



VALERIANO PROPERTY SUBDIVISION TRAFFIC IMPACT STUDY

ANDREW JOHNSON HIGHWAY (US 11E)
KNOX COUNTY, TN

ARDURRA PROJECT NO. 02004-0001.000



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September 25
2026



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1 EXECUTIVE SUMMARY

This report provides a summary of a traffic impact study that was performed for a proposed residential development to be located along Andrew Johnson Highway (US 11E) within the Trentville community of Knox County, TN. The project site is located northeast of the intersection of Asheville Highway (US 25W) at Andrew Johnson Highway (US 11E). The conceptual plan for this project, Valeriano Property Subdivision, proposes a total of 117 Single Family Lots.

The conceptual plan shows one site access onto Andrew Johnson Highway (US 11E) at an existing median opening located approximately 860 feet east of Pleasant Hill Road and 3,640 feet west of N Ruggles Ferry Pike.

The purpose of this study was the evaluation of the traffic operational and safety impacts of the proposed residential development upon roadways in the vicinity of the site. Of particular interest in this study is the proposed development access at Andrew Johnson Highway (US 11E). Appropriate intersection evaluations were conducted at this location in order to determine the anticipated impacts and to establish recommended measures to mitigate these impacts. These evaluations included trip generation, trip distribution, capacity analyses, turn lane warrant analyses and sight distance assessments.

The primary conclusion of this study is that traffic generated from the proposed residential development will have minor impacts on delay at the intersection of Andrew Johnson Highway (US 11E) at Pleasant Hill Road. Under the proposed conditions evaluated, the Andrew Johnson Highway (US 11E) at Pleasant Hill Road intersection was found to operate at a LOS "C" or better, while the proposed site access (Road "A") was found to operate at a LOS "D" or better.

The following list is a summary of the improvements that are recommended to be implemented with the construction of this project:

1. Install STOP sign at unsignalized Site Access (Road "A") at Andrew Johnson Highway (US 11E).
2. Consider the installation of a southbound left turn lane at the intersection of Andrew Johnson Highway (US 11E) and the proposed roadway (Road "A"). The recommended total turn lane length per the TDOT Highway System Access Manual is 555 feet including 505 for lane change and deceleration and 50 feet for vehicle storage. The minimum queue storage length is 50 feet with a bay taper length of 220 feet.
3. Widen the existing median opening. The recommended minimum median opening per TDOT standard drawings is 48 feet.
4. Any future improvements to the intersection needs to be reviewed, coordinated and approved by the Tennessee Department of Transportation.



2 INTRODUCTION & PURPOSE OF STUDY

This report provides a summary of a traffic impact study that was performed for a proposed residential development to be located along Andrew Johnson Highway (US 11E) within the Trentville Community in Knox County, TN. The project site is located northeast of the intersection of Asheville Highway (US 25W) at Andrew Johnson Highway (US 11E). FIGURE 1 is a location map identifying the major roadways in the vicinity of the site.



FIGURE 1
LOCATION MAP

The conceptual plan for this project, Valeriano Property Subdivision, proposes a residential development with 117 single-family lots. The project is to have one site access onto Andrew Johnson Highway (US 11E) at an existing median opening located approximately 860 feet east of Pleasant Hill Road and 3,640 feet west of N Ruggles Ferry Pike. A Conceptual Site Plan which details the proposed site configuration can be found in APPENDIX A.

The purpose of this study was the evaluation of the traffic operational and safety impacts of the proposed residential development upon roadways in the vicinity of the site. Of particular interest in this study is the proposed development access at Andrew Johnson Highway (US 11E). Appropriate intersection evaluations were conducted at this location to determine the anticipated impacts and to establish recommended measures to mitigate these impacts. These evaluations included trip generation, trip distribution, capacity analyses, turn lane warrant analyses and sight distance assessments.



3 EXISTING CONDITIONS

EXISTING ROADWAY CONDITIONS

According to the Knoxville-Knox County Major Road Plan Andrew Johnson Highway (US 11E) is a Major Arterial with a 120-foot right-of-way between Asheville Highway (US 25W) and the Jefferson County Line and provides east-west access in Knox County. Andrew Johnson Highway carries traffic to and from both residential and commercial areas. In the vicinity of the proposed development, the roadway consists of two 12-foot through travel lanes in each direction with a 32-foot grass median. There are 10-foot shoulders and rumble strips on both eastbound and westbound travel lanes. The speed limit on Andrew Johnson Highway (US 11E) is posted as 55 mph. The 2025 ADT on Andrew Johnson Highway (US 11E) was 17,390 vpd. The existing median cut has an approximate width of 26 feet at the proposed location of the subdivision site access.

Pleasant Hill Road is not classified by the Knoxville-Knox County Major Road Plan; therefore, it is considered a Local Street. The posted speed limit on Pleasant Hill Road is 25 mph.

EXISTING SITE CONDITIONS

The total site acreage for this project consists of approximately 28.86 acres located northeast of the intersection of Asheville Highway (US 25W) at Andrew Johnson Highway (US 11E). Knoxville is located to the west and Jefferson County is located to the east of the proposed site. The site is primarily bordered by general agricultural and residential land uses with some commercial land uses south near the intersection of Asheville Highway (US 25W) at Andrew Johnson Highway (US 11E).

The existing site is located in the vicinity of Carter Elementary School with access to Strawberry Plains Pike and Carter Middle School and Carter High School with access to North Carter School Road.

The Parent Responsibility Zone (PRZ) for Knox County Schools is an area around the school where the parent is responsible for providing transportation and the student is not eligible for school bus service. The Elementary School PRZ is one (1) mile from the school, and the Middle and High School PRZ is one-half (1.5) miles from the school by the shortest route on a publicly maintained road. The proposed subdivision will be in the Parent Responsibility Zone for both Carter Middle School and Carter High School but not Carter Elementary School.



FIGURE 2
EXISTING SITE CONDITIONS

EXISTING TRAFFIC DATA

Existing traffic data was gathered for this study. Annual average daily traffic data (AADT) collected by TDOT along Andrew Johnson Highway (US 11E) in the area of the proposed development were utilized. Two count stations, one located on Andrew Johnson Highway (US 11E) near the intersection with Pleasant Hill Road and one located on Andrew Johnson Highway (US 11E) near the Jefferson County Line, were felt to have relevance for this study. The most currently available data from these count stations is contained in TABLE 1.

In addition to the available AADT data, an intersection turning movement traffic count was performed to determine the current AM and PM peak hour operating volumes at the intersection of Andrew Johnson Highway (US 11E) at Pleasant Hill Road. The traffic count was conducted in September 2026. The raw data traffic count summary sheets are contained in APPENDIX A.



TABLE 1
ANNUAL AVERAGE DAILY TRAFFIC COUNT SUMMARY

COUNT YEAR	TDOT COUNT STATION 47000060 AJ HWY (US 11E) AT PLEASANT HILL RD	TDOT COUNT STATION 47000218 AJ HWY (US 11E) AT JEFFERSON CO LINE
2025	17,390	14,648
2024	18,915	14,347
2023	17,946	14,907
2022	18,196	16,988
2021	17,282	18,274
2020	17,162	15,538
2019	19,327	17,916
2018	19,099	17,115
2017	18,622	19,341
2016	19,644	18,597
2015	18,271	18,133
2014	18,016	16,472
2013	18,587	17,134
2012	18,506	16,466
2011	17,934	16,603
2010	18,210	16,307

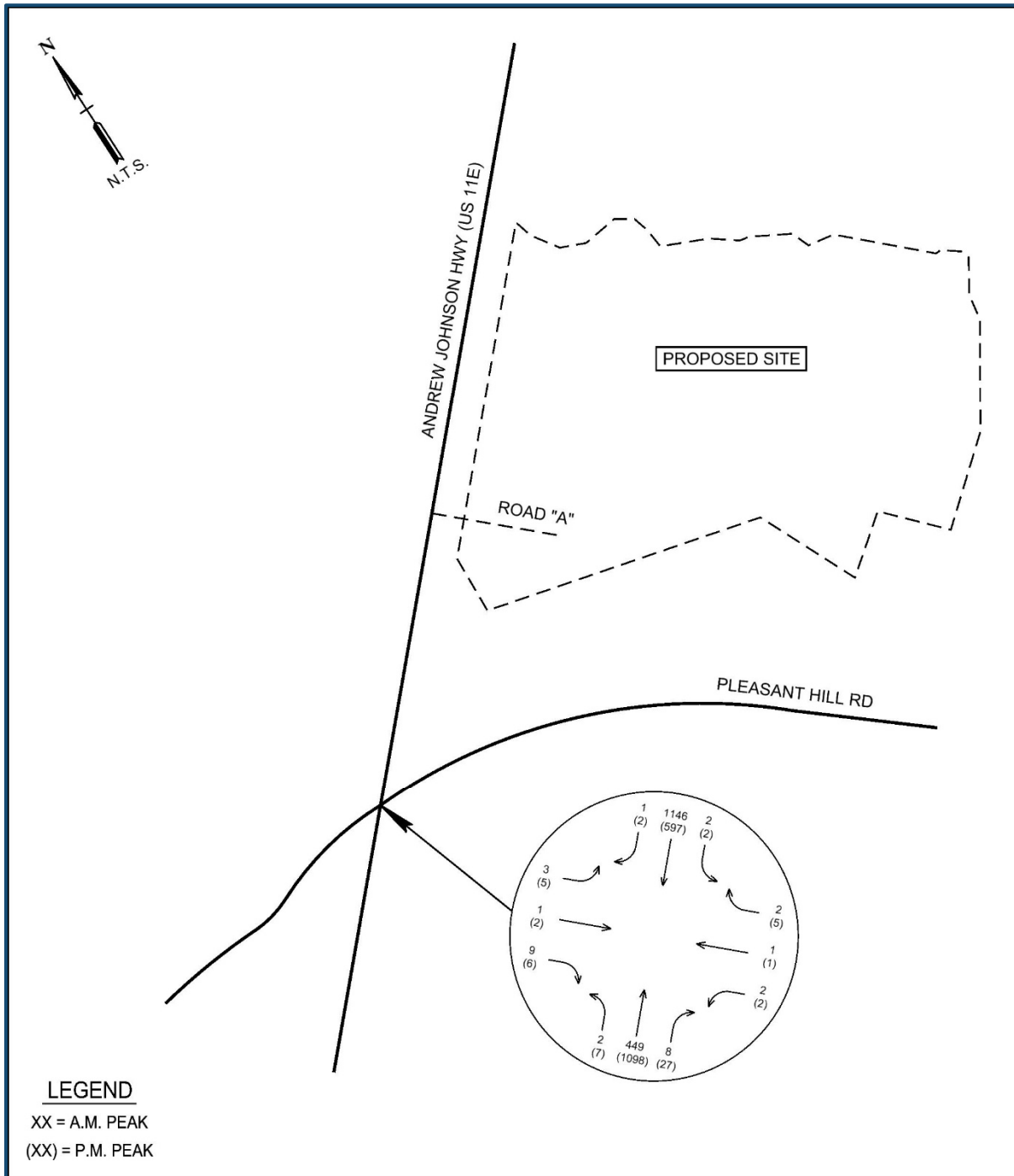


FIGURE 3
2026 EXISTING TRAFFIC VOLUMES



EXISTING CAPACITY ANALYSES / LEVELS-OF-SERVICE

Capacity analyses employing the methods of the Highway Capacity Manual (7th Edition) were conducted for the existing study intersection. The analyses were performed with the 2026 existing traffic volumes and existing intersection traffic control and lane configurations. The intersection of Andrew Johnson Highway (US 11E) at Pleasant Hill Road was found to operate at a Level-of-Service (LOS) “C” during the both the AM and PM peak hours with approach delays of 18.0 seconds and 17.9 seconds, respectively.

The EVALUATIONS section of this report may be referenced for tabular summaries and discussion of these analyses, while more detailed summaries are presented on the computer printouts contained in APPENDIX C.



