



NORRIS FREEWAY SUBDIVISION TRAFFIC IMPACT STUDY

NORRIS FREEWAY (U.S. 441) AT PELLEAUX ROAD
KNOX COUNTY, TN

ARDURRA PROJECT NO. 02003-0001.000



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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 Pelleaux Road within the Halls community of Knox County, TN. The project site is located west of the two-way stop-controlled intersection of Norris Freeway (U.S. 441) at Pelleaux Road. The conceptual plan for this project proposes a total of 111 Single-Family Lots.

The conceptual plan shows one site access location onto Pelleaux Road. The proposed site access, Road "A", will tie into Pelleaux Road approximately 600 feet west of Norris Freeway (U.S. 441) and approximately 830 feet east of Zachary Pointe Lane.

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 points on Pelleaux Road as mentioned above and the intersection of Norris Freeway (U.S. 441) at Pelleaux Road. Appropriate intersection evaluations were conducted at these locations 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 the study intersection. The study intersections were found to operate at an acceptable LOS "C" or better and will minimally impact current side street delay.

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 the unsignalized intersection of Proposed Site Access Road "A" at Pelleaux Road.
2. Consider the installation of a northbound left turn lane at the intersection of Norris Freeway (U.S. 441) and Pelleaux Road. Per the TDOT Highway System Access Manual the total recommended turn lane length including queue storage and taper length is 465 feet with a minimum queue storage length of 50 feet and a bay taper length of 200 feet.
3. A southbound right turn lane on Norris Freeway (U.S. 441) is warranted per the TDOT Highway System Access Manual but due to existing site constraints including the location of an existing creek crossing a right turn lane is not recommended.



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 Pelleaux Road within the Halls community of Knox County, TN. The project site is located west of the two-way stop-controlled intersection of Norris Freeway (U.S. 441) at Pelleaux Road. 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 proposes a residential development with 111 Single Family Lots. The conceptual plan shows one site access location onto Pelleaux Road. The proposed site access, Road “A”, will tie into Pelleaux Road approximately 600 feet west of Norris Freeway (U.S. 441) and 830 feet east of Zachary Pointe Lane. 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 mentioned above and the two-way stop-controlled intersection of Norris Freeway (U.S. 441) at Pelleaux Road. Appropriate intersection evaluations were conducted at these locations 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 a sight distance assessment.



3 EXISTING CONDITIONS

EXISTING ROADWAY CONDITIONS

According to the TDOT Roadway Functional Classification Map, Norris Freeway (U.S. 441) is classified as a Minor Arterial between Maynardville Pike and Andersonville Pike and is classified as a Major Collector between Andersonville Pike to the Anderson County line. Norris Freeway (U.S. 441) provides north-south access for the Halls community in Knox County. Norris Freeway (U.S. 441) carries traffic to and from residential, agricultural areas, and commercial areas. In the vicinity of the proposed development, the roadway consists of two 12-foot through travel lanes in each direction. Shoulders exist on either side of the roadway, but no sidewalks are present. The speed limit on Norris Freeway (U.S. 441) is posted as 50 mph. The 2025 ADT on Norris Freeway (U.S. 441) was 15,184 vpd.

Pelleaux Road is classified as a Minor Collector according to the TDOT Roadway Functional Classification Map. Pelleaux Road provides north-south access for the Halls community in Knox County. Pelleaux Road carries traffic to and from residential and agricultural areas. In the vicinity of the proposed development, the roadway consists of two 10-foot through travel lanes in each direction. Neither shoulders nor sidewalks are present along Pelleaux Road. The speed limit on Pelleaux Road is posted as 30 mph. The 2024 ADT on Pelleaux Road was 1,460 vpd.



EXISTING SITE CONDITIONS

The total site acreage for this project consists of approximately 40.5 acres located west of Norris Freeway (U.S. 441). The site is primarily bordered by general agricultural and residential land uses.

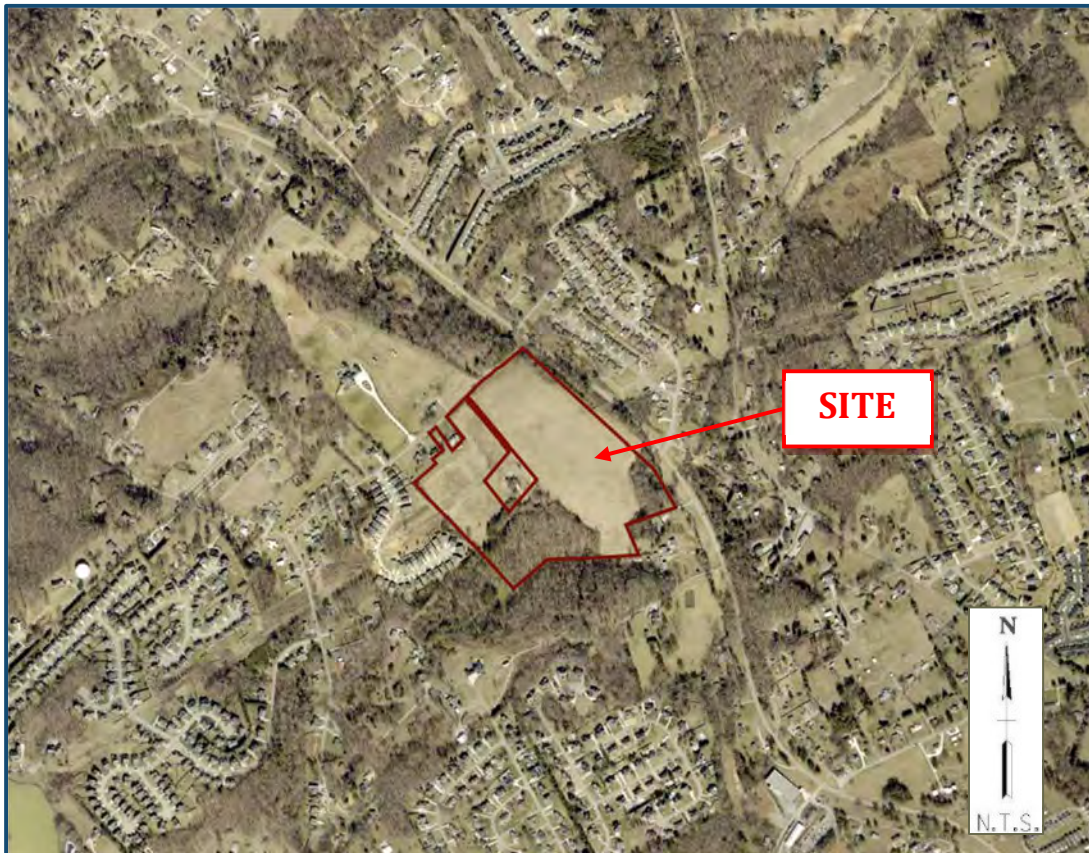


FIGURE 2
EXISTING SITE CONDITIONS

EXISTING TRAFFIC DATA

Existing traffic data was gathered for this study. Annual average daily traffic data (AADT) collected by TDOT and the Knoxville Regional Transportation Planning Organization (TPO) on roadways within the vicinity of the proposed development were utilized. Two count stations, one located on Norris Freeway (U.S. 441) west of Maynardville Pike and one located on Pelleaux Road east of Long Hollow Road 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, intersection turning movement traffic counts were performed to determine the current AM and PM peak hour operating volumes at the intersection of Norris Freeway (U.S. 441) and Pelleaux Road. The traffic count was conducted during September 2026. The 2026 peak hour volumes from the existing traffic data are shown in FIGURE 3, and 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 47000023 (S.R. 71) NW HALLS CROSSROADS	KNOX TPO COUNT STATION 093M207 PELLEAUX ROAD EAST OF LONG HOLLOW ROAD
2025	8,166	-
2024	8,493	1,460
2023	8,058	-
2022	8,527	1,480
2021	7,379	-
2020	7,028	-
2019	8,158	1,500
2018	8,000	-
2017	8,365	-
2016	8,618	1,290
2015	7,701	-
2014	7,693	1,120
2013	8,712	-
2012	7,944	840

