			4	
Permitted Phases	6		6			2	8		8	4		
Actuated Green, G (s)	34.6	34.6	34.6	25.8	65.9	65.9		11.6	11.6		11.6	
Effective Green, g (s)	34.6	34.6	34.6	25.8	65.9	65.9		11.6	11.6		11.6	
Actuated g/C Ratio	0.38	0.38	0.38	0.29	0.73	0.73		0.13	0.13		0.13	
Clearance Time (s)	6.5	6.5	6.5	5.5	6.5	6.5		6.0	6.0		6.0	
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)	302	1360	608	507	2591	1159		164	204		215	
v/s Ratio Prot		c0.27		c0.25	0.17							
v/s Ratio Perm	0.02		0.02			0.02		0.07	0.03		c0.07	
v/c Ratio	0.04	0.70	0.06	0.89	0.23	0.03		0.52	0.26		0.55	
Uniform Delay, d1	17.3	23.3	17.4	30.7	3.9	3.3		36.6	35.3		36.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	0.3	3.0	0.2	16.8	0.2	0.0		3.0	0.7		3.1	
Delay (s)	17.6	26.3	17.6	47.4	4.1	3.3		39.6	36.0		39.8	
Level of Service	B	C	B	D	A	A		D	D		D	
Approach Delay (s)		25.5			21.7			36.6			39.8	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	110	1264	1	85	888	123	21	23	133	336	262
v/c Ratio	0.26	0.72	0.00	0.32	0.47	0.10	0.13	0.10	0.34	0.88	0.76
Control Delay	9.0	24.0	0.0	12.7	11.9	2.2	39.8	34.2	2.4	66.2	32.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.0	24.0	0.0	12.7	11.9	2.2	39.8	34.2	2.4	66.2	32.2
Queue Length 50th (ft)	14	240	0	8	45	0	11	12	0	94	70
Queue Length 95th (ft)	54	#534	0	38	332	21	34	33	0	#186	151
Internal Link Dist (ft)		330			1378			508			852
Turn Bay Length (ft)	275			100		100	75		75	125	
Base Capacity (vph)	467	1756	1030	283	1889	1211	177	331	405	380	402
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.72	0.00	0.30	0.47	0.10	0.12	0.07	0.33	0.88	0.65

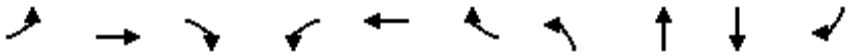
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	101	1163	1	78	817	113	19	21	122	309	65	176
Future Volume (vph)	101	1163	1	78	817	113	19	21	122	309	65	176
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	7.0	6.0	5.5	7.0	6.0	6.0	6.0	5.5	6.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	3433	1659	
Flt Permitted	0.27	1.00	1.00	0.10	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	498	3539	1583	182	3539	1583	1770	1863	1583	3433	1659	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	110	1264	1	85	888	123	21	23	133	336	71	191
RTOR Reduction (vph)	0	0	1	0	0	50	0	0	121	0	112	0
Lane Group Flow (vph)	110	1264	0	85	888	73	21	23	12	336	150	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA	Over	Prot	NA	
Protected Phases	1	6	7	5	2	3	7		5	3	8	
Permitted Phases	6		6	2		2		4				
Actuated Green, G (s)	47.9	41.0	44.3	51.9	43.5	53.5	3.3	6.1	8.4	10.0	12.8	
Effective Green, g (s)	47.9	41.0	44.3	51.9	43.5	53.5	3.3	6.1	8.4	10.0	12.8	
Actuated g/C Ratio	0.53	0.46	0.49	0.58	0.48	0.59	0.04	0.07	0.09	0.11	0.14	
Clearance Time (s)	4.5	7.0	6.0	5.5	7.0	6.0	6.0	6.0	5.5	6.0	6.0	
Vehicle Extension (s)	2.5	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	362	1612	779	253	1710	941	64	126	147	381	235	
v/s Ratio Prot	0.02	c0.36	0.00	c0.03	0.25	0.01	c0.01		0.01	c0.10	0.09	
v/s Ratio Perm	0.14		0.00	0.16		0.04		c0.01				
v/c Ratio	0.30	0.78	0.00	0.34	0.52	0.08	0.33	0.18	0.08	0.88	0.64	
Uniform Delay, d1	10.8	20.8	11.6	12.6	16.0	7.8	42.3	39.6	37.3	39.4	36.4	
Progression Factor	1.00	1.00	1.00	1.15	0.67	3.43	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	3.9	0.0	0.7	1.0	0.0	3.0	0.7	0.2	20.6	5.6	
Delay (s)	11.2	24.7	11.6	15.3	11.8	26.6	45.3	40.3	37.5	60.0	42.0	
Level of Service	B	C	B	B	B	C	D	D	D	E	D	
Approach Delay (s)		23.6			13.7			38.8			52.1	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	24.5
Intersection Capacity Utilization	70.0%	ICU Level of Service	C
Analysis Period (min)	15		

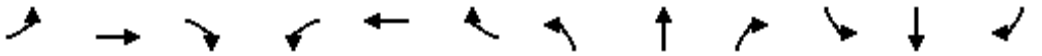
c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	39	1582	63	177	1005	8	97	154	14	27
v/c Ratio	0.11	0.77	0.07	0.63	0.44	0.01	0.58	0.48	0.08	0.08
Control Delay	1.9	8.9	0.2	33.9	3.2	0.0	51.3	12.8	34.5	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1.9	8.9	0.2	33.9	3.2	0.0	51.3	12.8	34.5	0.4
Queue Length 50th (ft)	6	348	1	37	37	0	53	5	7	0
Queue Length 95th (ft)	m1	m18	m0	m#120	53	m0	100	58	24	0
Internal Link Dist (ft)		1378			451			168	267	
Turn Bay Length (ft)	250		50	75		50				75
Base Capacity (vph)	370	2055	967	290	2305	1067	216	371	234	405
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.77	0.07	0.61	0.44	0.01	0.45	0.42	0.06	0.07

Intersection Summary

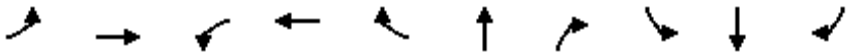
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	1455	58	163	925	7	89	8	133	6	6	25
Future Volume (vph)	36	1455	58	163	925	7	89	8	133	6	6	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5	6.5	5.5	6.5	6.5	6.0	6.0			6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.98	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1600			1817	1583
Flt Permitted	0.20	1.00	1.00	0.10	1.00	1.00	0.75	1.00			0.81	1.00
Satd. Flow (perm)	379	3539	1583	185	3539	1583	1394	1600			1508	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	1582	63	177	1005	8	97	9	145	7	7	27
RTOR Reduction (vph)	0	0	28	0	0	3	0	128	0	0	0	24
Lane Group Flow (vph)	39	1582	35	177	1005	5	97	26	0	0	14	3
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6		6	2		2	8			4		4
Actuated Green, G (s)	50.1	50.1	50.1	57.4	56.4	56.4	10.8	10.8			10.8	10.8
Effective Green, g (s)	50.1	50.1	50.1	57.4	56.4	56.4	10.8	10.8			10.8	10.8
Actuated g/C Ratio	0.56	0.56	0.56	0.64	0.63	0.63	0.12	0.12			0.12	0.12
Clearance Time (s)	5.5	6.5	6.5	5.5	6.5	6.5	6.0	6.0			6.0	6.0
Vehicle Extension (s)	2.0	5.0	5.0	2.0	5.0	5.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	285	1970	881	313	2217	992	167	192			180	189
v/s Ratio Prot	0.01	c0.45		c0.07	0.28			0.02				
v/s Ratio Perm	0.07		0.02	0.29		0.00	c0.07				0.01	0.00
v/c Ratio	0.14	0.80	0.04	0.57	0.45	0.01	0.58	0.14			0.08	0.02
Uniform Delay, d1	10.1	16.0	9.0	22.7	8.8	6.3	37.5	35.4			35.2	34.9
Progression Factor	0.17	0.45	0.21	1.04	0.29	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	0.1	2.5	0.1	1.1	0.6	0.0	3.3	0.1			0.1	0.0
Delay (s)	1.7	9.7	1.9	24.8	3.2	6.3	40.7	35.6			35.2	34.9
Level of Service	A	A	A	C	A	A	D	D			D	C
Approach Delay (s)		9.2			6.4			37.6			35.0	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		

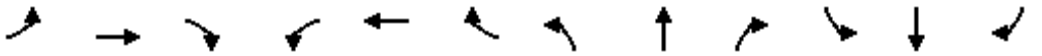
c Critical Lane Group



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	232	1475	15	793	40	51	45	71	72	399
v/c Ratio	0.58	0.64	0.12	0.46	0.04	0.30	0.15	0.42	0.42	0.65
Control Delay	52.4	5.2	40.9	19.6	0.3	43.2	1.1	45.2	45.0	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.4	5.2	40.9	19.6	0.3	43.2	1.1	45.2	45.0	8.1
Queue Length 50th (ft)	62	15	8	166	0	28	0	41	42	12
Queue Length 95th (ft)	m75	#573	27	261	2	m62	m0	82	83	54
Internal Link Dist (ft)		451		2286		401			247	
Turn Bay Length (ft)	225		200		200			125		
Base Capacity (vph)	432	2303	216	1713	1150	286	384	261	265	622
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.64	0.07	0.46	0.03	0.18	0.12	0.27	0.27	0.64

Intersection Summary

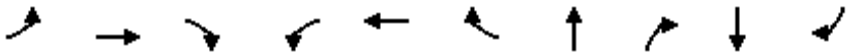
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	213	1356	1	14	730	37	9	38	41	111	20	367
Future Volume (vph)	213	1356	1	14	730	37	9	38	41	111	20	367
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5		4.0	6.5	6.0		6.0	6.0	6.0	6.0	5.5
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	1.00
Satd. Flow (prot)	3433	3539		1770	3539	1583		1845	1583	1681	1710	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	1.00
Satd. Flow (perm)	3433	3539		1770	3539	1583		1845	1583	1681	1710	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	232	1474	1	15	793	40	10	41	45	121	22	399
RTOR Reduction (vph)	0	0	0	0	0	18	0	0	42	0	0	289
Lane Group Flow (vph)	232	1475	0	15	793	22	0	51	3	71	72	110
Turn Type	Prot	NA		Prot	NA	pm+ov	Split	NA	Perm	Split	NA	pm+ov
Protected Phases	5	2		1	6	3	4	4		3	3	5
Permitted Phases						6			4			3
Actuated Green, G (s)	10.5	51.8		1.5	41.3	48.8		6.7	6.7	7.5	7.5	18.0
Effective Green, g (s)	10.5	51.8		1.5	41.3	48.8		6.7	6.7	7.5	7.5	18.0
Actuated g/C Ratio	0.12	0.58		0.02	0.46	0.54		0.07	0.07	0.08	0.08	0.20
Clearance Time (s)	5.5	6.5		4.0	6.5	6.0		6.0	6.0	6.0	6.0	5.5
Vehicle Extension (s)	2.0	5.0		3.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	400	2036		29	1624	858		137	117	140	142	316
v/s Ratio Prot	c0.07	c0.42		0.01	0.22	0.00		c0.03		c0.04	0.04	0.04
v/s Ratio Perm						0.01			0.00			0.03
v/c Ratio	0.58	0.72		0.52	0.49	0.03		0.37	0.03	0.51	0.51	0.35
Uniform Delay, d1	37.7	13.9		43.9	17.0	9.6		39.6	38.6	39.5	39.5	31.0
Progression Factor	1.30	0.16		1.00	1.00	1.00		1.01	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	1.5		14.7	1.1	0.0		0.6	0.0	1.1	1.0	0.2
Delay (s)	49.7	3.7		58.6	18.0	9.6		40.6	38.7	40.5	40.5	31.2
Level of Service	D	A		E	B	A		D	D	D	D	C
Approach Delay (s)		10.0			18.4			39.7			33.7	
Approach LOS		A			B			D			C	

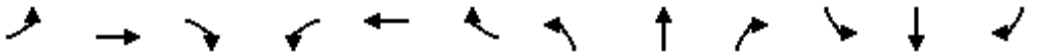
Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	7	327	128	141	758	8	58	65	48	36
v/c Ratio	0.03	0.51	0.20	0.25	0.72	0.01	0.26	0.18	0.19	0.10
Control Delay	12.3	17.0	4.0	5.7	11.9	0.0	22.9	3.4	21.4	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.3	17.0	4.0	5.7	11.9	0.0	22.9	3.4	21.4	0.6
Queue Length 50th (ft)	1	73	0	14	119	0	14	0	11	0
Queue Length 95th (ft)	8	152	28	36	252	1	48	13	41	0
Internal Link Dist (ft)		1577			763		1711		308	
Turn Bay Length (ft)	100		250	200				200		
Base Capacity (vph)	653	1728	1477	616	1859	1579	518	671	595	671
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.19	0.09	0.23	0.41	0.01	0.11	0.10	0.08	0.05

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	301	118	130	697	7	44	9	60	18	26	33
Future Volume (vph)	6	301	118	130	697	7	44	9	60	18	26	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.98	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1789	1583		1825	1583
Flt Permitted	0.38	1.00	1.00	0.38	1.00	1.00		0.73	1.00		0.84	1.00
Satd. Flow (perm)	704	1863	1583	716	1863	1583		1359	1583		1561	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	327	128	141	758	8	48	10	65	20	28	36
RTOR Reduction (vph)	0	0	85	0	0	3	0	0	54	0	0	30
Lane Group Flow (vph)	7	327	43	141	758	5	0	58	11	0	48	6
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)	16.1	16.1	16.1	27.9	27.9	27.9		7.8	7.8		7.8	7.8
Effective Green, g (s)	16.1	16.1	16.1	27.9	27.9	27.9		7.8	7.8		7.8	7.8
Actuated g/C Ratio	0.34	0.34	0.34	0.58	0.58	0.58		0.16	0.16		0.16	0.16
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	237	628	534	546	1089	925		222	258		255	258
v/s Ratio Prot		0.18		0.03	c0.41							
v/s Ratio Perm	0.01		0.03	0.12		0.00		c0.04	0.01		0.03	0.00
v/c Ratio	0.03	0.52	0.08	0.26	0.70	0.01		0.26	0.04		0.19	0.02
Uniform Delay, d1	10.6	12.7	10.8	5.1	6.9	4.1		17.4	16.8		17.2	16.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	0.8	0.1	0.3	2.0	0.0		0.6	0.1		0.4	0.0
Delay (s)	10.6	13.5	10.8	5.3	8.9	4.1		18.1	16.9		17.6	16.8
Level of Service	B	B	B	A	A	A		B	B		B	B
Approach Delay (s)		12.7			8.3			17.4			17.2	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	47.7	Sum of lost time (s)	18.0
Intersection Capacity Utilization	64.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

SYNCHRO ANALYSIS REPORTS
Background 2030
PM Peak Hour

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NET	NER	SWT
Lane Group Flow (vph)	33	1121	86	540	1145	110	171	567	136
v/c Ratio	0.19	0.85	0.14	0.94	0.44	0.09	0.85	0.79	0.50
Control Delay	34.0	46.1	9.6	67.6	7.4	1.1	87.1	13.3	49.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.0	46.1	9.6	67.6	7.4	1.1	87.1	13.3	49.7
Queue Length 50th (ft)	20	476	8	429	182	0	140	11	91
Queue Length 95th (ft)	50	#612	45	#637	220	15	#259	139	159
Internal Link Dist (ft)		867			267		507		379
Turn Bay Length (ft)	100		75	200		125		200	
Base Capacity (vph)	171	1313	632	605	2615	1198	215	734	292
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.85	0.14	0.89	0.44	0.09	0.80	0.77	0.47

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	30	1031	79	497	1053	101	85	73	522	19	66	40
Future Volume (vph)	30	1031	79	497	1053	101	85	73	522	19	66	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	5.5	6.5	6.5		6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97	1.00		0.99	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1814	1583		1770	
Flt Permitted	0.25	1.00	1.00	0.95	1.00	1.00		0.66	1.00		0.88	
Satd. Flow (perm)	462	3539	1583	1770	3539	1583		1220	1583		1578	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	1121	86	540	1145	110	92	79	567	21	72	43
RTOR Reduction (vph)	0	0	45	0	0	29	0	0	461	0	13	0
Lane Group Flow (vph)	33	1121	41	540	1145	81	0	171	106	0	123	0
Turn Type	Perm	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		6		5	2			8			4	
Permitted Phases	6		6			2	8		8	4		
Actuated Green, G (s)	48.3	48.3	48.3	42.3	96.1	96.1		21.4	21.4		21.4	
Effective Green, g (s)	48.3	48.3	48.3	42.3	96.1	96.1		21.4	21.4		21.4	
Actuated g/C Ratio	0.37	0.37	0.37	0.33	0.74	0.74		0.16	0.16		0.16	
Clearance Time (s)	6.5	6.5	6.5	5.5	6.5	6.5		6.0	6.0		6.0	
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)	171	1314	588	575	2616	1170		200	260		259	
v/s Ratio Prot		c0.32		c0.31	0.32							
v/s Ratio Perm	0.07		0.03			0.05		c0.14	0.07		0.08	
v/c Ratio	0.19	0.85	0.07	0.94	0.44	0.07		0.85	0.41		0.47	
Uniform Delay, d1	27.7	37.6	26.4	42.6	6.5	4.7		52.8	48.6		49.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	2.5	7.2	0.2	23.2	0.5	0.1		28.2	1.0		1.4	
Delay (s)	30.2	44.8	26.6	65.8	7.1	4.8		81.0	49.7		50.6	
Level of Service	C	D	C	E	A	A		F	D		D	
Approach Delay (s)		43.1			24.6			56.9			50.6	
Approach LOS		D			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	37.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	86.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	239	1430	2	96	1620	423	28	53	104	341	213
v/c Ratio	0.75	0.78	0.00	0.30	0.90	0.37	0.25	0.38	0.30	0.90	0.57
Control Delay	45.1	29.2	0.0	24.8	26.7	1.9	63.5	64.4	2.3	84.8	21.3
Queue Delay	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.1	29.8	0.0	24.8	26.7	1.9	63.5	64.4	2.3	84.8	21.3
Queue Length 50th (ft)	139	525	0	28	335	12	23	44	0	148	40
Queue Length 95th (ft)	#277	578	0	m42	#828	30	56	85	1	#240	121
Internal Link Dist (ft)		330			1378			508			852
Turn Bay Length (ft)	275			100		100	75		75	125	
Base Capacity (vph)	319	1881	981	315	1808	1131	122	229	350	377	415
Starvation Cap Reductn	0	164	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.83	0.00	0.30	0.90	0.37	0.23	0.23	0.30	0.90	0.51

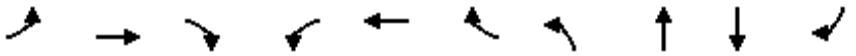
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	220	1316	2	88	1490	389	26	49	96	314	33	163
Future Volume (vph)	220	1316	2	88	1490	389	26	49	96	314	33	163
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	7.0	6.0	5.5	7.0	6.0	6.0	6.0	5.5	6.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	3433	1631	
Flt Permitted	0.09	1.00	1.00	0.13	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	160	3539	1583	233	3539	1583	1770	1863	1583	3433	1631	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	239	1430	2	96	1620	423	28	53	104	341	36	177
RTOR Reduction (vph)	0	0	1	0	0	77	0	0	91	0	139	0
Lane Group Flow (vph)	239	1430	1	96	1620	346	28	53	13	341	74	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA	Over	Prot	NA	
Protected Phases	1	6	7	5	2	3	7		5	3	8	
Permitted Phases	6		6	2		2		4				
Actuated Green, G (s)	65.4	65.4	70.5	65.5	64.0	78.3	5.1	9.4	16.4	14.3	18.6	
Effective Green, g (s)	65.4	65.4	70.5	65.5	64.0	78.3	5.1	9.4	16.4	14.3	18.6	
Actuated g/C Ratio	0.50	0.50	0.54	0.50	0.49	0.60	0.04	0.07	0.13	0.11	0.14	
Clearance Time (s)	4.5	7.0	6.0	5.5	7.0	6.0	6.0	6.0	5.5	6.0	6.0	
Vehicle Extension (s)	2.5	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	313	1780	858	311	1742	953	69	134	199	377	233	
v/s Ratio Prot	0.11	c0.40	0.00	0.04	c0.46	0.04	0.02		0.01	c0.10	c0.05	
v/s Ratio Perm	0.27		0.00	0.12		0.18		0.03				
v/c Ratio	0.76	0.80	0.00	0.31	0.93	0.36	0.41	0.40	0.07	0.90	0.32	
Uniform Delay, d1	35.4	26.9	13.6	34.6	30.9	13.2	61.0	57.6	50.1	57.2	50.0	
Progression Factor	1.00	1.00	1.00	0.73	0.69	0.23	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	10.1	4.0	0.0	0.4	7.7	0.2	3.9	1.9	0.1	24.3	0.8	
Delay (s)	45.5	30.9	13.6	25.7	29.1	3.2	64.8	59.5	50.2	81.5	50.8	
Level of Service	D	C	B	C	C	A	E	E	D	F	D	
Approach Delay (s)		33.0			23.8			55.1			69.7	
Approach LOS		C			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	34.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.5
Intersection Capacity Utilization	89.6%	ICU Level of Service	E
Analysis Period (min)	15		

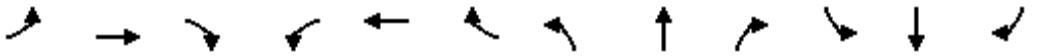
c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	79	1673	75	190	1703	23	218	322	42	138
v/c Ratio	0.46	0.80	0.08	0.80	0.76	0.02	0.88	0.74	0.26	0.34
Control Delay	32.0	14.3	2.5	64.8	5.1	0.0	84.7	32.5	48.4	9.2
Queue Delay	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Total Delay	32.0	14.3	2.5	64.8	5.3	0.0	84.7	32.5	48.4	9.2
Queue Length 50th (ft)	25	263	0	96	69	0	177	116	30	0
Queue Length 95th (ft)	m50	423	m6	m#182	m82	m0	#297	223	66	55
Internal Link Dist (ft)		1378			451			168	267	
Turn Bay Length (ft)	250		50	75		50				75
Base Capacity (vph)	185	2084	965	248	2251	1032	282	475	185	438
Starvation Cap Reductn	0	0	0	0	87	0	0	0	0	0
Spillback Cap Reductn	0	8	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.81	0.08	0.77	0.79	0.02	0.77	0.68	0.23	0.32

Intersection Summary

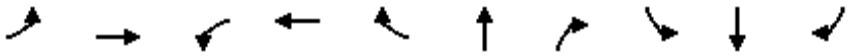
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	1539	69	175	1567	21	201	43	253	16	23	127
Future Volume (vph)	73	1539	69	175	1567	21	201	43	253	16	23	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5	6.5	5.5	6.5	6.5	6.0	6.0			6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.98	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1624			1826	1583
Flt Permitted	0.06	1.00	1.00	0.08	1.00	1.00	0.73	1.00			0.48	1.00
Satd. Flow (perm)	108	3539	1583	141	3539	1583	1359	1624			892	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	79	1673	75	190	1703	23	218	47	275	17	25	138
RTOR Reduction (vph)	0	0	31	0	0	9	0	143	0	0	0	113
Lane Group Flow (vph)	79	1673	44	190	1703	14	218	179	0	0	42	25
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6		6	2		2	8			4		4
Actuated Green, G (s)	75.5	75.5	75.5	82.6	81.6	81.6	23.7	23.7			23.7	23.7
Effective Green, g (s)	75.5	75.5	75.5	82.6	81.6	81.6	23.7	23.7			23.7	23.7
Actuated g/C Ratio	0.58	0.58	0.58	0.64	0.63	0.63	0.18	0.18			0.18	0.18
Clearance Time (s)	5.5	6.5	6.5	5.5	6.5	6.5	6.0	6.0			6.0	6.0
Vehicle Extension (s)	2.0	5.0	5.0	2.0	5.0	5.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	148	2055	919	249	2221	993	247	296			162	288
v/s Ratio Prot	0.03	c0.47		0.07	c0.48			0.11				
v/s Ratio Perm	0.28		0.03	0.41		0.01	c0.16				0.05	0.02
v/c Ratio	0.53	0.81	0.05	0.76	0.77	0.01	0.88	0.60			0.26	0.09
Uniform Delay, d1	23.0	21.7	11.7	38.6	17.4	9.1	51.8	48.8			45.6	44.2
Progression Factor	1.65	0.55	0.96	1.17	0.22	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	1.2	2.3	0.1	8.3	1.1	0.0	28.1	2.4			0.3	0.0
Delay (s)	39.1	14.2	11.3	53.3	4.9	9.1	79.8	51.2			45.9	44.2
Level of Service	D	B	B	D	A	A	E	D			D	D
Approach Delay (s)		15.2			9.7			62.8			44.6	
Approach LOS		B			A			E			D	