4 BACKGROUND CONDITIONS

BACKGROUND TRAFFIC GROWTH

To determine traffic volumes resulting solely from background traffic growth to year 2031, it was necessary to establish an annual growth rate for existing traffic. The ADT values previously discussed, as well as knowledge of the area, were used to determine an approximate annual growth rate. Based on the available data, a background annual growth rate of 1.0% was assumed. Existing volumes from the intersection of Andrew Johnson Highway (US 11E) at Pleasant Hill Road were grown by 1.0% every year from the year 2026, when the counts were conducted, to the year 2031.

The background traffic volumes shown on FIGURE 4 represent the Year 2031 background growth conditions without traffic related to the proposed development.

BACKGROUND CAPACITY ANALYSES / LEVELS-OF-SERVICE

Appropriate capacity analyses as described in the Existing Conditions section of this report were conducted utilizing the Year 2031 background volumes shown in FIGURE 4. Under Year 2031 background conditions, without traffic related to the proposed development, the intersection of Andrew Johnson Highway (US 11E) at Pleasant Hill Road was found to operate at a Level-of-Service (LOS) "C" during both the AM and PM peak hours with an approach delay of 19.0 seconds and 18.9 seconds, respectively.

The EVALUATIONS section of this report may be referenced for tabular summaries and discussion of these analyses, while more detailed summaries are presented on the computer printouts contained in APPENDIX C.

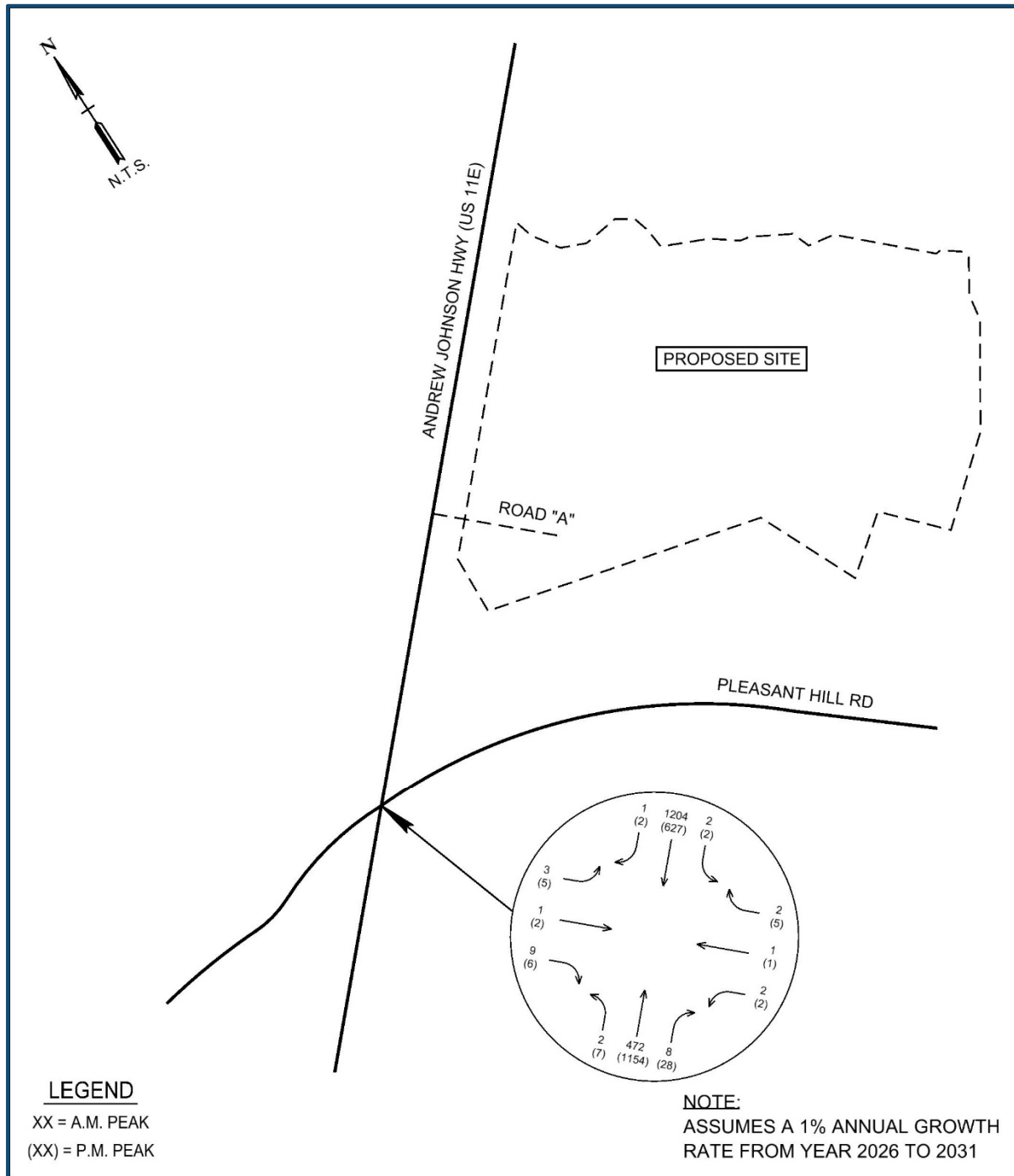


FIGURE 4
2031 BACKGROUND TRAFFIC VOLUMES



5 FUTURE CONDITIONS

TRIP GENERATION

In order to estimate the expected traffic volumes to be generated by the proposed development, the procedures recommended by the Institute of Transportation Engineers were utilized. Trip generation rates developed by the Institute of Transportation Engineers (Trip Generation, 12th Edition) were utilized to generate the estimated trips for the proposed development. The generated traffic volumes were determined based on the data for the weekday, AM peak hour and PM peak hour. Fitted curve equations were used for the trip generation calculations. Based on standard practices, if the “R-squared” value is 0.75 or greater the fitted curve equation is used for trip generation, otherwise the average rate is used. TABLE 2 provides a summary of the expected newly generated traffic for the development. More detailed information is contained in APPENDIX B.

TABLE 2 TRIP GENERATION SUMMARY					
LAND USE	ITE CODE	SIZE	WEEKDAY (TRIPS/DAY)	AM PEAK HOUR (TRIPS/HR)	PM PEAK HOUR (TRIPS/HR)
Single-Family Detached	210	117 Lots			
Entering Trips			605	23	69
Exiting Trips			<u>605</u>	<u>61</u>	<u>42</u>
Total			1210	84	111

TRIP DISTRIBUTION AND ASSIGNMENT

FIGURE 5 provides a summary of the trip distribution patterns assumed for this study. These patterns were based on the existing traffic patterns derived from the traffic counts and knowledge of the area. FIGURE 6 provides a summary of the anticipated trips associated with the proposed development as assigned to the study intersection utilizing the trip generation data from TABLE 2 and the distribution patterns shown on FIGURE 5.

FIGURE 7 represents the 2031 combined traffic data with anticipated trips from the proposed development. The volumes shown in FIGURE 7 are the combined volumes used in the analysis of the future conditions.



FUTURE CAPACITY ANALYSES / LEVELS-OF-SERVICE

Capacity analyses as described in the Existing Conditions section of this report were conducted for 2031, full build-out conditions utilizing the Year 2031 combined volumes shown in FIGURE 7.

Under 2031 combined conditions, the intersection of Andrew Johnson Highway (US 11E) and the proposed site access (Road “A”) was found to operate at a LOS “C” during the AM peak hour and at a LOS “D” in the PM peak hour with an approach delay of 16.1 seconds and 26.4 seconds, respectively. The intersection of Andrew Johnson Highway (US 11E) at Pleasant Hill Road was found to operate at a LOS “C” during both the AM and PM peak hours with an approach delay of 19.7 and 19.6 seconds, respectively.

The EVALUATIONS section of this report may be referenced for tabular summaries and discussion of these analyses, while more detailed summaries are presented on the computer printouts contained in APPENDIX C.