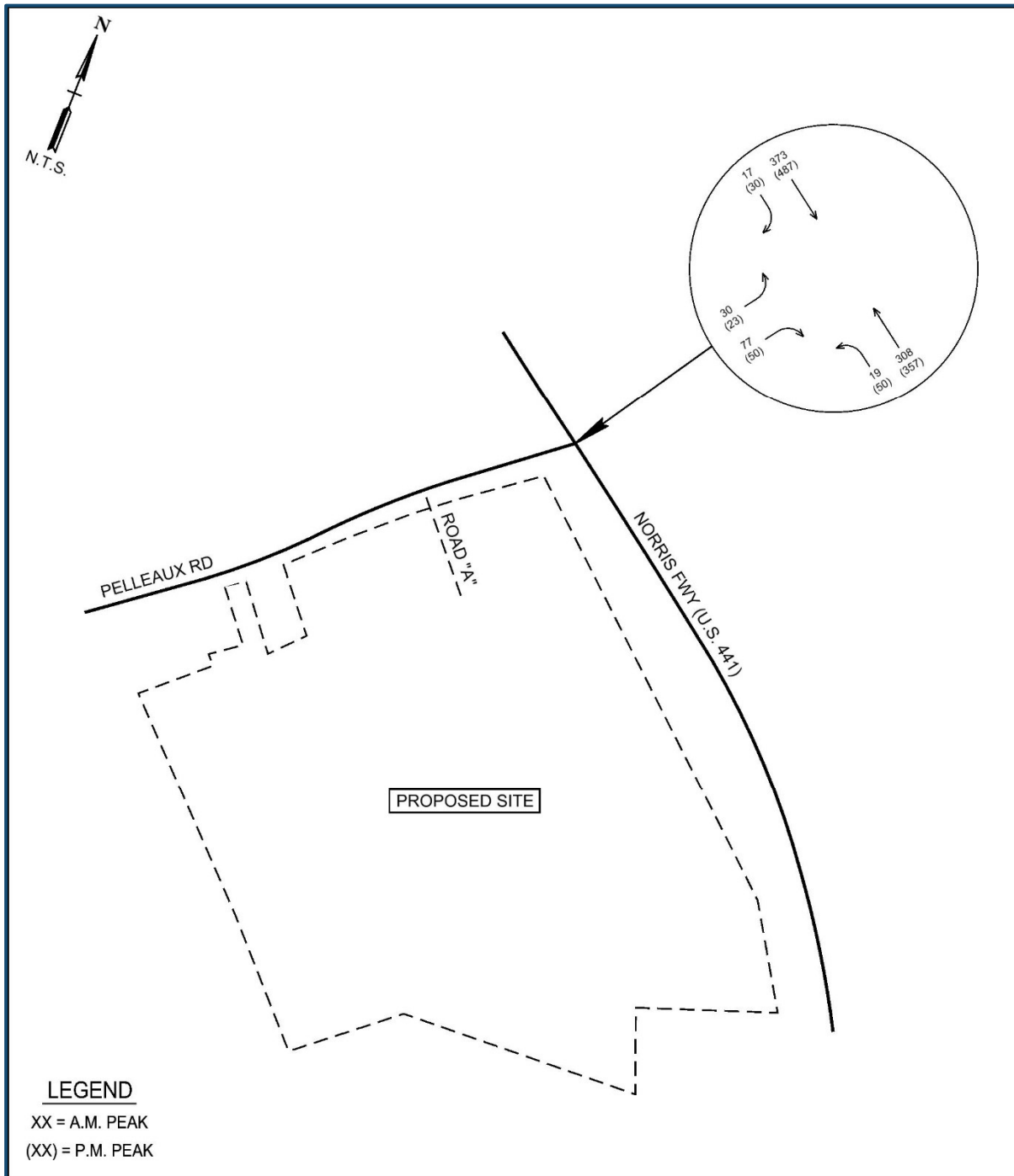


FIGURE 3
2026 EXISTING TRAFFIC VOLUMES



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 Norris Freeway (U.S. 441) at Pelleaux Road was found to operate at a Level-of-Service (LOS) “B” during the AM and PM peak hours with an approach delay of 12.3 seconds and 13.9 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

Due to Norris Freeway (U.S. 441) being a TDOT maintained roadway facility, the year 2031 was established as the study horizon. 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 4.0% was assumed. Existing volumes from the intersection of Norris Freeway (U.S. 441) at Pelleaux Road were grown by 4.0% 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 full build out of the proposed residential development and 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 development, the intersection of Norris Freeway (U.S. 441) at Pelleaux Road was found to operate at a Level-of-Service (LOS) “B” during the AM peak hour and at a LOS “C” in the PM peak hour with approach delays of 14.1 seconds and 17.0 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.

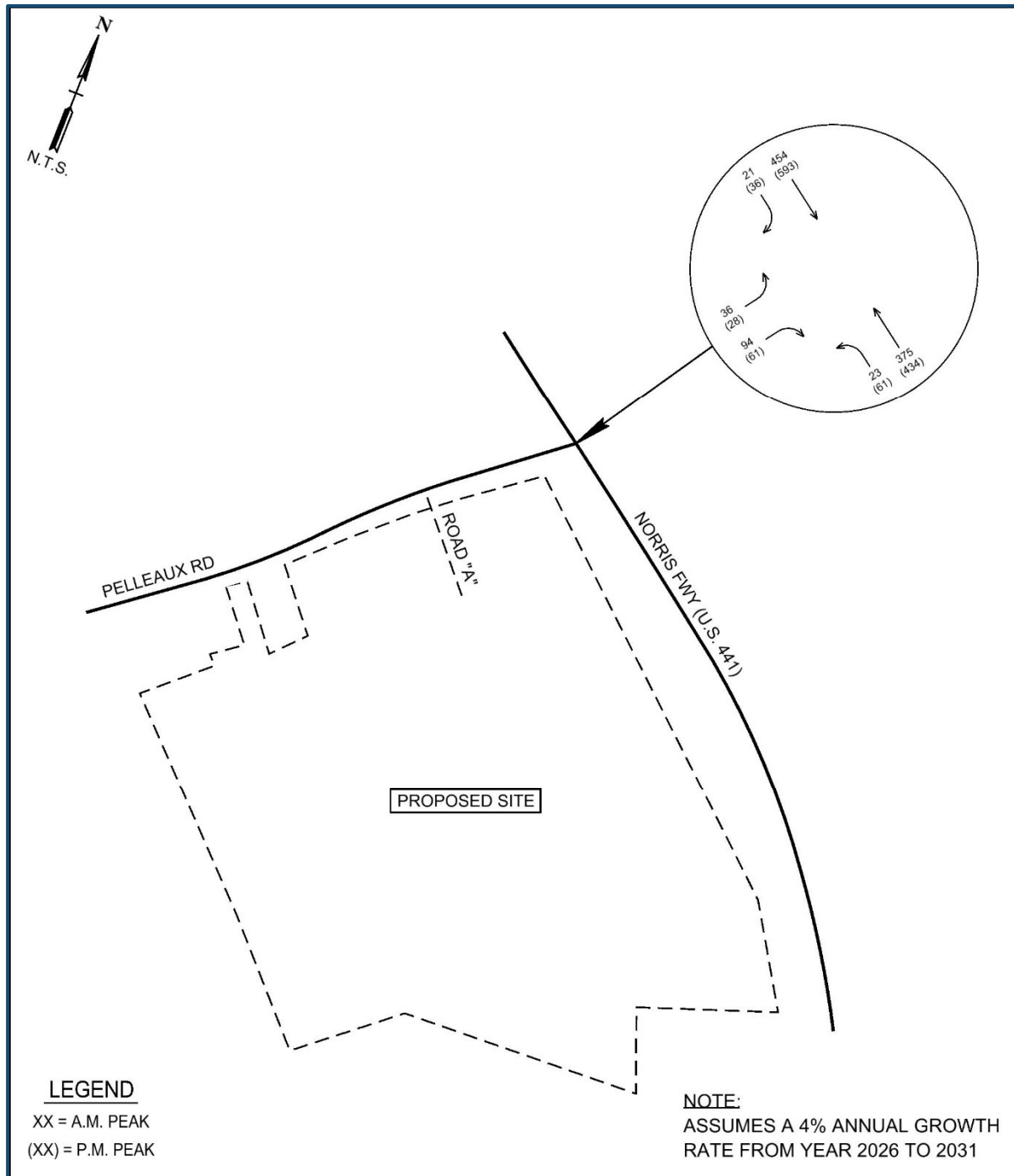


FIGURE 4
2031 BACKGROUND TRAFFIC VOLUMES



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 curves 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	111 D.U.			
Entering Trips			580	22	66
Exiting Trips			<u>581</u>	<u>58</u>	<u>40</u>
Total			1161	80	106

TRIP DISTRIBUTION AND ASSIGNMENT

FIGURE 6 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.



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 Norris Freeway (U.S. 441) and Pelleaux Road was found to operate at a LOS “C” during both the AM and PM peak hours with an approach delay of 18.1 seconds and 20.6 seconds, respectively. The intersection of Pelleaux Road at proposed “Road A” was found to operate at a LOS “A” during both the AM and PM peak hours with an approach delay of 9.3 seconds and 9.1 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.