Intersection Summary			
HCM 2000 Control Delay	19.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	85.1%	ICU Level of Service	E
Analysis Period (min)	15		

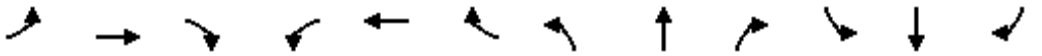
c Critical Lane Group



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	487	1437	25	1577	208	96	46	102	104	341
v/c Ratio	0.86	0.65	0.25	0.94	0.20	0.62	0.16	0.68	0.68	0.63
Control Delay	75.4	4.2	64.0	44.7	3.3	73.5	1.3	79.0	78.3	19.4
Queue Delay	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Total Delay	75.4	4.5	64.0	44.7	3.3	73.5	1.3	79.0	78.3	19.6
Queue Length 50th (ft)	197	66	21	671	15	79	0	88	90	89
Queue Length 95th (ft)	m#324	198	50	#846	46	m136	m0	151	154	168
Internal Link Dist (ft)		451		2286		401			247	
Turn Bay Length (ft)	225		200		200			125		
Base Capacity (vph)	569	2214	149	1680	1060	198	312	181	185	538
Starvation Cap Reductn	0	240	0	0	0	0	0	0	0	17
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.73	0.17	0.94	0.20	0.48	0.15	0.56	0.56	0.65

Intersection Summary

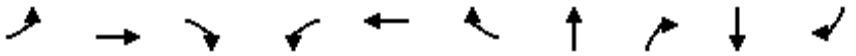
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	448	1318	4	23	1451	191	18	70	42	144	45	314
Future Volume (vph)	448	1318	4	23	1451	191	18	70	42	144	45	314
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5		4.0	6.5	6.0		6.0	6.0	6.0	6.0	5.5
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	1.00
Satd. Flow (prot)	3433	3538		1770	3539	1583		1844	1583	1681	1724	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	1.00
Satd. Flow (perm)	3433	3538		1770	3539	1583		1844	1583	1681	1724	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	487	1433	4	25	1577	208	20	76	46	157	49	341
RTOR Reduction (vph)	0	0	0	0	0	71	0	0	42	0	0	128
Lane Group Flow (vph)	487	1437	0	25	1577	137	0	96	4	102	104	213
Turn Type	Prot	NA		Prot	NA	pm+ov	Split	NA	Perm	Split	NA	pm+ov
Protected Phases	5	2		1	6	3	4	4		3	3	5
Permitted Phases						6			4			3
Actuated Green, G (s)	21.6	79.7		5.0	61.6	73.3		11.1	11.1	11.7	11.7	33.3
Effective Green, g (s)	21.6	79.7		5.0	61.6	73.3		11.1	11.1	11.7	11.7	33.3
Actuated g/C Ratio	0.17	0.61		0.04	0.47	0.56		0.09	0.09	0.09	0.09	0.26
Clearance Time (s)	5.5	6.5		4.0	6.5	6.0		6.0	6.0	6.0	6.0	5.5
Vehicle Extension (s)	2.0	5.0		3.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	570	2169		68	1676	892		157	135	151	155	405
v/s Ratio Prot	c0.14	0.41		0.01	c0.45	0.01		c0.05		c0.06	0.06	0.09
v/s Ratio Perm						0.07			0.00			0.05
v/c Ratio	0.85	0.66		0.37	0.94	0.15		0.61	0.03	0.68	0.67	0.53
Uniform Delay, d1	52.7	16.4		61.0	32.5	13.5		57.4	54.5	57.3	57.3	41.6
Progression Factor	1.26	0.19		1.00	1.00	1.00		0.99	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.3	1.0		3.3	11.8	0.0		4.9	0.0	9.0	8.6	0.6
Delay (s)	73.6	4.0		64.3	44.3	13.6		62.0	54.5	66.3	65.9	42.1
Level of Service	E	A		E	D	B		E	D	E	E	D
Approach Delay (s)		21.7			41.1			59.6			51.2	
Approach LOS		C			D			E			D	

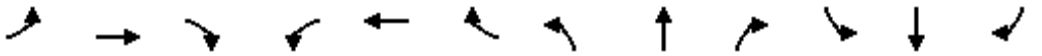
Intersection Summary			
HCM 2000 Control Delay	34.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	81.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	33	721	83	99	468	30	106	190	24	14
v/c Ratio	0.08	0.82	0.10	0.29	0.38	0.03	0.49	0.47	0.10	0.04
Control Delay	10.7	24.9	1.7	6.6	6.3	1.5	38.0	9.5	30.1	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.7	24.9	1.7	6.6	6.3	1.5	38.0	9.5	30.1	0.2
Queue Length 50th (ft)	7	242	0	12	73	0	42	0	9	0
Queue Length 95th (ft)	23	443	13	31	144	7	104	56	33	0
Internal Link Dist (ft)		1577			763		1711		308	
Turn Bay Length (ft)	100		250	200				200		
Base Capacity (vph)	655	1323	1156	387	1624	1385	341	526	363	465
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.54	0.07	0.26	0.29	0.02	0.31	0.36	0.07	0.03

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	663	76	91	431	28	76	21	175	12	10	13
Future Volume (vph)	30	663	76	91	431	28	76	21	175	12	10	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1793	1583		1814	1583
Flt Permitted	0.49	1.00	1.00	0.15	1.00	1.00		0.76	1.00		0.81	1.00
Satd. Flow (perm)	921	1863	1583	279	1863	1583		1409	1583		1502	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	721	83	99	468	30	83	23	190	13	11	14
RTOR Reduction (vph)	0	0	43	0	0	10	0	0	160	0	0	12
Lane Group Flow (vph)	33	721	40	99	468	20	0	106	30	0	24	2
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)	32.9	32.9	32.9	46.0	46.0	46.0		10.8	10.8		10.8	10.8
Effective Green, g (s)	32.9	32.9	32.9	46.0	46.0	46.0		10.8	10.8		10.8	10.8
Actuated g/C Ratio	0.48	0.48	0.48	0.67	0.67	0.67		0.16	0.16		0.16	0.16
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	440	890	756	340	1245	1058		221	248		235	248
v/s Ratio Prot		c0.39		0.03	c0.25							
v/s Ratio Perm	0.04		0.03	0.16		0.01		c0.08	0.02		0.02	0.00
v/c Ratio	0.07	0.81	0.05	0.29	0.38	0.02		0.48	0.12		0.10	0.01
Uniform Delay, d1	9.7	15.3	9.6	8.8	5.0	3.8		26.4	24.9		24.8	24.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	5.6	0.0	0.5	0.2	0.0		1.6	0.2		0.2	0.0
Delay (s)	9.8	20.9	9.6	9.3	5.2	3.8		28.1	25.1		25.0	24.5
Level of Service	A	C	A	A	A	A		C	C		C	C
Approach Delay (s)		19.4			5.8			26.2			24.8	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	68.8	Sum of lost time (s)	18.0
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

SYNCHRO ANALYSIS REPORTS
Projected 2030
AM Peak Hour

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NET	NER	SWT
Lane Group Flow (vph)	13	952	104	510	605	47	132	508	142
v/c Ratio	0.05	0.80	0.17	0.92	0.24	0.04	0.73	0.76	0.56
Control Delay	22.9	34.2	5.9	53.4	5.0	1.5	59.3	11.8	42.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.9	34.2	5.9	53.4	5.0	1.5	59.3	11.8	42.2
Queue Length 50th (ft)	5	268	0	271	57	0	71	0	70
Queue Length 95th (ft)	19	#380	36	#455	77	9	#149	97	129
Internal Link Dist (ft)		867			267		507		379
Turn Bay Length (ft)	100		75	200		125		200	
Base Capacity (vph)	266	1197	604	580	2524	1142	205	687	286
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.80	0.17	0.88	0.24	0.04	0.64	0.74	0.50

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	12	876	96	469	557	43	79	42	467	22	93	16
Future Volume (vph)	12	876	96	469	557	43	79	42	467	22	93	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	5.5	6.5	6.5		6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97	1.00		0.99	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1804	1583		1817	
Flt Permitted	0.42	1.00	1.00	0.95	1.00	1.00		0.66	1.00		0.92	
Satd. Flow (perm)	788	3539	1583	1770	3539	1583		1234	1583		1682	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	952	104	510	605	47	86	46	508	24	101	17
RTOR Reduction (vph)	0	0	68	0	0	13	0	0	433	0	6	0
Lane Group Flow (vph)	13	952	36	510	605	34	0	132	75	0	136	0
Turn Type	Perm	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		6		5	2			8			4	
Permitted Phases	6		6			2	8		8	4		
Actuated Green, G (s)	30.5	30.5	30.5	28.2	64.2	64.2		13.3	13.3		13.3	
Effective Green, g (s)	30.5	30.5	30.5	28.2	64.2	64.2		13.3	13.3		13.3	
Actuated g/C Ratio	0.34	0.34	0.34	0.31	0.71	0.71		0.15	0.15		0.15	
Clearance Time (s)	6.5	6.5	6.5	5.5	6.5	6.5		6.0	6.0		6.0	
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)	267	1199	536	554	2524	1129		182	233		248	
v/s Ratio Prot		c0.27		c0.29	0.17							
v/s Ratio Perm	0.02		0.02			0.02		c0.11	0.05		0.08	
v/c Ratio	0.05	0.79	0.07	0.92	0.24	0.03		0.73	0.32		0.55	
Uniform Delay, d1	20.0	26.9	20.1	29.8	4.5	3.8		36.6	34.3		35.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	0.3	5.5	0.2	20.8	0.2	0.0		13.4	0.8		2.5	
Delay (s)	20.3	32.4	20.4	50.6	4.7	3.8		50.0	35.1		38.0	
Level of Service	C	C	C	D	A	A		D	D		D	
Approach Delay (s)		31.1			24.8			38.2			38.0	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	30.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	78.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	151	1325	1	88	940	123	21	60	164	336	279
v/c Ratio	0.43	0.84	0.00	0.34	0.59	0.12	0.13	0.27	0.42	0.98	0.66
Control Delay	12.8	31.2	0.0	13.5	17.9	2.8	39.8	37.5	3.4	86.1	27.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.8	31.2	0.0	13.5	17.9	2.8	39.8	37.5	3.4	86.1	27.2
Queue Length 50th (ft)	32	339	0	8	241	8	11	33	0	100	74
Queue Length 95th (ft)	71	#575	0	39	351	22	34	65	0	#186	#190
Internal Link Dist (ft)		330			1378			508			852
Turn Bay Length (ft)	275			100		100	75		75	125	
Base Capacity (vph)	382	1571	956	281	1586	1056	177	331	406	343	444
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.84	0.00	0.31	0.59	0.12	0.12	0.18	0.40	0.98	0.63

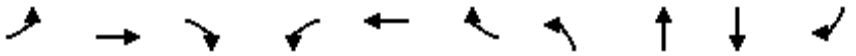
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	139	1219	1	81	865	113	19	55	151	309	74	183
Future Volume (vph)	139	1219	1	81	865	113	19	55	151	309	74	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	7.0	6.0	5.5	7.0	6.0	6.0	6.0	5.5	6.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	3433	1663	
Flt Permitted	0.20	1.00	1.00	0.11	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	367	3539	1583	203	3539	1583	1770	1863	1583	3433	1663	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	151	1325	1	88	940	123	21	60	164	336	80	199
RTOR Reduction (vph)	0	0	1	0	0	61	0	0	149	0	97	0
Lane Group Flow (vph)	151	1325	0	88	940	62	21	60	15	336	182	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA	Over	Prot	NA	
Protected Phases	1	6	7	5	2	3	7		5	3	8	
Permitted Phases	6		6	2		2		4				
Actuated Green, G (s)	45.3	36.3	39.6	45.1	36.7	45.7	3.3	11.8	8.4	9.0	17.5	
Effective Green, g (s)	45.3	36.3	39.6	45.1	36.7	45.7	3.3	11.8	8.4	9.0	17.5	
Actuated g/C Ratio	0.50	0.40	0.44	0.50	0.41	0.51	0.04	0.13	0.09	0.10	0.19	
Clearance Time (s)	4.5	7.0	6.0	5.5	7.0	6.0	6.0	6.0	5.5	6.0	6.0	
Vehicle Extension (s)	2.5	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	325	1427	696	247	1443	803	64	244	147	343	323	
v/s Ratio Prot	c0.05	c0.37	0.00	0.03	0.27	0.01	0.01		0.01	c0.10	c0.11	
v/s Ratio Perm	0.19		0.00	0.14		0.03		c0.03				
v/c Ratio	0.46	0.93	0.00	0.36	0.65	0.08	0.33	0.25	0.10	0.98	0.56	
Uniform Delay, d1	13.4	25.6	14.1	16.5	21.5	11.4	42.3	35.1	37.4	40.4	32.8	
Progression Factor	1.00	1.00	1.00	1.06	0.78	4.04	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.8	11.9	0.0	0.8	2.1	0.0	3.0	0.5	0.3	42.6	2.2	
Delay (s)	14.1	37.6	14.1	18.3	18.9	45.8	45.3	35.6	37.7	83.0	35.0	
Level of Service	B	D	B	B	B	D	D	D	D	F	D	
Approach Delay (s)		35.2			21.8			37.8			61.2	
Approach LOS		D			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	35.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	24.5
Intersection Capacity Utilization	71.6%	ICU Level of Service	C
Analysis Period (min)	15		

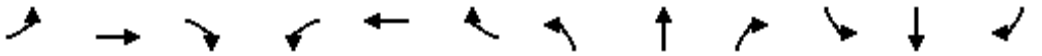
c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	39	1674	63	177	1061	8	97	154	14	27
v/c Ratio	0.12	0.82	0.07	0.66	0.46	0.01	0.58	0.48	0.08	0.08
Control Delay	1.2	6.9	0.1	37.2	3.3	0.0	51.3	12.8	34.5	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1.2	6.9	0.1	37.2	3.3	0.0	51.3	12.8	34.5	0.4
Queue Length 50th (ft)	1	80	0	43	42	0	53	5	7	0
Queue Length 95th (ft)	m1	m22	m0	m#114	57	m0	100	58	24	0
Internal Link Dist (ft)		1378			451			168	267	
Turn Bay Length (ft)	250		50	75		50				75
Base Capacity (vph)	354	2053	966	277	2305	1067	216	371	234	405
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.82	0.07	0.64	0.46	0.01	0.45	0.42	0.06	0.07

Intersection Summary

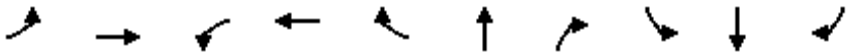
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	1540	58	163	976	7	89	8	133	6	6	25
Future Volume (vph)	36	1540	58	163	976	7	89	8	133	6	6	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5	6.5	5.5	6.5	6.5	6.0	6.0			6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.98	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1600			1817	1583
Flt Permitted	0.19	1.00	1.00	0.09	1.00	1.00	0.75	1.00			0.81	1.00
Satd. Flow (perm)	346	3539	1583	161	3539	1583	1394	1600			1508	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	1674	63	177	1061	8	97	9	145	7	7	27
RTOR Reduction (vph)	0	0	28	0	0	3	0	128	0	0	0	24
Lane Group Flow (vph)	39	1674	35	177	1061	5	97	26	0	0	14	3
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6		6	2		2	8			4		4
Actuated Green, G (s)	50.0	50.0	50.0	57.4	56.4	56.4	10.8	10.8			10.8	10.8
Effective Green, g (s)	50.0	50.0	50.0	57.4	56.4	56.4	10.8	10.8			10.8	10.8
Actuated g/C Ratio	0.56	0.56	0.56	0.64	0.63	0.63	0.12	0.12			0.12	0.12
Clearance Time (s)	5.5	6.5	6.5	5.5	6.5	6.5	6.0	6.0			6.0	6.0
Vehicle Extension (s)	2.0	5.0	5.0	2.0	5.0	5.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	268	1966	879	302	2217	992	167	192			180	189
v/s Ratio Prot	0.01	c0.47		c0.07	0.30			0.02				
v/s Ratio Perm	0.07		0.02	0.30		0.00	c0.07				0.01	0.00
v/c Ratio	0.15	0.85	0.04	0.59	0.48	0.01	0.58	0.14			0.08	0.02
Uniform Delay, d1	10.3	16.9	9.1	24.7	9.0	6.3	37.5	35.4			35.2	34.9
Progression Factor	0.09	0.27	0.02	1.06	0.29	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	0.0	2.7	0.0	1.4	0.6	0.0	3.3	0.1			0.1	0.0
Delay (s)	1.0	7.2	0.2	27.7	3.2	6.3	40.7	35.6			35.2	34.9
Level of Service	A	A	A	C	A	A	D	D			D	C
Approach Delay (s)		6.8			6.7			37.6			35.0	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	78.2%	ICU Level of Service	D
Analysis Period (min)	15		

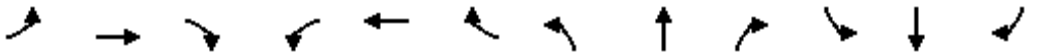
c Critical Lane Group



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	248	1550	15	830	40	51	45	71	72	416
v/c Ratio	0.59	0.67	0.12	0.49	0.04	0.30	0.14	0.42	0.42	0.68
Control Delay	51.0	5.6	40.9	20.3	0.1	43.2	1.0	45.2	45.0	9.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.0	5.6	40.9	20.3	0.1	43.2	1.0	45.2	45.0	9.4
Queue Length 50th (ft)	66	15	8	178	0	28	0	41	42	21
Queue Length 95th (ft)	m75	#622	27	278	0	m61	m0	82	83	62
Internal Link Dist (ft)		451		2286		401			247	
Turn Bay Length (ft)	225		200		200			125		
Base Capacity (vph)	428	2303	216	1697	1148	286	399	261	265	614
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.67	0.07	0.49	0.03	0.18	0.11	0.27	0.27	0.68

Intersection Summary

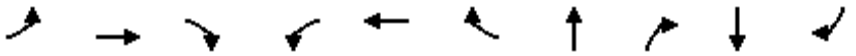
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	228	1425	1	14	764	37	9	38	41	111	20	383
Future Volume (vph)	228	1425	1	14	764	37	9	38	41	111	20	383
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5		4.0	6.5	6.0		6.0	6.0	6.0	6.0	5.5
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	1.00
Satd. Flow (prot)	3433	3539		1770	3539	1583		1845	1583	1681	1710	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	1.00
Satd. Flow (perm)	3433	3539		1770	3539	1583		1845	1583	1681	1710	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	248	1549	1	15	830	40	10	41	45	121	22	416
RTOR Reduction (vph)	0	0	0	0	0	18	0	0	42	0	0	280
Lane Group Flow (vph)	248	1550	0	15	830	22	0	51	3	71	72	136
Turn Type	Prot	NA		Prot	NA	pm+ov	Split	NA	Perm	Split	NA	pm+ov
Protected Phases	5	2		1	6	3	4	4		3	3	5
Permitted Phases						6			4			3
Actuated Green, G (s)	10.9	51.8		1.5	40.9	48.4		6.7	6.7	7.5	7.5	18.4
Effective Green, g (s)	10.9	51.8		1.5	40.9	48.4		6.7	6.7	7.5	7.5	18.4
Actuated g/C Ratio	0.12	0.58		0.02	0.45	0.54		0.07	0.07	0.08	0.08	0.20
Clearance Time (s)	5.5	6.5		4.0	6.5	6.0		6.0	6.0	6.0	6.0	5.5
Vehicle Extension (s)	2.0	5.0		3.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	415	2036		29	1608	851		137	117	140	142	323
v/s Ratio Prot	c0.07	c0.44		0.01	0.23	0.00		c0.03		c0.04	0.04	0.05
v/s Ratio Perm						0.01			0.00			0.04
v/c Ratio	0.60	0.76		0.52	0.52	0.03		0.37	0.03	0.51	0.51	0.42
Uniform Delay, d1	37.5	14.4		43.9	17.5	9.7		39.6	38.6	39.5	39.5	31.2
Progression Factor	1.28	0.15		1.00	1.00	1.00		1.01	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	1.7		14.7	1.2	0.0		0.6	0.0	1.1	1.0	0.3
Delay (s)	48.7	3.8		58.6	18.7	9.8		40.7	38.7	40.5	40.5	31.5
Level of Service	D	A		E	B	A		D	D	D	D	C
Approach Delay (s)		10.0			19.0			39.7			33.8	
Approach LOS		B			B			D			C	

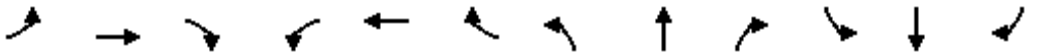
Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	7	438	128	225	998	8	58	109	48	36
v/c Ratio	0.04	0.60	0.18	0.41	0.84	0.01	0.30	0.34	0.22	0.11
Control Delay	10.5	17.3	2.8	6.5	15.4	0.0	32.0	10.5	30.0	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.5	17.3	2.8	6.5	15.4	0.0	32.0	10.5	30.0	0.7
Queue Length 50th (ft)	1	114	0	25	209	0	17	0	14	0
Queue Length 95th (ft)	8	205	24	56	441	0	65	45	55	0
Internal Link Dist (ft)		1577			763		1711		308	
Turn Bay Length (ft)	100		250	200				200		
Base Capacity (vph)	361	1521	1315	568	1726	1469	391	533	449	533
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.29	0.10	0.40	0.58	0.01	0.15	0.20	0.11	0.07

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	403	118	207	918	7	44	9	100	18	26	33
Future Volume (vph)	6	403	118	207	918	7	44	9	100	18	26	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.98	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1789	1583		1825	1583
Flt Permitted	0.24	1.00	1.00	0.32	1.00	1.00		0.73	1.00		0.84	1.00
Satd. Flow (perm)	443	1863	1583	588	1863	1583		1359	1583		1561	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	438	128	225	998	8	48	10	109	20	28	36
RTOR Reduction (vph)	0	0	76	0	0	3	0	0	93	0	0	31
Lane Group Flow (vph)	7	438	52	225	998	5	0	58	16	0	48	5
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)	23.7	23.7	23.7	38.2	38.2	38.2		8.5	8.5		8.5	8.5
Effective Green, g (s)	23.7	23.7	23.7	38.2	38.2	38.2		8.5	8.5		8.5	8.5
Actuated g/C Ratio	0.40	0.40	0.40	0.65	0.65	0.65		0.14	0.14		0.14	0.14
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	178	752	639	553	1212	1030		196	229		226	229
v/s Ratio Prot		0.24		0.06	c0.54							
v/s Ratio Perm	0.02		0.03	0.21		0.00		c0.04	0.01		0.03	0.00
v/c Ratio	0.04	0.58	0.08	0.41	0.82	0.01		0.30	0.07		0.21	0.02
Uniform Delay, d1	10.6	13.6	10.8	5.5	7.7	3.6		22.4	21.7		22.1	21.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	1.2	0.1	0.5	4.7	0.0		0.8	0.1		0.5	0.0
Delay (s)	10.7	14.8	10.8	6.0	12.4	3.6		23.3	21.8		22.6	21.6
Level of Service	B	B	B	A	B	A		C	C		C	C
Approach Delay (s)		13.9			11.2			22.3			22.2	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	58.7	Sum of lost time (s)	18.0
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	12.7

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	60	1	97	36	1	24	34	556	18	11	844	21
Future Vol, veh/h	60	1	97	36	1	24	34	556	18	11	844	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	100	150	-	100	100	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	65	1	105	39	1	26	37	604	20	12	917	23