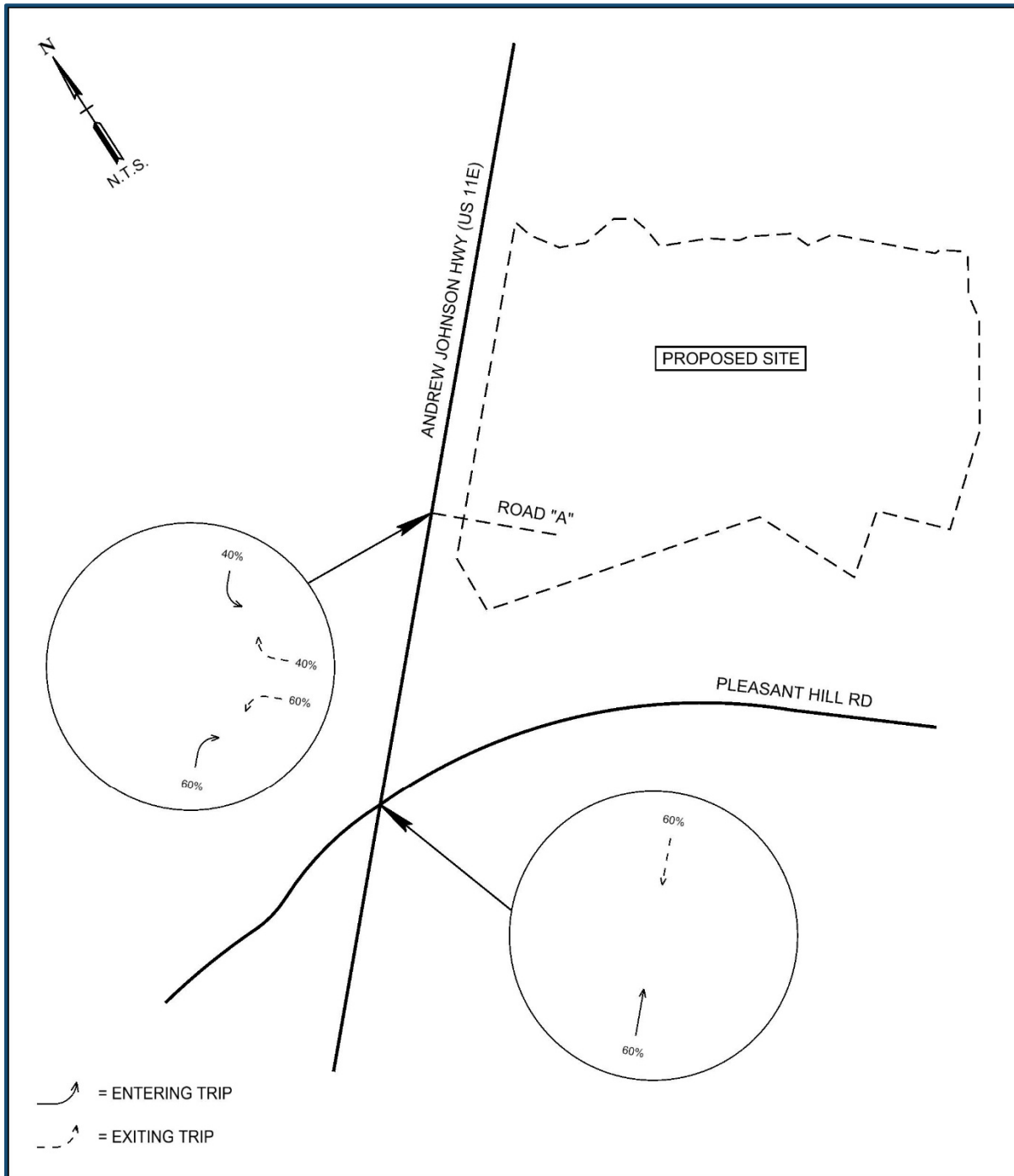


FIGURE 5
TRIP DISTRIBUTION PATTERNS

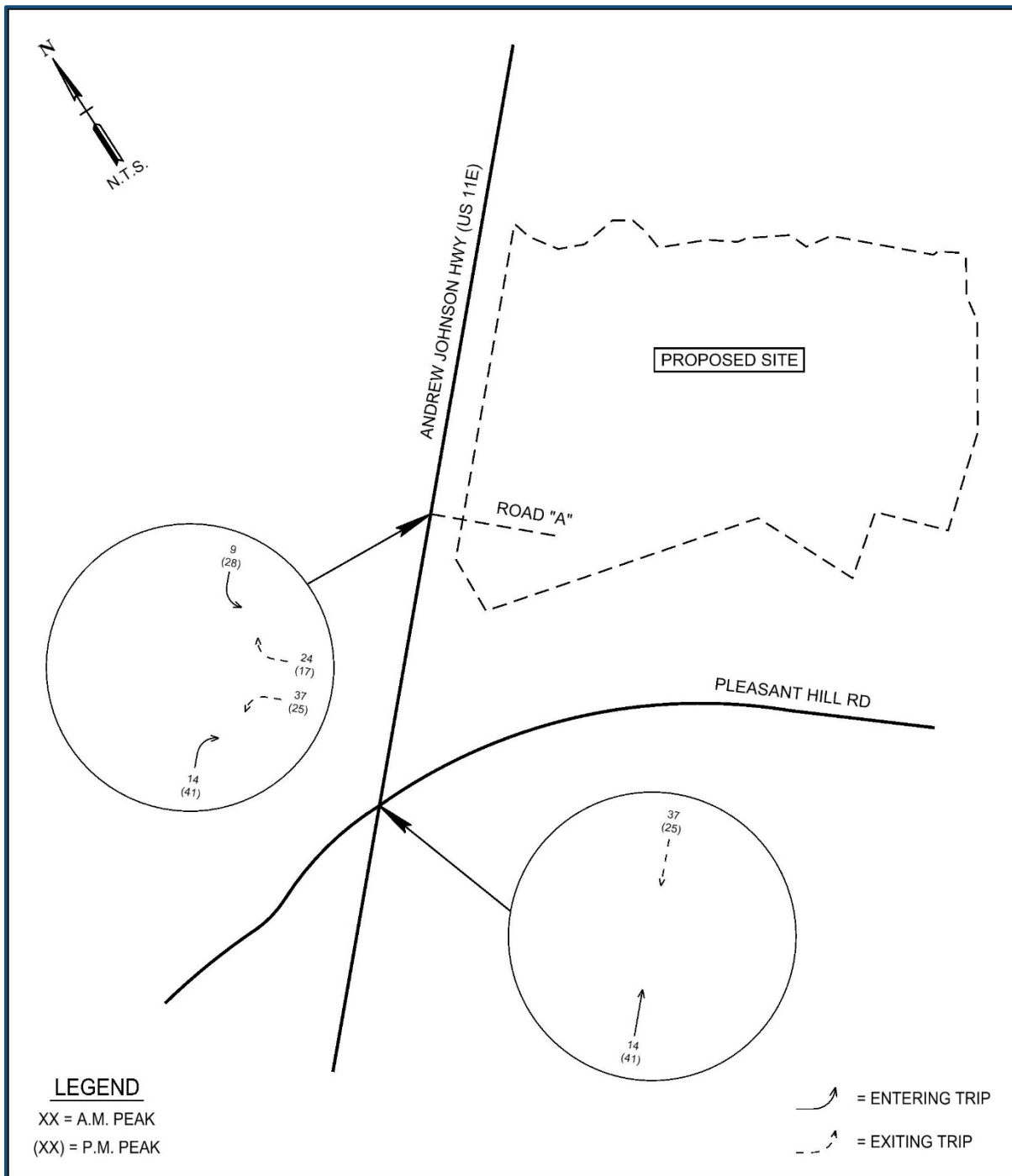


FIGURE 6
TRIP ASSIGNMENT

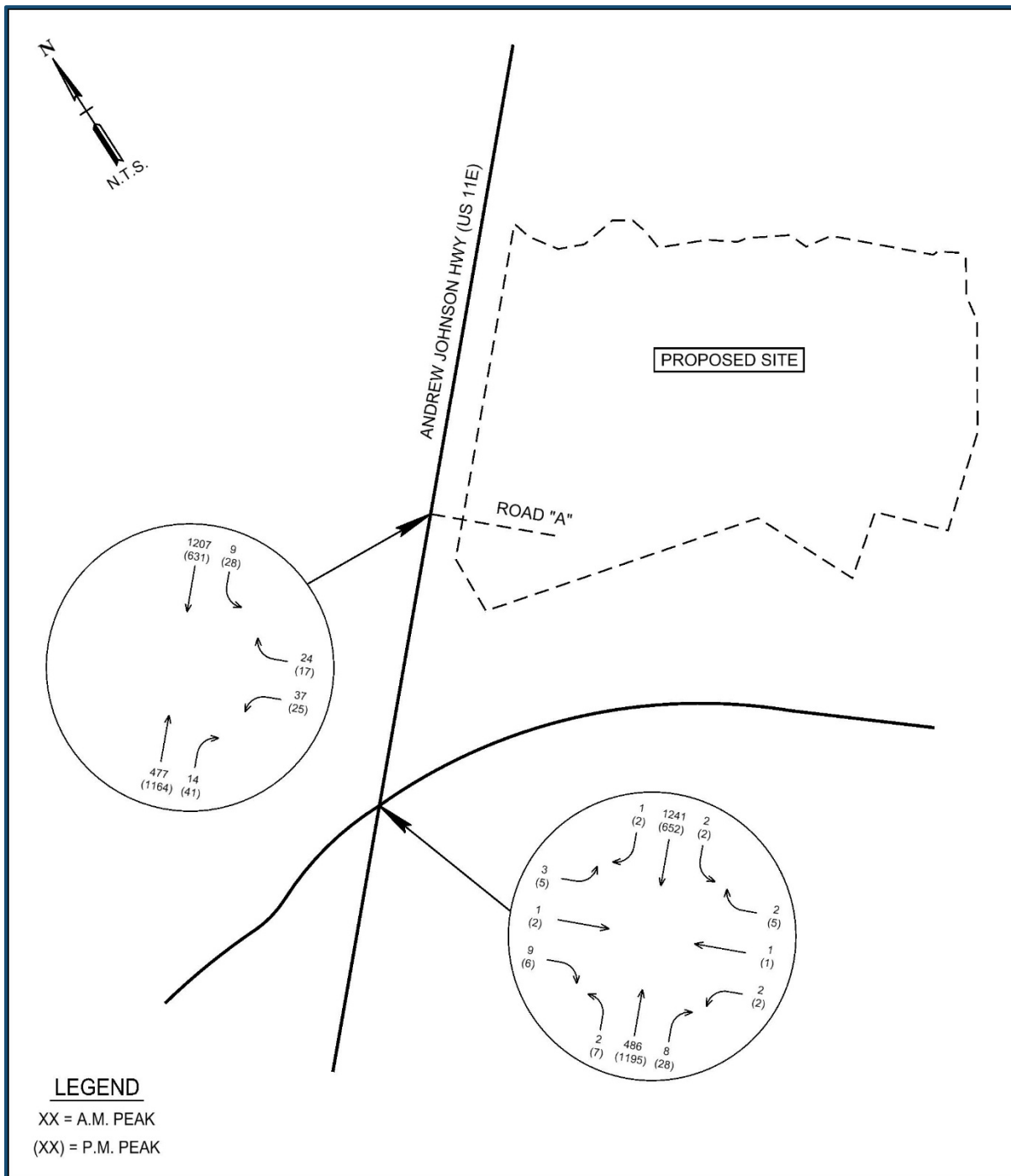


FIGURE 7
2031 COMBINED TRAFFIC VOLUMES



6 EVALUATIONS

INTERSECTION CAPACITY ANALYSES

**TABLE 3
CAPACITY ANALYSIS SUMMARY**

INTERSECTION	TIME PERIOD	YEAR 2026 EXISTING (LOS/DELAY)	YEAR 2031 BACKGROUND (LOS/DELAY)	YEAR 2031 COMBINED (LOS/DELAY)
Andrew Johnson Highway at Pleasant Hill Road (SIDE STREET STOP) ¹	A.M.	C 18.0	C 19.0	C 19.7
	P.M.	C 17.9	C 18.9	C 19.6
Andrew Johnson Highway at Site Access Road "A" (SIDE STREET STOP) ¹	A.M.	-	-	C 16.1
	P.M.	-	-	D 26.4
Andrew Johnson Highway at Site Access Road "A" with Southbound Left-Turn Lane (SIDE STREET STOP) ¹	A.M.	-	-	C 16.1
	P.M.	-	-	D 26.3
¹ SIDE STREET STOP CONTROL – Level-of-Service and Average Vehicular Delay (seconds) for side street approach utilizing HCM methodology.				

The results summarized in TABLE 3 indicate that a LOS "D" or better can be anticipated at Andrew Johnson Highway (US 11E) at the proposed roadway (Road "A") under the future evaluated conditions. The anticipated delay for the intersection of Andrew Johnson Highway (US 11E) when the southbound left-turn lane is added will be approximately 16.1 seconds in the AM peak hour and 26.3 seconds in the PM Peak hour. The anticipated delay for the intersection of Andrew Johnson Highway (US 11E) and Pleasant Hill Road will be approximately 19.7 seconds during the AM peak hour and 19.6 seconds during the PM peak hour.



TURN LANE ASSESSMENT

The proposed site access was reviewed using TDOT's Highway System Access Manual guidelines for the need of a northbound right-turn lane on Andrew Johnson Highway (US 11E) and a southbound left turn lane on Andrew Johnson Highway (US 11E). Combined conditions were evaluated as part of the assessment with the following results:

- Build-out Traffic
 - Andrew Johnson Highway (US 11E) at Proposed Site Access (Road "A")
 - Left Turn Warrant – AM Peak: **Met** / PM Peak: **Met**
 - Right Turn Warrant – AM Peak: Not Met / PM Peak: **Met**

TDOT recommends that turn lanes be installed when turn lane warrants are met during both the AM or PM peak hours at existing and proposed intersections. As indicated above, a volume-based left-turn lane is warranted at the proposed intersection of Andrew Johnson Highway (US 11E) at the proposed roadway (Road "A"). The turn lane warrant analyses worksheets are in APPENDIX D.

TURN LANE DESIGN

The left turn lane for the intersection of Andrew Johnson Highway (US 11E) was designed using the 2031 combined traffic volumes and the standards outlined in TDOT's Highway System Access Manual (HSAM) Volumes 3: Geometric Design Criteria and AASHTO's A Policy on Geometric Design of Highways and Streets, 7th edition.

Per Table 3-11: Lane Change and Deceleration the recommended lane change and deceleration distance for a roadway with a speed limit of 55 mph is 505 feet. Using Table 3-12: Queue Storage Length for Exclusive Left-Turn Lanes at Unsignalized Intersection, the minimum queue storage length for a turn lane is 50 feet. Therefore, the total recommended turn lane length at Andrew Johnson Highway (US 11E) at the proposed roadway (Road "A") is 555 feet per the TDOT Highway System Access Manual.

The recommended bay taper length for a roadway with a design speed of 55 mph and a lane width of 12 feet is 220 feet.

MEDIAN IMPROVEMENTS

Presently, the existing median opening adjacent to the proposed entrance (Road "A") is 26 feet long. Per TDOT Standard Drawing RP-DHO-1, the minimum design of a median opening for a 32-foot wide median should be a minimum of 48 feet. Therefore, it is recommended that the length of the existing median opening should be extended to a minimum of 48 feet.



SIGHT DISTANCE ASSESSMENT

Intersection sight distance was reviewed for the proposed site access at Andrew Johnson Highway (US 11E). The posted speed limit on Andrew Johnson Highway (US 11E) is 55 mph. Based on AASHTO “A Policy of Geometric Design of Highways and Streets” and TDOT’s Standard Drawing “RD11-SD-5”, the minimum stopping sight distance is 495 feet for a 55-mph roadway and the intersection sight distance is 530 feet for a right turning vehicle and 610 feet for a left turning vehicle.

Intersection sight distance was assessed via field measurements at the proposed site access to Andrew Johnson Highway (US 11E) in September 2026. The measurements were taken looking left and right from a point 15 feet from the edge of the major road and measured with a driver eye height of 3.5 feet and an object height of 3.5 feet above the driving surface of the major road.