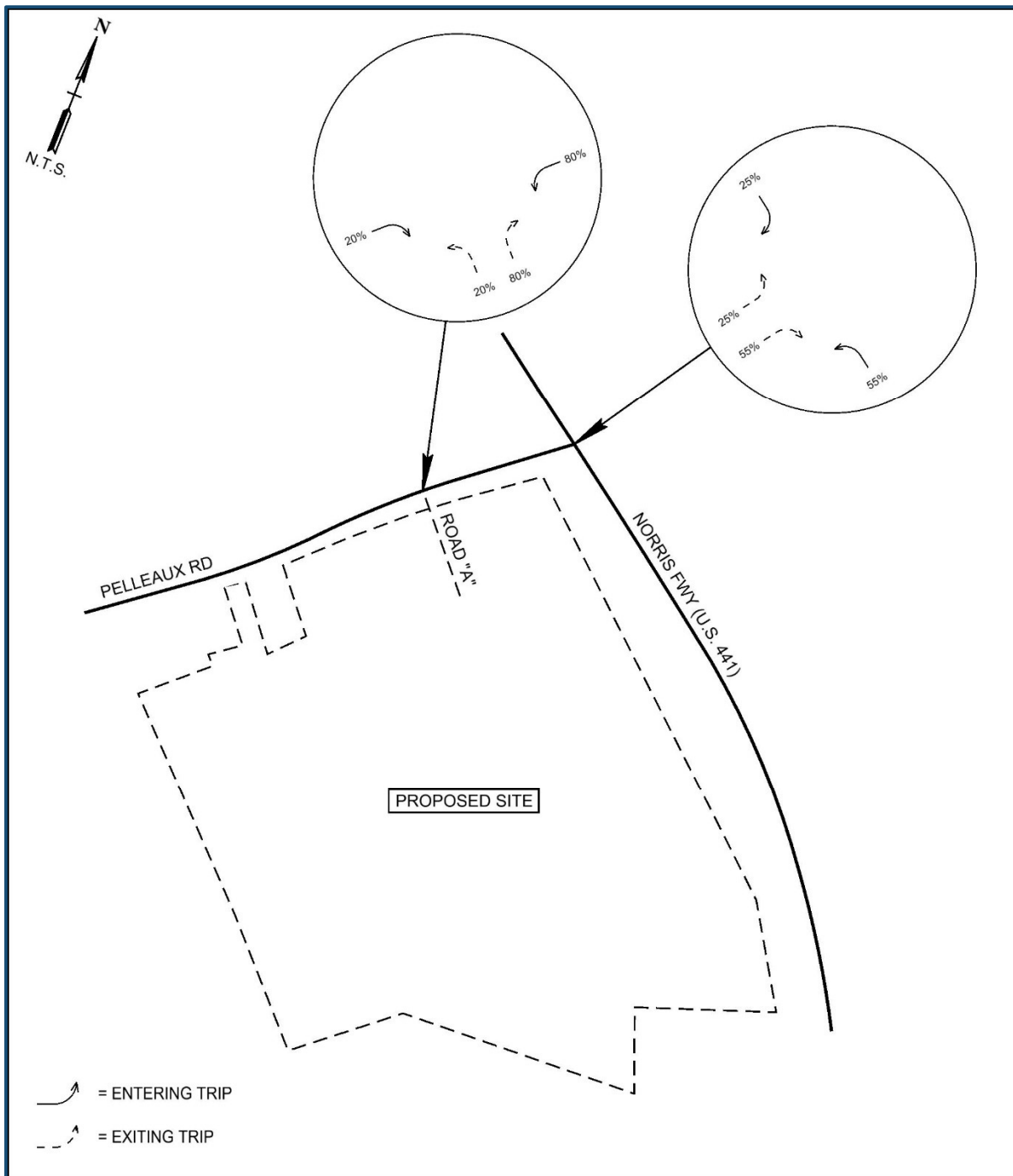


FIGURE 5
TRIP DISTRIBUTION PATTERNS

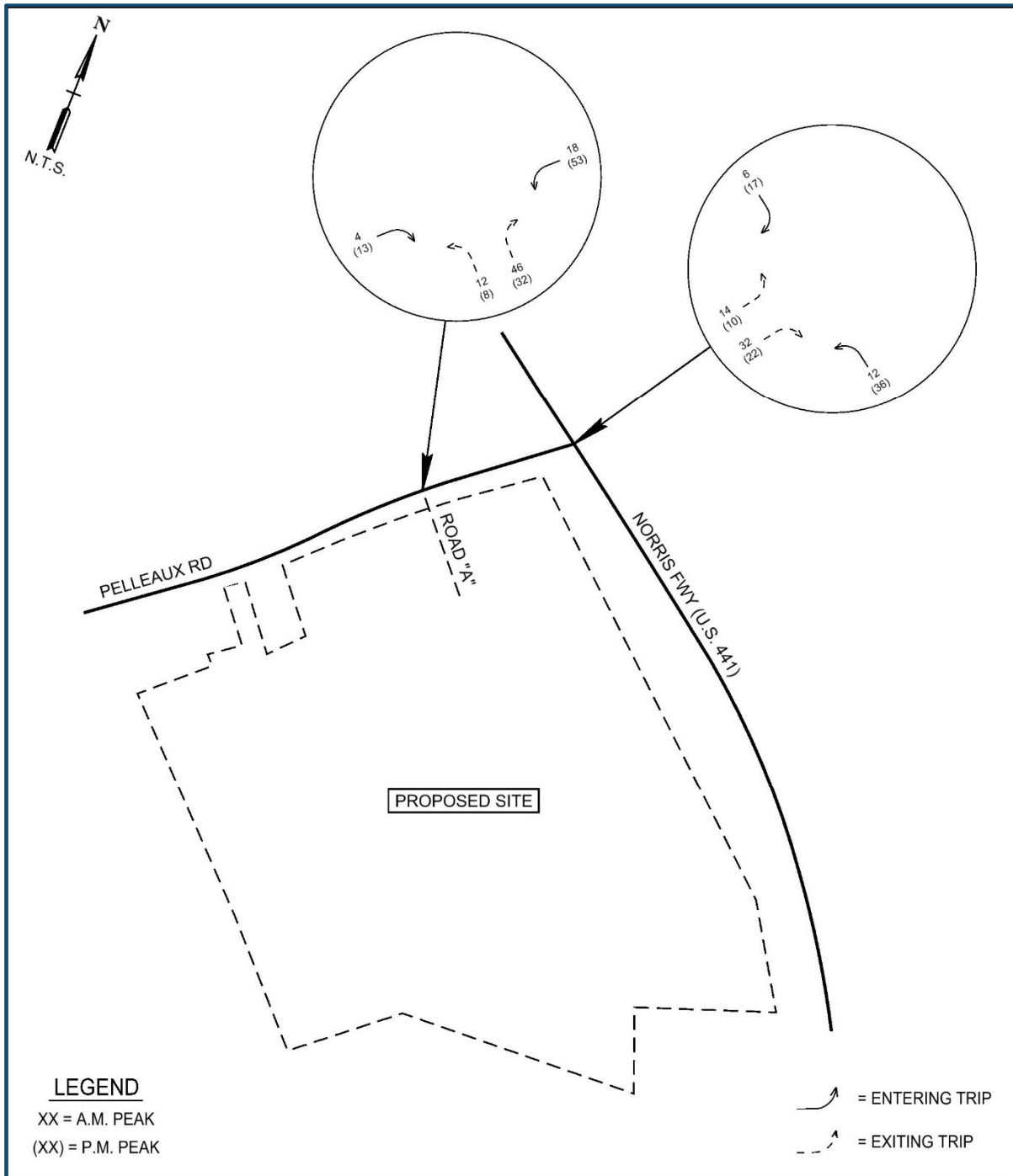


**FIGURE 6
TRIP ASSIGNMENT**

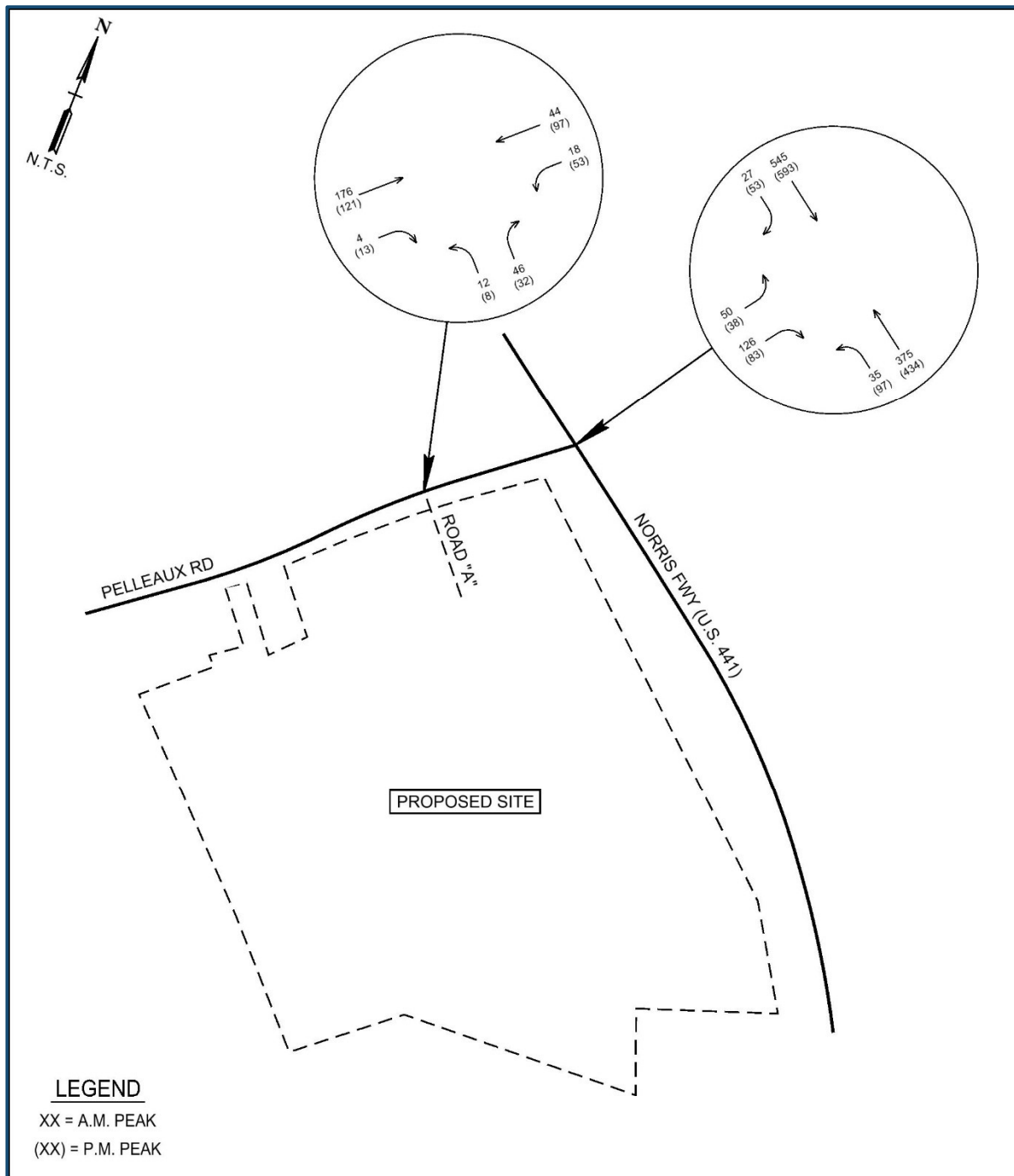


FIGURE 7
2031 COMBINED TRAFFIC VOLUMES



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)
Norris Freeway (U.S. 441) at Pelleaux Road (SIDE STREET STOP) ¹	A.M. P.M.	B 12.3 B 13.9	B 14.1 C 17.0	C 18.1 C 20.6
Norris Freeway (U.S. 441) at Pelleaux Road (With Proposed Turn Lanes) (SIDE STREET STOP) ¹	A.M. P.M.			C 17.6 C 19.1
Pelleaux Road at "Road A" (SIDE STREET STOP) ¹	A.M. P.M.			A 9.3 A 9.1

¹SIDE 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 the anticipated delay for the intersection of Norris Freeway (U.S. 441) at Pelleaux Road will operate at an acceptable LOS C during both the AM and PM peak hours and the intersection of Pelleaux Road at the proposed site access "Road A" will operate at an acceptable LOS A during both the AM and PM peak hours after the completion of the residential development.

The addition of a northbound left turn lane and/or a southbound right turn lane on Norris Freeway (U.S. 441) will have minimal impacts on the average delay of the intersection.



TURN LANE ASSESSMENT

The intersection of Pelleaux Road at the proposed roadway (Road “A”) was evaluated for a right-turn lane and a left-turn lane warrant utilizing the Knox County Access Control and Driveway Design Policy turn lane volume thresholds and the intersection of Norris Freeway (U.S. 441) at Pelleaux Road Turn was evaluated for a right-turn lane and a left-turn lane utilizing TDOT’s Highway System Access Manual (HSAM) Volume 3: Geometric Design Criteria turn lane volume thresholds. Existing, background and combined build-out conditions were evaluated as part of this assessment with the following results:

- 2026 Existing Traffic
 - Norris Freeway (U.S. 441) at Pelleaux Road
 - Right Turn Warrant – AM Peak: Not Met / PM Peak: **Met**
 - Left Turn Warrant – AM Peak: **Met** / PM Peak: **Met**
- 2031 Background Traffic
 - Norris Freeway (U.S. 441) at Pelleaux Road
 - Right Turn Warrant – AM Peak: Not Met / PM Peak: **Met**
 - Left Turn Warrant – AM Peak: **Met** / PM Peak: **Met**
- 2031 Build-out Traffic
 - Proposed Roadway (Road “A”) at Pelleaux Road
 - Right Turn Warrant – AM Peak: Not Met / PM Peak: Not Met
 - Left Turn Warrant – AM Peak: Not Met / PM Peak: Not Met
 - Norris Freeway (U.S. 441) at Pelleaux Road
 - Right Turn Warrant – AM Peak: **Met** / PM Peak: **Met**
 - Left Turn Warrant – AM Peak: **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 right-turn lane is warranted at the intersection of Norris Freeway (U.S. 441) at Pelleaux Road under combined conditions and a left-turn lane is warranted at the intersection of Norris Freeway (U.S. 441) and Pelleaux Road under existing, background and combined conditions. The turn lane warrant analysis worksheet is in APPENDIX D.