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1643	1639	917	1684	1642	604	940	0	0	624	0	0
Stage 1	941	941	-	678	678	-	-	-	-	-	-	-
Stage 2	702	698	-	1006	964	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	80	100	330	75	100	498	729	-	-	957	-	-
Stage 1	316	342	-	442	452	-	-	-	-	-	-	-
Stage 2	429	442	-	291	334	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	72	94	330	48	94	498	729	-	-	957	-	-
Mov Cap-2 Maneuver	72	94	-	48	94	-	-	-	-	-	-	-
Stage 1	300	338	-	419	429	-	-	-	-	-	-	-
Stage 2	385	419	-	195	330	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	83.2	130.9	0.6	0.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	NWLn2	SELn1	SELn2	SWL	SWT	SWR
Capacity (veh/h)	729	-	-	49	498	72	330	957	-	-
HCM Lane V/C Ratio	0.051	-	-	0.821	0.052	0.921	0.319	0.012	-	-
HCM Control Delay (s)	10.2	-	-	207.7	12.6	182.2	20.9	8.8	-	-
HCM Lane LOS	B	-	-	F	B	F	C	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	3.4	0.2	4.6	1.3	0	-	-

Intersection	
Int Delay, s/veh	53.9

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	36	7	48	131	3	88	17	535	88	73	689	13
Future Vol, veh/h	36	7	48	131	3	88	17	535	88	73	689	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	100	100	-	100	250	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	39	8	52	142	3	96	18	582	96	79	749	14

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1623	1621	749	1562	1539	582	763	0	0	678	0	0
Stage 1	907	907	-	618	618	-	-	-	-	-	-	-
Stage 2	716	714	-	944	921	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	82	103	412	~ 91	116	513	850	-	-	914	-	-
Stage 1	330	355	-	477	481	-	-	-	-	-	-	-
Stage 2	421	435	-	315	349	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	60	92	412	~ 69	104	513	850	-	-	914	-	-
Mov Cap-2 Maneuver	60	92	-	~ 69	104	-	-	-	-	-	-	-
Stage 1	323	324	-	467	471	-	-	-	-	-	-	-
Stage 2	333	426	-	245	319	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	78.6	$ 383.9	0.2	0.9
HCM LOS	F	F		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	NWLn2	SELn1	SELn2	SWL	SWT	SWR
Capacity (veh/h)	850	-	-	70	513	64	412	914	-	-
HCM Lane V/C Ratio	0.022	-	-	2.081	0.186	0.73	0.127	0.087	-	-
HCM Control Delay (s)	9.3	-	-	$ 627.1	13.6	149.5	15	9.3	-	-
HCM Lane LOS	A	-	-	F	B	F	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	13.5	0.7	3.2	0.4	0.3	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

SYNCHRO ANALYSIS REPORTS
Projected 2030
PM Peak Hour

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NET	NER	SWT
Lane Group Flow (vph)	33	1121	148	713	1145	110	287	700	228
v/c Ratio	0.24	1.07	0.29	1.15	0.47	0.10	1.18	0.85	0.67
Control Delay	45.8	97.5	24.8	129.3	11.9	2.7	164.2	19.9	61.6
Queue Delay	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0
Total Delay	45.8	97.5	24.8	129.3	12.4	2.7	164.2	19.9	61.6
Queue Length 50th (ft)	25	~636	63	~818	257	8	~335	101	199
Queue Length 95th (ft)	58	#776	125	#1066	303	29	#528	310	298
Internal Link Dist (ft)		867			267		507		379
Turn Bay Length (ft)	100		75	200		125		200	
Base Capacity (vph)	137	1049	513	619	2418	1108	243	824	340
Starvation Cap Reductn	0	0	0	0	737	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	1.07	0.29	1.15	0.68	0.10	1.18	0.85	0.67

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	30	1031	136	656	1053	101	126	138	644	19	151	40
Future Volume (vph)	30	1031	136	656	1053	101	126	138	644	19	151	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	5.5	6.5	6.5		6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98	1.00		1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583		1819	1583		1807	
Flt Permitted	0.25	1.00	1.00	0.95	1.00	1.00		0.56	1.00		0.79	
Satd. Flow (perm)	462	3539	1583	1770	3539	1583		1043	1583		1434	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	1121	148	713	1145	110	137	150	700	21	164	43
RTOR Reduction (vph)	0	0	44	0	0	26	0	0	455	0	5	0
Lane Group Flow (vph)	33	1121	104	713	1145	84	0	287	245	0	223	0
Turn Type	Perm	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		6		5	2			8			4	
Permitted Phases	6		6			2	8		8	4		
Actuated Green, G (s)	44.5	44.5	44.5	52.5	102.5	102.5		35.0	35.0		35.0	
Effective Green, g (s)	44.5	44.5	44.5	52.5	102.5	102.5		35.0	35.0		35.0	
Actuated g/C Ratio	0.30	0.30	0.30	0.35	0.68	0.68		0.23	0.23		0.23	
Clearance Time (s)	6.5	6.5	6.5	5.5	6.5	6.5		6.0	6.0		6.0	
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)	137	1049	469	619	2418	1081		243	369		334	
v/s Ratio Prot		c0.32		c0.40	0.32							
v/s Ratio Perm	0.07		0.07			0.05		c0.28	0.15		0.16	
v/c Ratio	0.24	1.07	0.22	1.15	0.47	0.08		1.18	0.66		0.67	
Uniform Delay, d1	40.0	52.8	39.7	48.8	11.1	7.9		57.5	52.2		52.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	4.1	48.1	1.1	85.9	0.7	0.1		115.6	4.5		5.0	
Delay (s)	44.1	100.8	40.8	134.6	11.8	8.1		173.1	56.7		57.2	
Level of Service	D	F	D	F	B	A		F	E		E	
Approach Delay (s)		92.6			56.1			90.5			57.2	
Approach LOS		F			E			F			E	

Intersection Summary			
HCM 2000 Control Delay	74.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	110.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	271	1532	2	96	1746	423	28	87	133	341	302
v/c Ratio	0.93	0.84	0.00	0.36	0.97	0.40	0.28	0.58	0.37	0.83	0.82
Control Delay	79.8	35.3	0.0	32.4	35.2	3.1	75.3	80.9	4.2	80.9	61.2
Queue Delay	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.8	38.3	0.0	32.4	35.2	3.1	75.3	80.9	4.2	80.9	61.2
Queue Length 50th (ft)	~225	653	0	26	510	38	27	83	0	168	221
Queue Length 95th (ft)	#407	698	0	m42	#1021	m91	62	141	9	#269	#411
Internal Link Dist (ft)		330			1378			508			852
Turn Bay Length (ft)	275			100		100	75		75	125	
Base Capacity (vph)	291	1958	974	268	1816	1058	106	198	355	413	369
Starvation Cap Reductn	0	315	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.93	0.93	0.00	0.36	0.96	0.40	0.26	0.44	0.37	0.83	0.82

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

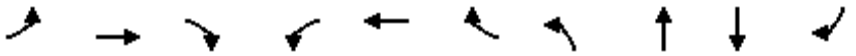
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	249	1409	2	88	1606	389	26	80	122	314	72	206
Future Volume (vph)	249	1409	2	88	1606	389	26	80	122	314	72	206
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	7.0	6.0	5.5	7.0	6.0	6.0	6.0	5.5	6.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	3433	1655	
Flt Permitted	0.07	1.00	1.00	0.08	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	135	3539	1583	155	3539	1583	1770	1863	1583	3433	1655	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	271	1532	2	96	1746	423	28	87	133	341	78	224
RTOR Reduction (vph)	0	0	1	0	0	55	0	0	117	0	66	0
Lane Group Flow (vph)	271	1532	1	96	1746	368	28	87	16	341	236	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA	Over	Prot	NA	
Protected Phases	1	6	7	5	2	3	7		5	3	8	
Permitted Phases	6		6	2		2		4				
Actuated Green, G (s)	75.3	75.3	80.5	75.2	73.7	94.2	5.2	12.2	17.5	20.5	27.5	
Effective Green, g (s)	75.3	75.3	80.5	75.2	73.7	94.2	5.2	12.2	17.5	20.5	27.5	
Actuated g/C Ratio	0.50	0.50	0.54	0.50	0.49	0.63	0.03	0.08	0.12	0.14	0.18	
Clearance Time (s)	4.5	7.0	6.0	5.5	7.0	6.0	6.0	6.0	5.5	6.0	6.0	
Vehicle Extension (s)	2.5	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	286	1776	849	266	1738	994	61	151	184	469	303	
v/s Ratio Prot	c0.13	0.43	0.00	0.04	c0.49	0.05	0.02		0.01	0.10	c0.14	
v/s Ratio Perm	0.35		0.00	0.14		0.18		c0.05				
v/c Ratio	0.95	0.86	0.00	0.36	1.00	0.37	0.46	0.58	0.08	0.73	0.78	
Uniform Delay, d1	48.5	32.8	16.1	46.2	38.1	13.5	71.0	66.4	59.1	62.1	58.3	
Progression Factor	1.00	1.00	1.00	0.71	0.64	0.57	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	38.8	5.8	0.0	0.5	18.5	0.2	5.4	5.2	0.2	5.6	11.9	
Delay (s)	87.4	38.6	16.1	33.1	42.8	7.9	76.4	71.6	59.3	67.6	70.2	
Level of Service	F	D	B	C	D	A	E	E	E	E	E	
Approach Delay (s)		45.9			35.9			65.6			68.9	
Approach LOS		D			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	45.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	24.5
Intersection Capacity Utilization	94.4%	ICU Level of Service	F
Analysis Period (min)	15		

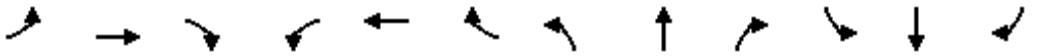
c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	79	1802	75	190	1829	23	218	322	42	138
v/c Ratio	0.53	0.84	0.08	0.83	0.80	0.02	0.91	0.75	0.30	0.36
Control Delay	47.0	12.9	2.0	82.8	5.1	0.0	98.8	37.6	58.6	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Total Delay	47.0	12.9	2.0	82.8	5.6	0.0	98.8	37.6	58.6	13.2
Queue Length 50th (ft)	32	152	0	132	102	0	207	138	35	10
Queue Length 95th (ft)	m58	448	m9	m#199	108	m0	#348	255	76	72
Internal Link Dist (ft)		1378			451			168	267	
Turn Bay Length (ft)	250		50	75		50				75
Base Capacity (vph)	160	2152	990	244	2290	1046	262	454	154	406
Starvation Cap Reductn	0	0	0	0	151	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.84	0.08	0.78	0.86	0.02	0.83	0.71	0.27	0.34

Intersection Summary

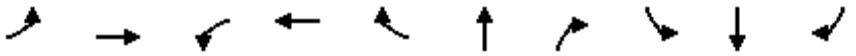
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	1658	69	175	1683	21	201	43	253	16	23	127
Future Volume (vph)	73	1658	69	175	1683	21	201	43	253	16	23	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5	6.5	5.5	6.5	6.5	6.0	6.0			6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.98	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1624			1826	1583
Flt Permitted	0.05	1.00	1.00	0.06	1.00	1.00	0.73	1.00			0.43	1.00
Satd. Flow (perm)	90	3539	1583	110	3539	1583	1359	1624			797	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	79	1802	75	190	1829	23	218	47	275	17	25	138
RTOR Reduction (vph)	0	0	27	0	0	8	0	143	0	0	0	103
Lane Group Flow (vph)	79	1802	48	190	1829	15	218	179	0	0	42	35
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6		6	2		2	8			4		4
Actuated Green, G (s)	91.2	91.2	91.2	98.1	97.1	97.1	26.5	26.5			26.5	26.5
Effective Green, g (s)	91.2	91.2	91.2	98.1	97.1	97.1	26.5	26.5			26.5	26.5
Actuated g/C Ratio	0.61	0.61	0.61	0.65	0.65	0.65	0.18	0.18			0.18	0.18
Clearance Time (s)	5.5	6.5	6.5	5.5	6.5	6.5	6.0	6.0			6.0	6.0
Vehicle Extension (s)	2.0	5.0	5.0	2.0	5.0	5.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	148	2151	962	230	2290	1024	240	286			140	279
v/s Ratio Prot	0.03	c0.51		0.08	c0.52			0.11				
v/s Ratio Perm	0.29		0.03	c0.46		0.01	c0.16				0.05	0.02
v/c Ratio	0.53	0.84	0.05	0.83	0.80	0.01	0.91	0.62			0.30	0.13
Uniform Delay, d1	27.8	23.5	11.9	47.1	19.3	9.4	60.6	57.2			53.7	52.0
Progression Factor	1.83	0.41	0.58	1.29	0.19	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	1.2	2.6	0.1	12.8	1.3	0.0	33.6	3.0			0.4	0.1
Delay (s)	52.0	12.3	7.0	73.5	4.9	9.4	94.1	60.2			54.1	52.1
Level of Service	D	B	A	E	A	A	F	E			D	D
Approach Delay (s)		13.7			11.3			73.9			52.5	
Approach LOS		B			B			E			D	

Intersection Summary			
HCM 2000 Control Delay	21.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	88.4%	ICU Level of Service	E
Analysis Period (min)	15		

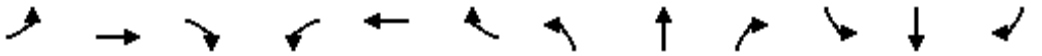
c Critical Lane Group



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	533	1519	25	1667	208	96	46	102	104	378
v/c Ratio	0.92	0.64	0.28	0.92	0.20	0.67	0.18	0.75	0.74	0.74
Control Delay	89.2	3.0	75.6	44.0	4.5	89.0	1.6	98.0	96.6	33.6
Queue Delay	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7
Total Delay	89.2	3.3	75.6	44.0	4.5	89.0	1.6	98.0	96.6	35.3
Queue Length 50th (ft)	256	74	24	812	26	92	0	103	105	164
Queue Length 95th (ft)	m#370	94	57	#991	60	m155	m0	#185	#185	262
Internal Link Dist (ft)		451		2286		401			247	
Turn Bay Length (ft)	225		200		200			125		
Base Capacity (vph)	584	2358	129	1809	1073	172	272	156	160	509
Starvation Cap Reductn	0	316	0	0	0	0	0	0	0	43
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.91	0.74	0.19	0.92	0.19	0.56	0.17	0.65	0.65	0.81

Intersection Summary

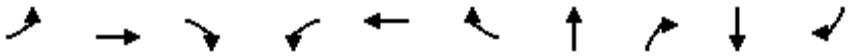
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	490	1394	4	23	1534	191	18	70	42	144	45	348
Future Volume (vph)	490	1394	4	23	1534	191	18	70	42	144	45	348
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5		4.0	6.5	6.0		6.0	6.0	6.0	6.0	5.5
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	1.00
Satd. Flow (prot)	3433	3538		1770	3539	1583		1844	1583	1681	1724	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	1.00
Satd. Flow (perm)	3433	3538		1770	3539	1583		1844	1583	1681	1724	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	533	1515	4	25	1667	208	20	76	46	157	49	378
RTOR Reduction (vph)	0	0	0	0	0	56	0	0	42	0	0	106
Lane Group Flow (vph)	533	1519	0	25	1667	152	0	96	4	102	104	272
Turn Type	Prot	NA		Prot	NA	pm+ov	Split	NA	Perm	Split	NA	pm+ov
Protected Phases	5	2		1	6	3	4	4		3	3	5
Permitted Phases						6			4			3
Actuated Green, G (s)	25.4	98.4		5.2	76.7	88.9		11.7	11.7	12.2	12.2	37.6
Effective Green, g (s)	25.4	98.4		5.2	76.7	88.9		11.7	11.7	12.2	12.2	37.6
Actuated g/C Ratio	0.17	0.66		0.03	0.51	0.59		0.08	0.08	0.08	0.08	0.25
Clearance Time (s)	5.5	6.5		4.0	6.5	6.0		6.0	6.0	6.0	6.0	5.5
Vehicle Extension (s)	2.0	5.0		3.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	581	2320		61	1809	938		143	123	136	140	396
v/s Ratio Prot	c0.16	0.43		0.01	c0.47	0.01		c0.05		c0.06	0.06	0.12
v/s Ratio Perm						0.08			0.00			0.06
v/c Ratio	0.92	0.65		0.41	0.92	0.16		0.67	0.03	0.75	0.74	0.69
Uniform Delay, d1	61.3	15.6		70.9	33.9	13.8		67.3	63.9	67.4	67.4	50.9
Progression Factor	1.25	0.13		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.0	0.8		4.4	9.3	0.0		9.3	0.0	18.4	16.9	3.9
Delay (s)	88.9	2.9		75.3	43.1	13.8		76.3	63.9	85.8	84.2	54.8
Level of Service	F	A		E	D	B		E	E	F	F	D
Approach Delay (s)		25.2			40.3			72.3			65.4	
Approach LOS		C			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	37.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	85.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

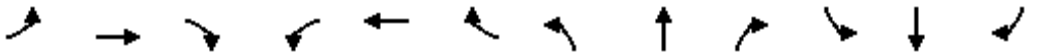


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	33	1033	83	182	690	30	106	318	24	14
v/c Ratio	0.08	1.00	0.09	0.70	0.51	0.03	0.55	0.75	0.12	0.05
Control Delay	10.9	50.3	1.5	30.7	7.4	1.4	45.4	21.6	33.0	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.9	50.3	1.5	30.7	7.4	1.4	45.4	21.6	33.0	0.3
Queue Length 50th (ft)	8	~541	0	42	135	0	54	38	12	0
Queue Length 95th (ft)	24	#889	14	#141	248	7	105	127	34	0
Internal Link Dist (ft)		1577			763		1711		308	
Turn Bay Length (ft)	100		250	200				200		
Base Capacity (vph)	416	1031	925	273	1361	1166	265	493	283	386
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	1.00	0.09	0.67	0.51	0.03	0.40	0.65	0.08	0.04

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	950	76	167	635	28	76	21	293	12	10	13
Future Volume (vph)	30	950	76	167	635	28	76	21	293	12	10	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583		1793	1583		1814	1583
Flt Permitted	0.40	1.00	1.00	0.08	1.00	1.00		0.76	1.00		0.81	1.00
Satd. Flow (perm)	750	1863	1583	140	1863	1583		1409	1583		1505	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	1033	83	182	690	30	83	23	318	13	11	14
RTOR Reduction (vph)	0	0	37	0	0	8	0	0	208	0	0	12
Lane Group Flow (vph)	33	1033	46	182	690	22	0	106	110	0	24	2
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)	47.1	47.1	47.1	61.4	61.4	61.4		11.7	11.7		11.7	11.7
Effective Green, g (s)	47.1	47.1	47.1	61.4	61.4	61.4		11.7	11.7		11.7	11.7
Actuated g/C Ratio	0.55	0.55	0.55	0.72	0.72	0.72		0.14	0.14		0.14	0.14
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	415	1031	876	259	1344	1142		193	217		206	217
v/s Ratio Prot		c0.55		0.07	c0.37							
v/s Ratio Perm	0.04		0.03	0.44		0.01		c0.08	0.07		0.02	0.00
v/c Ratio	0.08	1.00	0.05	0.70	0.51	0.02		0.55	0.51		0.12	0.01
Uniform Delay, d1	8.9	19.0	8.7	23.2	5.2	3.3		34.2	34.0		32.2	31.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	28.5	0.0	8.3	0.3	0.0		3.2	1.9		0.3	0.0
Delay (s)	9.0	47.5	8.8	31.5	5.6	3.4		37.4	35.9		32.4	31.7
Level of Service	A	D	A	C	A	A		D	D		C	C
Approach Delay (s)		43.6			10.7			36.3			32.2	
Approach LOS		D			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	30.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	85.1	Sum of lost time (s)	18.0
Intersection Capacity Utilization	86.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	65.3

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	59	2	51	44	3	26	101	960	75	31	805	86
Future Vol, veh/h	59	2	51	44	3	26	101	960	75	31	805	86
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	100	150	-	100	100	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	64	2	55	48	3	28	110	1043	82	34	875	93

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2263	2288	875	2281	2299	1043	968	0	0	1125	0	0
Stage 1	943	943	-	1263	1263	-	-	-	-	-	-	-
Stage 2	1320	1345	-	1018	1036	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	~ 29	39	349	~ 28	39	279	712	-	-	621	-	-
Stage 1	315	341	-	208	241	-	-	-	-	-	-	-
Stage 2	193	220	-	286	309	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 20	31	349	~ 19	31	279	712	-	-	621	-	-
Mov Cap-2 Maneuver	~ 20	31	-	~ 19	31	-	-	-	-	-	-	-
Stage 1	266	322	-	176	204	-	-	-	-	-	-	-
Stage 2	144	186	-	226	292	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	$ 792.5	$ 770.3	1	0.4
HCM LOS	F	F		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	NWLn2	SELn1	SELn2	SWL	SWT	SWR
Capacity (veh/h)	712	-	-	19	279	20	349	621	-	-
HCM Lane V/C Ratio	0.154	-	-	2.689	0.101	3.315	0.159	0.054	-	-
HCM Control Delay (s)	11	-	$	1185.7	19.4	$ 1440.7	17.3	11.1	-	-
HCM Lane LOS	B	-	-	F	C	F	C	B	-	-
HCM 95th %tile Q(veh)	0.5	-	-	6.8	0.3	8.7	0.6	0.2	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	574.2

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	34	3	25	209	6	214	58	753	235	216	690	43
Future Vol, veh/h	34	3	25	209	6	214	58	753	235	216	690	43
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	100	100	-	100	250	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	37	3	27	227	7	233	63	818	255	235	750	47

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2412	2419	750	2203	2211	818	797	0	0	1073	0	0
Stage 1	1220	1220	-	944	944	-	-	-	-	-	-	-
Stage 2	1192	1199	-	1259	1267	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	~ 23	32	411	~ 32	44	376	825	-	-	650	-	-
Stage 1	220	253	-	315	341	-	-	-	-	-	-	-
Stage 2	228	259	-	~ 209	240	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 5	19	411	~ 18	26	376	825	-	-	650	-	-
Mov Cap-2 Maneuver	~ 5	19	-	~ 18	26	-	-	-	-	-	-	-
Stage 1	203	161	-	291	315	-	-	-	-	-	-	-
Stage 2	79	239	-	~ 122	153	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, $	2734.3	$ 2924.2	0.5	3.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	NWLn2	SELn1	SELn2	SWL	SWT	SWR
Capacity (veh/h)	825	-	-	18	376	5	411	650	-	-
HCM Lane V/C Ratio	0.076	-	-	12.983	0.619	8.043	0.066	0.361	-	-
HCM Control Delay (s)	9.7	-	-	$ 5806	28.9	$ 4572	14.4	13.6	-	-
HCM Lane LOS	A	-	-	F	D	F	B	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	29.9	4	6.7	0.2	1.6	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

SYNCHRO ANALYSIS REPORTS
Projected 2030
w Mitigation
AM Peak Hour

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NET	NER	SWT
Lane Group Flow (vph)	13	952	104	510	605	47	132	508	142
v/c Ratio	0.04	0.62	0.14	0.77	0.25	0.04	0.60	0.82	0.47
Control Delay	19.1	23.7	4.9	42.4	6.3	2.2	44.7	18.2	35.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.1	23.7	4.9	42.4	6.3	2.2	44.7	18.2	35.7
Queue Length 50th (ft)	4	221	0	140	60	0	70	44	69
Queue Length 95th (ft)	18	325	33	195	103	12	119	154	116
Internal Link Dist (ft)		867			267		507		379
Turn Bay Length (ft)	100		75	200		125		200	
Base Capacity (vph)	340	1530	743	718	2434	1103	310	705	419
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.62	0.14	0.71	0.25	0.04	0.43	0.72	0.34