The field measurements indicate that the intersection of Andrew Johnson Highway (US 11E) at the proposed site access (Road “A”) has adequate sight distance looking both left and right along Andrew Johnson Highway (US 11E). The sight distance observed from the field measurements can be seen in FIGURE 8.



Looking left along Andrew Johnson Highway
(US 11E) from the proposed site access.
Approx. Sight Distance: 950 ft



Looking right along Andrew Johnson Highway
(US 11E) from the proposed site access.
Approx. Sight Distance: 1,000+ ft

FIGURE 8
SIGHT DISTANCE ASSESSMENT



7 CONCLUSIONS & RECOMMENDATIONS

The primary conclusion of this study is that traffic generated from the proposed residential development will have minor impacts on delay at the intersection of Andrew Johnson Highway (US 11E) at Pleasant Hill Road. Under the proposed conditions evaluated, the Andrew Johnson Highway (US 11E) at Pleasant Hill Road intersection was found to operate at a LOS “C” or better, while the proposed site access (Road “A”) was found to operate at a LOS “D” or better.

The following list is a summary of the improvements that are recommended to be implemented with the construction of this project:

1. Install STOP sign at unsignalized Site Access (Road “A”) at Andrew Johnson Highway (US 11E).
2. Consider the installation of a southbound left turn lane at the intersection of Andrew Johnson Highway (US 11E) and the proposed roadway (Road “A”). The recommended total turn lane length per the TDOT Highway System Access Manual is 555 feet including 505 for lane change and deceleration and 50 feet for vehicle storage. The minimum queue storage length is 50 feet with a bay taper length of 220 feet.
3. Widen the existing median opening. The recommended minimum median opening per TDOT standard drawings is 48 feet.
4. Any future improvements to the intersection needs to be reviewed, coordinated and approved by the Tennessee Department of Transportation.



APPENDIX A | TRAFFIC DATA
APPENDIX B | TRIP GENERATION
APPENDIX C | CAPACITY ANALYSES
APPENDIX D | TURN LANE WARRANT EVALUATIONS

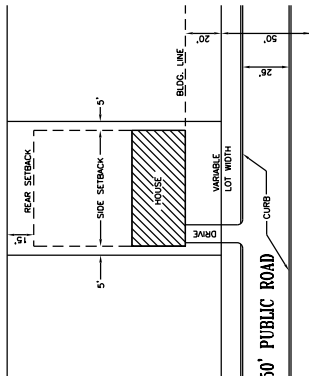
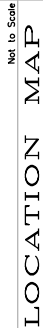


APPENDIX A | TRAFFIC DATA

NOTE: CONTRACTOR IS RESPONSIBLE FOR ALL TRENCH SAFETY.

CONTRACTOR SHALL SHORE AND BRACE ALL OPEN TRENCHES AS REQUIRED BY STATE AND FEDERAL LAWS AND LOCAL ORDINANCES; TO CONFORM WITH RECOMMENDATIONS SET FORTH IN AGC MANUAL OF ACCIDENT PREVENTION IN CONSTRUCTION; TO PROTECT LIFE, PROPERTY, OR WORK; TO AVOID EXCESSIVELY WIDE CUTS IN UNSTABLE MATERIAL.

OSHA RULES SHALL BE ADHERED BY:



TYPICAL LOT LAYOUT
DETACHED HOMES

OWNER/DEVELOPER

REECE VALERIANO
405 MONTBROOK LN

PHONE: (868) 202-8832

25890-C

2 SHEET(S)

Q:\25890\25890-C(EMAIL).DWG

CONCEPT PLAN FOR
VALIARIANO PROPERTY ON
ANDREW JOHNSON HWY

TAX MAP 62 PARCEL 97 & TAX MAP 63, PARCELS 49.08 & 49.0428TH CIVIL DISTRICT,
KNOX COUNTY, TENNESSEE?

DEED REFERENCES: DEED BK 1751, PG 454

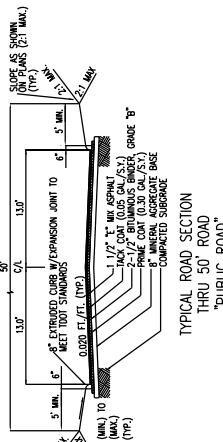


SCALE
HORIZONTAL: 1" = 100'

DATE 10/15/26

[illegible]

BATSON, HIMES, NORVELL & POE
REGISTERED ENGINEERS & LAND SURVEYORS
 4334 PAPERMILL DRIVE
 KNOXVILLE, TENNESSEE 37909
 PHONE: (865) 588-6472
 FAX: (865) 588-6473
 email@bhn-p.com

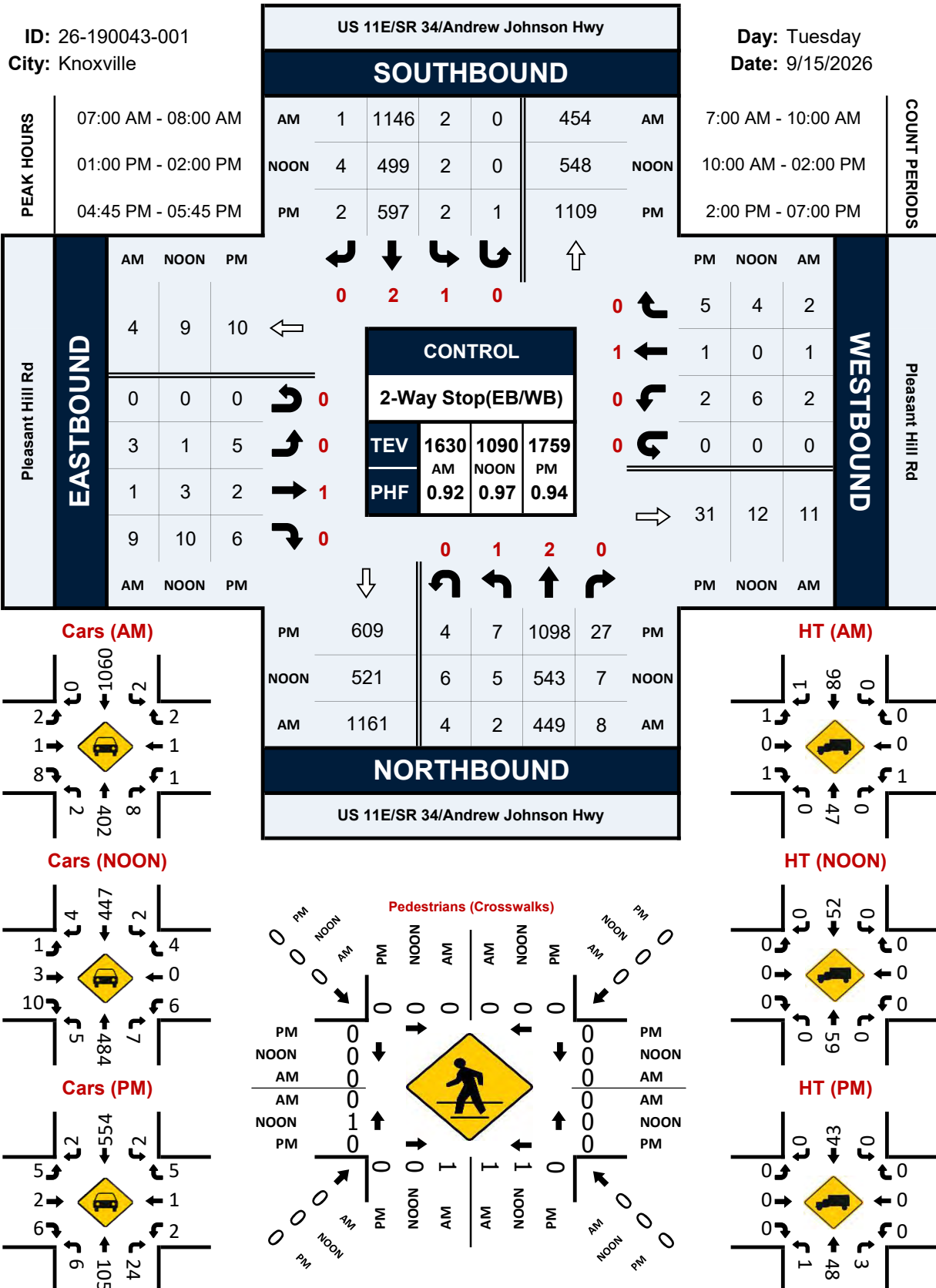


US 11E/SR 34/Andrew Johnson Hwy & Pleasant Hill Rd

Peak Hour Turning Movement Count

ID: 26-190043-001
City: Knoxville

Day: Tuesday
Date: 9/15/2026



National Data & Surveying Services

Intersection Turning Movement Count

Location: US 11E/SR 34/Andrew Johnson Hwy & Pleasant Hill Rd
City: Knoxville
Control: 2-Way Stop(EB/WB)

Project ID: 26-190043-001
Date: 9/15/2026

Data - Total

NS/EW Streets:	US 11E/SR 34/Andrew Johnson Hwy				US 11E/SR 34/Andrew Johnson Hwy				Pleasant Hill Rd				Pleasant Hill Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	1 NL	2 NT	0 NR	0 NU	1 SL	2 ST	0 SR	0 SU	0 EL	1 ET	0 ER	0 EU	0 WL	1 WT	0 WR	0 WU	
7:00 AM	0	84	1	0	2	280	0	0	1	0	1	0	0	0	0	0	369
7:15 AM	0	118	0	1	0	316	0	0	1	1	2	0	1	1	0	0	441
7:30 AM	1	123	2	1	0	274	1	0	0	0	5	0	0	0	1	0	408
7:45 AM	1	124	5	2	0	276	0	0	1	0	1	0	1	0	1	0	412
8:00 AM	0	89	2	1	1	187	0	0	0	0	3	0	0	0	1	0	285
8:15 AM	1	100	2	1	0	233	0	0	0	0	0	0	2	0	1	0	340
8:30 AM	1	136	1	2	0	163	0	0	0	0	0	0	1	0	0	0	304
8:45 AM	0	116	1	1	1	157	0	0	1	0	1	0	2	0	0	0	280
9:00 AM	0	91	2	1	0	153	0	1	0	0	1	0	0	0	0	0	249
9:15 AM	0	118	0	2	0	168	0	0	0	0	1	0	0	0	0	0	289
9:30 AM	4	118	1	2	0	154	0	0	0	0	2	0	1	0	0	0	282
9:45 AM	2	120	0	1	0	130	0	0	0	0	2	0	1	0	0	0	256
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s :	0.80%	96.88%	1.23%	1.09%	0.16%	99.76%	0.04%	0.04%	16.67%	4.17%	79.17%	0.00%	64.29%	7.14%	28.57%	0.00%	3915
PEAK HR :	07:00 AM - 08:00 AM																TOTAL
PEAK HR VOL :	2	449	8	4	2	1146	1	0	3	1	9	0	2	1	2	0	1630
PEAK HR FACTOR :	0.500	0.905	0.400	0.500	0.250	0.907	0.250	0.000	0.750	0.250	0.450	0.000	0.500	0.250	0.500	0.000	0.924
	0.877				0.909				0.650				0.625				