The TDOT volume-based warrants indicate situations where a turn lane would help mitigate traffic conflicts, not necessarily situations where a turn lane is required or must be constructed.

TURN LANE DESIGN

Turn lanes for the intersection of Norris Freeway (U.S. 441) and Pelleaux Road were designed using the 2031 combined traffic volumes and the standards outlined in TDOT’s Highway System Access Manual (HSAM) Volume 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 Distance the recommended lane change and deceleration distance for a roadway with a speed limit of 50 mph is 415 feet and per Table 3-12: Queue Storage Length for Exclusive Left-Turn Lanes at Unsignalized Intersections, the minimum queue storage length for a turn lane is 50 feet. Therefore, the total recommended turn lane length at Norris Freeway (U.S. 441) at Pelleaux Road is 465 feet per the TDOT Highway System Access Manual.



SIGHT DISTANCE ASSESSMENT

Pelleaux Road is maintained by Knox County Engineering, therefore; sight distance requirements, outlined in Knox County's Subdivision Regulations, were utilized to determine intersection sight distance. Based on the distance requirements for a 30-mph roadway, 300 feet of sight distance is required to make a turn from a side street stop-controlled scenario.

Intersection sight distance was assessed via field measurements at proposed site access (Road "A") at Pelleaux Road 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 sight distance at proposed site access (Road "A") was found to be greater than the required sight distance for both right and left-turning vehicles. The sight distance observed from the field measurements can be seen in FIGURE 9.



Looking left along Pelleaux Road from the proposed site access ("Road A").

Approx. sight distance: 425 ft.



Looking right along Pelleaux Road from the proposed site access ("Road A").

Approx. sight distance: 400 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 the study intersection. The study intersections were found to operate at an acceptable LOS “C” or better and will minimally impact current side street delay.

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 the unsignalized intersection of Proposed Site Access Road “A” at Pelleaux Road.
2. Consider the installation of a northbound left turn lane at the intersection of Norris Freeway (U.S. 441) and Pelleaux Road. Per the TDOT Highway System Access Manual the total recommended turn lane length including queue storage and taper length is 465 feet with a minimum queue storage length of 50 feet and a bay taper length of 200 feet.
3. A southbound right turn lane on Norris Freeway (U.S. 441) is warranted per the TDOT Highway System Access Manual but due to existing site constraints including the location of an existing creek crossing a right turn lane is not recommended.



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



APPENDIX A | TRAFFIC DATA

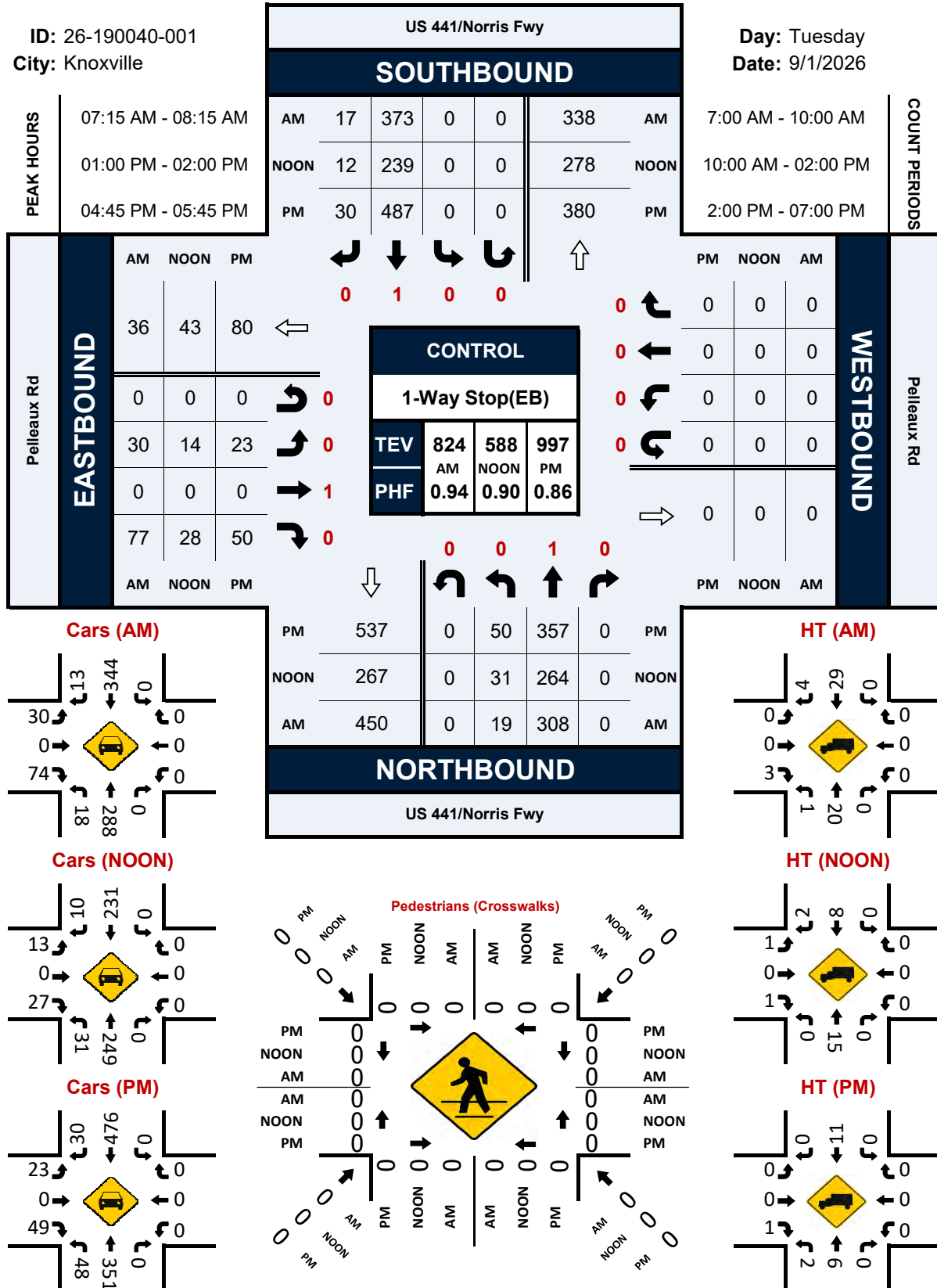


US 441/Norris Fwy & Pelleaux Rd

Peak Hour Turning Movement Count

ID: 26-190040-001
City: Knoxville

Day: Tuesday
Date: 9/1/2026



Project ID: 26-190040-001
Location: US 441/Norris Fwy & Pelleaux Rd
City: Knoxville