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	12	876	96	469	557	43	79	42	467	22	93	16
Future Volume (vph)	12	876	96	469	557	43	79	42	467	22	93	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	5.5	6.5	6.5		6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97	1.00		0.99	
Satd. Flow (prot)	1770	3539	1583	3433	3539	1583		1804	1583		1817	
Flt Permitted	0.42	1.00	1.00	0.95	1.00	1.00		0.68	1.00		0.92	
Satd. Flow (perm)	788	3539	1583	3433	3539	1583		1270	1583		1693	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	952	104	510	605	47	86	46	508	24	101	17
RTOR Reduction (vph)	0	0	58	0	0	15	0	0	348	0	6	0
Lane Group Flow (vph)	13	952	46	510	605	32	0	132	160	0	136	0
Turn Type	Perm	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		6		5	2			8			4	
Permitted Phases	6		6			2	8		8	4		
Actuated Green, G (s)	38.9	38.9	38.9	17.5	61.9	61.9		15.6	15.6		15.6	
Effective Green, g (s)	38.9	38.9	38.9	17.5	61.9	61.9		15.6	15.6		15.6	
Actuated g/C Ratio	0.43	0.43	0.43	0.19	0.69	0.69		0.17	0.17		0.17	
Clearance Time (s)	6.5	6.5	6.5	5.5	6.5	6.5		6.0	6.0		6.0	
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)	340	1529	684	667	2434	1088		220	274		293	
v/s Ratio Prot		c0.27		c0.15	0.17							
v/s Ratio Perm	0.02		0.03			0.02		c0.10	0.10		0.08	
v/c Ratio	0.04	0.62	0.07	0.76	0.25	0.03		0.60	0.58		0.46	
Uniform Delay, d1	14.8	19.8	14.9	34.3	5.3	4.5		34.3	34.2		33.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	0.2	1.9	0.2	5.2	0.2	0.1		4.4	3.2		1.2	
Delay (s)	15.0	21.8	15.1	39.5	5.5	4.5		38.7	37.4		34.6	
Level of Service	B	C	B	D	A	A		D	D		C	
Approach Delay (s)		21.0			20.4			37.6			34.6	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	25.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	75.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SET	SER	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Group Flow (vph)	47	52	145	96	18	582	96	79	749	14
v/c Ratio	0.22	0.15	0.69	0.28	0.05	0.46	0.09	0.14	0.57	0.01
Control Delay	33.4	1.0	51.6	7.2	6.7	9.5	2.2	6.9	10.2	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.4	1.0	51.6	7.2	6.7	9.5	2.2	6.9	10.2	0.0
Queue Length 50th (ft)	23	0	78	0	3	149	2	10	151	0
Queue Length 95th (ft)	52	2	135	33	12	253	20	34	375	0
Internal Link Dist (ft)	543		489			1435			866	
Turn Bay Length (ft)		100		100	100		100	250		100
Base Capacity (vph)	277	420	273	420	384	1261	1098	579	1322	1141
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.12	0.53	0.23	0.05	0.46	0.09	0.14	0.57	0.01

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	36	7	48	131	3	88	17	535	88	73	689	13
Future Volume (vph)	36	7	48	131	3	88	17	535	88	73	689	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1789	1583		1776	1583	1770	1863	1583	1770	1863	1583
Flt Permitted		0.71	1.00		0.70	1.00	0.24	1.00	1.00	0.40	1.00	1.00
Satd. Flow (perm)		1314	1583		1296	1583	456	1863	1583	752	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	8	52	142	3	96	18	582	96	79	749	14
RTOR Reduction (vph)	0	0	44	0	0	80	0	0	30	0	0	4
Lane Group Flow (vph)	0	47	8	0	145	16	18	582	66	79	749	10
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		14.7	14.7		14.7	14.7	58.5	58.5	58.5	61.5	61.5	61.5
Effective Green, g (s)		14.7	14.7		14.7	14.7	58.5	58.5	58.5	61.5	61.5	61.5
Actuated g/C Ratio		0.16	0.16		0.16	0.16	0.65	0.65	0.65	0.68	0.68	0.68
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		214	258		211	258	322	1210	1028	568	1273	1081
v/s Ratio Prot							0.00	c0.31		0.01	c0.40	
v/s Ratio Perm		0.04	0.01		c0.11	0.01	0.04		0.04	0.09		0.01
v/c Ratio		0.22	0.03		0.69	0.06	0.06	0.48	0.06	0.14	0.59	0.01
Uniform Delay, d1		32.7	31.7		35.5	31.8	7.9	8.0	5.8	7.0	7.5	4.5
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.5	0.1		9.0	0.1	0.1	1.4	0.1	0.1	2.0	0.0
Delay (s)		33.2	31.7		44.4	31.9	8.0	9.4	5.9	7.1	9.5	4.6
Level of Service		C	C		D	C	A	A	A	A	A	A
Approach Delay (s)		32.4			39.4			8.9			9.2	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	14.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

SYNCHRO ANALYSIS REPORTS
Projected 2030
w Mitigation
PM Peak Hour

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NET	NER	SWT
Lane Group Flow (vph)	33	1121	148	713	1145	110	287	700	228
v/c Ratio	0.20	0.87	0.24	0.89	0.51	0.11	0.93	0.92	0.49
Control Delay	33.3	49.9	17.3	65.4	14.2	2.6	85.6	37.0	47.1
Queue Delay	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Total Delay	33.3	49.9	17.3	65.4	14.6	2.6	85.6	37.0	47.1
Queue Length 50th (ft)	20	495	50	321	265	7	261	274	172
Queue Length 95th (ft)	49	575	100	393	291	26	#475	#562	269
Internal Link Dist (ft)		867			267		507		379
Turn Bay Length (ft)	100		75	200		125		200	
Base Capacity (vph)	176	1352	645	870	2388	1096	310	757	462
Starvation Cap Reductn	0	0	0	0	617	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.83	0.23	0.82	0.65	0.10	0.93	0.92	0.49

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	30	1031	136	656	1053	101	126	138	644	19	151	40
Future Volume (vph)	30	1031	136	656	1053	101	126	138	644	19	151	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	5.5	6.5	6.5		6.0	6.0		6.0	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98	1.00		1.00	
Satd. Flow (prot)	1770	3539	1583	3433	3539	1583		1819	1583		1807	
Flt Permitted	0.25	1.00	1.00	0.95	1.00	1.00		0.61	1.00		0.92	
Satd. Flow (perm)	462	3539	1583	3433	3539	1583		1134	1583		1666	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	1121	148	713	1145	110	137	150	700	21	164	43
RTOR Reduction (vph)	0	0	42	0	0	32	0	0	325	0	6	0
Lane Group Flow (vph)	33	1121	106	713	1145	78	0	287	375	0	222	0
Turn Type	Perm	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		6		5	2			8			4	
Permitted Phases	6		6			2	8		8	4		
Actuated Green, G (s)	50.9	50.9	50.9	32.8	89.2	89.2		38.3	38.3		38.3	
Effective Green, g (s)	50.9	50.9	50.9	32.8	89.2	89.2		38.3	38.3		38.3	
Actuated g/C Ratio	0.36	0.36	0.36	0.23	0.64	0.64		0.27	0.27		0.27	
Clearance Time (s)	6.5	6.5	6.5	5.5	6.5	6.5		6.0	6.0		6.0	
Vehicle Extension (s)	2.0	2.0	2.0	3.0	3.0	3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)	167	1286	575	804	2254	1008		310	433		455	
v/s Ratio Prot		c0.32		c0.21	0.32							
v/s Ratio Perm	0.07		0.07			0.05		c0.25	0.24		0.13	
v/c Ratio	0.20	0.87	0.18	0.89	0.51	0.08		0.93	0.87		0.49	
Uniform Delay, d1	30.5	41.5	30.4	51.8	13.6	9.7		49.5	48.4		42.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	2.6	8.3	0.7	11.6	0.8	0.2		32.2	16.5		0.8	
Delay (s)	33.2	49.8	31.1	63.4	14.4	9.8		81.6	64.9		43.5	
Level of Service	C	D	C	E	B	A		F	E		D	
Approach Delay (s)		47.3			31.9			69.8			43.5	
Approach LOS		D			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	45.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	95.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

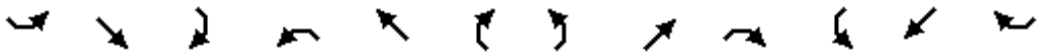
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	271	1532	2	96	1746	423	28	87	133	341	302
v/c Ratio	1.03	0.85	0.00	0.38	0.98	0.40	0.27	0.55	0.37	0.80	0.78
Control Delay	100.7	35.4	0.0	36.3	36.8	4.0	69.3	73.9	3.2	74.0	54.0
Queue Delay	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	100.7	37.6	0.0	36.3	36.8	4.0	69.3	73.9	3.2	74.0	54.0
Queue Length 50th (ft)	~213	612	0	32	492	70	25	77	0	157	200
Queue Length 95th (ft)	#389	672	0	m43	#974	m93	59	133	0	#267	#385
Internal Link Dist (ft)		330			1378			508			852
Turn Bay Length (ft)	275			100		100	75		75	125	
Base Capacity (vph)	264	1921	967	250	1794	1064	113	212	355	427	385
Starvation Cap Reductn	0	251	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.03	0.92	0.00	0.38	0.97	0.40	0.25	0.41	0.37	0.80	0.78

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

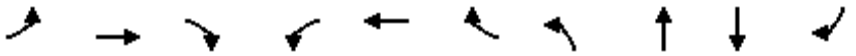
m Volume for 95th percentile queue is metered by upstream signal.



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	249	1409	2	88	1606	389	26	80	122	314	72	206
Future Volume (vph)	249	1409	2	88	1606	389	26	80	122	314	72	206
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	7.0	6.0	5.5	7.0	6.0	6.0	6.0	5.5	6.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	3433	1655	
Flt Permitted	0.08	1.00	1.00	0.08	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	142	3539	1583	141	3539	1583	1770	1863	1583	3433	1655	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	271	1532	2	96	1746	423	28	87	133	341	78	224
RTOR Reduction (vph)	0	0	1	0	0	57	0	0	119	0	70	0
Lane Group Flow (vph)	271	1532	1	96	1746	366	28	87	14	341	232	0
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA	Over	Prot	NA	
Protected Phases	1	6	7	5	2	3	7		5	3	8	
Permitted Phases	6		6	2		2		4				
Actuated Green, G (s)	68.6	68.6	73.7	70.0	68.5	88.3	5.1	11.9	15.2	19.8	26.6	
Effective Green, g (s)	68.6	68.6	73.7	70.0	68.5	88.3	5.1	11.9	15.2	19.8	26.6	
Actuated g/C Ratio	0.49	0.49	0.53	0.50	0.49	0.63	0.04	0.09	0.11	0.14	0.19	
Clearance Time (s)	4.5	7.0	6.0	5.5	7.0	6.0	6.0	6.0	5.5	6.0	6.0	
Vehicle Extension (s)	2.5	2.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	259	1734	833	247	1731	998	64	158	171	485	314	
v/s Ratio Prot	c0.12	0.43	0.00	0.04	c0.49	0.05	0.02		0.01	0.10	c0.14	
v/s Ratio Perm	0.39		0.00	0.15		0.18		c0.05				
v/c Ratio	1.05	0.88	0.00	0.39	1.01	0.37	0.44	0.55	0.08	0.70	0.74	
Uniform Delay, d1	45.1	32.1	15.7	45.1	35.8	12.4	66.0	61.5	56.1	57.3	53.4	
Progression Factor	1.00	1.00	1.00	0.80	0.71	0.86	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	68.6	7.0	0.0	0.6	19.3	0.1	4.7	4.1	0.2	4.6	8.7	
Delay (s)	113.7	39.1	15.7	36.7	44.7	10.9	70.8	65.6	56.4	61.9	62.1	
Level of Service	F	D	B	D	D	B	E	E	E	E	E	
Approach Delay (s)		50.2			38.1			61.2			62.0	
Approach LOS		D			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	46.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	24.5
Intersection Capacity Utilization	94.4%	ICU Level of Service	F
Analysis Period (min)	15		

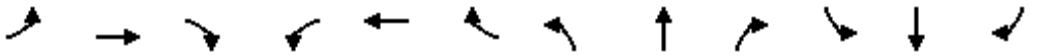
c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	79	1802	75	190	1829	23	218	322	42	138
v/c Ratio	0.50	0.85	0.08	0.86	0.81	0.02	0.91	0.76	0.29	0.35
Control Delay	39.5	12.6	1.7	80.4	6.3	0.0	94.4	37.5	54.6	10.7
Queue Delay	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0
Total Delay	39.5	12.6	1.7	80.4	6.7	0.0	94.4	37.5	54.6	10.7
Queue Length 50th (ft)	26	134	0	123	92	0	193	134	33	3
Queue Length 95th (ft)	m49	415	m8	m#212	m90	m0	#332	249	71	61
Internal Link Dist (ft)		1378			451			168	267	
Turn Bay Length (ft)	250		50	75		50				75
Base Capacity (vph)	173	2132	983	230	2248	1029	262	448	158	413
Starvation Cap Reductn	0	0	0	0	107	0	0	0	0	0
Spillback Cap Reductn	0	4	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.85	0.08	0.83	0.85	0.02	0.83	0.72	0.27	0.33

Intersection Summary

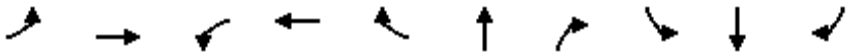
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	1658	69	175	1683	21	201	43	253	16	23	127
Future Volume (vph)	73	1658	69	175	1683	21	201	43	253	16	23	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5	6.5	5.5	6.5	6.5	6.0	6.0			6.0	6.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.98	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1624			1826	1583
Flt Permitted	0.05	1.00	1.00	0.06	1.00	1.00	0.73	1.00			0.44	1.00
Satd. Flow (perm)	98	3539	1583	109	3539	1583	1359	1624			821	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	79	1802	75	190	1829	23	218	47	275	17	25	138
RTOR Reduction (vph)	0	0	29	0	0	8	0	138	0	0	0	110
Lane Group Flow (vph)	79	1802	46	190	1829	15	218	184	0	0	42	28
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	1	6		5	2			8			4	
Permitted Phases	6		6	2		2	8			4		4
Actuated Green, G (s)	84.3	84.3	84.3	89.9	88.9	88.9	24.8	24.8			24.8	24.8
Effective Green, g (s)	84.3	84.3	84.3	89.9	88.9	88.9	24.8	24.8			24.8	24.8
Actuated g/C Ratio	0.60	0.60	0.60	0.64	0.64	0.64	0.18	0.18			0.18	0.18
Clearance Time (s)	5.5	6.5	6.5	5.5	6.5	6.5	6.0	6.0			6.0	6.0
Vehicle Extension (s)	2.0	5.0	5.0	2.0	5.0	5.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	158	2130	953	223	2247	1005	240	287			145	280
v/s Ratio Prot	0.03	c0.51		0.08	c0.52			0.11				
v/s Ratio Perm	0.27		0.03	c0.47		0.01	c0.16				0.05	0.02
v/c Ratio	0.50	0.85	0.05	0.85	0.81	0.01	0.91	0.64			0.29	0.10
Uniform Delay, d1	26.4	22.6	11.4	44.8	19.3	9.4	56.5	53.5			50.0	48.2
Progression Factor	1.86	0.41	0.60	1.22	0.25	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	0.6	2.7	0.1	16.5	1.2	0.0	33.6	3.6			0.4	0.1
Delay (s)	49.5	12.0	6.9	71.2	6.1	9.4	90.1	57.1			50.4	48.3
Level of Service	D	B	A	E	A	A	F	E			D	D
Approach Delay (s)		13.3			12.2			70.4			48.8	
Approach LOS		B			B			E			D	

Intersection Summary			
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	88.4%	ICU Level of Service	E
Analysis Period (min)	15		

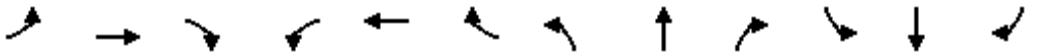
c Critical Lane Group



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	533	1519	25	1667	208	96	46	102	104	378
v/c Ratio	0.88	0.66	0.26	0.97	0.20	0.64	0.17	0.72	0.71	0.71
Control Delay	79.6	3.7	69.7	50.7	4.1	81.1	1.4	88.7	87.8	27.9
Queue Delay	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7
Total Delay	79.6	4.1	69.7	50.7	4.1	81.1	1.4	88.7	87.8	28.5
Queue Length 50th (ft)	234	71	22	777	22	86	0	95	97	140
Queue Length 95th (ft)	m#357	185	54	#961	54	m145	m0	162	165	232
Internal Link Dist (ft)		451		2286		401			247	
Turn Bay Length (ft)	225		200		200			125		
Base Capacity (vph)	604	2292	139	1721	1054	184	291	168	172	532
Starvation Cap Reductn	0	286	0	0	0	0	0	0	0	28
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.76	0.18	0.97	0.20	0.52	0.16	0.61	0.60	0.75

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	490	1394	4	23	1534	191	18	70	42	144	45	348
Future Volume (vph)	490	1394	4	23	1534	191	18	70	42	144	45	348
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	6.5		4.0	6.5	6.0		6.0	6.0	6.0	6.0	5.5
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	1.00
Satd. Flow (prot)	3433	3538		1770	3539	1583		1844	1583	1681	1724	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	1.00
Satd. Flow (perm)	3433	3538		1770	3539	1583		1844	1583	1681	1724	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	533	1515	4	25	1667	208	20	76	46	157	49	378
RTOR Reduction (vph)	0	0	0	0	0	62	0	0	42	0	0	114
Lane Group Flow (vph)	533	1519	0	25	1667	146	0	96	4	102	104	264
Turn Type	Prot	NA		Prot	NA	pm+ov	Split	NA	Perm	Split	NA	pm+ov
Protected Phases	5	2		1	6	3	4	4		3	3	5
Permitted Phases						6			4			3
Actuated Green, G (s)	24.7	89.1		5.1	68.0	79.9		11.4	11.4	11.9	11.9	36.6
Effective Green, g (s)	24.7	89.1		5.1	68.0	79.9		11.4	11.4	11.9	11.9	36.6
Actuated g/C Ratio	0.18	0.64		0.04	0.49	0.57		0.08	0.08	0.09	0.09	0.26
Clearance Time (s)	5.5	6.5		4.0	6.5	6.0		6.0	6.0	6.0	6.0	5.5
Vehicle Extension (s)	2.0	5.0		3.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	605	2251		64	1718	903		150	128	142	146	413
v/s Ratio Prot	c0.16	0.43		0.01	c0.47	0.01		c0.05		c0.06	0.06	0.11
v/s Ratio Perm						0.08			0.00			0.05
v/c Ratio	0.88	0.67		0.39	0.97	0.16		0.64	0.03	0.72	0.71	0.64
Uniform Delay, d1	56.2	16.2		65.9	35.0	14.2		62.3	59.2	62.4	62.4	45.9
Progression Factor	1.26	0.17		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.1	0.9		3.9	15.7	0.0		6.8	0.0	13.4	12.8	2.4
Delay (s)	79.0	3.6		69.8	50.7	14.2		68.8	59.2	75.9	75.2	48.3
Level of Service	E	A		E	D	B		E	E	E	E	D
Approach Delay (s)		23.2			47.0			65.7			57.9	
Approach LOS		C			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	38.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	85.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SET	SER	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Group Flow (vph)	40	27	234	233	63	818	255	235	750	47
v/c Ratio	0.15	0.07	0.83	0.45	0.18	0.85	0.28	0.83	0.67	0.05
Control Delay	23.4	0.3	52.4	6.8	5.8	25.3	4.5	39.9	14.5	1.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.4	0.3	52.4	6.8	5.8	25.3	4.5	39.9	14.5	1.0
Queue Length 50th (ft)	14	0	95	1	8	284	19	47	227	0
Queue Length 95th (ft)	38	0	#205	52	19	#515	54	#171	363	7
Internal Link Dist (ft)	543		489			1435			866	
Turn Bay Length (ft)		100		100	100		100	250		100
Base Capacity (vph)	277	422	299	539	348	966	900	282	1122	984
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.06	0.78	0.43	0.18	0.85	0.28	0.83	0.67	0.05

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	34	3	25	209	6	214	58	753	235	216	690	43
Future Volume (vph)	34	3	25	209	6	214	58	753	235	216	690	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1780	1583		1777	1583	1770	1863	1583	1770	1863	1583
Flt Permitted		0.65	1.00		0.70	1.00	0.25	1.00	1.00	0.11	1.00	1.00
Satd. Flow (perm)		1216	1583		1310	1583	460	1863	1583	204	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	3	27	227	7	233	63	818	255	235	750	47
RTOR Reduction (vph)	0	0	21	0	0	181	0	0	79	0	0	20
Lane Group Flow (vph)	0	40	6	0	234	52	63	818	176	235	750	27
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)		15.0	15.0		15.0	15.0	38.8	36.4	36.4	47.0	40.6	40.6
Effective Green, g (s)		15.0	15.0		15.0	15.0	38.8	36.4	36.4	47.0	40.6	40.6
Actuated g/C Ratio		0.21	0.21		0.21	0.21	0.55	0.52	0.52	0.67	0.58	0.58
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		260	339		280	339	299	968	823	284	1080	918
v/s Ratio Prot							0.01	0.44		c0.08	0.40	
v/s Ratio Perm		0.03	0.00		c0.18	0.03	0.11		0.11	c0.48		0.02
v/c Ratio		0.15	0.02		0.84	0.15	0.21	0.85	0.21	0.83	0.69	0.03
Uniform Delay, d1		22.3	21.7		26.3	22.3	8.5	14.4	9.1	14.9	10.3	6.3
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.3	0.0		18.9	0.2	0.4	9.0	0.6	17.6	3.7	0.1
Delay (s)		22.6	21.7		45.3	22.6	8.8	23.4	9.7	32.6	14.0	6.3
Level of Service		C	C		D	C	A	C	A	C	B	A
Approach Delay (s)		22.3			33.9			19.5			17.9	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	21.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCS ANALYSIS REPORTS
Projected 2030
2-Lane Highway
AM Peak Hour

HCS7 Two-Lane Highway Report

Project Information

Analyst	KCole	Date	6/27/2022
Agency	CDM Smith	Analysis Year	2030 EB Emory Rd 2-In
Jurisdiction	TDOT/Knox Co/TPO	Time Analyzed	AM Pk Hr
Project Description	Bell Farms TIS - 2022	Units	U.S. Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	8800
Measured FFS	Measured	Free-Flow Speed, mi/h	60.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	550	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.32

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	60.0
Speed Slope Coefficient	4.65511	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.29483	PF Power Coefficient	0.74574
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	5.5
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	8700	-	-	56.7

Vehicle Results

Average Speed, mi/h	56.7	Percent Followers, %	56.4
Segment Travel Time, minutes	1.76	Follower Density, followers/mi/ln	5.5
Vehicle LOS	C		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	550	Bicycle Effective Width, ft	24
Bicycle LOS Score	2.74	Bicycle Effective Speed Factor	4.17
Bicycle LOS	C		

Segment 2

Vehicle Inputs

Segment Type	Passing Zone	Length, ft	1050
Measured FFS	Measured	Free-Flow Speed, mi/h	60.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	647	Opposing Demand Flow Rate, veh/h	1039
Peak Hour Factor	0.94	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.38

Intermediate Results			
Segment Vertical Class	1	Free-Flow Speed, mi/h	60.0
Speed Slope Coefficient	4.50644	Speed Power Coefficient	0.43492
PF Slope Coefficient	-1.39092	PF Power Coefficient	0.74887
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	7.2
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data					
#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	56.5

Vehicle Results			
Average Speed, mi/h	56.5	Percent Followers, %	63.3
Segment Travel Time, minutes	0.21	Follower Density, followers/mi/ln	7.2
Vehicle LOS	C		

Bicycle Results			
Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	647	Bicycle Effective Width, ft	24
Bicycle LOS Score	2.82	Bicycle Effective Speed Factor	4.17
Bicycle LOS	C		

Segment 3

Vehicle Inputs			
Segment Type	Passing Zone	Length, ft	1450
Measured FFS	Measured	Free-Flow Speed, mi/h	60.0

Demand and Capacity			
Directional Demand Flow Rate, veh/h	681	Opposing Demand Flow Rate, veh/h	923
Peak Hour Factor	0.94	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.40

Intermediate Results			
Segment Vertical Class	1	Free-Flow Speed, mi/h	60.0
Speed Slope Coefficient	4.48972	Speed Power Coefficient	0.44196
PF Slope Coefficient	-1.37884	PF Power Coefficient	0.75483
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	7.8
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data					
#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	1450	-	-	56.5

Vehicle Results			
Average Speed, mi/h	56.5	Percent Followers, %	64.4
Segment Travel Time, minutes	0.29	Follower Density, followers/mi/ln	7.8
Vehicle LOS	C		

Bicycle Results			
Percent Occupied Parking	0	Pavement Condition Rating	4

Flow Rate Outside Lane, veh/h	681	Bicycle Effective Width, ft	24
Bicycle LOS Score	2.84	Bicycle Effective Speed Factor	4.17
Bicycle LOS	C		