NOON	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	1 NL	2 NT	0 NR	0 NU	1 SL	2 ST	0 SR	0 SU	0 EL	1 ET	0 ER	0 EU	0 WL	1 WT	0 WR	0 WU	
10:00 AM	0	114	0	1	0	138	2	0	1	0	2	0	0	0	0	0	258
10:15 AM	0	113	1	1	1	125	1	0	1	0	3	0	0	0	1	0	247
10:30 AM	1	90	4	0	0	140	0	0	1	0	4	0	0	0	2	0	242
10:45 AM	1	109	0	1	0	126	0	0	2	0	3	0	1	0	0	0	243
11:00 AM	0	108	2	1	0	144	0	2	0	0	0	0	0	0	1	0	258
11:15 AM	1	131	1	3	0	131	0	0	0	0	1	0	0	0	0	0	268
11:30 AM	2	125	1	0	0	131	0	0	1	1	4	0	1	0	0	0	266
11:45 AM	3	102	2	0	0	126	1	0	0	2	3	0	0	1	0	0	240
12:00 PM	1	124	2	0	1	112	0	0	0	0	2	0	0	1	0	0	243
12:15 PM	0	133	2	1	2	138	2	0	0	0	0	0	1	0	1	0	280
12:30 PM	2	123	1	2	3	137	0	0	1	1	1	0	1	0	0	0	272
12:45 PM	1	125	3	3	1	124	0	0	1	0	1	0	0	0	1	0	260
1:00 PM	2	118	1	0	2	119	2	0	1	1	2	0	2	0	3	0	253
1:15 PM	1	148	3	1	0	118	0	0	0	1	2	0	3	0	1	0	278
1:30 PM	1	135	1	1	0	134	2	0	0	1	5	0	1	0	0	0	281
1:45 PM	1	142	2	4	0	128	0	0	0	0	1	0	0	0	0	0	278
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s :	0.85%	96.90%	1.30%	0.95%	0.48%	98.95%	0.48%	0.10%	18.00%	14.00%	68.00%	0.00%	45.45%	9.09%	45.45%	0.00%	4167
PEAK HR :	01:00 PM - 02:00 PM																TOTAL
PEAK HR VOL :	5	543	7	6	2	499	4	0	1	3	10	0	6	0	4	0	1090
PEAK HR FACTOR :	0.625	0.917	0.583	0.375	0.250	0.931	0.500	0.000	0.250	0.750	0.500	0.000	0.500	0.000	0.333	0.000	0.970
	0.917				0.928				0.583				0.500				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	1 NL	2 NT	0 NR	0 NU	1 SL	2 ST	0 SR	0 SU	0 EL	1 ET	0 ER	0 EU	0 WL	1 WT	0 WR	0 WU	
2:00 PM	2	157	1	1	1	162	1	0	0	0	2	0	1	0	1	0	329
2:15 PM	1	165	3	1	0	141	0	0	1	0	1	0	0	0	1	0	314
2:30 PM	1	142	3	1	0	140	0	0	0	0	5	0	0	0	0	0	292
2:45 PM	2	195	2	2	0	141	1	0	1	1	2	0	0	0	3	0	350
3:00 PM	1	184	8	0	0	121	0	0	1	0	0	0	1	0	1	0	317
3:15 PM	1	213	5	1	1	161	2	0	0	0	3	0	0	0	2	0	389
3:30 PM	3	248	1	2	1	159	0	0	2	0	2	0	0	1	1	0	420
3:45 PM	3	257	3	3	0	162	2	0	0	0	3	0	1	0	1	0	435
4:00 PM	3	267	2	1	3	141	0	0	1	0	4	0	0	0	0	0	422
4:15 PM	0	291	2	1	0	159	1	0	1	0	0	0	0	0	0	0	455
4:30 PM	0	267	2	1	0	141	0	0	1	1	0	0	0	0	0	0	413
4:45 PM	1	251	9	0	1	162	0	0	1	2	2	0	0	0	0	0	429
5:00 PM	4	270	2	0	0	145	2	0	0	0	3	0	0	1	2	0	429
5:15 PM	1	297	9	3	0	150	0	0	3	0	0	0	1	0	2	0	466
5:30 PM	1	280	7	1	1	140	0	1	1	0	1	0	1	0	1	0	435
5:45 PM	3	262	11	4	1	110	0	0	0	0	2	0	1	0	3	0	397
6:00 PM	1	228	5	2	1	136	0	0	0	0	0	0	1	0	1	0	375
6:15 PM	2	170	2	1	1	116	0	0	1	2	3	0	0	0	1	0	299
6:30 PM	1	154	3	0	1	101	0	0	0	1	2	0	1	1	0	0	265
6:45 PM	1	137	4	1	1	79	1	0	0	0	1	0	1	1	1	0	228
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s :	0.70%	96.90%	1.84%	0.57%	0.47%	99.14%	0.36%	0.04%	24.56%	12.28%	63.16%	0.00%	26.47%	11.76%	61.76%	0.00%	7459
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	7	1098	27	4	2	597	2	1	5	2	6	0	2	1	5	0	1759
PEAK HR FACTOR :	0.438	0.924	0.750	0.333	0.500	0.921	0.250	0.250	0.417	0.250	0.500	0.000	0.500	0.250	0.625	0.000	0.944
	0.916				0.923				0.650				0.667				



APPENDIX B | TRIP GENERATION

Land Use: 210

Single-Family Detached Housing

Description

A single-family detached housing site includes any single-family detached home on an individual lot. A typical site surveyed is a suburban subdivision.

Specialized Land Use

Data have been submitted for several single-family detached housing developments with homes that are commonly referred to as patio homes. A patio home is a detached housing unit that is located on a small lot with little (or no) front or back yard. In some subdivisions, communal maintenance of outside grounds is provided for the patio homes. The three patio home sites total 299 dwelling units with overall weighted average trip generation rates of 5.35 vehicle trips per dwelling unit for weekday, 0.26 for the AM adjacent street peak hour, and 0.47 for the PM adjacent street peak hour. These patio home rates, based on a small sample of sites, are lower than those for single-family detached housing (Land Use 210), lower than those for single-family attached housing (Land Use 215), and higher than those for senior adult housing—single-family (Land Use 251). (Source 1008)

Additional Data

The sites were surveyed in the 1990s, the 2000s, the 2010s, and the 2020s in Alabama, Arizona, British Columbia (CAN), California, Delaware, Illinois, Kentucky, Massachusetts, Minnesota, Montana, New Jersey, New York, North Carolina, Ontario (CAN), Oregon, Pennsylvania, South Carolina, South Dakota, Vermont, and West Virginia.

Source Numbers

356, 357, 367, 384, 387, 407, 435, 522, 550, 552, 579, 598, 601, 603, 614, 637, 711, 716, 720, 728, 735, 868, 869, 903, 925, 936, 1005, 1007, 1008, 1010, 1033, 1066, 1077, 1078, 1079, 1204, 1221, 1225, 1236, 1251, 1265, 1267

Single-Family Detached Housing (210)

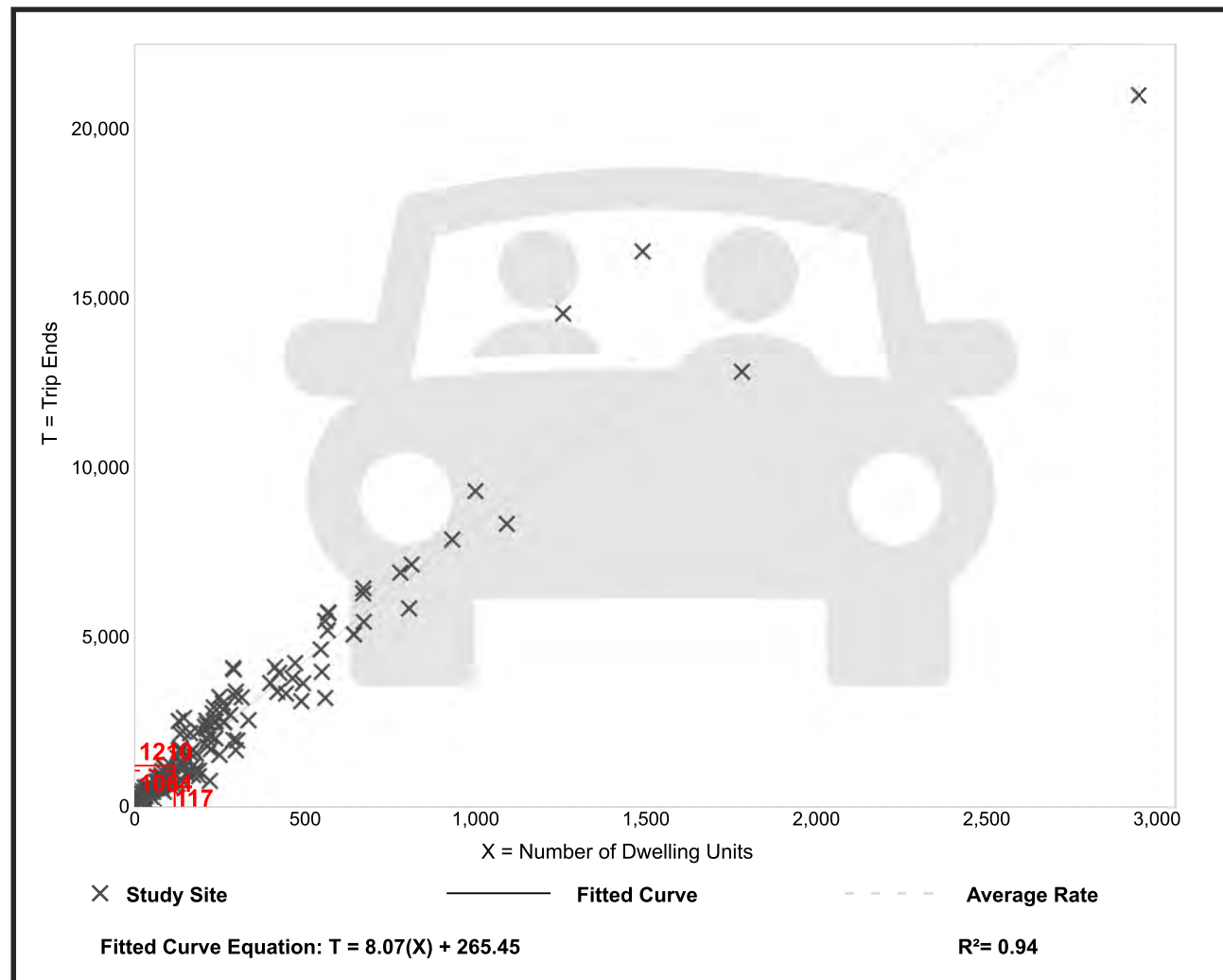
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 155
Avg. Num. of Dwelling Units: 261
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.09	3.47 - 23.80	2.29

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

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

Setting/Location: General Urban/Suburban

Number of Studies: 153

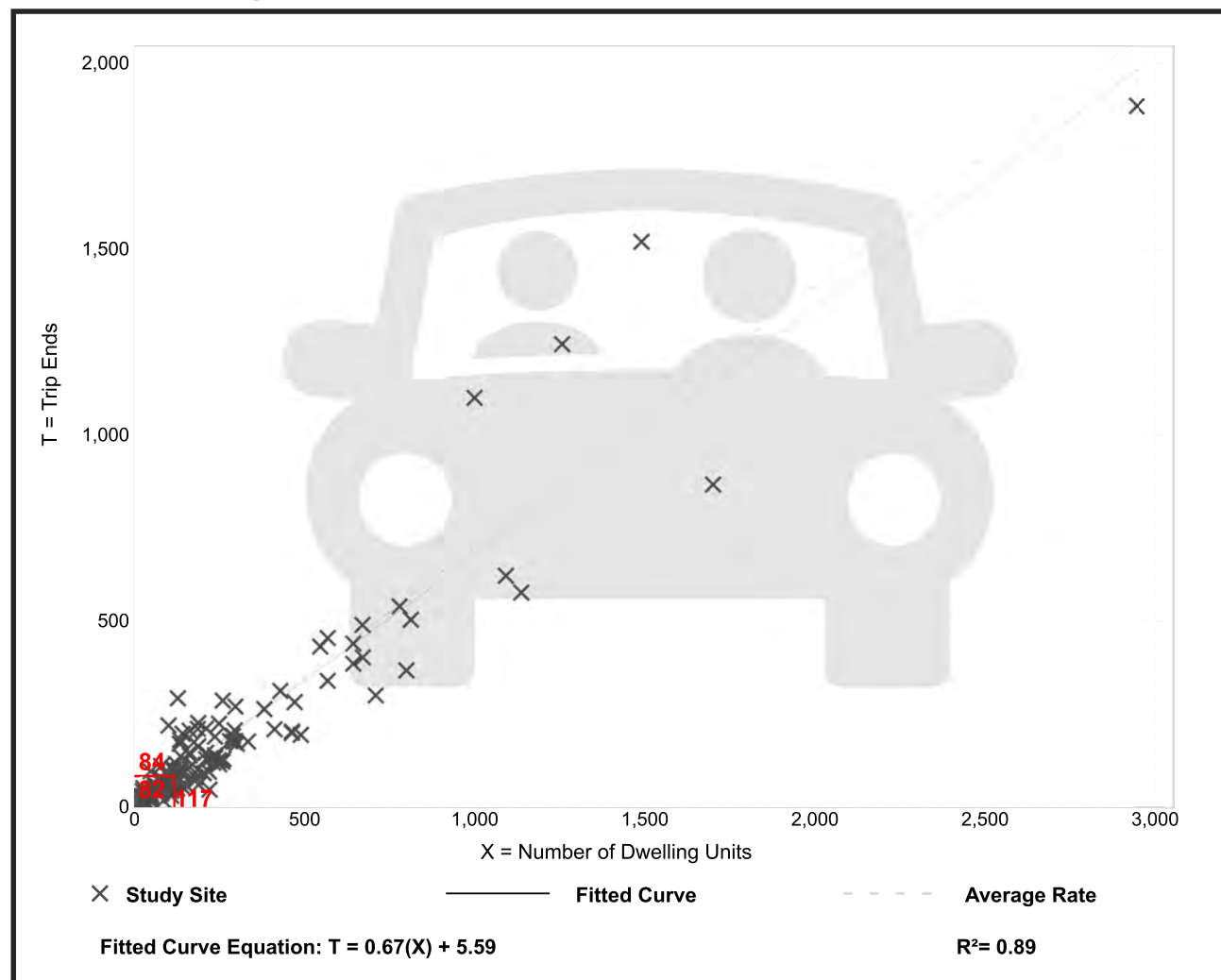
Avg. Num. of Dwelling Units: 239

Directional Distribution: 27% entering, 73% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.70	0.22 - 2.27	0.26