Day: Tuesday
Date: 9/1/2026

Groups Printed - Cars, PU, Vans - Heavy Trucks

	US 441/Norris Fwy Northbound							US 441/Norris Fwy Southbound							Pelleaux Rd Eastbound							Pelleaux Rd Westbound							
Start Time	Left	Thru	Rgt	Uturn	Peds	App. Total		Left	Thru	Rgt	Uturn	Peds	App. Total		Left	Thru	Rgt	Uturn	Peds	App. Total		Left	Thru	Rgt	Uturn	Peds	App. Total		
7:00 AM	2	81	0	0	0	83		0	41	7	0	0	48		4	0	10	0	0	14		0	0	0	0	0	0	0	145
7:15 AM	5	77	0	0	0	82		0	105	4	0	0	109		12	0	14	0	0	26		0	0	0	0	0	0	0	217
7:30 AM	4	99	0	0	0	103		0	94	3	0	0	97		10	0	8	0	0	18		0	0	0	0	0	0	0	218
7:45 AM	2	67	0	0	0	69		0	99	8	0	0	107		5	0	26	0	0	31		0	0	0	0	0	0	0	207
Total	13	324	0	0	0	337		0	339	22	0	0	361		31	0	58	0	0	89		0	0	0	0	0	0	0	787
8:00 AM	8	65	0	0	0	73		0	75	2	0	0	77		3	0	29	0	0	32		0	0	0	0	0	0	0	182
8:15 AM	17	66	0	0	0	83		0	62	3	0	0	65		3	0	14	0	0	17		0	0	0	0	0	0	0	165
8:30 AM	9	52	0	0	0	61		0	61	2	0	0	63		5	0	2	0	0	7		0	0	0	0	0	0	0	131
8:45 AM	3	52	0	0	0	55		0	48	1	0	0	49		5	0	7	0	0	12		0	0	0	0	0	0	0	116
Total	37	235	0	0	0	272		0	246	8	0	0	254		16	0	52	0	0	68		0	0	0	0	0	0	0	594
9:00 AM	6	58	0	0	0	64		0	52	1	0	0	53		3	0	11	0	0	14		0	0	0	0	0	0	0	131
9:15 AM	5	51	0	0	0	56		0	67	4	0	0	71		2	0	9	0	0	11		0	0	0	0	0	0	0	138
9:30 AM	5	33	0	0	0	38		0	71	2	0	0	73		4	0	6	0	0	10		0	0	0	0	0	0	0	121
9:45 AM	7	45	0	0	0	52		0	61	2	0	0	63		3	0	7	0	0	10		0	0	0	0	0	0	0	125
Total	23	187	0	0	0	210		0	251	9	0	0	260		12	0	33	0	0	45		0	0	0	0	0	0	0	515
BREAK																													
10:00 AM	9	65	0	0	0	74		0	54	1	0	0	55		3	0	3	0	0	6		0	0	0	0	0	0	0	135
10:15 AM	6	50	0	0	0	56		0	60	4	0	0	64		2	0	7	0	0	9		0	0	0	0	0	0	0	129
10:30 AM	10	43	0	0	0	53		0	41	0	0	0	41		2	0	7	0	0	9		0	0	0	0	0	0	0	103
10:45 AM	7	48	0	0	0	55		0	55	2	0	0	57		3	0	9	0	0	12		0	0	0	0	0	0	0	124
Total	32	206	0	0	0	238		0	210	7	0	0	217		10	0	26	0	0	36		0	0	0	0	0	0	0	491
11:00 AM	3	37	0	0	0	40		0	56	3	0	0	59		2	0	6	0	0	8		0	0	0	0	0	0	0	107
11:15 AM	3	60	0	0	0	63		0	50	0	0	0	50		2	0	4	0	0	6		0	0	0	0	0	0	0	119
11:30 AM	11	57	0	0	0	68		0	55	3	0	0	58		5	0	7	0	0	12		0	0	0	0	0	0	0	138
11:45 AM	17	44	0	0	0	61		0	56	0	0	0	56		5	0	7	0	0	12		0	0	0	0	0	0	0	129
Total	34	198	0	0	0	232		0	217	6	0	0	223		14	0	24	0	0	38		0	0	0	0	0	0	0	493
12:00 PM	7	53	0	0	0	60		0	53	4	0	0	57		5	0	9	0	0	14		0	0	0	0	0	0	0	131
12:15 PM	11	55	0	0	0	66		0	38	4	0	0	42		2	0	5	0	0	7		0	0	0	0	0	0	0	115
12:30 PM	10	45	0	0	0	55		0	43	3	0	0	46		2	0	10	0	0	12		0	0	0	0	0	0	0	113
12:45 PM	6	48	0	0	0	54		0	62	2	0	0	64		1	0	4	0	0	5		0	0	0	0	0	0	0	123
Total	34	201	0	0	0	235		0	196	13	0	0	209		10	0	28	0	0	38		0	0	0	0	0	0	0	482
1:00 PM	5	70	0	0	0	75		0	53	2	0	0	55		2	0	12	0	0	14		0	0	0	0	0	0	0	144
1:15 PM	8	66	0	0	0	74		0	59	2	0	0	61		4	0	3	0	0	7		0	0	0	0	0	0	0	142
1:30 PM	12	61	0	0	0	73		0	57	1	0	0	58		3	0	5	0	0	8		0	0	0	0	0	0	0	139
1:45 PM	6	67	0	0	0	73		0	70	7	0	0	77		5	0	8	0	0	13		0	0	0	0	0	0	0	163
Total	31	264	0	0	0	295		0	239	12	0	0	251		14	0	28	0	0	42		0	0	0	0	0	0	0	588
BREAK																													
2:00 PM	9	78	0	0	0	87		0	59	1	0	0	60		3	0	6	0	0	9		0	0	0	0	0	0	0	156
2:15 PM	12	74	0	0	0	86		0	66	3	0	0	69		2	0	9	0	0	11		0	0	0	0	0	0	0	166
2:30 PM	4	68	0	0	0	72		0	57	0	0	0	57		2	0	11	0	0	13		0	0	0	0	0	0	0	142
2:45 PM	3	70	0	0	0	73		0	82	3	0	0	85		5	0	11	0	0	16		0	0	0	0	0	0	0	174
Total	28	290	0	0	0	318		0	264	7	0	0	271		12	0	37	0	0	49		0	0	0	0	0	0	0	638
3:00 PM	11	81	0	0	0	92		0	89	2	0	0	91		4	0	9	0	0	13		0	0	0	0	0	0	0	196
3:15 PM	12	67	0	0	0	79		0	88	5	0	0	93		8	0	11	0	0	19		0	0	0	0	0	0	0	191
3:30 PM	18	72	0	0	0	90		0	94	5	0	0	99		5	0	7	0	0	12		0	0	0	0	0	0	0	201
3:45 PM	19	92	0	0	0	111		0	83	7	0	0	90		4	0	12	0	0	16		0	0	0	0	0	0	0	217
Total	60	312	0	0	0	372		0	354	19	0	0	373		21	0	39	0	0	60		0	0	0	0	0	0	0	805
4:00 PM	12	102	0	0	0	114		0	82	7	0	0	89		5	0	5	0	0	10		0	0	0	0	0	0	0	213
4:15 PM	17	75	0	0	0	92		0	118	7	0	0	125		8	0	13	0	0	21		0	0	0	0	0	0	0	238
4:30 PM	14	73	0	0	0	87		0	101	6	0	0	107		10	0	9	0	0	19		0	0	0	0	0	0	0	213
4:45 PM	13	90	0	0	0	103		0	118	5	0	0	123		6	0	11	0	0	17		0	0	0	0	0	0	0	243
Total	56	340	0	0	0	396		0	419	25	0	0	444		29	0	38	0	0	67		0	0	0	0	0	0	0	907
5:00 PM	9	82	0	0	0	91		0	112	7	0	0	119		7	0	14	0	0	21		0	0	0	0	0	0	0	231
5:15 PM	16	102	0	0	0	118		0	145	11	0	0	156		4	0	13	0	0	17		0	0	0	0	0	0	0	291
5:30 PM	12	83	0	0	0	95		0	112	7	0	0	119		6	0	12	0	0	18		0	0	0	0	0	0	0	232
5:45 PM	13	81	0	0	0	94		0	94	8	0	0	102		3	0	14	0	0	17		0	0	0	0	0	0	0	213
Total	50	348	0	0	0	398		0	463	33	0	0	496		20	0	53	0	0	73		0	0	0	0	0	0	0	967
6:00 PM	6	75	0	0	0	81		0	88	1	0	0	89		3	0	10	0	0	13		0	0	0	0	0	0	0	183
6:15 PM	17	64	0	0	0	81		0	84	3	0	0	87		7	0	9	0	0	16		0	0	0	0	0	0	0	184
6:30 PM	19	57	0	0	0	76		0	70	4	0	0	74		1	0	5	0	0	6		0	0	0	0	0	0	0	156
6:45 PM	11	66	0	0	0	77		0																					

Project ID: 26-190040-001
Location: US 441/Norris Fwy & Pelleaux Rd
City: Knoxville

PEAK HOURS

Day: Tuesday
Date: 9/1/2026

AM

	US 441/Norris Fwy Northbound					US 441/Norris Fwy Southbound					Pelleaux Rd Eastbound					Pelleaux Rd Westbound					
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total
Peak Hour Analysis from 07:00 AM - 10:00 AM																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
7:15 AM	5	77	0	0	82	0	105	4	0	109	12	0	14	0	26	0	0	0	0	0	217
7:30 AM	4	99	0	0	103	0	94	3	0	97	10	0	8	0	18	0	0	0	0	0	218
7:45 AM	2	67	0	0	69	0	99	8	0	107	5	0	26	0	31	0	0	0	0	0	207
8:00 AM	8	65	0	0	73	0	75	2	0	77	3	0	29	0	32	0	0	0	0	0	182
Total Volume	19	308	0	0	327	0	373	17	0	390	30	0	77	0	107	0	0	0	0	0	824
% App. Total	5.8	94.2	0.0	0.0	100	0.0	95.6	4.4	0.0	100	28.0	0.0	72.0	0.0	100	0.0	0.0	0.0	0.0	0.0	
PHF	0.794					0.894					0.836										0.945
Cars, PU, Vans	18	288	0	0	306	0	344	13	0	357	30	0	74	0	104	0	0	0	0	0	767
% Cars, PU, Vans	94.7	93.5	0.0	0.0	93.6	0.0	92.2	76.5	0.0	91.5	100.0	0.0	96.1	0.0	97.2	0.0	0.0	0.0	0.0	0.0	93.1
Heavy trucks	1	20	0	0	21	0	29	4	0	33	0	0	3	0	3	0	0	0	0	0	57
%Heavy trucks	5.3	6.5	0.0	0.0	6.4	0.0	7.8	23.5	0.0	8.5	0.0	0.0	3.9	0.0	2.8	0.0	0.0	0.0	0.0	0.0	6.9

NOON

	US 441/Norris Fwy Northbound					US 441/Norris Fwy Southbound					Pelleaux Rd Eastbound					Pelleaux Rd Westbound					
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total
Peak Hour Analysis from 10:00 AM - 02:00 PM																					
Peak Hour for Entire Intersection Begins at 01:00 PM																					
1:00 PM	5	70	0	0	75	0	53	2	0	55	2	0	12	0	14	0	0	0	0	0	144
1:15 PM	8	66	0	0	74	0	59	2	0	61	4	0	3	0	7	0	0	0	0	0	142
1:30 PM	12	61	0	0	73	0	57	1	0	58	3	0	5	0	8	0	0	0	0	0	139
1:45 PM	6	67	0	0	73	0	70	7	0	77	5	0	8	0	13	0	0	0	0	0	163
Total Volume	31	264	0	0	295	0	239	12	0	251	14	0	28	0	42	0	0	0	0	0	588
% App. Total	10.5	89.5	0.0	0.0	100	0.0	95.2	4.8	0.0	100	33.3	0.0	66.7	0.0	100	0.0	0.0	0.0	0.0	0.0	
PHF	0.983					0.815					0.750										0.902
Cars, PU, Vans	31	249	0	0	280	0	231	10	0	241	13	0	27	0	40	0	0	0	0	0	561
% Cars, PU, Vans	100.0	94.3	0.0	0.0	94.9	0.0	96.7	83.3	0.0	96.0	92.9	0.0	96.4	0.0	95.2	0.0	0.0	0.0	0.0	0.0	95.4
Heavy trucks	0	15	0	0	15	0	8	2	0	10	1	0	1	0	2	0	0	0	0	0	27
%Heavy trucks	0.0	5.7	0.0	0.0	5.1	0.0	3.3	16.7	0.0	4.0	7.1	0.0	3.6	0.0	4.8	0.0	0.0	0.0	0.0	0.0	4.6