Segment 4

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	3450
Measured FFS	Measured	Free-Flow Speed, mi/h	60.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	701	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.41

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	60.0
Speed Slope Coefficient	4.60545	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.32053	PF Power Coefficient	0.75850
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	7.9
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	56.3

Vehicle Results

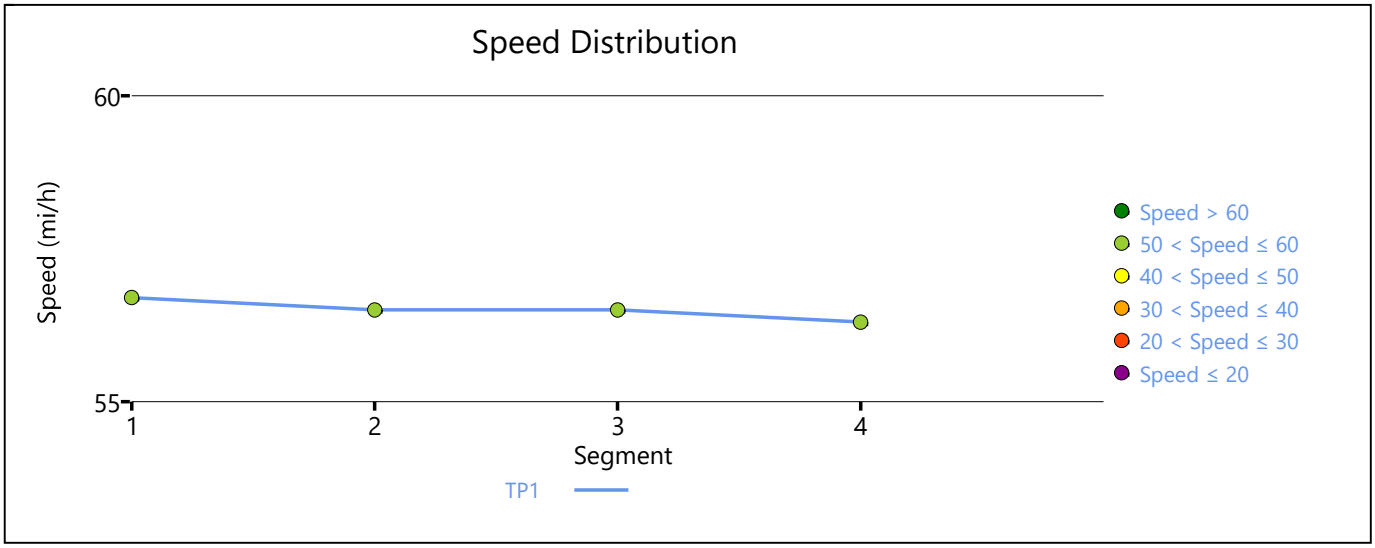
Average Speed, mi/h	56.3	Percent Followers, %	63.5
Segment Travel Time, minutes	0.70	Follower Density, followers/mi/ln	7.9
Vehicle LOS	C		

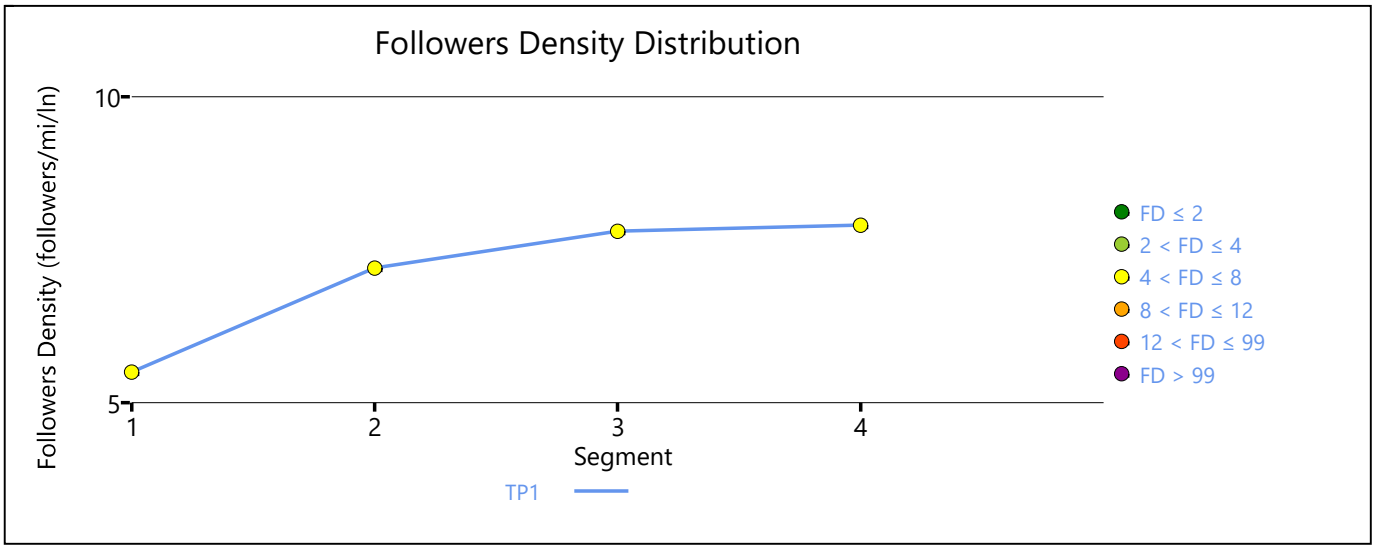
Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	701	Bicycle Effective Width, ft	24
Bicycle LOS Score	2.86	Bicycle Effective Speed Factor	4.17
Bicycle LOS	C		

Facility Results

T	Follower Density, followers/mi/ln	LOS
1	6.4	C





HCS7 Two-Lane Highway Report

Project Information

Analyst	KCole	Date	6/27/2022
Agency	CDM Smith	Analysis Year	2030 WB Emory Rd 2-ln
Jurisdiction	TDOT/Knox Co/TPO	Time Analyzed	AM Pk Hr
Project Description	Bell Farms TIS - 2022	Units	U.S. Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	2400
Measured FFS	Measured	Free-Flow Speed, mi/h	60.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	700	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.41

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	60.0
Speed Slope Coefficient	4.59165	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34746	PF Power Coefficient	0.75151
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	8.0
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	8700	-	-	56.3

Vehicle Results

Average Speed, mi/h	56.3	Percent Followers, %	64.3
Segment Travel Time, minutes	0.48	Follower Density, followers/mi/ln	8.0
Vehicle LOS	C		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	700	Bicycle Effective Width, ft	24
Bicycle LOS Score	2.86	Bicycle Effective Speed Factor	4.17
Bicycle LOS	C		

Segment 2

Vehicle Inputs

Segment Type	Passing Zone	Length, ft	930
Measured FFS	Measured	Free-Flow Speed, mi/h	60.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	824	Opposing Demand Flow Rate, veh/h	701
Peak Hour Factor	0.94	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.48

Intermediate Results			
Segment Vertical Class	1	Free-Flow Speed, mi/h	60.0
Speed Slope Coefficient	4.44672	Speed Power Coefficient	0.45956
PF Slope Coefficient	-1.37386	PF Power Coefficient	0.75949
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	10.2
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data					
#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	56.2

Vehicle Results			
Average Speed, mi/h	56.2	Percent Followers, %	69.5
Segment Travel Time, minutes	0.19	Follower Density, followers/mi/ln	10.2
Vehicle LOS	D		

Bicycle Results			
Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	824	Bicycle Effective Width, ft	24
Bicycle LOS Score	2.94	Bicycle Effective Speed Factor	4.17
Bicycle LOS	C		

Segment 3

Vehicle Inputs			
Segment Type	Passing Constrained	Length, ft	825
Measured FFS	Measured	Free-Flow Speed, mi/h	60.0

Demand and Capacity			
Directional Demand Flow Rate, veh/h	923	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.54

Intermediate Results			
Segment Vertical Class	1	Free-Flow Speed, mi/h	60.0
Speed Slope Coefficient	4.57372	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.39685	PF Power Coefficient	0.73632
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	12.1
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data					
#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	1450	-	-	55.8

Vehicle Results			
Average Speed, mi/h	55.8	Percent Followers, %	73.2
Segment Travel Time, minutes	0.17	Follower Density, followers/mi/ln	12.1
Vehicle LOS	E		

Bicycle Results			
Percent Occupied Parking	0	Pavement Condition Rating	4

Flow Rate Outside Lane, veh/h	923	Bicycle Effective Width, ft	24
Bicycle LOS Score	3.00	Bicycle Effective Speed Factor	4.17
Bicycle LOS	C		

Segment 4

Vehicle Inputs

Segment Type	Passing Zone	Length, ft	880
Measured FFS	Measured	Free-Flow Speed, mi/h	60.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	932	Opposing Demand Flow Rate, veh/h	681
Peak Hour Factor	0.94	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.55

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	60.0
Speed Slope Coefficient	4.44273	Speed Power Coefficient	0.46149
PF Slope Coefficient	-1.37234	PF Power Coefficient	0.76019
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	12.1
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	55.9

Vehicle Results

Average Speed, mi/h	55.9	Percent Followers, %	72.8
Segment Travel Time, minutes	0.18	Follower Density, followers/mi/ln	12.1
Vehicle LOS	E		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	932	Bicycle Effective Width, ft	24
Bicycle LOS Score	3.00	Bicycle Effective Speed Factor	4.17
Bicycle LOS	C		

Segment 5

Vehicle Inputs

Segment Type	Passing Zone	Length, ft	485
Measured FFS	Measured	Free-Flow Speed, mi/h	60.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	1039	Opposing Demand Flow Rate, veh/h	647
Peak Hour Factor	0.94	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.61

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	60.0
Speed Slope Coefficient	4.43588	Speed Power Coefficient	0.46489
PF Slope Coefficient	-1.36961	PF Power Coefficient	0.76139

In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	14.1
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	485	-	-	55.7

Vehicle Results

Average Speed, mi/h	55.7	Percent Followers, %	75.6
Segment Travel Time, minutes	0.10	Follower Density, followers/mi/ln	14.1
Vehicle LOS	E		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	1039	Bicycle Effective Width, ft	24
Bicycle LOS Score	3.06	Bicycle Effective Speed Factor	4.17
Bicycle LOS	C		

Segment 6

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	9000
Measured FFS	Measured	Free-Flow Speed, mi/h	60.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	1039	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.61

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	60.0
Speed Slope Coefficient	4.65662	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.29572	PF Power Coefficient	0.74440
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	13.8
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	55.5

Vehicle Results

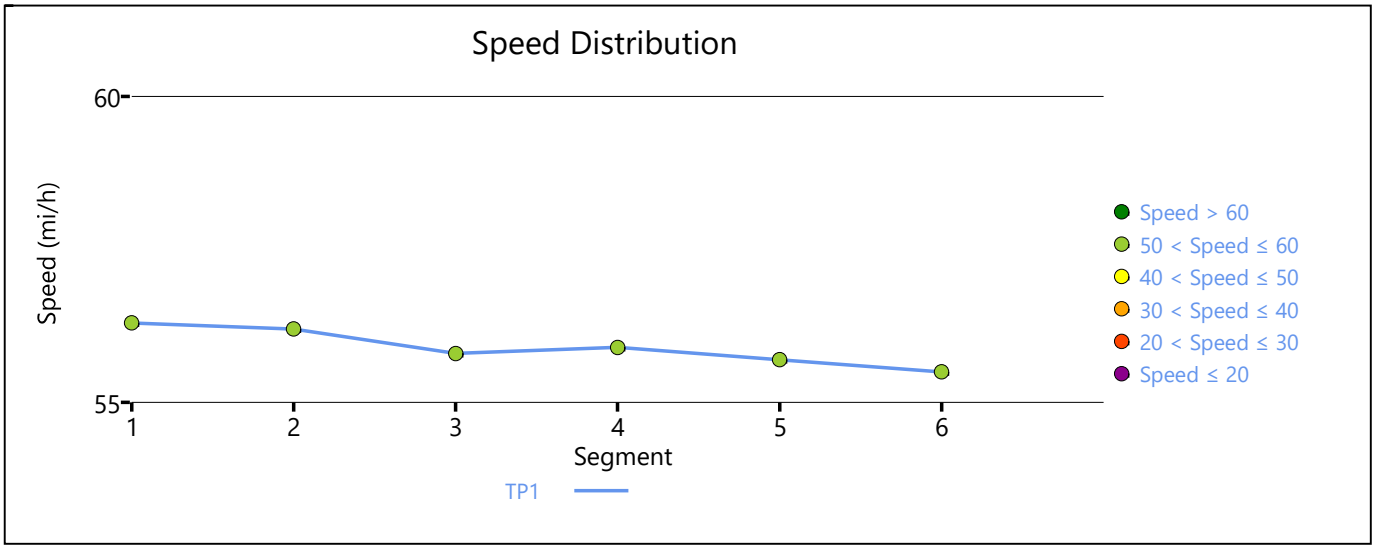
Average Speed, mi/h	55.5	Percent Followers, %	73.6
Segment Travel Time, minutes	1.84	Follower Density, followers/mi/ln	13.8
Vehicle LOS	E		

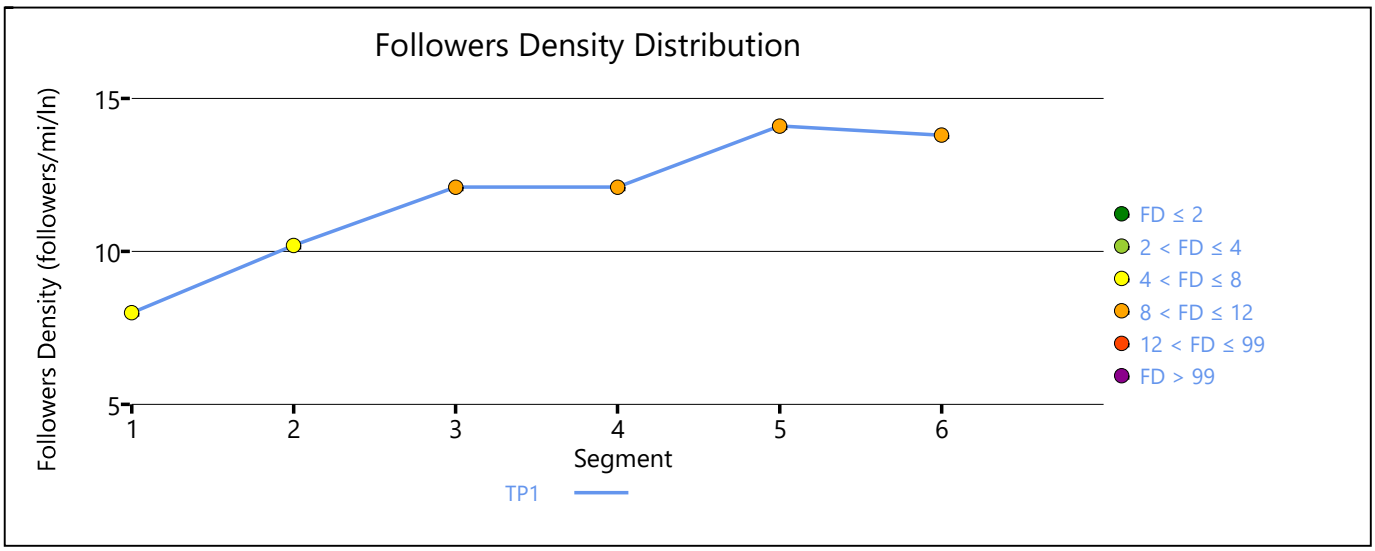
Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	1039	Bicycle Effective Width, ft	24
Bicycle LOS Score	3.06	Bicycle Effective Speed Factor	4.17
Bicycle LOS	C		

Facility Results

T	Follower Density, followers/mi/ln	LOS
1	12.4	D





HCS ANALYSIS REPORTS
Projected 2030
2-Lane Highway
PM Peak Hour

HCS7 Two-Lane Highway Report

Project Information

Analyst	KCole	Date	6/27/2022
Agency	CDM Smith	Analysis Year	2030 EB Emory Rd 2-In
Jurisdiction	TDOT/Knox Co/TPO	Time Analyzed	PM Pk Hr
Project Description	Bell Farms TIS - 2022	Units	U.S. Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	8800
Measured FFS	Measured	Free-Flow Speed, mi/h	60.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	1324	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.78

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	60.0
Speed Slope Coefficient	4.65511	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.29483	PF Power Coefficient	0.74574
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	19.2
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	8700	-	-	54.9

Vehicle Results

Average Speed, mi/h	54.9	Percent Followers, %	79.7
Segment Travel Time, minutes	1.82	Follower Density, followers/mi/ln	19.2
Vehicle LOS	E		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	1324	Bicycle Effective Width, ft	24
Bicycle LOS Score	3.18	Bicycle Effective Speed Factor	4.17
Bicycle LOS	C		

Segment 2

Vehicle Inputs

Segment Type	Passing Zone	Length, ft	1050
Measured FFS	Measured	Free-Flow Speed, mi/h	60.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	1156	Opposing Demand Flow Rate, veh/h	932
Peak Hour Factor	0.94	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.68

Intermediate Results			
Segment Vertical Class	1	Free-Flow Speed, mi/h	60.0
Speed Slope Coefficient	4.48869	Speed Power Coefficient	0.44140
PF Slope Coefficient	-1.38700	PF Power Coefficient	0.75207
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	16.4
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data					
#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	55.4

Vehicle Results			
Average Speed, mi/h	55.4	Percent Followers, %	78.7
Segment Travel Time, minutes	0.22	Follower Density, followers/mi/ln	16.4
Vehicle LOS	E		

Bicycle Results			
Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	1156	Bicycle Effective Width, ft	24
Bicycle LOS Score	3.11	Bicycle Effective Speed Factor	4.17
Bicycle LOS	C		

Segment 3

Vehicle Inputs			
Segment Type	Passing Zone	Length, ft	1450
Measured FFS	Measured	Free-Flow Speed, mi/h	60.0

Demand and Capacity			
Directional Demand Flow Rate, veh/h	1113	Opposing Demand Flow Rate, veh/h	1010
Peak Hour Factor	0.94	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.65

Intermediate Results			
Segment Vertical Class	1	Free-Flow Speed, mi/h	60.0
Speed Slope Coefficient	4.50409	Speed Power Coefficient	0.43661
PF Slope Coefficient	-1.38213	PF Power Coefficient	0.75224
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	15.6
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data					
#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	1450	-	-	55.5

Vehicle Results			
Average Speed, mi/h	55.5	Percent Followers, %	77.6
Segment Travel Time, minutes	0.30	Follower Density, followers/mi/ln	15.6
Vehicle LOS	E		

Bicycle Results			
Percent Occupied Parking	0	Pavement Condition Rating	4

Flow Rate Outside Lane, veh/h	1113	Bicycle Effective Width, ft	24
Bicycle LOS Score	3.09	Bicycle Effective Speed Factor	4.17
Bicycle LOS	C		

Segment 4

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	3450
Measured FFS	Measured	Free-Flow Speed, mi/h	60.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	1065	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.63

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	60.0
Speed Slope Coefficient	4.60545	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.32053	PF Power Coefficient	0.75850
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	14.4
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	55.5

Vehicle Results

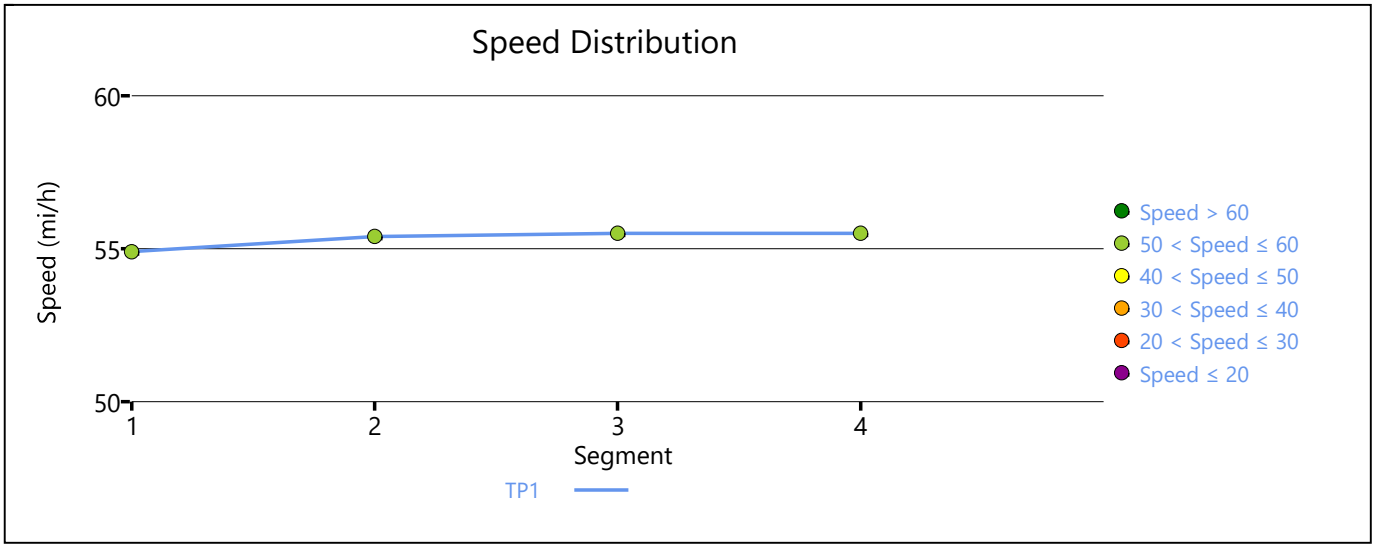
Average Speed, mi/h	55.5	Percent Followers, %	75.0
Segment Travel Time, minutes	0.71	Follower Density, followers/mi/ln	14.4
Vehicle LOS	E		

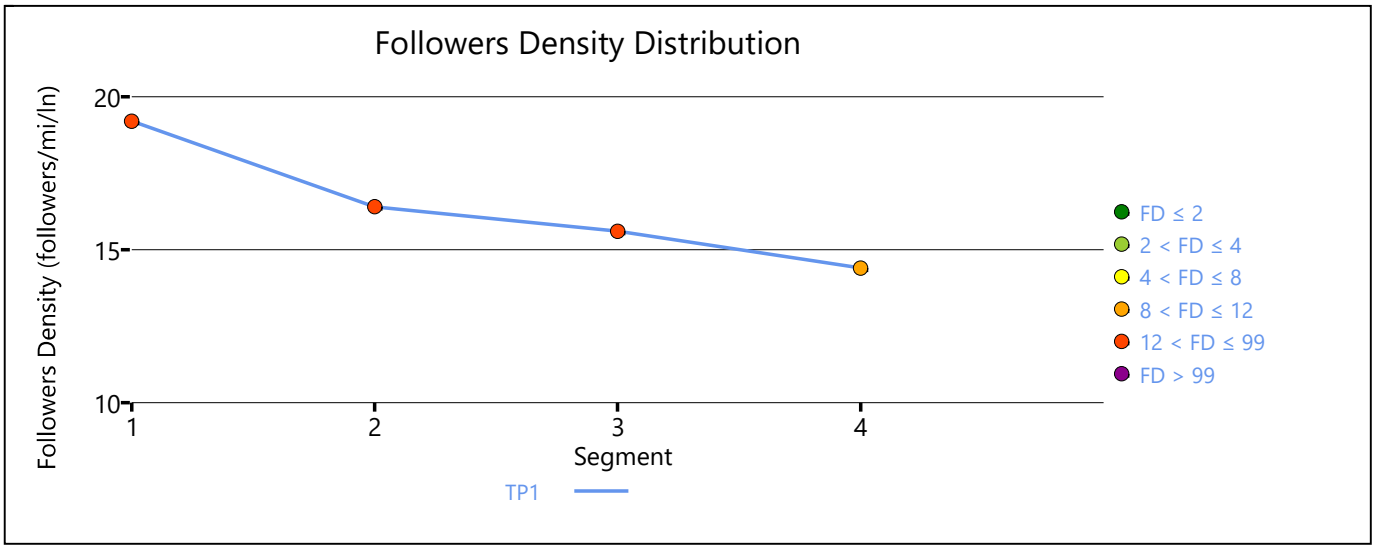
Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	1065	Bicycle Effective Width, ft	24
Bicycle LOS Score	3.07	Bicycle Effective Speed Factor	4.17
Bicycle LOS	C		