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 166

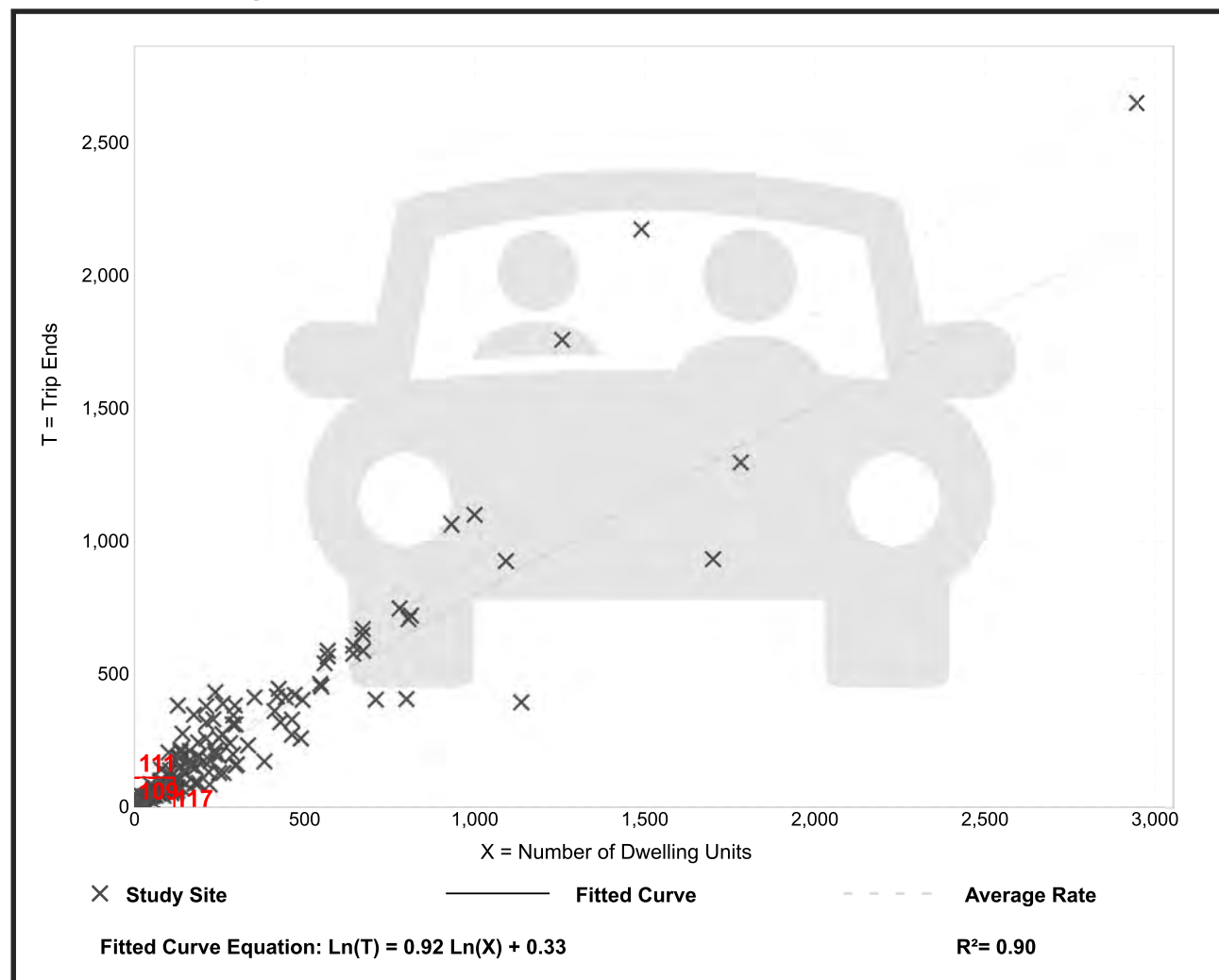
Avg. Num. of Dwelling Units: 266

Directional Distribution: 62% entering, 38% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.93	0.35 - 2.98	0.33

Data Plot and Equation



Project: Valeriano Property Subdivision

Date Conducted: 9/23/26

Single-Family Detached Housing (210)

117 Lots

Average Daily Traffic

$$T = 8.07(X) + 265.45$$

$$T = 8.07(117) + 265.45$$

$$T = 1210$$

Peak Hour of Adjacent Street Traffic

One Hour Between 7 and 9 a.m.

$$T = 0.67(X) + 5.59$$

$$T = 0.67(117) + 5.59$$

$$T = 84$$

Peak Hour of Adjacent Street Traffic

One Hour Between 4 and 6 p.m.

$$\ln(T) = 0.90\ln(X) + 0.33$$

$$\ln(T) = 0.90\ln(117) + 0.33$$

$$T = 111$$

Time Period	Total Trips	Percent		Number	
		Enter	Exit	Enter	Exit
Weekday (24 hours)	1210	50%	50%	605	605
AM Peak Hour	84	27%	73%	23	61
PM Peak Hour	111	62%	38%	69	42



APPENDIX C | CAPACITY ANALYSES

HCM 7th TWSC
1: Andrew Johnson Hwy & Pleasant Hill Rd

Valeriano Property Subdivision
Existing AM Peak

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	3	1	9	2	1	2	2	449	8	2	1146	1
Future Vol, veh/h	3	1	9	2	1	2	2	449	8	2	1146	1
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	-	-	-	-	-	-	175	-	-	190	-	-
Veh in Median Storage, #	-	2	-	-	2	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	65	65	65	63	63	63	88	88	88	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2	8	8	8	8	8	8
Mvmt Flow	5	2	14	3	2	3	2	510	9	2	1259	1

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1525	1788	630	1154	1784	260	1260	0	0	519	0	0
Stage 1	1264	1264	-	519	519	-	-	-	-	-	-	-
Stage 2	260	524	-	635	1265	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.26	-	-	4.26	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.28	-	-	2.28	-	-
Pot Cap-1 Maneuver	81	80	424	152	81	739	516	-	-	1002	-	-
Stage 1	179	239	-	508	531	-	-	-	-	-	-	-
Stage 2	722	528	-	433	239	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	79	80	424	145	80	739	516	-	-	1002	-	-
Mov Cap-2 Maneuver	168	213	-	331	212	-	-	-	-	-	-	-
Stage 1	179	238	-	506	528	-	-	-	-	-	-	-
Stage 2	713	526	-	415	238	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Ctrl Dly, s/v	18		14.91		0.05		0.01	
HCM LOS	C		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	516	-	-	297	371	1002	-	-
HCM Lane V/C Ratio	0.004	-	-	0.067	0.021	0.002	-	-
HCM Ctrl Dly (s/v)	12	-	-	18	14.9	8.6	-	-
HCM Lane LOS	B	-	-	C	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-

HCM 7th TWSC
1: Andrew Johnson Hwy & Pleasant Hill Rd

Valeriano Property Subdivision
Existing PM Peak

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↙	↕		↙	↕	
Traffic Vol, veh/h	5	2	6	2	1	5	7	1098	27	2	597	2
Future Vol, veh/h	5	2	6	2	1	5	7	1098	27	2	597	2
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	-	-	-	-	-	-	175	-	-	190	-	-
Veh in Median Storage, #	-	2	-	-	2	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	65	65	65	67	67	67	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	8	8	8	8	8	8
Mvmt Flow	8	3	9	3	1	7	8	1193	29	2	649	2

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1267	1892	326	1554	1879	611	651	0	0	1223	0	0
Stage 1	654	654	-	1223	1223	-	-	-	-	-	-	-
Stage 2	613	1238	-	330	655	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.26	-	-	4.26	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.28	-	-	2.28	-	-
Pot Cap-1 Maneuver	126	69	670	77	71	436	892	-	-	534	-	-
Stage 1	422	461	-	190	250	-	-	-	-	-	-	-
Stage 2	447	246	-	657	461	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	121	68	670	74	70	436	892	-	-	534	-	-
Mov Cap-2 Maneuver	307	210	-	175	213	-	-	-	-	-	-	-
Stage 1	420	459	-	188	248	-	-	-	-	-	-	-
Stage 2	433	244	-	641	459	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Ctrl Dly, s/v	15.17		17.94		0.06		0.04	
HCM LOS	C		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	892	-	-	374	290	534	-
HCM Lane V/C Ratio	0.009	-	-	0.053	0.041	0.004	-
HCM Ctrl Dly (s/v)	9.1	-	-	15.2	17.9	11.8	-
HCM Lane LOS	A	-	-	C	C	B	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-

HCM 7th TWSC
1: Andrew Johnson Hwy & Pleasant Hill Rd

Valeriano Property Subdivision
Background AM Peak

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↙	↕		↙	↕	
Traffic Vol, veh/h	3	1	9	2	1	2	2	472	8	2	1204	1
Future Vol, veh/h	3	1	9	2	1	2	2	472	8	2	1204	1
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	-	-	-	-	-	-	175	-	-	190	-	-
Veh in Median Storage, #	-	2	-	-	2	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	65	65	65	63	63	63	88	88	88	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2	8	8	8	8	8	8
Mvmt Flow	5	2	14	3	2	3	2	536	9	2	1323	1
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1602	1878	662	1212	1874	273	1324	0	0	545	0	0
Stage 1	1328	1328	-	545	545	-	-	-	-	-	-	-
Stage 2	274	550	-	667	1329	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.26	-	-	4.26	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.28	-	-	2.28	-	-
Pot Cap-1 Maneuver	71	71	404	138	71	725	487	-	-	979	-	-
Stage 1	164	223	-	490	517	-	-	-	-	-	-	-
Stage 2	709	514	-	415	222	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	69	70	404	131	71	725	487	-	-	979	-	-
Mov Cap-2 Maneuver	153	199	-	315	197	-	-	-	-	-	-	-
Stage 1	163	222	-	488	514	-	-	-	-	-	-	-
Stage 2	701	512	-	397	222	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Ctrl Dly, s/v	18.98		15.44		0.05		0.01					
HCM LOS	C		C									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	487	-	-	277	353	979	-	-				
HCM Lane V/C Ratio	0.005	-	-	0.072	0.023	0.002	-	-				
HCM Ctrl Dly (s/v)	12.4	-	-	19	15.4	8.7	-	-				
HCM Lane LOS	B	-	-	C	C	A	-	-				
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0	-	-				