PM

	US 441/Norris Fwy Northbound					US 441/Norris Fwy Southbound					Pelleaux Rd Eastbound					Pelleaux Rd Westbound					
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total
Peak Hour Analysis from 02:00 PM - 07:00 PM																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
4:45 PM	13	90	0	0	103	0	118	5	0	123	6	0	11	0	17	0	0	0	0	0	243
5:00 PM	9	82	0	0	91	0	112	7	0	119	7	0	14	0	21	0	0	0	0	0	231
5:15 PM	16	102	0	0	118	0	145	11	0	156	4	0	13	0	17	0	0	0	0	0	291
5:30 PM	12	83	0	0	95	0	112	7	0	119	6	0	12	0	18	0	0	0	0	0	232
Total Volume	50	357	0	0	407	0	487	30	0	517	23	0	50	0	73	0	0	0	0	0	997
% App. Total	12.3	87.7	0.0	0.0	100	0.0	94.2	5.8	0.0	100	31.5	0.0	68.5	0.0	100	0.0	0.0	0.0	0.0	0.0	
PHF	0.862					0.829					0.869										0.857
Cars, PU, Vans	48	351	0	0	399	0	476	30	0	506	23	0	49	0	72	0	0	0	0	0	977
% Cars, PU, Vans	96.0	98.3	0.0	0.0	98.0	0.0	97.7	100.0	0.0	97.9	100.0	0.0	98.0	0.0	98.6	0.0	0.0	0.0	0.0	0.0	98.0
Heavy trucks	2	6	0	0	8	0	11	0	0	11	0	0	1	0	1	0	0	0	0	0	20
%Heavy trucks	4.0	1.7	0.0	0.0	2.0	0.0	2.3	0.0	0.0	2.1	0.0	0.0	2.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	2.0