Facility Results

T	Follower Density, followers/mi/ln	LOS
1	17.5	E





HCS7 Two-Lane Highway Report

Project Information

Analyst	KCole	Date	6/27/2022
Agency	CDM Smith	Analysis Year	2030 WB Emory Rd 2-ln
Jurisdiction	TDOT/Knox Co/TPO	Time Analyzed	PM Pk Hr
Project Description	Bell Farms TIS - 2022	Units	U.S. Customary

Segment 1

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	2400
Measured FFS	Measured	Free-Flow Speed, mi/h	60.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	1003	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.59

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	60.0
Speed Slope Coefficient	4.59165	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.34746	PF Power Coefficient	0.75151
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	13.4
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	8700	-	-	55.6

Vehicle Results

Average Speed, mi/h	55.6	Percent Followers, %	74.1
Segment Travel Time, minutes	0.49	Follower Density, followers/mi/ln	13.4
Vehicle LOS	E		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	1003	Bicycle Effective Width, ft	24
Bicycle LOS Score	3.04	Bicycle Effective Speed Factor	4.17
Bicycle LOS	C		

Segment 2

Vehicle Inputs

Segment Type	Passing Zone	Length, ft	930
Measured FFS	Measured	Free-Flow Speed, mi/h	60.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	1010	Opposing Demand Flow Rate, veh/h	1065
Peak Hour Factor	0.94	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.59

Intermediate Results			
Segment Vertical Class	1	Free-Flow Speed, mi/h	60.0
Speed Slope Coefficient	4.51052	Speed Power Coefficient	0.43352
PF Slope Coefficient	-1.39169	PF Power Coefficient	0.74813
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	13.7
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data					
#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	55.7

Vehicle Results			
Average Speed, mi/h	55.7	Percent Followers, %	75.4
Segment Travel Time, minutes	0.19	Follower Density, followers/mi/ln	13.7
Vehicle LOS	E		

Bicycle Results			
Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	1010	Bicycle Effective Width, ft	24
Bicycle LOS Score	3.04	Bicycle Effective Speed Factor	4.17
Bicycle LOS	C		

Segment 3

Vehicle Inputs			
Segment Type	Passing Constrained	Length, ft	825
Measured FFS	Measured	Free-Flow Speed, mi/h	60.0

Demand and Capacity			
Directional Demand Flow Rate, veh/h	983	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.58

Intermediate Results			
Segment Vertical Class	1	Free-Flow Speed, mi/h	60.0
Speed Slope Coefficient	4.57372	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.39685	PF Power Coefficient	0.73632
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	13.2
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data					
#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	1450	-	-	55.7

Vehicle Results			
Average Speed, mi/h	55.7	Percent Followers, %	74.8
Segment Travel Time, minutes	0.17	Follower Density, followers/mi/ln	13.2
Vehicle LOS	E		

Bicycle Results			
Percent Occupied Parking	0	Pavement Condition Rating	4

Flow Rate Outside Lane, veh/h	983	Bicycle Effective Width, ft	24
Bicycle LOS Score	3.03	Bicycle Effective Speed Factor	4.17
Bicycle LOS	C		

Segment 4

Vehicle Inputs

Segment Type	Passing Zone	Length, ft	880
Measured FFS	Measured	Free-Flow Speed, mi/h	60.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	1004	Opposing Demand Flow Rate, veh/h	1106
Peak Hour Factor	0.94	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.59

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	60.0
Speed Slope Coefficient	4.51705	Speed Power Coefficient	0.43138
PF Slope Coefficient	-1.39280	PF Power Coefficient	0.74694
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	13.6
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	55.7

Vehicle Results

Average Speed, mi/h	55.7	Percent Followers, %	75.3
Segment Travel Time, minutes	0.18	Follower Density, followers/mi/ln	13.6
Vehicle LOS	E		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	1004	Bicycle Effective Width, ft	24
Bicycle LOS Score	3.04	Bicycle Effective Speed Factor	4.17
Bicycle LOS	C		

Segment 5

Vehicle Inputs

Segment Type	Passing Zone	Length, ft	485
Measured FFS	Measured	Free-Flow Speed, mi/h	60.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	1004	Opposing Demand Flow Rate, veh/h	1156
Peak Hour Factor	0.94	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.59

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	60.0
Speed Slope Coefficient	4.52475	Speed Power Coefficient	0.42896
PF Slope Coefficient	-1.39394	PF Power Coefficient	0.74552

In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	13.6
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	485	-	-	55.7

Vehicle Results

Average Speed, mi/h	55.7	Percent Followers, %	75.3
Segment Travel Time, minutes	0.10	Follower Density, followers/mi/ln	13.6
Vehicle LOS	E		

Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	1004	Bicycle Effective Width, ft	24
Bicycle LOS Score	3.04	Bicycle Effective Speed Factor	4.17
Bicycle LOS	C		

Segment 6

Vehicle Inputs

Segment Type	Passing Constrained	Length, ft	9000
Measured FFS	Measured	Free-Flow Speed, mi/h	60.0

Demand and Capacity

Directional Demand Flow Rate, veh/h	1004	Opposing Demand Flow Rate, veh/h	-
Peak Hour Factor	0.94	Total Trucks, %	2.00
Segment Capacity, veh/h	1700	Demand/Capacity (D/C)	0.59

Intermediate Results

Segment Vertical Class	1	Free-Flow Speed, mi/h	60.0
Speed Slope Coefficient	4.65662	Speed Power Coefficient	0.41674
PF Slope Coefficient	-1.29572	PF Power Coefficient	0.74440
In Passing Lane Effective Length?	No	Total Segment Density, veh/mi/ln	13.2
%Improved % Followers	0.0	% Improved Avg Speed	0.0

Subsegment Data

#	Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1	Tangent	5280	-	-	55.5

Vehicle Results

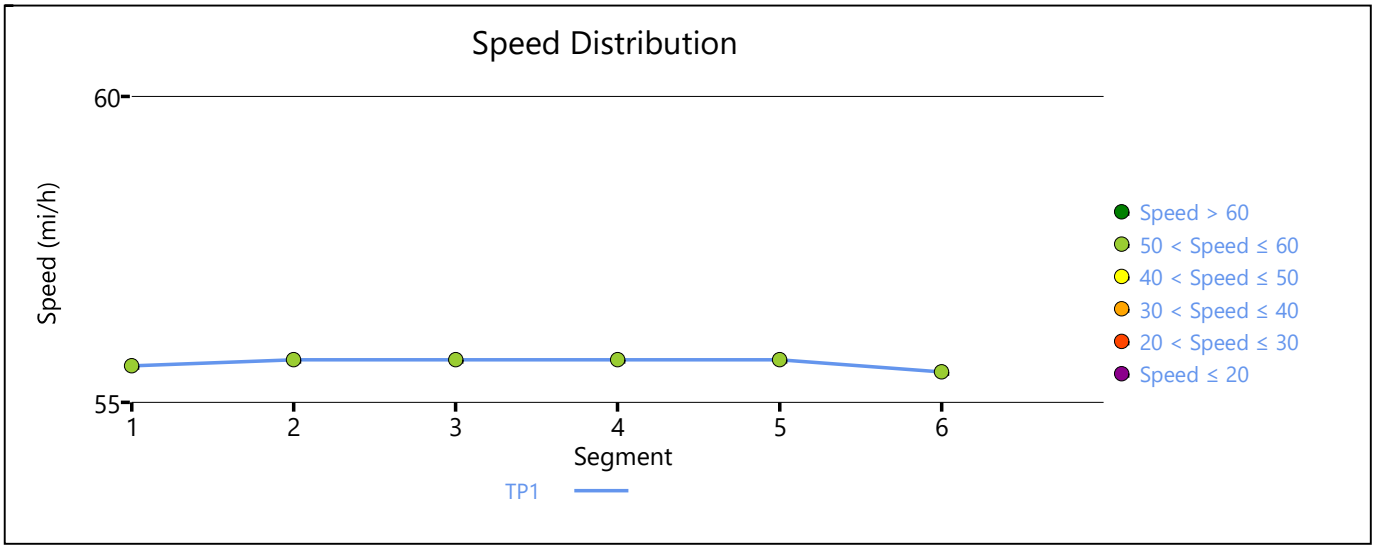
Average Speed, mi/h	55.5	Percent Followers, %	72.7
Segment Travel Time, minutes	1.84	Follower Density, followers/mi/ln	13.2
Vehicle LOS	E		

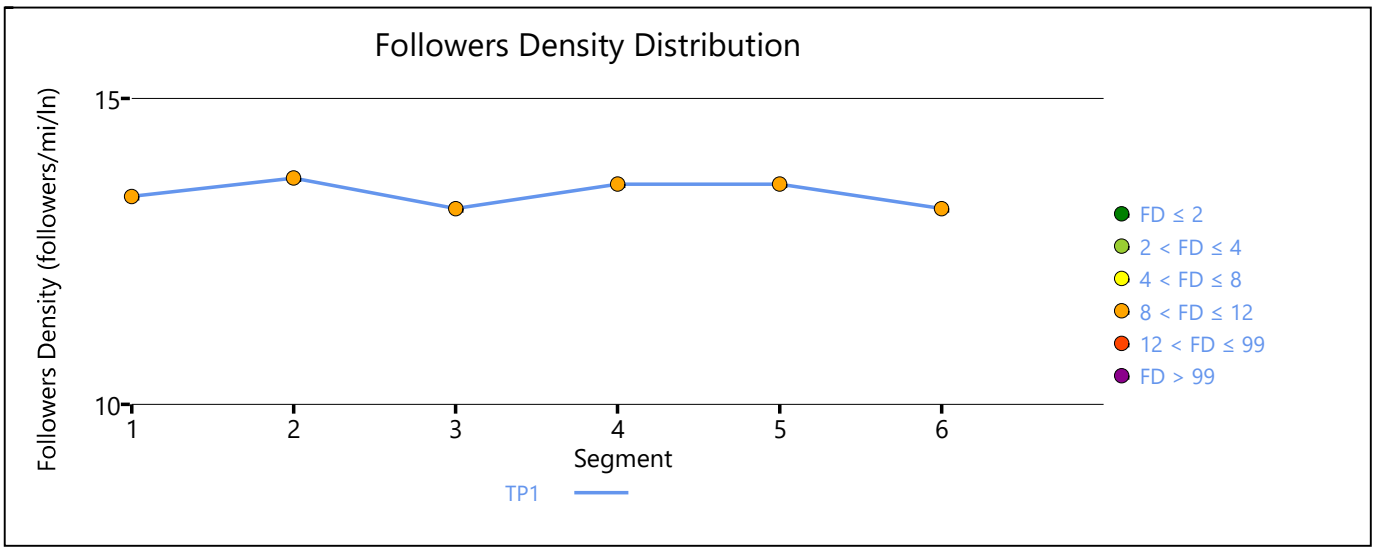
Bicycle Results

Percent Occupied Parking	0	Pavement Condition Rating	4
Flow Rate Outside Lane, veh/h	1004	Bicycle Effective Width, ft	24
Bicycle LOS Score	3.04	Bicycle Effective Speed Factor	4.17
Bicycle LOS	C		

Facility Results

T	Follower Density, followers/mi/ln	LOS
1	13.3	D





TURNING MOVEMENT COUNTS

National Data & Surveying Services

Intersection Turning Movement Count

Location: SR 131/W Emory Rd & US 25W/SR 9/SR 131/Clinton Hwy
City: Powell
Control: Signalized

Project ID: 22-190025-001
Date: 6/14/2022

Data - Total

NS/EW Streets:	SR 131/W Emory Rd				SR 131/W Emory Rd				US 25W/SR 9/SR 131/Clinton Hwy				US 25W/SR 9/SR 131/Clinton Hwy				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	1	0	0	1	0	0	1	2	1	0	1	2	1	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	11	1	62	0	7	6	3	0	2	184	12	0	59	107	1	0	455
7:15 AM	10	6	73	0	3	16	2	0	4	187	14	0	72	105	9	0	501
7:30 AM	11	4	89	0	7	18	3	0	2	193	25	0	97	130	8	0	587
7:45 AM	6	4	76	0	2	13	3	0	4	172	14	0	90	131	9	0	524
8:00 AM	15	6	59	0	6	16	5	0	0	167	15	0	76	91	9	0	465
8:15 AM	5	6	69	0	1	11	1	0	2	150	13	0	61	89	5	0	413
8:30 AM	5	6	51	0	6	15	3	0	4	141	11	1	49	111	6	0	409
8:45 AM	15	7	62	0	6	5	1	0	2	143	10	0	46	96	6	0	399
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	78	40	541	0	38	100	21	0	20	1337	114	1	550	860	53	0	3753
APPROACH %'s :	11.84%	6.07%	82.09%	0.00%	23.90%	62.89%	13.21%	0.00%	1.36%	90.83%	7.74%	0.07%	37.59%	58.78%	3.62%	0.00%	
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	42	20	297	0	18	63	13	0	10	719	68	0	335	457	35	0	2077
PEAK HR FACTOR :	0.700	0.833	0.834	0.000	0.643	0.875	0.650	0.000	0.625	0.931	0.680	0.000	0.863	0.872	0.972	0.000	0.885
	0.863				0.839				0.906				0.880				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	1	0	0	1	0	0	1	2	1	0	1	2	1	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	22	10	74	0	4	10	7	0	9	175	11	0	78	168	13	0	581
4:15 PM	22	19	90	0	5	8	6	0	5	230	7	0	84	179	18	0	673
4:30 PM	17	20	100	0	4	13	6	0	4	150	18	0	96	231	13	0	672
4:45 PM	22	12	95	0	4	9	6	0	7	207	19	0	86	201	15	0	683
5:00 PM	13	13	96	0	1	9	11	0	5	211	14	0	101	220	21	0	715
5:15 PM	20	22	118	0	6	17	4	0	4	221	16	0	94	216	20	0	758
5:30 PM	13	12	114	0	5	18	12	0	9	207	13	0	113	227	27	0	770
5:45 PM	14	23	79	0	9	19	15	0	10	203	12	0	81	192	20	0	677
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	143	131	766	0	38	103	67	0	53	1604	110	0	733	1634	147	0	5529
APPROACH %'s :	13.75%	12.60%	73.65%	0.00%	18.27%	49.52%	32.21%	0.00%	3.00%	90.78%	6.23%	0.00%	29.16%	65.00%	5.85%	0.00%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	68	59	423	0	16	53	33	0	25	846	62	0	394	864	83	0	2926
PEAK HR FACTOR :	0.773	0.670	0.896	0.000	0.667	0.736	0.688	0.000	0.694	0.957	0.816	0.000	0.872	0.952	0.769	0.000	0.950
	0.859				0.729				0.968				0.913				

National Data & Surveying Services

Intersection Turning Movement Count

Location: W Emory Rd/Bill Bell Wy & US 25W/SR 9/SR 131/Clinton Hwy
City: Powell
Control: Signalized

Project ID: 22-190025-002
Date: 6/14/2022

Data - Total

NS/EW Streets:	W Emory Rd/Bill Bell Wy				W Emory Rd/Bill Bell Wy				US 25W/SR 9/SR 131/Clinton Hwy				US 25W/SR 9/SR 131/Clinton Hwy				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1	1	1	0	2	0.5	0.5	0	1	2	1	0	1	2	1	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	4	2	26	0	43	17	25	0	17	229	0	0	9	140	14	1	527
7:15 AM	2	3	21	0	74	13	36	0	21	233	1	0	11	155	21	0	591
7:30 AM	3	5	24	0	85	16	39	0	25	268	0	0	25	199	27	0	716
7:45 AM	7	6	25	0	52	7	44	0	19	217	0	0	19	173	31	0	600
8:00 AM	1	1	18	0	72	11	25	0	14	199	1	0	7	147	27	0	523
8:15 AM	0	6	20	0	56	10	16	0	16	199	0	0	11	132	25	0	491
8:30 AM	4	4	22	0	61	15	25	0	12	183	0	0	12	139	28	0	505
8:45 AM	5	7	13	0	64	5	16	0	14	196	0	1	10	124	39	0	494
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	26	34	169	0	507	94	226	0	138	1724	2	1	104	1209	212	1	4447
APPROACH %'s :	11.35%	14.85%	73.80%	0.00%	61.31%	11.37%	27.33%	0.00%	7.40%	92.44%	0.11%	0.05%	6.82%	79.23%	13.89%	0.07%	
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	16	16	96	0	254	53	144	0	82	947	1	0	64	667	93	1	2434
PEAK HR FACTOR :	0.571	0.667	0.923	0.000	0.747	0.779	0.818	0.000	0.820	0.883	0.250	0.000	0.640	0.838	0.750	0.250	0.850
	0.842				0.805				0.879				0.822				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1	1	1	0	2	0.5	0.5	0	1	2	1	0	1	2	1	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	9	8	15	0	60	6	23	0	27	222	0	0	18	238	56	0	682
4:15 PM	3	9	19	0	59	9	27	0	40	264	0	0	26	237	68	0	761
4:30 PM	5	9	16	0	71	9	35	0	42	218	0	0	17	303	80	1	806
4:45 PM	1	8	13	0	61	7	34	0	38	254	0	0	17	286	74	0	793
5:00 PM	8	9	29	0	91	7	30	0	40	266	0	0	16	302	81	0	879
5:15 PM	3	15	12	0	52	5	32	0	43	294	0	0	20	304	80	1	861
5:30 PM	9	7	22	0	54	7	37	0	59	261	2	0	18	318	84	0	878
5:45 PM	5	11	19	0	59	10	18	0	26	247	0	0	12	273	76	0	756
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	43	76	145	0	507	60	236	0	315	2026	2	0	144	2261	599	2	6416
APPROACH %'s :	16.29%	28.79%	54.92%	0.00%	63.14%	7.47%	29.39%	0.00%	13.44%	86.47%	0.09%	0.00%	4.79%	75.22%	19.93%	0.07%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	21	39	76	0	258	26	133	0	180	1075	2	0	71	1210	319	1	3411
PEAK HR FACTOR :	0.583	0.650	0.655	0.000	0.709	0.929	0.899	0.000	0.763	0.914	0.250	0.000	0.888	0.951	0.949	0.250	0.970
	0.739				0.814				0.932				0.953				

National Data & Surveying Services

Intersection Turning Movement Count

Location: W Beaver Creek Dr & US 25W/SR 9/SR 131/Clinton Hwy
City: Powell
Control: Signalized

Project ID: 22-190025-003
Date: 6/14/2022

Data - Total

NS/EW Streets:	W Beaver Creek Dr				W Beaver Creek Dr				US 25W/SR 9/SR 131/Clinton Hwy				US 25W/SR 9/SR 131/Clinton Hwy				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1	0.5	0.5	0	0.5	0.5	1	0	1	2	1	0	1	2	1	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	10	0	24	0	2	1	1	0	9	274	8	0	33	150	4	1	517
7:15 AM	14	0	17	0	2	1	5	0	7	292	13	0	32	167	1	0	551
7:30 AM	18	1	26	0	3	1	4	0	9	336	16	1	43	227	3	0	688
7:45 AM	18	5	32	0	0	3	11	0	10	282	10	0	33	199	2	0	605
8:00 AM	23	2	34	0	1	1	5	0	9	272	9	0	26	162	1	0	545
8:15 AM	19	2	22	0	3	1	7	0	3	252	12	0	26	148	0	0	495
8:30 AM	9	0	41	0	4	0	2	0	9	245	4	0	28	166	2	1	511
8:45 AM	15	4	25	0	3	3	8	0	8	237	16	1	32	143	4	0	499
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	126	14	221	0	18	11	43	0	64	2190	88	2	253	1362	17	2	4411
APPROACH %'s :	34.90%	3.88%	61.22%	0.00%	25.00%	15.28%	59.72%	0.00%	2.73%	93.43%	3.75%	0.09%	15.48%	83.35%	1.04%	0.12%	
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	73	8	109	0	6	6	25	0	35	1182	48	1	134	755	7	0	2389
PEAK HR FACTOR :	0.793	0.400	0.801	0.000	0.500	0.500	0.568	0.000	0.875	0.879	0.750	0.250	0.779	0.831	0.583	0.000	0.868
	0.805				0.661				0.874				0.821				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	1	0.5	0.5	0	0.5	0.5	1	0	1	2	1	0	1	2	1	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	27	4	43	0	3	4	25	0	7	257	17	0	27	276	7	0	697
4:15 PM	32	5	49	0	4	8	23	0	17	295	13	0	37	257	8	0	748
4:30 PM	39	5	45	0	4	7	27	0	18	273	9	0	32	339	6	0	804
4:45 PM	37	5	45	0	6	12	23	0	19	293	10	0	22	320	1	0	793
5:00 PM	39	15	50	0	5	3	35	0	20	340	18	0	36	312	5	0	878
5:15 PM	39	11	55	0	5	10	37	0	18	317	15	0	44	348	7	0	906
5:30 PM	40	8	46	0	3	3	33	0	18	303	12	0	32	319	8	1	826
5:45 PM	47	9	57	0	3	7	22	0	17	295	12	0	31	293	1	0	794
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	300	62	390	0	33	54	225	0	134	2373	106	0	261	2464	43	1	6446
APPROACH %'s :	39.89%	8.24%	51.86%	0.00%	10.58%	17.31%	72.12%	0.00%	5.13%	90.82%	4.06%	0.00%	9.43%	88.99%	1.55%	0.04%	
PEAK HR :	05:00 PM - 06:00 PM																TOTAL
PEAK HR VOL :	165	43	208	0	16	23	127	0	73	1255	57	0	143	1272	21	1	3404
PEAK HR FACTOR :	0.878	0.717	0.912	0.000	0.800	0.575	0.858	0.000	0.913	0.923	0.792	0.000	0.813	0.914	0.656	0.250	0.939
	0.920				0.798				0.916				0.900				

National Data & Surveying Services

Intersection Turning Movement Count

Location: SR 131/Powell Dr & US 25W/SR 9/SR 131/Clinton Hwy
City: Powell
Control: Signalized

Project ID: 22-190025-004
Date: 6/14/2022

Data - Total

NS/EW Streets:	SR 131/Powell Dr				SR 131/Powell Dr				US 25W/SR 9/SR 131/Clinton Hwy				US 25W/SR 9/SR 131/Clinton Hwy				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0.5	0.5	1	0	1.5	0.5	1	0	2	2	0	0	1	2	1	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	1	5	8	0	17	2	73	0	25	264	0	0	1	119	11	0	526
7:15 AM	2	10	11	0	24	4	79	0	35	282	0	0	2	126	6	0	581
7:30 AM	3	11	9	0	20	7	80	0	48	309	0	0	2	193	3	0	685
7:45 AM	3	9	13	0	26	5	74	0	51	251	1	0	1	166	12	4	616
8:00 AM	1	8	8	0	21	4	67	0	37	262	0	0	1	111	9	4	533
8:15 AM	5	5	10	0	21	5	54	0	34	236	0	0	8	122	10	0	510
8:30 AM	5	12	11	0	26	8	59	0	38	245	2	0	4	126	12	1	549
8:45 AM	0	7	9	0	25	10	48	0	45	216	0	0	2	131	19	2	514
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	20	67	79	0	180	45	534	0	313	2065	3	0	21	1094	82	11	4514
APPROACH %'s :	12.05%	40.36%	47.59%	0.00%	23.72%	5.93%	70.36%	0.00%	13.15%	86.73%	0.13%	0.00%	1.74%	90.56%	6.79%	0.91%	
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	9	38	41	0	91	20	300	0	171	1104	1	0	6	596	30	8	2415
PEAK HR FACTOR :	0.750	0.864	0.788	0.000	0.875	0.714	0.938	0.000	0.838	0.893	0.250	0.000	0.750	0.772	0.625	0.500	0.881
	0.880				0.960				0.894				0.808				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0.5	0.5	1	0	1.5	0.5	1	0	2	2	0	0	1	2	1	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	3	5	5	0	26	4	60	0	72	223	0	0	3	248	25	2	676
4:15 PM	7	17	9	0	32	9	70	0	81	243	0	0	3	237	27	0	735
4:30 PM	3	10	12	0	23	8	49	0	88	241	0	0	11	304	33	2	784
4:45 PM	6	16	8	0	27	15	50	0	98	240	3	0	5	288	34	0	790
5:00 PM	2	17	11	0	28	10	54	0	100	289	0	0	6	296	49	0	862
5:15 PM	7	21	9	0	36	10	82	0	98	268	0	0	5	318	27	1	882
5:30 PM	3	16	14	0	27	10	68	0	69	279	1	0	6	279	47	0	819
5:45 PM	6	14	6	0	29	11	59	0	84	261	0	0	7	256	35	0	768
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	37	116	74	0	228	77	492	0	690	2044	4	0	46	2226	277	5	6316
APPROACH %'s :	16.30%	51.10%	32.60%	0.00%	28.61%	9.66%	61.73%	0.00%	25.20%	74.65%	0.15%	0.00%	1.80%	87.16%	10.85%	0.20%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	18	70	42	0	118	45	254	0	365	1076	4	0	22	1181	157	1	3353
PEAK HR FACTOR :	0.643	0.833	0.750	0.000	0.819	0.750	0.774	0.000	0.913	0.931	0.333	0.000	0.917	0.928	0.801	0.250	0.950
	0.878				0.814				0.929				0.969				