HCM 7th TWSC
1: Andrew Johnson Hwy & Pleasant Hill Rd

Valeriano Property Subdivision
Background PM Peak

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↙	↕		↙	↕	
Traffic Vol, veh/h	5	2	6	2	1	5	7	1154	28	2	627	2
Future Vol, veh/h	5	2	6	2	1	5	7	1154	28	2	627	2
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	-	-	-	-	-	-	175	-	-	190	-	-
Veh in Median Storage, #	-	2	-	-	2	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	65	65	65	67	67	67	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	8	8	8	8	8	8
Mvmt Flow	8	3	9	3	1	7	8	1254	30	2	682	2

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1330	1987	342	1631	1973	642	684	0	0	1285	0	0
Stage 1	687	687	-	1285	1285	-	-	-	-	-	-	-
Stage 2	643	1300	-	347	688	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.26	-	-	4.26	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.28	-	-	2.28	-	-
Pot Cap-1 Maneuver	113	60	654	67	62	417	866	-	-	505	-	-
Stage 1	403	446	-	174	234	-	-	-	-	-	-	-
Stage 2	428	230	-	642	445	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	108	60	654	64	61	417	866	-	-	505	-	-
Mov Cap-2 Maneuver	292	196	-	161	199	-	-	-	-	-	-	-
Stage 1	401	444	-	173	231	-	-	-	-	-	-	-
Stage 2	414	228	-	626	443	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Ctrl Dly, s/v	15.72		18.87		0.05		0.04	
HCM LOS	C		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	866	-	-	356 271	505	-	-
HCM Lane V/C Ratio	0.009	-	-	0.056 0.044	0.004	-	-
HCM Ctrl Dly (s/v)	9.2	-	-	15.7 18.9	12.2	-	-
HCM Lane LOS	A	-	-	C C	B	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2 0.1	0	-	-

HCM 7th TWSC
1: Andrew Johnson Hwy & Pleasant Hill Rd

Valeriano Property Subdivision
Combined AM Peak

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	3	1	9	2	1	2	2	486	8	2	1241	1
Future Vol, veh/h	3	1	9	2	1	2	2	486	8	2	1241	1
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	-	-	-	-	-	-	175	-	-	190	-	-
Veh in Median Storage, #	-	2	-	-	2	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	65	65	65	63	63	63	88	88	88	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2	8	8	8	8	8	8
Mvmt Flow	5	2	14	3	2	3	2	552	9	2	1364	1

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1650	1935	682	1248	1931	281	1365	0	0	561	0	0
Stage 1	1369	1369	-	561	561	-	-	-	-	-	-	-
Stage 2	281	566	-	687	1369	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.26	-	-	4.26	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.28	-	-	2.28	-	-
Pot Cap-1 Maneuver	65	65	392	130	65	716	469	-	-	966	-	-
Stage 1	154	213	-	479	508	-	-	-	-	-	-	-
Stage 2	702	506	-	403	213	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	64	65	392	123	65	716	469	-	-	966	-	-
Mov Cap-2 Maneuver	145	190	-	305	189	-	-	-	-	-	-	-
Stage 1	154	212	-	477	506	-	-	-	-	-	-	-
Stage 2	693	503	-	385	212	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Ctrl Dly, s/v	19.66		15.8		0.05		0.01	
HCM LOS	C		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	469	-	-	266 341	966	-	-
HCM Lane V/C Ratio	0.005	-	-	0.075 0.023	0.002	-	-
HCM Ctrl Dly (s/v)	12.7	-	-	19.7 15.8	8.7	-	-
HCM Lane LOS	B	-	-	C C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2 0.1	0	-	-

HCM 7th TWSC
3: Andrew Johnson Hwy & Road "A"

Valeriano Property Subdivision
Combined AM Peak

Intersection						
Int Delay, s/veh	0.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	37	24	477	14	9	1207
Future Vol, veh/h	37	24	477	14	9	1207
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	88	88	91	91
Heavy Vehicles, %	2	2	8	8	8	8
Mvmt Flow	40	26	542	16	10	1326
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	1233	279	0	0	558	0
Stage 1	550	-	-	-	-	-
Stage 2	683	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.26	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.28	-
Pot Cap-1 Maneuver	169	718	-	-	969	-
Stage 1	542	-	-	-	-	-
Stage 2	463	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	166	718	-	-	969	-
Mov Cap-2 Maneuver	301	-	-	-	-	-
Stage 1	542	-	-	-	-	-
Stage 2	455	-	-	-	-	-
Approach	WB	NB		SB		
HCM Ctrl Dly, s/v	16.11	0		0.2		
HCM LOS	C					
Minor Lane/Major Mvmt		NBT	NBRWBLn1	SBL	SBT	
Capacity (veh/h)		-	-	390	27	-
HCM Lane V/C Ratio		-	-	0.17	0.01	-
HCM Ctrl Dly (s/v)		-	-	16.1	8.8	0.1
HCM Lane LOS		-	-	C	A	A
HCM 95th %tile Q(veh)		-	-	0.6	0	-

HCM 7th TWSC
1: Andrew Johnson Hwy & Pleasant Hill Rd

Valeriano Property Subdivision
Combined PM Peak

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↙	↕		↙	↕	
Traffic Vol, veh/h	5	2	6	2	1	5	7	1195	28	2	652	2
Future Vol, veh/h	5	2	6	2	1	5	7	1195	28	2	652	2
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	-	-	-	-	-	-	175	-	-	190	-	-
Veh in Median Storage, #	-	2	-	-	2	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	65	65	65	67	67	67	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	8	8	8	8	8	8
Mvmt Flow	8	3	9	3	1	7	8	1299	30	2	709	2

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1380	2059	355	1690	2045	665	711	0	0	1329	0	0
Stage 1	714	714	-	1329	1329	-	-	-	-	-	-	-
Stage 2	665	1345	-	360	715	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.26	-	-	4.26	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.28	-	-	2.28	-	-
Pot Cap-1 Maneuver	104	54	641	61	55	403	846	-	-	484	-	-
Stage 1	388	433	-	163	222	-	-	-	-	-	-	-
Stage 2	415	218	-	631	433	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	100	54	641	58	55	403	846	-	-	484	-	-
Mov Cap-2 Maneuver	280	186	-	151	190	-	-	-	-	-	-	-
Stage 1	387	431	-	162	220	-	-	-	-	-	-	-
Stage 2	401	217	-	614	431	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Ctrl Dly, s/v	16.16		19.6		0.05		0.04	
HCM LOS	C		C					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	846	-	-	342 258	484	-	-
HCM Lane V/C Ratio	0.009	-	-	0.058 0.046	0.004	-	-
HCM Ctrl Dly (s/v)	9.3	-	-	16.2 19.6	12.5	-	-
HCM Lane LOS	A	-	-	C C	B	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2 0.1	0	-	-

HCM 7th TWSC
3: Andrew Johnson Hwy & Road "A"

Valeriano Property Subdivision
Combined PM Peak

Intersection						
Int Delay, s/veh	1.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	25	17	1164	41	28	631
Future Vol, veh/h	25	17	1164	41	28	631
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	88	88	91	91
Heavy Vehicles, %	2	2	8	8	8	8
Mvmt Flow	27	18	1323	47	31	693
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	1754	685	0	0	1369	0
Stage 1	1346	-	-	-	-	-
Stage 2	408	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.26	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.28	-
Pot Cap-1 Maneuver	76	391	-	-	467	-
Stage 1	207	-	-	-	-	-
Stage 2	640	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	70	391	-	-	467	-
Mov Cap-2 Maneuver	163	-	-	-	-	-
Stage 1	207	-	-	-	-	-
Stage 2	587	-	-	-	-	-
Approach	WB	NB		SB		
HCM Ctrl Dly, s/v	26.42	0		1.51		
HCM LOS	D					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	213	153	-	
HCM Lane V/C Ratio	-	-	0.214	0.066	-	
HCM Ctrl Dly (s/v)	-	-	26.4	13.2	1	
HCM Lane LOS	-	-	D	B	A	
HCM 95th %tile Q(veh)	-	-	0.8	0.2	-	

HCM 7th TWSC
3: Andrew Johnson Hwy & Road "A"

Valeriano Property Subdivision
Combined AM Peak LT

Intersection						
Int Delay, s/veh	0.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	37	24	477	14	9	1207
Future Vol, veh/h	37	24	477	14	9	1207
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	88	88	91	91
Heavy Vehicles, %	2	2	8	8	8	8
Mvmt Flow	40	26	542	16	10	1326
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1233	279	0	0	558	0
Stage 1	550	-	-	-	-	-
Stage 2	683	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.26	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.28	-
Pot Cap-1 Maneuver	169	718	-	-	969	-
Stage 1	542	-	-	-	-	-
Stage 2	463	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	167	718	-	-	969	-
Mov Cap-2 Maneuver	302	-	-	-	-	-
Stage 1	542	-	-	-	-	-
Stage 2	458	-	-	-	-	-
Approach	WB	NB	SB			
HCM Ctrl Dly, s/v	16.06	0	0.06			
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	391	969	-	
HCM Lane V/C Ratio	-	-	0.169	0.01	-	
HCM Ctrl Dly (s/v)	-	-	16.1	8.8	-	
HCM Lane LOS	-	-	C	A	-	
HCM 95th %tile Q(veh)	-	-	0.6	0	-	

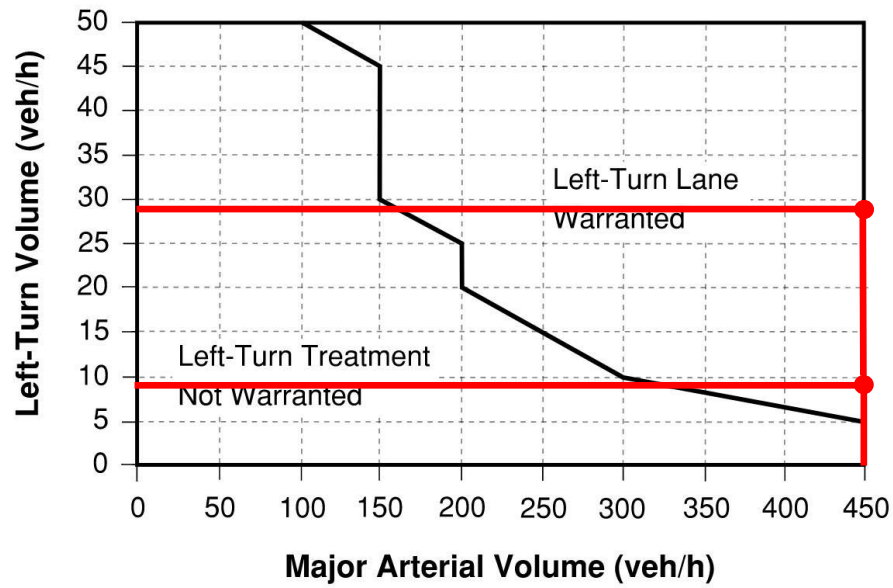
HCM 7th TWSC
3: Andrew Johnson Hwy & Road "A"