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

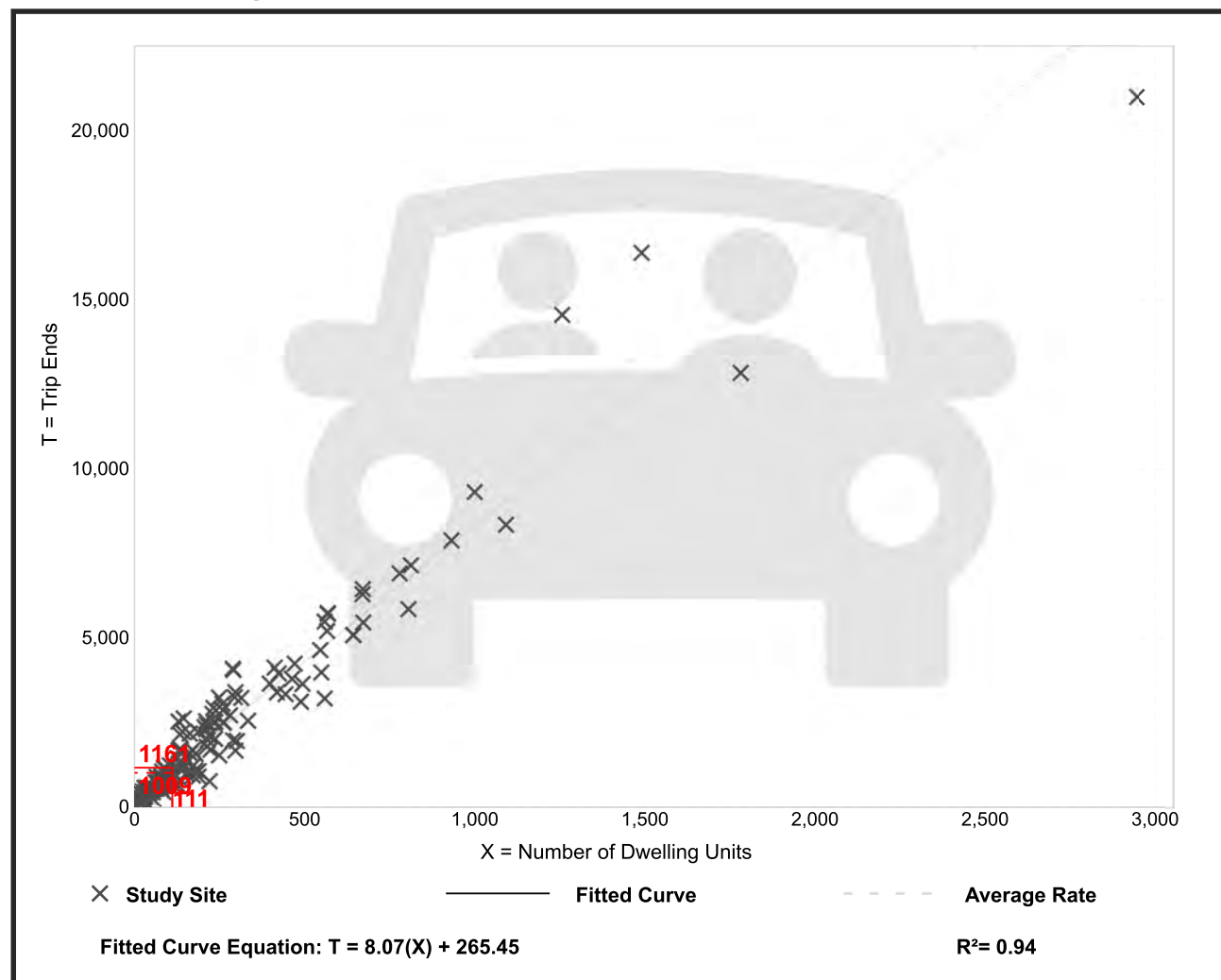
Avg. Num. of Dwelling Units: 261

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

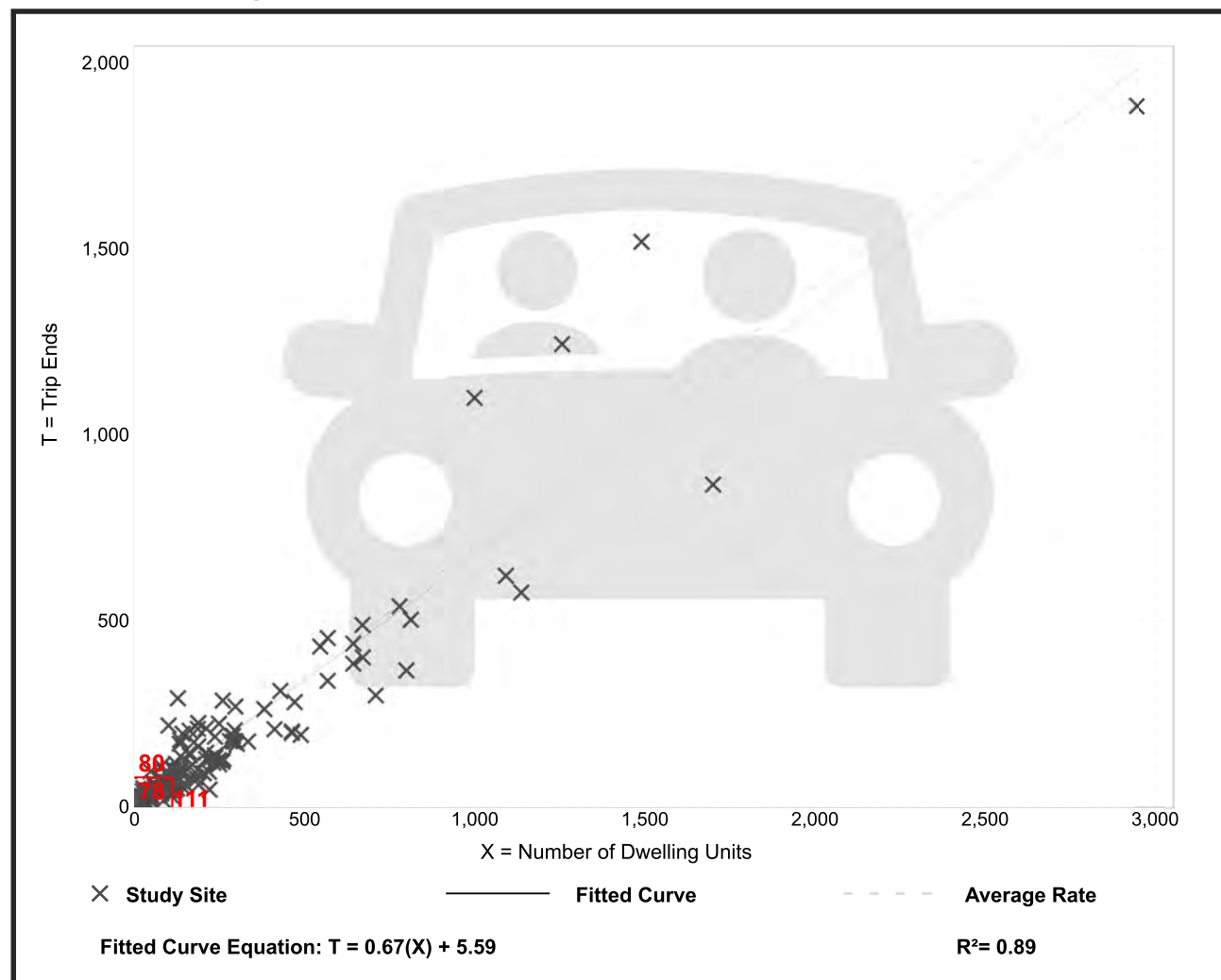
Avg. Num. of Dwelling Units: 239

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

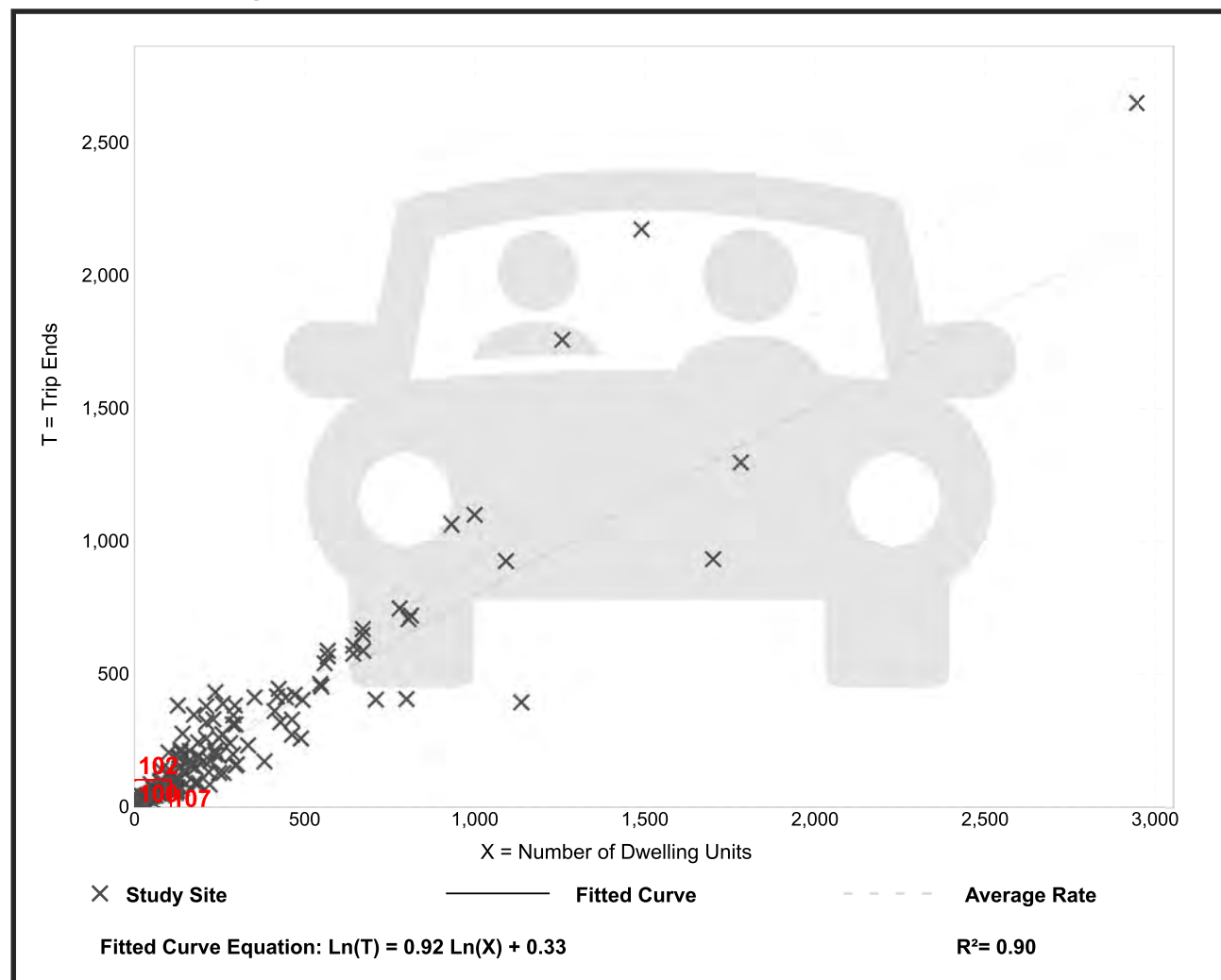
Avg. Num. of Dwelling Units: 266

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: Norris Freeway Subdivision

Date Conducted: 9/16/26

Single-Family Detached Housing (210)

111 Dwelling Units

Average Daily Traffic

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

$$T = 8.07(111) + 265.45$$

$$T = 1161$$

Peak Hour of Adjacent Street Traffic

One Hour Between 7 and 9 a.m.

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

$$T = 0.67(111) + 5.59$$

$$T = 80$$

Peak Hour of Adjacent Street Traffic

One Hour Between 4 and 6 p.m.

$$\ln(T) = 0.92\ln(X) + 0.33$$

$$\ln(T) = 0.92\ln(111) + 0.33$$

$$T = 106$$

Time Period	Total Trips	Percent		Number	
		Enter	Exit	Enter	Exit
Weekday (24 hours)	1161	50%	50%	580	581
AM Peak Hour	80	27%	73%	22	58
PM Peak Hour	106	62%	38%	66	40



APPENDIX C | CAPACITY ANALYSES

HCM 7th TWSC
1: Norris Freeway (U.S. 441) & Pelleaux Road

Norris Freeway Subdivision TIS
Existing AM

Intersection						
Int Delay, s/veh	1.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	30	77	19	308	373	17
Future Vol, veh/h	30	77	19	308	373	17
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, #	0	-	-	0	0	-
Grade, %	-9	-	-	3	-3	-
Peak Hour Factor	84	84	79	79	89	89
Heavy Vehicles, %	2	2	8	8	8	8
Mvmt Flow	36	92	24	390	419	19
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	867	429	438	0	-	0
Stage 1	429	-	-	-	-	-
Stage 2	438	-	-	-	-	-
Critical Hdwy	4.62	5.32	4.18	-	-	-
Critical Hdwy Stg 1	3.62	-	-	-	-	-
Critical Hdwy Stg 2	3.62	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.272	-	-	-
Pot Cap-1 Maneuver	499	697	1090	-	-	-
Stage 1	814	-	-	-	-	-
Stage 2	810	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	485	697	1090	-	-	-
Mov Cap-2 Maneuver	485	-	-	-	-	-
Stage 1	791	-	-	-	-	-
Stage 2	810	-	-	-	-	-
Approach	EB	NB		SB		
HCM Ctrl Dly, s/v	12.29	0.49		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	105	-	621	-	-	
HCM Lane V/C Ratio	0.022	-	0.205	-	-	
HCM Ctrl Dly (s/v)	8.4	0	12.3	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.1	-	0.8	-	-	

HCM 7th TWSC
1: Norris Freeway (U.S. 441) & Pelleaux Road

Norris Freeway Subdivision TIS
Existing PM

Intersection						
Int Delay, s/veh	1.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	23	50	50	357	487	30
Future Vol, veh/h	23	50	50	357	487	30
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, #	0	-	-	0	0	-
Grade, %	-9	-	-	3	-3	-
Peak Hour Factor	87	87	86	86	83	83
Heavy Vehicles, %	2	2	8	8	8	8
Mvmt Flow	26	57	58	415	587	36
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1136	605	623	0	-	0
Stage 1	605	-	-	-	-	-
Stage 2	531	-	-	-	-	-
Critical Hdwy	4.62	5.32	4.18	-	-	-
Critical Hdwy Stg 1	3.62	-	-	-	-	-
Critical Hdwy Stg 2	3.62	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.272	-	-	-
Pot Cap-1 Maneuver	394	579	930	-	-	-
Stage 1	738	-	-	-	-	-
Stage 2	769	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	362	579	930	-	-	-
Mov Cap-2 Maneuver	362	-	-	-	-	-
Stage 1	678	-	-	-	-	-
Stage 2	769	-	-	-	-	-
Approach	EB	NB		SB		
HCM Ctrl Dly, s/v	13.92	1.12		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	221	-	487	-	-	
HCM Lane V/C Ratio	0.063	-	0.172	-	-	
HCM Ctrl Dly (s/v)	9.1	0	13.9	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.2	-	0.6	-	-	

HCM 7th TWSC
1: Norris Freeway (U.S. 441) & Pelleaux Road

Norris Freeway Subdivision TIS
2031 Background AM

Intersection						
Int Delay, s/veh	2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	36	94	23	375	454	21
Future Vol, veh/h	36	94	23	375	454	21
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, #	0	-	-	0	0	-
Grade, %	-9	-	-	3	-3	-
Peak Hour Factor	84	84	79	79	89	89
Heavy Vehicles, %	2	2	8	8	8	8
Mvmt Flow	43	112	29	475	510	24
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1055	522	534	0	-	0
Stage 1	522	-	-	-	-	-
Stage 2	533	-	-	-	-	-
Critical Hdwy	4.62	5.32	4.18	-	-	-
Critical Hdwy Stg 1	3.62	-	-	-	-	-
Critical Hdwy Stg 2	3.62	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.272	-	-	-
Pot Cap-1 Maneuver	424	632	1004	-	-	-
Stage 1	773	-	-	-	-	-
Stage 2	768	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	407	632	1004	-	-	-
Mov Cap-2 Maneuver	407	-	-	-	-	-
Stage 1	742	-	-	-	-	-
Stage 2	768	-	-	-	-	-
Approach	EB	NB		SB		
HCM Ctrl Dly, s/v	14.13	0.5		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	104	-	548	-	-	
HCM Lane V/C Ratio	0.029	-	0.282	-	-	
HCM Ctrl Dly (s/v)	8.7	0	14.1	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.1	-	1.2	-	-	

HCM 7th TWSC
1: Norris Freeway (U.S. 441) & Pelleaux Road

Norris Freeway Subdivision TIS
2031 Background PM

Intersection						
Int Delay, s/veh	1.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	28	61	61	434	593	36
Future Vol, veh/h	28	61	61	434	593	36
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, #	0	-	-	0	0	-
Grade, %	-9	-	-	3	-3	-
Peak Hour Factor	87	87	86	86	83	83
Heavy Vehicles, %	2	2	8	8	8	8
Mvmt Flow	32	70	71	505	714	43
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1383	736	758	0	-	0
Stage 1	736	-	-	-	-	-
Stage 2	647	-	-	-	-	-
Critical Hdwy	4.62	5.32	4.18	-	-	-
Critical Hdwy Stg 1	3.62	-	-	-	-	-
Critical Hdwy Stg 2	3.62	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.272	-	-	-
Pot Cap-1 Maneuver	316	504	827	-	-	-
Stage 1	685	-	-	-	-	-
Stage 2	721	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	279	504	827	-	-	-
Mov Cap-2 Maneuver	279	-	-	-	-	-
Stage 1	603	-	-	-	-	-
Stage 2	721	-	-	-	-	-
Approach	EB	NB		SB		
HCM Ctrl Dly, s/v	17	1.2		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	222	-	402	-	-	
HCM Lane V/C Ratio	0.086	-	0.255	-	-	
HCM Ctrl Dly (s/v)	9.8	0	17	-	-	
HCM Lane LOS	A	A	C	-	-	
HCM 95th %tile Q(veh)	0.3	-	1	-	-	

HCM 7th TWSC
1: Norris Freeway (U.S. 441) & Pelleaux Road

Norris Freeway Subdivision TIS
2031 Combined AM

Intersection						
Int Delay, s/veh	3.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	50	126	35	375	545	27
Future Vol, veh/h	50	126	35	375	545	27
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, #	0	-	-	0	0	-
Grade, %	-9	-	-	3	-3	-
Peak Hour Factor	84	84	79	79	89	89
Heavy Vehicles, %	2	2	8	8	8	8
Mvmt Flow	60	150	44	475	612	30
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1191	628	643	0	-	0
Stage 1	628	-	-	-	-	-
Stage 2	563	-	-	-	-	-
Critical Hdwy	4.62	5.32	4.18	-	-	-
Critical Hdwy Stg 1	3.62	-	-	-	-	-
Critical Hdwy Stg 2	3.62	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.272	-	-	-
Pot Cap-1 Maneuver	376	565	914	-	-	-
Stage 1	728	-	-	-	-	-
Stage 2	755	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	351	565	914	-	-	-
Mov Cap-2 Maneuver	351	-	-	-	-	-
Stage 1	680	-	-	-	-	-
Stage 2	755	-	-	-	-	-
Approach	EB	NB		SB		
HCM Ctrl Dly, s/v	18.1	0.78		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	154	-	482	-	-	
HCM Lane V/C Ratio	0.048	-	0.435	-	-	
HCM Ctrl Dly (s/v)	9.1	0	18.1	-	-	
HCM Lane LOS	A	A	C	-	-	
HCM 95th %tile Q(veh)	0.2	-	2.2	-	-	