National Data & Surveying Services

Intersection Turning Movement Count

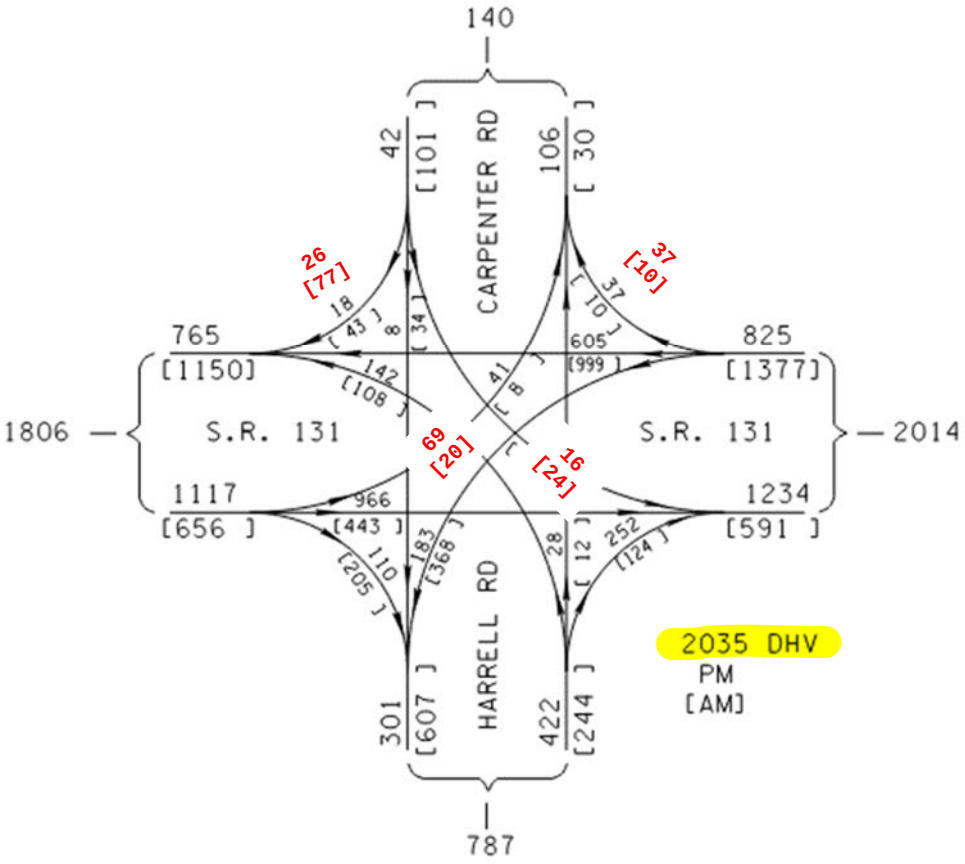
Location: SR 131/W Emory Rd & Harrell Rd
City: Knoxville
Control: 1-Way Stop(WB)

Project ID: 22-190025-005
Date: 6/14/2022

Data - Total

NS/EW Streets:	SR 131/W Emory Rd				SR 131/W Emory Rd				Harrell Rd				Harrell Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	51	16	0	26	93	0	0	0	0	0	0	11	0	5	0	202
7:15 AM	0	46	21	0	34	127	0	0	0	0	0	0	8	0	14	0	250
7:30 AM	1	79	33	0	27	174	0	0	0	0	0	0	10	0	20	0	344
7:45 AM	1	61	21	0	33	154	1	0	0	0	0	0	12	0	8	0	291
8:00 AM	1	59	22	0	27	125	1	0	0	0	0	0	6	0	12	0	253
8:15 AM	0	39	25	0	32	105	0	0	1	0	0	0	14	0	16	0	232
8:30 AM	0	48	18	0	16	75	0	0	0	1	0	0	8	0	16	0	182
8:45 AM	0	39	18	0	25	75	0	0	0	0	0	0	11	0	12	0	180
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	3	422	174	0	220	928	2	0	1	1	0	0	80	0	103	0	1934
APPROACH %'s :	0.50%	70.45%	29.05%	0.00%	19.13%	80.70%	0.17%	0.00%	50.00%	50.00%	0.00%	0.00%	43.72%	0.00%	56.28%	0.00%	
PEAK HR :	07:15 AM - 08:15 AM																TOTAL
PEAK HR VOL :	3	245	97	0	121	580	2	0	0	0	0	0	36	0	54	0	1138
PEAK HR FACTOR :	0.750	0.775	0.735	0.000	0.890	0.833	0.500	0.000	0.000	0.000	0.000	0.000	0.750	0.000	0.675	0.000	0.827
		0.763				0.874								0.750			

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	125	12	0	21	74	0	0	0	0	0	0	14	0	23	0	269
4:15 PM	0	133	13	0	15	70	0	0	0	0	0	0	9	0	30	0	270
4:30 PM	0	142	15	0	19	93	0	0	0	0	1	0	11	0	36	0	317
4:45 PM	0	134	16	0	22	84	0	0	0	0	0	0	15	0	36	0	307
5:00 PM	0	121	7	0	12	87	0	0	2	0	2	0	21	0	34	0	286
5:15 PM	0	157	18	0	25	85	0	0	0	0	0	0	13	0	39	0	337
5:30 PM	0	135	21	0	19	96	0	0	0	0	0	0	13	0	44	0	328
5:45 PM	0	121	17	0	21	84	0	0	0	0	0	0	13	0	38	0	294
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	1068	119	0	154	673	0	0	2	0	3	0	109	0	280	0	2408
APPROACH %'s :	0.00%	89.97%	10.03%	0.00%	18.62%	81.38%	0.00%	0.00%	40.00%	0.00%	60.00%	0.00%	28.02%	0.00%	71.98%	0.00%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	0	547	62	0	78	352	0	0	2	0	2	0	62	0	153	0	1258
PEAK HR FACTOR :	0.000	0.871	0.738	0.000	0.780	0.917	0.000	0.000	0.250	0.000	0.250	0.000	0.738	0.000	0.869	0.000	0.933
		0.870				0.935				0.250				0.943			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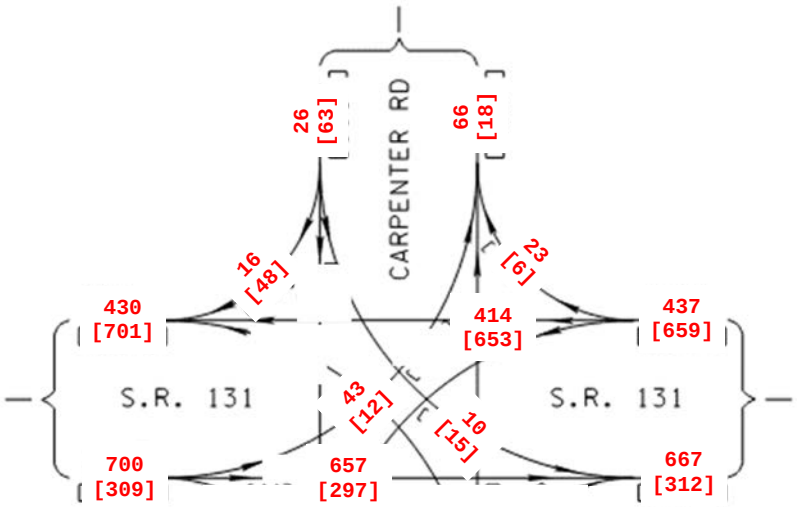
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2022

PM

[AM]

Prepared by NDS/ATD

Prepared by National Data & Surveying Services

VOLUME

SR 131/W Emory Rd S/O Rio Grande Dr

Day: Tuesday
Date: 6/14/2022

City: Powell
Project #: TN22_190026_001

DAILY TOTALS	NB	SB	EB	WB	Total
	5,501	5,889	0	0	11,390

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
0:00	7		7		0	0	14		12:00	76		82		0	0	158	
0:15	6		11		0	0	17		12:15	70		68		0	0	138	
0:30	7		6		0	0	13		12:30	67		71		0	0	138	
0:45	7	27	5	29	0	0	12	56	12:45	59	272	92	313	0	0	151	585
1:00	5		3		0	0	8		13:00	78		66		0	0	144	
1:15	4		4		0	0	8		13:15	88		71		0	0	159	
1:30	7		5		0	0	12		13:30	78		75		0	0	153	
1:45	3	19	6	18	0	0	9	37	13:45	82	326	78	290	0	0	160	616
2:00	6		8		0	0	14		14:00	80		74		0	0	154	
2:15	2		4		0	0	6		14:15	73		80		0	0	153	
2:30	3		0		0	0	3		14:30	90		82		0	0	172	
2:45	5	16	1	13	0	0	6	29	14:45	72	315	87	323	0	0	159	638
3:00	4		4		0	0	8		15:00	90		76		0	0	166	
3:15	2		3		0	0	5		15:15	90		95		0	0	185	
3:30	3		4		0	0	7		15:30	91		107		0	0	198	
3:45	3	12	7	18	0	0	10	30	15:45	121	392	90	368	0	0	211	760
4:00	7		8		0	0	15		16:00	117		94		0	0	211	
4:15	10		12		0	0	22		16:15	128		96		0	0	224	
4:30	10		33		0	0	43		16:30	143		123		0	0	266	
4:45	15	42	27	80	0	0	42	122	16:45	135	523	112	425	0	0	247	948
5:00	13		36		0	0	49		17:00	135		113		0	0	248	
5:15	13		53		0	0	66		17:15	160		123		0	0	283	
5:30	25		65		0	0	90		17:30	142		132		0	0	274	
5:45	23	74	61	215	0	0	84	289	17:45	120	557	125	493	0	0	245	1050
6:00	33		53		0	0	86		18:00	107		95		0	0	202	
6:15	34		63		0	0	97		18:15	112		101		0	0	213	
6:30	50		98		0	0	148		18:30	105		111		0	0	216	
6:45	58	175	97	311	0	0	155	486	18:45	81	405	79	386	0	0	160	791
7:00	81		87		0	0	168		19:00	77		71		0	0	148	
7:15	85		120		0	0	205		19:15	79		67		0	0	146	
7:30	117		167		0	0	284		19:30	73		64		0	0	137	
7:45	81	364	149	523	0	0	230	887	19:45	75	304	67	269	0	0	142	573
8:00	82		115		0	0	197		20:00	62		62		0	0	124	
8:15	73		94		0	0	167		20:15	61		60		0	0	121	
8:30	72		77		0	0	149		20:30	51		62		0	0	113	
8:45	69	296	68	354	0	0	137	650	20:45	50	224	56	240	0	0	106	464
9:00	59		66		0	0	125		21:00	52		61		0	0	113	
9:15	78		66		0	0	144		21:15	48		47		0	0	95	
9:30	63		63		0	0	126		21:30	26		40		0	0	66	
9:45	74	274	85	280	0	0	159	554	21:45	40	166	35	183	0	0	75	349
10:00	84		61		0	0	145		22:00	25		31		0	0	56	
10:15	66		58		0	0	124		22:15	30		30		0	0	60	
10:30	71		64		0	0	135		22:30	18		22		0	0	40	
10:45	64	285	77	260	0	0	141	545	22:45	26	99	28	111	0	0	54	210
11:00	66		77		0	0	143		23:00	13		19		0	0	32	
11:15	61		79		0	0	140		23:15	21		21		0	0	42	
11:30	67		75		0	0	142		23:30	16		19		0	0	35	
11:45	84	278	83	314	0	0	167	592	23:45	6	56	14	73	0	0	20	129
TOTALS		1862		2415				**4277**	**TOTALS**		3639		3474				**7113**
SPLIT %		43.5%		56.5%				**37.6%**	**SPLIT %**		51.2%		48.8%				**62.4%**

DAILY TOTALS	NB	SB	EB	WB	Total
	5,501	5,889	0	0	11,390

AM Peak Hour	7:15	7:15			**7:15**	**PM Peak Hour**	16:30	17:00			**16:45**
AM Pk Volume	365	551			**916**	**PM Pk Volume**	573	493			**1052**
Pk Hr Factor	0.780	0.825			**0.806**	**Pk Hr Factor**	0.895	0.934			**0.929**
7 - 9 Volume	660	877	0	0	**1537**	**4 - 6 Volume**	1080	918	0	0	**1998**
7 - 9 Peak Hour	7:15	7:15			**7:15**	**4 - 6 Peak Hour**	16:30	17:00			**16:45**
7 - 9 Pk Volume	365	551	0	0	**916**	**4 - 6 Pk Volume**	573	493	0	0	**1052**
Pk Hr Factor	0.780	0.825	0.000	0.000	**0.806**	**Pk Hr Factor**	0.895	0.934	0.000	0.000	**0.929**

SPEED

SR 131/W Emory Rd S/O Rio Grande Dr

Day: Tuesday
Date: 6/14/2022

City: Powell
Project #: TN22_190026_001

Summary

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
0:00 AM	0	0	0	0	0	1	6	6	16	18	6	3	0	56
1:00	0	0	0	0	0	1	2	2	15	4	3	6	4	37
2:00	0	0	0	0	0	1	3	5	10	5	2	1	2	29
3:00	0	0	0	0	0	0	4	2	9	9	3	3	0	30
4:00	0	0	0	0	0	0	4	12	31	42	22	8	3	122
5:00	0	0	0	0	0	0	3	32	95	90	46	17	6	289
6:00	0	0	0	0	0	1	23	74	171	150	57	7	3	486
7:00	0	0	0	0	1	9	41	205	363	190	67	10	1	887
8:00	0	0	0	0	0	3	23	133	225	199	53	11	3	650
9:00	0	0	0	0	1	8	29	119	207	138	44	7	1	554
10:00	0	0	0	0	0	1	46	149	197	117	35	0	0	545
11:00	2	0	0	0	1	5	37	142	208	157	30	9	1	592
12:00 PM	0	0	0	0	0	0	22	136	217	152	41	15	2	585
13:00	0	0	0	0	1	8	37	105	231	173	52	9	0	616
14:00	1	0	0	0	0	1	29	120	273	168	41	5	0	638
15:00	0	0	0	0	0	2	30	142	287	228	62	8	1	760
16:00	2	4	0	0	8	15	43	184	375	246	55	12	4	948
17:00	0	0	0	0	1	3	29	238	409	303	58	9	0	1050
18:00	0	0	1	0	1	4	32	118	273	258	87	16	1	791
19:00	0	0	0	0	0	2	13	94	229	155	64	12	4	573
20:00	0	0	0	0	0	1	14	71	182	131	55	8	2	464
21:00	0	0	0	0	0	4	32	84	116	81	20	9	3	349
22:00	0	0	0	0	0	1	13	45	78	44	23	4	2	210
23:00	0	0	0	0	0	2	12	29	33	40	10	1	2	129
Totals	5	4	1		14	73	527	2247	4250	3098	936	190	45	11390
% of Totals	0%	0%	0%		0%	1%	5%	20%	37%	27%	8%	2%	0%	100%

AM Volumes	2	0	0	0	3	30	221	881	1547	1119	368	82	24	4277
% AM	0%				0%	0%	2%	8%	14%	10%	3%	1%	0%	38%
AM Peak Hour	11:00				7:00	7:00	10:00	7:00	7:00	8:00	7:00	5:00	5:00	7:00
Volume	2				1	9	46	205	363	199	67	17	6	887
PM Volumes	3	4	1	0	11	43	306	1366	2703	1979	568	108	21	7113
% PM	0%	0%	0%		0%	0%	3%	12%	24%	17%	5%	1%	0%	62%
PM Peak Hour	16:00	16:00	18:00		16:00	16:00	16:00	17:00	17:00	17:00	18:00	18:00	16:00	17:00
Volume	2	4	1		8	15	43	238	409	303	87	16	4	1050

Directional Peak Periods	AM 7-9			NOON 12-2			PM 4-6			Off Peak Volumes		
All Speeds	Volume	↔	%	Volume	↔	%	Volume	↔	%	Volume	↔	%
	1537		13%	1201		11%	1998		18%	6654		58%

Street Name	Direction	Percentiles					
		15th	50th	Average	85th	95th	ADT
SR 131/W Emory Rd	Summary	47	53	53	59	63	11390

Prepared by National Data & Surveying Services

CLASSIFICATION

SR 131/W Emory Rd S/O Rio Grande Dr

Day: Tuesday
Date: 6/14/2022

City: Powell
Project #: TN22_190026_001n

North Bound

Time	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10	# 11	# 12	# 13	Total
0:00 AM	0	3	4	0	0	0	0	0	0	0	0	0	0	7
0:15	0	6	0	0	0	0	0	0	0	0	0	0	0	6
0:30	0	6	1	0	0	0	0	0	0	0	0	0	0	7
0:45	0	7	0	0	0	0	0	0	0	0	0	0	0	7
1:00	0	5	0	0	0	0	0	0	0	0	0	0	0	5
1:15	0	4	0	0	0	0	0	0	0	0	0	0	0	4
1:30	0	5	1	0	1	0	0	0	0	0	0	0	0	7
1:45	0	3	0	0	0	0	0	0	0	0	0	0	0	3
2:00	0	4	2	0	0	0	0	0	0	0	0	0	0	6
2:15	0	1	1	0	0	0	0	0	0	0	0	0	0	2
2:30	0	2	1	0	0	0	0	0	0	0	0	0	0	3
2:45	0	4	1	0	0	0	0	0	0	0	0	0	0	5
3:00	0	3	0	0	0	0	0	0	1	0	0	0	0	4
3:15	0	2	0	0	0	0	0	0	0	0	0	0	0	2
3:30	0	3	0	0	0	0	0	0	0	0	0	0	0	3
3:45	0	2	1	0	0	0	0	0	0	0	0	0	0	3
4:00	0	5	2	0	0	0	0	0	0	0	0	0	0	7
4:15	0	8	1	0	1	0	0	0	0	0	0	0	0	10
4:30	0	5	4	1	0	0	0	0	0	0	0	0	0	10
4:45	0	12	3	0	0	0	0	0	0	0	0	0	0	15
5:00	0	12	1	0	0	0	0	0	0	0	0	0	0	13
5:15	0	7	4	0	1	1	0	0	0	0	0	0	0	13
5:30	0	14	7	2	2	0	0	0	0	0	0	0	0	25
5:45	0	11	10	0	2	0	0	0	0	0	0	0	0	23
6:00	0	21	10	0	2	0	0	0	0	0	0	0	0	33
6:15	0	28	4	0	2	0	0	0	0	0	0	0	0	34
6:30	0	37	9	0	4	0	0	0	0	0	0	0	0	50
6:45	0	43	11	0	4	0	0	0	0	0	0	0	0	58
7:00	0	56	18	1	6	0	0	0	0	0	0	0	0	81
7:15	0	65	16	2	2	0	0	0	0	0	0	0	0	85
7:30	0	84	25	0	7	1	0	0	0	0	0	0	0	117
7:45	0	55	21	0	4	1	0	0	0	0	0	0	0	81
8:00	0	60	19	0	1	0	0	0	2	0	0	0	0	82
8:15	0	48	18	0	5	2	0	0	0	0	0	0	0	73
8:30	0	46	21	0	4	0	0	1	0	0	0	0	0	72
8:45	0	48	16	1	3	1	0	0	0	0	0	0	0	69
9:00	0	42	13	0	2	0	0	2	0	0	0	0	0	59
9:15	2	50	16	1	5	2	0	1	1	0	0	0	0	78
9:30	1	44	11	1	5	0	0	0	1	0	0	0	0	63
9:45	0	52	19	0	3	0	0	0	0	0	0	0	0	74
10:00	1	50	24	0	6	0	0	2	1	0	0	0	0	84
10:15	0	46	15	1	3	1	0	0	0	0	0	0	0	66
10:30	1	51	18	0	0	1	0	0	0	0	0	0	0	71
10:45	0	41	19	0	3	1	0	0	0	0	0	0	0	64
11:00	0	43	16	0	6	1	0	0	0	0	0	0	0	66
11:15	0	46	12	0	3	0	0	0	0	0	0	0	0	61
11:30	0	45	15	0	7	0	0	0	0	0	0	0	0	67
11:45	0	57	22	1	3	1	0	0	0	0	0	0	0	84
12:00 PM	1	52	19	0	3	0	0	1	0	0	0	0	0	76
12:15	0	45	23	0	0	0	0	2	0	0	0	0	0	70
12:30	1	46	17	0	3	0	0	0	0	0	0	0	0	67
12:45	1	43	12	0	2	1	0	0	0	0	0	0	0	59
13:00	0	58	18	0	1	1	0	0	0	0	0	0	0	78
13:15	0	64	16	1	6	1	0	0	0	0	0	0	0	88
13:30	0	58	13	1	6	0	0	0	0	0	0	0	0	78
13:45	0	57	19	1	5	0	0	0	0	0	0	0	0	82
14:00	0	49	23	0	7	1	0	0	0	0	0	0	0	80
14:15	0	52	19	0	1	0	0	1	0	0	0	0	0	73
14:30	1	66	19	0	2	1	0	1	0	0	0	0	0	90
14:45	0	53	17	1	1	0	0	0	0	0	0	0	0	72
15:00	0	63	22	1	4	0	0	0	0	0	0	0	0	90
15:15	2	60	22	2	3	1	0	0	0	0	0	0	0	90
15:30	1	69	14	0	7	0	0	0	0	0	0	0	0	91
15:45	2	79	33	1	6	0	0	0	0	0	0	0	0	121
16:00	0	83	25	0	8	1	0	0	0	0	0	0	0	117
16:15	1	91	34	0	1	0	0	0	1	0	0	0	0	128
16:30	1	103	31	0	8	0	0	0	0	0	0	0	0	143
16:45	0	99	31	0	4	0	0	1	0	0	0	0	0	135
17:00	0	93	36	0	5	1	0	0	0	0	0	0	0	135
17:15	1	114	38	0	6	0	0	1	0	0	0	0	0	160
17:30	1	112	27	0	2	0	0	0	0	0	0	0	0	142
17:45	0	101	15	0	2	0	0	2	0	0	0	0	0	120
18:00	2	83	20	0	2	0	0	0	0	0	0	0	0	107
18:15	1	85	19	1	5	0	0	1	0	0	0	0	0	112
18:30	0	84	16	2	3	0	0	0	0	0	0	0	0	105
18:45	3	59	14	0	3	0	0	1	1	0	0	0	0	81
19:00	0	58	16	0	3	0	0	0	0	0	0	0	0	77
19:15	0	58	18	0	3	0	0	0	0	0	0	0	0	79
19:30	0	62	10	0	1	0	0	0	0	0	0	0	0	73
19:45	3	55	15	0	2	0	0	0	0	0	0	0	0	75
20:00	1	53	7	0	1	0	0	0	0	0	0	0	0	62
20:15	0	48	10	1	2	0	0	0	0	0	0	0	0	61
20:30	0	43	7	0	1	0	0	0	0	0	0	0	0	51
20:45	0	39	11	0	0	0	0	0	0	0	0	0	0	50
21:00	2	43	7	0	0	0	0	0	0	0	0	0	0	52
21:15	0	39	7	0	2	0	0	0	0	0	0	0	0	48
21:30	1	21	4	0	0	0	0	0	0	0	0	0	0	26
21:45	0	32	7	0	1	0	0	0	0	0	0	0	0	40
22:00	0	18	6	0	1	0	0	0	0	0	0	0	0	25
22:15	0	22	8	0	0	0	0	0	0	0	0	0	0	30
22:30	0	17	1	0	0	0	0	0	0	0	0	0	0	18
22:45	0	20	5	1	0	0	0	0	0	0	0	0	0	26
23:00	0	12	1	0	0	0	0	0	0	0	0	0	0	13
23:15	0	16	5	0	0	0	0	0	0	0	0	0	0	21
23:30	0	14	2	0	0	0	0	0	0	0	0	0	0	16
23:45	0	3	2	1	0	0	0	0	0	0	0	0	0	6
Totals	**31**	**3986**	**1193**	**25**	**220**	**21**		**17**	**8**					**5501**
% of Totals	1%	72%	22%	0%	4%	0%		0%	0%					100%