Valeriano Property Subdivision
Combined PM Peak LT

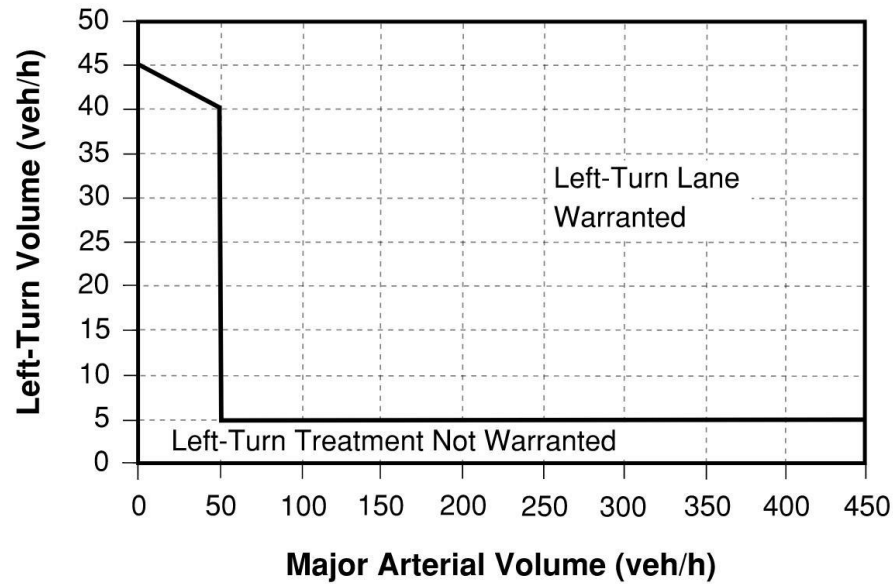
Intersection						
Int Delay, s/veh	0.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	25	17	1164	41	26	631
Future Vol, veh/h	25	17	1164	41	26	631
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	50	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	88	88	91	91
Heavy Vehicles, %	2	2	8	8	8	8
Mvmt Flow	27	18	1323	47	29	693
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	1750	685	0	0	1369	0
Stage 1	1346	-	-	-	-	-
Stage 2	404	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.26	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.28	-
Pot Cap-1 Maneuver	77	391	-	-	467	-
Stage 1	207	-	-	-	-	-
Stage 2	643	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	72	391	-	-	467	-
Mov Cap-2 Maneuver	164	-	-	-	-	-
Stage 1	207	-	-	-	-	-
Stage 2	604	-	-	-	-	-
Approach	WB	NB		SB		
HCM Ctrl Dly, s/v	26.27	0		0.52		
HCM LOS	D					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	214	467	-	
HCM Lane V/C Ratio	-	-	0.213	0.061	-	
HCM Ctrl Dly (s/v)	-	-	26.3	13.2	-	
HCM Lane LOS	-	-	D	B	-	
HCM 95th %tile Q(veh)	-	-	0.8	0.2	-	



APPENDIX D | TURN LANE WARRANT EVALUATIONS



(a) Three-Leg Intersections



(b) Four-Leg Intersections

STATE OF TENNESSEE	FIGURE B.1
LEFT-TURN LANE WARRANT FOR URBAN AND SUBURBAN ARTERIALS (UNSIGNALIZED)	

Figure B.1: Left-Turn Lane Warrant for Urban and Suburban Arterials (Unsignalized)

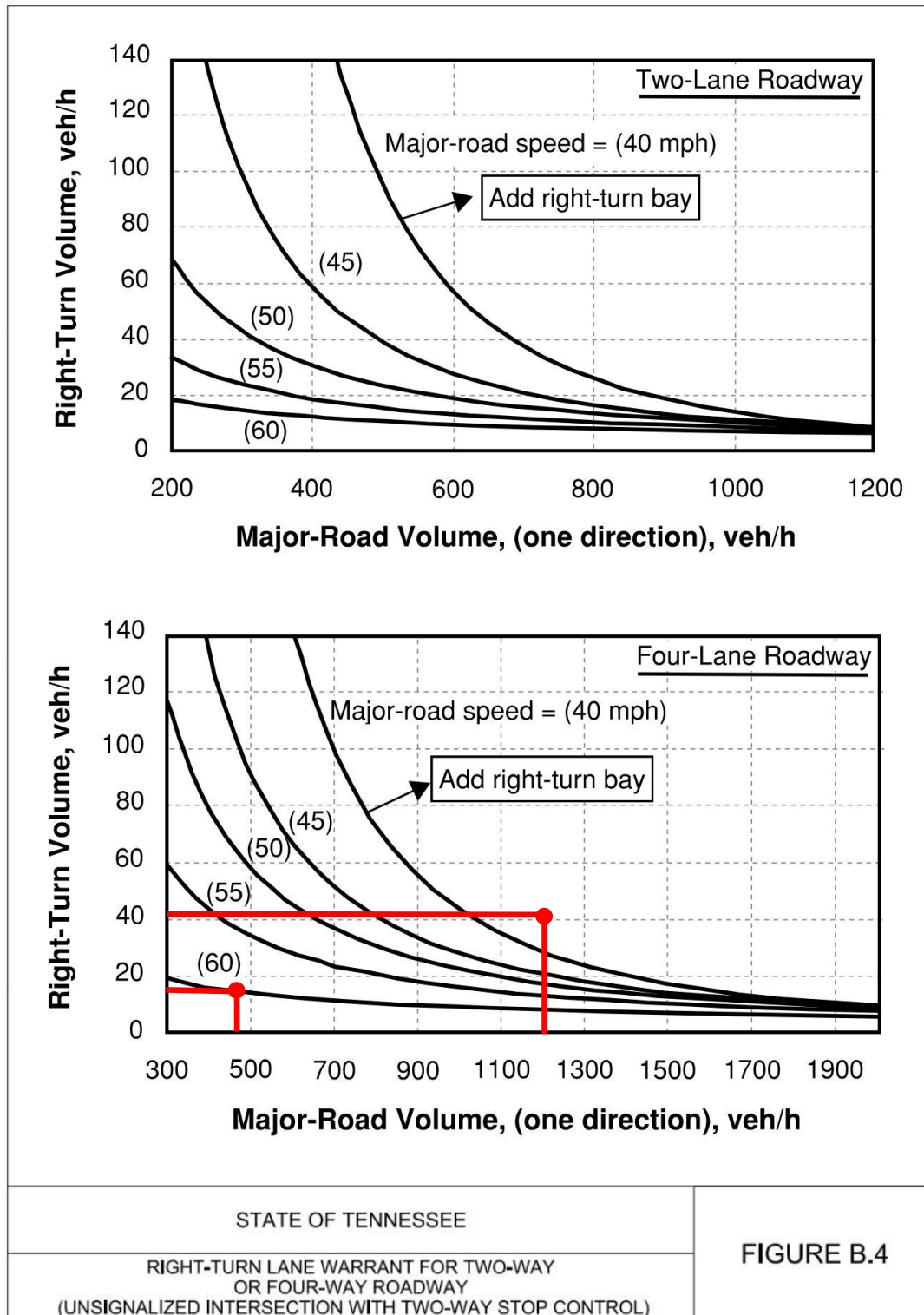


Figure B.4: Right-Turn Lane Warrant for Two-Way or Four-Way Roadway (Unsignalized Intersection with Two-Way Stop Control)

Study are available, assistance in determining storage lengths can be provided by the TDOT Region Traffic Office.

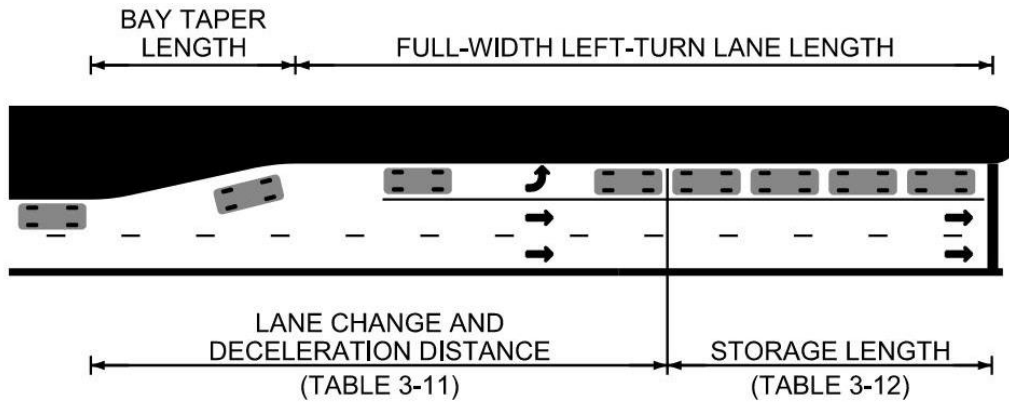


Figure 3-20: Functional Area, for an Exclusive Turn Lane.²⁷

Table 3-11: Lane Change and Deceleration Distance²⁷

Speed (MPH)	Lane Change and Deceleration Distance (ft)
20	70
25	105
30	150
35	205
40	265
45	340
50	415
55	505
60	600
65	700
70	815

Table 3-12: Queue Storage Length for Exclusive Left-Turn Lanes at Unsignalized Intersections²⁷

Left-Turn Volume (veh/h)	Storage Length (ft)				
	Opposing Volume (veh/h)				
	200	400	600	800	1,000
40	50	50	50	50	50
60	50	50	50	50	50
80	50	50	50	50	75
100	50	50	50	75	75
120	50	50	75	75	100
140	50	50	75	100	125
160	50	75	75	100	150
180	50	75	75	125	150
200	50	75	100	125	200
220	75	75	100	150	225
240	75	75	125	150	275
260	75	100	125	175	325
280	75	100	125	200	400
300	75	100	150	225	525

²⁷ AASHTO, A Policy on Geometric Design of Highways and Streets 7th Edition, (2018)

Turn Lane Taper Rates

When median width is insufficient for inclusion of a left-turn lane, travel lanes approaching and departing from the cross street will need to be transitioned to create space for the turn lane at the intersection. Use the following equations and guidelines for acceptable minimum taper rates at these locations (reference Figure 3-21).

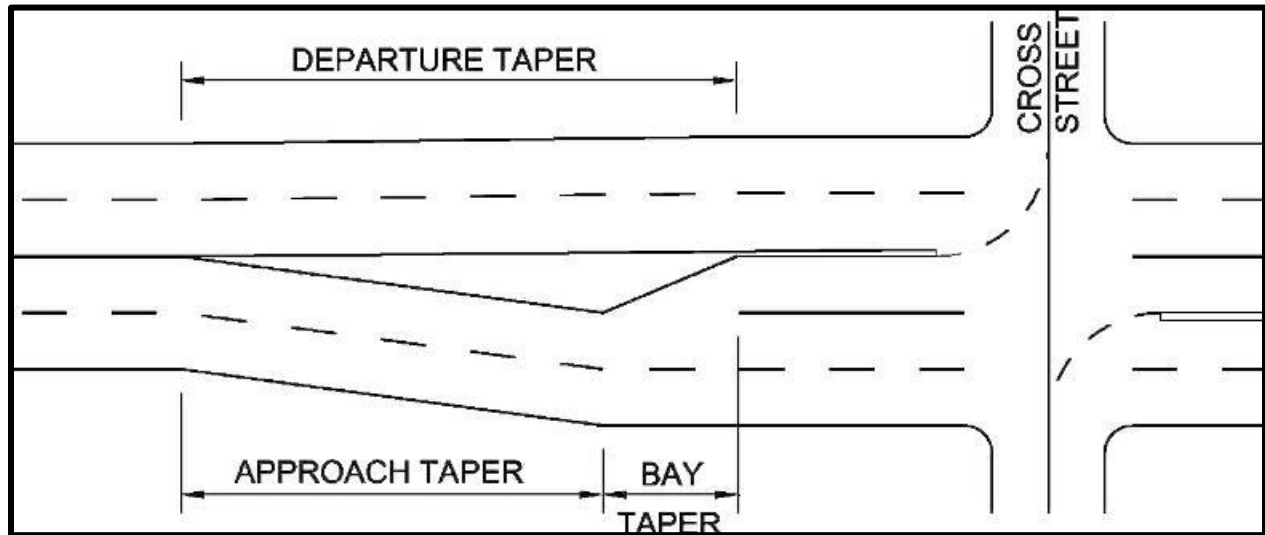


Figure 3-21: Turning Lane Taper Terminology

1) APPROACH TAPER

a) $L = W \times S$, Speed ≥ 45 mph

b) $L = \frac{WS^2}{60}$, Speed < 45 mph

Where L = Length of Taper in feet

W = Width of Offset in feet

S = Design Speed in miles per hour

2) BAY TAPER

$L = \frac{WS}{3}$, L, W, S as defined for approach taper above.

8:1 (Length : Width) Minimum Taper Rate for low speeds.

15:1 (Length : Width) Maximum Taper rate for higher speeds.

$L = (12 \text{ feet})(55 \text{ mph}) / 3$

$L = 220 \text{ ft}$

3) DEPARTURE TAPER

The departure taper begins at the end of the bay taper and ends at the beginning of the approach taper and cannot exceed the approach taper rate criteria.