AM Volumes	5	1292	432	11	97	13	0	6	6	0	0	0	0	1862
% AM	0%	23%	8%	0%	2%	0%		0%	0%					34%
AM Peak Hour	9:15	7:15	7:30	6:30	6:45	7:30		8:30	9:15					7:15
Volume	4	264	83	3	19	4		4	3					365
PM Volumes	26	2694	761	14	123	8	0	11	2	0	0	0	0	3639
% PM	0%	49%	14%	0%	2%	0%		0%	0%					66%
PM Peak Hour	18:00	17:00	16:30	14:30	13:15	12:30		12:00	15:30					16:30
Volume	6	420	136	4	24	3		3	1					573

Directional Peak Periods	AM 7-9			NOON 12-2			PM 4-6			Off Peak Volumes		
All Classes	Volume		%	Volume		%	Volume		%	Volume		%
	660	⟷	12%	598	⟷	11%	1080	⟷	20%	3163	⟷	57%

Classification Definitions

1 Motorcycles	**4** Buses	**7** > =4-Axle Single Units	**10** >=6-Axle Single Trailers	**13** >=7-Axle Multi-Trailers
2 Passenger Cars	**5** 2-Axle, 6-Tire Single Units	**8** <=4-Axle Single Trailers	**11** <=5-Axle Multi-Trailers	
3 2-Axle, 4-Tire Single Units	**6** 3-Axle Single Units	**9** 5-Axle Single Trailers	**12** 6-Axle Multi-Trailers	

Volume Count Report

LOCATION INFO	
Location ID	47000047
Type	SPOT
Fnct'l Class	4
Located On	W. EMORY RD.
Direction	2-WAY
County	Knox
Community	-
MPO ID	
HPMS ID	
Agency	tdot

COUNT DATA INFO	
Count Status	Accepted
Start Date	Wed 2/3/2021
End Date	Thu 2/4/2021
Start Time	11:00:00 AM
End Time	11:00:00 AM
Direction	
Notes	
Station	XA43717
Study	
Speed Limit	
Description	
Sensor Type	Axle/Tube
Source	
Latitude,Longitude	

INTERVAL:15-MIN

Time	15-min Interval				Hourly Count
	1st	2nd	3rd	4th	
0:00-1:00	10	16	10	13	49
1:00-2:00	8	5	9	8	30
2:00-3:00	6	7	2	6	21
3:00-4:00	6	15	8	8	37
4:00-5:00	10	14	38	27	89
5:00-6:00	45	57	60	65	227
6:00-7:00	67	109	132	150	458
7:00-8:00	174	212	245	227	858
8:00-9:00	217	175	164	128	684
9:00-10:00	113	93	113	124	443
10:00-11:00	121	116	136	98	471
11:00-12:00	100	136	124	118	478
12:00-13:00	153	117	129	135	534
13:00-14:00	133	164	163	138	598
14:00-15:00	147	175	182	154	658
15:00-16:00	185	160	226	243	814
16:00-17:00	203	223	229	261	916
17:00-18:00	272	270	227	210	979
18:00-19:00	210	207	173	157	747
19:00-20:00	136	110	118	89	453
20:00-21:00	95	90	85	55	325
21:00-22:00	49	58	55	46	208
22:00-23:00	38	36	23	19	116
23:00-24:00	22	19	17	20	78
Total					10,271
AADT					10,841
AM Peak					07:15-08:15 901
PM Peak					16:30-17:30 1,032

TDOT
AADT
MAPS

tdot traffic count history - Search | Traffic History | Transportation Data Manageme

https://tdot.public.ms2soft.com/tcds/tsearch.asp?loc=Tdot&mod=TCDS

Location ID	47000047	MPO ID	
Type	SPOT	HPMS ID	
On NHS		On HPMS	
LRS ID	47SR131001	LRS Loc Pt.	11.459
SF Group	Urban	Route Type	
AF Group	16	Route	
GF Group	Knox	Active	Yes
Class Dist Grp	16	Category	CC
Seas Clss Grp			
WIM Group			
QC Group	Default		
Fnct'l Class	Minor Arterial	Milepost	
Located On	W. EMORY RD.		
Loc On Alias			
	NEAR ANDERSON CO LINE		
More Detail			

STATION DATA

Directions: 2-WAY

AADT

Year	AADT	DHV-30	K %	D %	PA	BC	Src
2021	10,841	952	9	65	10,482 (97%)	359 (3%)	
2020	9,870	1,054	11	65	9,494 (96%)	376 (4%)	
2019	10,440		13	65			
2018	10,161		11	65			
2017	10,620		10	65			

1-5 of 37

Travel Demand Model

Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

Date	Int	Total
Wed 2/3/2021	15	10,271
Wed 1/29/2020	15	10,505
Wed 1/31/2018	15	10,062
Tue 1/24/2017	15	10,120
Wed 1/27/2016	15	9,792
Tue 1/27/2015	15	9,510
Wed 2/5/2014	15	9,329
Mon 2/4/2013	15	9,576
Mon 2/7/2011	15	8,582
Wed 1/27/2010	15	9,239

1-10 of 16

mm/dd/yyyy To Date

VOLUME TREND

Year	Annual Growth
2021	10%
2020	-5%
2019	3%
2018	-4%
2017	6%
2016	-1%
2015	14%
2014	-6%
2013	2%
2012	4%

1-10 of 36

SPEED

Date	Int	Pace	85th	Total
No Data				

CLASSIFICATION

Date	Int	Total
No Data		

WEIGH-IN-MOTION

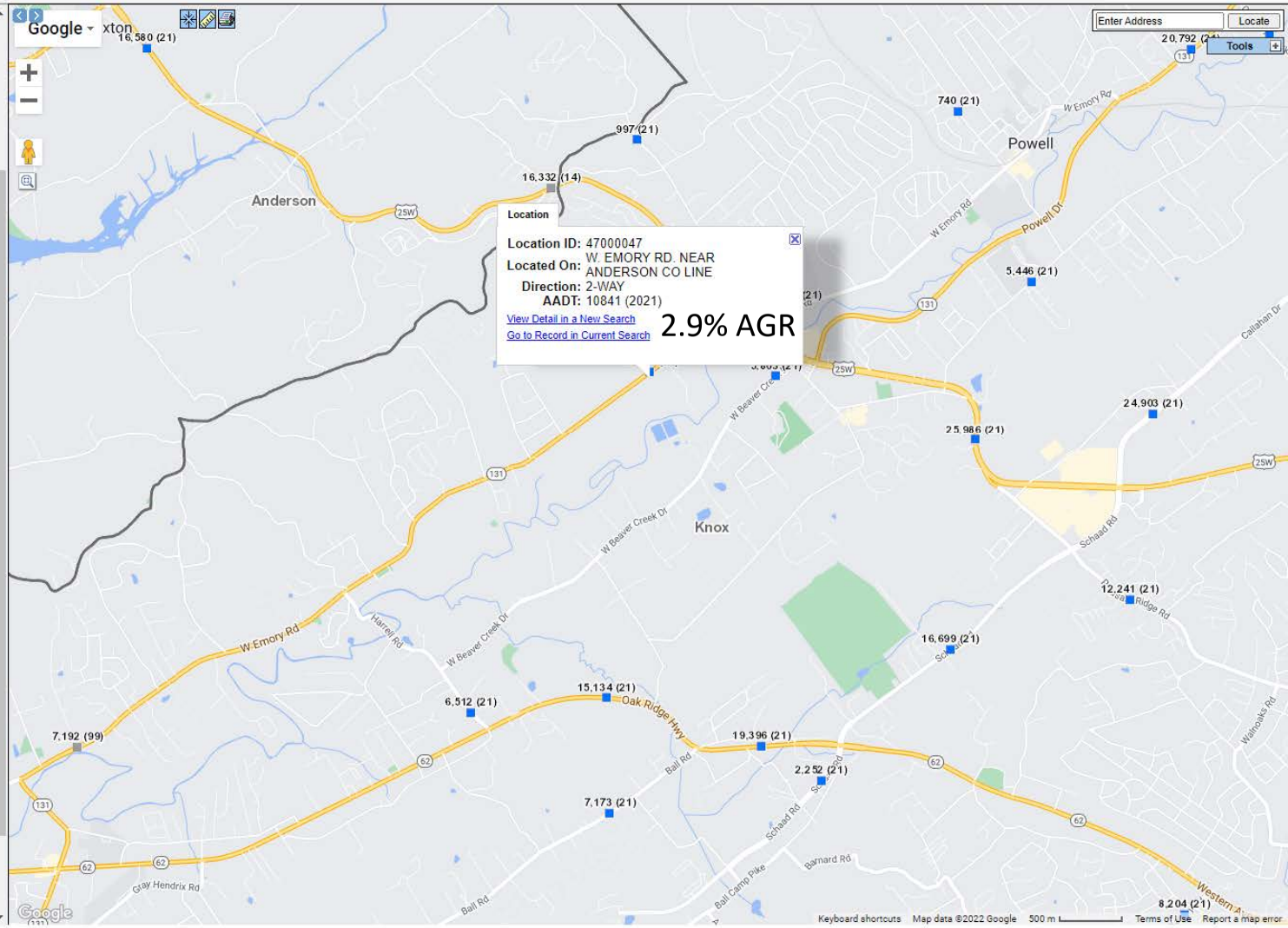
Date	Axles	Avg GVW	Total
No Data			

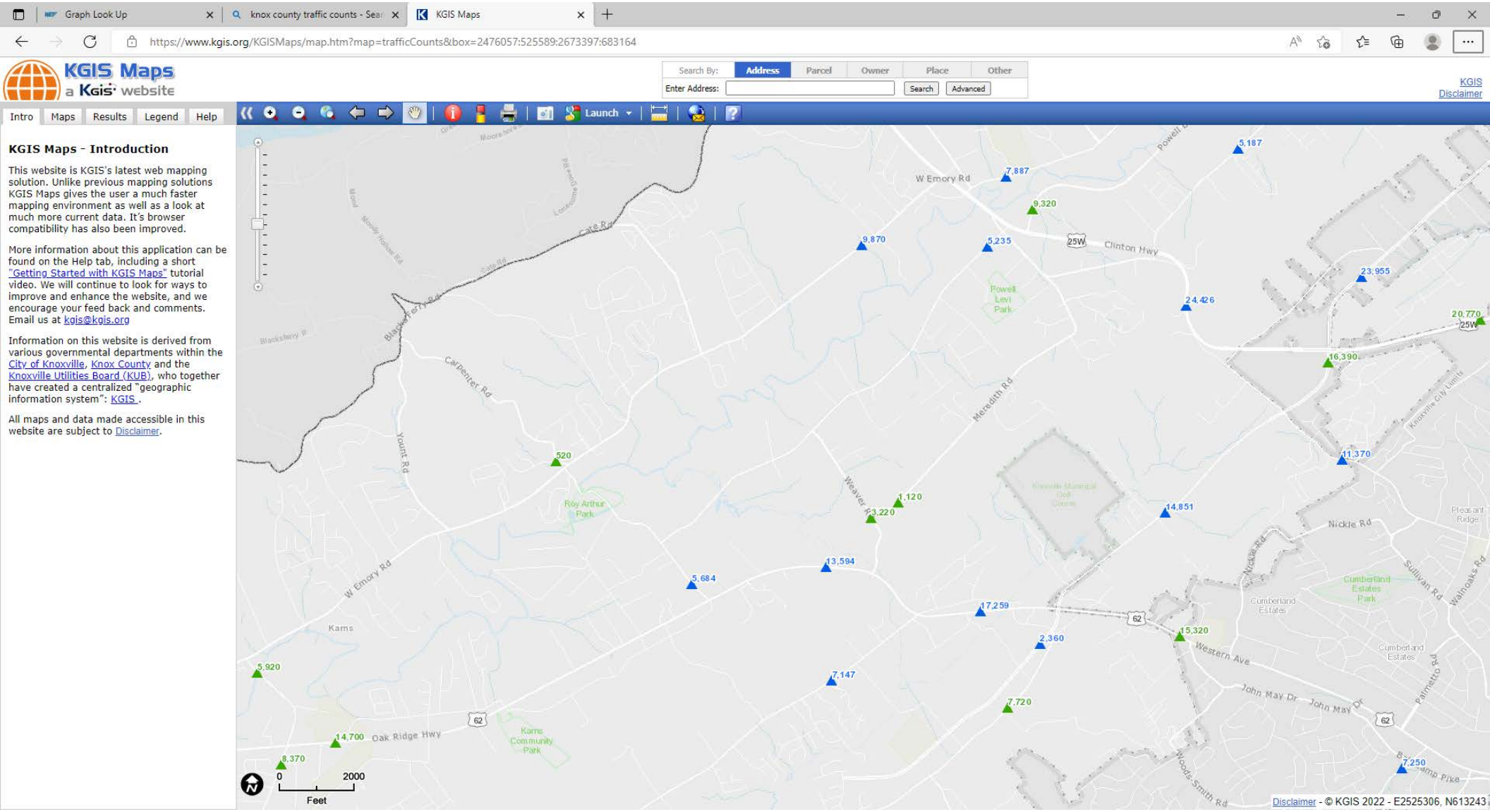
PER VEHICLE

Date	Axles	85th	Total
No Data			

GAP

Date	Int	Total




Graph Look Up
knox county traffic counts - Sear
KGIS Maps
https://www.kgis.org/KGISMaps/map.htm?map=trafficCounts&box=2476057:525589:2673397:683164
KGIS Maps
a Kgis website
Search By:
Address
Parcel
Owner
Place
Other
Enter Address:
Search
Advanced
KGIS
Disclaimer
Intro
Maps
Results
Legend
Help
Launch
KGIS Maps - Introduction
This website is KGIS's latest web mapping solution. Unlike previous mapping solutions KGIS Maps gives the user a much faster mapping environment as well as a look at much more current data. It's browser compatibility has also been improved.
More information about this application can be found on the Help tab, including a short "Getting Started with KGIS Maps" tutorial video. We will continue to look for ways to improve and enhance the website, and we encourage your feed back and comments. Email us at kgis@kgis.org
Information on this website is derived from various governmental departments within the City of Knoxville, Knox County and the Knoxville Utilities Board (KUB), who together have created a centralized "geographic information system": KGIS .
All maps and data made accessible in this website are subject to Disclaimer.
W Emory Rd
Clinton Hwy
Cate Rd
Carpenter Rd
Meredith Rd
Yount Rd
Weaver Rd
Nickle Rd
Western Ave
John May Dr
Oak Ridge Hwy
Woods Smith Rd
Karns
Powell Levi Park
Roy Arthur Park
Karns Community Park
Cumberland Estates
Cumberland Estates Park
Pleasant Ridge
Knoxville City Limits
5,187
7,887
9,320
9,870
5,235
23,955
24,426
20,770
16,390
11,370
520
1,120
3,220
14,851
13,594
5,684
17,259
15,320
2,360
7,147
7,720
5,920
14,700
8,370
7,250
0
2000
Feet
Disclaimer - © KGIS 2022 - E2525306, N613243

COMMENT RESOLUTION

Via Email: gouldjf@cdmsmith.com

SEPTEMBER 6, 2022

John F. Gould, P.E.
CDM Smith
1100 Marion St., Suite 300
Knoxville, TN 37921

RE: Bell Farms Master Plan Traffic Impact Study Review Comments

Dear Mr. Gould,

The Transportation Impact Study (TIS) for the above referenced development that was stamped with a date of 8/3/2022 has been reviewed by staff from Knox County Department of Engineering & Public Works, Knoxville-Knox County Planning and TDOT. We have identified the following comments related to the TIS that we require further information/revision on for the review of this case:

1. Please provide an Executive Summary that summarizes the major findings and recommendations with the next version of the TIS.
   Added

2. Figures 2 and 3 are reversed in order of reference, please revise.
   Corrected

3. Page 7, Existing Traffic Volumes – list all intersections that were counted and clarify the AM and PM peak hour varies since the text reads as though it is a 1.25 hour peak period.
   Added list with specific peak hours

4. Page 7, Existing Traffic Volumes – please provide additional documentation in a figure or in the appendix that demonstrates the adequate comparability of the ATC conducted for this study and the regular TDOT station count.
   Added comparison of AWT traffic counts conducted by CDM Smith and TDOT

5. Page 10, Figure 6 – turning movement counts are shown for the intersection of Carpenter Rd at W. Emory Rd however the count data are not included in appendix, please provide.
   Added TDOT DHV traffic from Harrell/Carpenter Rd design plans

6. Page 13 – in addition to realigning Harrell Rd and Carpenter Rd approaches mention that turn lanes and a traffic signal will be added as part of the upcoming improvement project.
   Signalization and turn lanes were identified in Background Capacity and LOS section of the submitted report (Pg 17). Revised report combined the description within the Background Capacity and LOS section.

7. Page 15, Figure 8B – please show the actual location of the Miller Farm subdivision access and add the volume bubble on this figure.
   Added bubble with site location

8. Page 17 – the discussion regarding mitigation of queueing traffic with additional lanes on W. Emory Rd was not provided as a formal recommendation later in the TIS, please clarify and document the specific need for additional lanes by stating the projected queue lengths and include in recommendations as appropriate.
   Added additional discussion regarding adverse queueing begining with the background traffic condition. Intersection LOS remain acceptable. The northbound double left-turn movement improves the intersection capacity and LOS. The NE approach queues should be addressed in the needed and recommended study of a 4-5 lane section for W Emory Road (SR 131).

9. Page 17 – a single left-turn lane is being proposed for the westbound leg of the improved W. Emory Rd/Harrell Rd/Carpenter Rd intersection instead of a double westbound left-turn lane as stated.
   Planned improved geometry was updated with the March 2022 plans provided with the comments.

10. Page 19 – include details for the trip generation used for the recreational facilities.
    Recreational trip generation details were in the Appendix.

11. Page 20 – change “Detached” to “Attached” for land use 215. Also, add the worksheets for the local apartment rate in the Appendix along with the other worksheets from ITE.
    Corrected. Added the Knox County documentation and calculation worksheet.

12. Page 21 – please include discussion about the existing school zoning associated with this site and how that may impact the distribution of trips, particularly in the AM peak and the fact that traffic counts used in this study would not account for those trips. Also include discussion regarding how the splits at each of the two development access points were determined for each land use.
    Traffic was distributed with some consideration of the patterns from the TMC data collected. The revised study increased the residential assignment for W Emory Road to 15% (from 5%) during the AM peak hour, a total assignment of 18% (from 13%) for W Emory Road and Powell Drive. The residential assignment from the proposed street access assumes 100% of the townhomes NB from the West access, 100% of the apartments NB from the east street access. The west access more directly accesses the townhomes as the east accesses more directly the Apartments. The SFU assumes more traffic SB from the west Street as it facilitates the longer spine street for the subdivision. The east access assumes an assignment more local but possibly influenced by signalization. Added description summarizing this assumption.

13. Page 22, Figure 11A and subsequent – add a bubble for the intersection of W. Emory Rd and Bill Bell Way since site traffic makes turns at the intersection, but these are not indicated directly except in another bubble.

This was not identified as a require study intersection.

14. Page 23, Figure 11B – revise the distribution values at W. Emory Rd/Harrell Rd/Carpenter Rd to match the arrow values.
    Corrected

15. Page 28, Figure 14 – the major directional distribution values as indicated in the large double arrows do not add up to total 100% nor match the individual intersection bubbles, please revise.
    20% of the Parks and Recreation trips may originate from the existing subdivision along W Emory Road west of the site. Added an arrow illustrating this local assignment.

16. Page 29, Figure 15 – the distribution percentage to/from the west at W. Emory Rd/Harrell Rd/ Carpenter Rd should be 40% instead of 45%.
    Corrected

17. Page 32, Figure 17A – the volumes do not balance in the PM peak as shown on the provided mark-up pages, please check and revise as necessary.
    Corrected. Bill Bell Way, Harrell Road and western access corrected for PM peak.

18. Page 35 – the Knox County Access Control Policy is referenced, please include the associated turn lane worksheets within the Appendix.
    Added to the Appendix

19. Page 37 and 39, Tables 7 and 8 – the values for V/C and Delay do not match one another for the first intersection listed for the AM signalized performance.
    Did not find this discrepancy. Tables match.

20. Page 41 – the proposed site traffic signal would serve more single-family lots directly if installed at the western site access (the boulevard section). Satisfaction of the signal warrant appears to be driven by the commercial land. It would seem beneficial to shift the commercial land use to the west access point and consider that location for the signal instead of the east access point.
    This response should be for the applicant. The study prepared was for the site plan illustrated.

21. Page 44 – the recommendation for a northwest double left-turn addition does not include any discussion about the associated required additional receiving lane on W. Emory Rd. Please include the additional receiving lane as a recommendation and provide its recommended length.
    Discussion of necessary receiving lanes was provided the Projected Capacity and LOS section of the report submitted (Pg 42). Added the minimum departure lanes in recommendations.

22. Include a Sight Distance analysis section in the report documenting the required and available amounts of intersection sight distance from each proposed access point. The required sight distance will have to be based on the prevailing speed of 59 mph that was documented in the TIS on page 35 and using the TDOT standard drawing RD11-SD-3 since W. Emory Rd is a state route.
    The current prevailing speed that exceeds the posted speed will be significantly impacted with the proposed development, W Emory Road operating near capacity and proposed signalization of the East access street; therefore, the sight distances and turn lane should be based on both the posted

but also an appropriate design, typically 10mph above an existing or proposed speed limit. Sight-distance and turn lanes use a 50mph.

23. The turn lane evaluation must also reference and utilize the TDOT design criteria and warrants as documented in the Tennessee Department of Transportation Highway System Access Manual (TDOT HSAM), Volume 3. The required right-turn lane lengths must be based on the reported 85th percentile speed of 59 mph unless a separate spot speed study can document a different prevailing speed.
    The turn lane analysis was expanded to discuss the speed limit, prevailing speed, and design speed. A design speed of 10mph above the posted 40mph (50mph) is suggested for the purpose of an appropriate design. It is noted that the projected traffic conditions and signalization will reduce the prevailing speeds. Sight distance and right-turn lane deceleration and storage was identified. A minimum distance for a constrained right-turn lane for a design speed of 50mph was revised in the report.

24. Determination of warrants for right-turn lanes needs to also be provided for the opposite directions for each development access point in addition to those evaluated in the TIS.
    Both eastbound and westbound direction for both access streets were provided in the Appendix. Added directional designations for clarification.

25. Provide a discussion of phasing for a development of this size and scale where it is unlikely to be all constructed/occupied simultaneously. A discussion of the specific recommendations and their need in relation to build-out of the site also needs to be provided, e.g. the signal warrants are expected to be met at what percent of site build-out?
    This is not within the scope of our current contract but can be addressed in an addendum upon an approved supplement.

26. Since schools are back in session now, new traffic count(s) needs to be done in order to verify assumed traffic patterns and peak volumes in the TIS are consistent with actual ones.
    Updated traffic counts are not in the current contract and/or an approved supplement. The comparison of AWTs conducted by CDM Smith and TDOT may further address this question.

Additional minor typo and other comments will be provided as attachment to this letter for your reference and correction. Please submit a fully revised TIS addressing these comments for additional review. Please contact me if you have any questions regarding the comments.

Sincerely,

Mike Conger, P.E.
Senior Transportation Engineer
Knoxville-Knox County Planning

CC: Mike Reynolds, AICP, Knoxville-Knox County Planning
Jim Snowden, PE, Knox County Engineering & Public Works
Bryan Bartnik, PE, TDOT Region 1 Traffic Office
Josh Sanderson, Smithbilt Homes


CDM
Smith