Intersection						
Int Delay, s/veh	1.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	176	4	18	44	12	26
Future Vol, veh/h	176	4	18	44	12	26
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, %	-9	-	-	9	-15	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	191	4	20	48	13	28
Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	0	0	196	0	280	193
Stage 1	-	-	-	-	193	-
Stage 2	-	-	-	-	87	-
Critical Hdwy	-	-	4.12	-	3.42	4.72
Critical Hdwy Stg 1	-	-	-	-	2.42	-
Critical Hdwy Stg 2	-	-	-	-	2.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1377	-	896	919
Stage 1	-	-	-	-	986	-
Stage 2	-	-	-	-	1007	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1377	-	883	919
Mov Cap-2 Maneuver	-	-	-	-	883	-
Stage 1	-	-	-	-	986	-
Stage 2	-	-	-	-	992	-
Approach	EB	WB		NB		
HCM Ctrl Dly, s/v	0	2.22		9.16		
HCM LOS				A		
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	908	-	-	523	-	
HCM Lane V/C Ratio	0.046	-	-	0.014	-	
HCM Ctrl Dly (s/v)	9.2	-	-	7.7	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0.1	-	-	0	-	

HCM 7th TWSC
1: Norris Freeway (U.S. 441) & Pelleaux Road

Norris Freeway Subdivision TIS
2031 Combined PM

Intersection						
Int Delay, s/veh	2.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	38	83	97	434	593	53
Future Vol, veh/h	38	83	97	434	593	53
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, #	0	-	-	0	0	-
Grade, %	-9	-	-	3	-3	-
Peak Hour Factor	87	87	86	86	83	83
Heavy Vehicles, %	2	2	8	8	8	8
Mvmt Flow	44	95	113	505	714	64

Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1477	746	778	0	-	0
Stage 1	746	-	-	-	-	-
Stage 2	730	-	-	-	-	-
Critical Hdwy	4.62	5.32	4.18	-	-	-
Critical Hdwy Stg 1	3.62	-	-	-	-	-
Critical Hdwy Stg 2	3.62	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.272	-	-	-
Pot Cap-1 Maneuver	291	498	812	-	-	-
Stage 1	681	-	-	-	-	-
Stage 2	687	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	235	498	812	-	-	-
Mov Cap-2 Maneuver	235	-	-	-	-	-
Stage 1	549	-	-	-	-	-
Stage 2	687	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	20.6	1.85	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	329	-	368	-	-
HCM Lane V/C Ratio	0.139	-	0.378	-	-
HCM Ctrl Dly (s/v)	10.1	0	20.6	-	-
HCM Lane LOS	B	A	C	-	-
HCM 95th %tile Q(veh)	0.5	-	1.7	-	-

Intersection						
Int Delay, s/veh	2.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	121	13	53	97	8	32
Future Vol, veh/h	121	13	53	97	8	32
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, %	-9	-	-	9	-15	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	132	14	58	105	9	35
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	146	0	359	139
Stage 1	-	-	-	-	139	-
Stage 2	-	-	-	-	221	-
Critical Hdwy	-	-	4.12	-	3.42	4.72
Critical Hdwy Stg 1	-	-	-	-	2.42	-
Critical Hdwy Stg 2	-	-	-	-	2.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1436	-	863	964
Stage 1	-	-	-	-	997	-
Stage 2	-	-	-	-	981	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1436	-	826	964
Mov Cap-2 Maneuver	-	-	-	-	826	-
Stage 1	-	-	-	-	997	-
Stage 2	-	-	-	-	939	-
Approach	EB		WB		NB	
HCM Ctrl Dly, s/v	0		2.69		9.05	
HCM LOS	A					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	933	-	-	636	-	
HCM Lane V/C Ratio	0.047	-	-	0.04	-	
HCM Ctrl Dly (s/v)	9	-	-	7.6	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-	

HCM 7th TWSC
1: Norris Freeway (U.S. 441) & Pelleaux Road

Norris Freeway Subdivision TIS
2031 Combined AM

Intersection						
Int Delay, s/veh	3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	50	126	35	375	545	27
Future Vol, veh/h	50	126	35	375	545	27
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	-	-	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-9	-	-	3	-3	-
Peak Hour Factor	84	84	79	79	89	89
Heavy Vehicles, %	2	2	8	8	8	8
Mvmt Flow	60	150	44	475	612	30

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	1176	612	643
Stage 1	612	-	-
Stage 2	563	-	-
Critical Hdwy	4.62	5.32	4.18
Critical Hdwy Stg 1	3.62	-	-
Critical Hdwy Stg 2	3.62	-	-
Follow-up Hdwy	3.518	3.318	2.272
Pot Cap-1 Maneuver	381	574	914
Stage 1	735	-	-
Stage 2	755	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	362	574	914
Mov Cap-2 Maneuver	362	-	-
Stage 1	699	-	-
Stage 2	755	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	17.61	0.78	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	914	-	492	-	-
HCM Lane V/C Ratio	0.048	-	0.425	-	-
HCM Ctrl Dly (s/v)	9.1	-	17.6	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	2.1	-	-

HCM 7th TWSC
1: Norris Freeway (U.S. 441) & Pelleaux Road

Norris Freeway Subdivision TIS
2031 Combined PM

Intersection						
Int Delay, s/veh	2.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	38	83	97	434	593	53
Future Vol, veh/h	38	83	97	434	593	53
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	-	-	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-9	-	-	3	-3	-
Peak Hour Factor	87	87	86	86	83	83
Heavy Vehicles, %	2	2	8	8	8	8
Mvmt Flow	44	95	113	505	714	64

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1445	714	778	0	-	0
Stage 1	714	-	-	-	-	-
Stage 2	730	-	-	-	-	-
Critical Hdwy	4.62	5.32	4.18	-	-	-
Critical Hdwy Stg 1	3.62	-	-	-	-	-
Critical Hdwy Stg 2	3.62	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.272	-	-	-
Pot Cap-1 Maneuver	299	515	812	-	-	-
Stage 1	693	-	-	-	-	-
Stage 2	687	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	258	515	812	-	-	-
Mov Cap-2 Maneuver	258	-	-	-	-	-
Stage 1	597	-	-	-	-	-
Stage 2	687	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	19.14	1.85	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	812	-	392	-	-
HCM Lane V/C Ratio	0.139	-	0.355	-	-
HCM Ctrl Dly (s/v)	10.1	-	19.1	-	-
HCM Lane LOS	B	-	C	-	-
HCM 95th %tile Q(veh)	0.5	-	1.6	-	-



APPENDIX D | TURN LANE WARRANT EVALUATIONS

TABLE 4A KNOX COUNTY LEFT-TURN LANE VOLUME THRESHOLDS FOR 2-LANE ROADWAYS WITH A PREVAILING SPEED OF 0 TO 35 MPH	Project No: 02003-0001.000 Project Name: Norris Freeway Subdivision TIS Notes:
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(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	300	235	185	145	120	100
150 - 199	245	200	160	130	110	90
200 - 249	205	170	140	115	100	80
250 - 299	175	150	125	105	90	70
300 - 349	155	135	110	95	80	65
350 - 399	135	120	100	85	70	60
400 - 449	120	105	90	75	65	55
450 - 499	105	90	80	70	60	50
500 - 549	95	80	70	65	55	50
550 - 599	85	70	65	60	50	45
600 - 649	75	65	60	55	45	40
650 - 699	70	60	55	50	40	35
700 - 749	65	55	50	45	35	30
750 or More	60	50	45	40	35	30

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= / > 600
100 - 149	100	80	70	60	55	50
150 - 199	90	75	65	55	50	45
200 - 249	80	72	60	55	50	45
250 - 299	70	65	55	50	45	40
300 - 349	65	60	50	50	45	40
350 - 399	60	55	50	45	40	40
400 - 449	55	50	45	45	40	35
450 - 499	50	45	45	40	35	35
500 - 549	50	45	40	40	35	35
550 - 599	45	40	40	35	35	35
600 - 649	40	35	35	35	35	30
650 - 699	35	35	35	30	30	30
700 - 749	30	30	30	30	30	30
750 or More	30	30	30	30	30	30

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

Intersection	Time Period	Opposing Volume	Through Volume	Left-Turn Volume	Warrant Threshold	Left-Turn Lane Warranted (Yes / No)
Pelleaux Road at Road "A"	2031 AM	179	44	17	245	No
Pelleaux Road at Road "A"	2031 PM	133	98	50	300	No

TABLE 4B KNOX COUNTY RIGHT-TURN LANE VOLUME THRESHOLDS FOR 2-LANE ROADWAYS WITH A PREVAILING SPEED OF 0 TO 35 MPH	Project No: 02003-0001.000 Project Name: Norris Freeway Subdivision TIS Notes:
--	---

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
300 - 349					Yes	Yes
350 - 399				Yes	Yes	Yes
400 - 449			Yes	Yes	Yes	Yes
450 - 499			Yes	Yes	Yes	Yes
500 - 549		Yes	Yes	Yes	Yes	Yes
550 - 599		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 - 599	= / > 600
Fewer Than 25						
25 - 49						Yes
50 - 99					Yes	Yes
100 - 149				Yes	Yes	Yes
150 - 199			Yes	Yes	Yes	Yes
200 - 249		Yes	Yes	Yes	Yes	Yes
250 - 299	Yes	Yes	Yes	Yes	Yes	Yes
300 - 349	Yes	Yes	Yes	Yes	Yes	Yes
350 - 399	Yes	Yes	Yes	Yes	Yes	Yes
400 - 449	Yes	Yes	Yes	Yes	Yes	Yes
450 - 499	Yes	Yes	Yes	Yes	Yes	Yes
500 - 549	Yes	Yes	Yes	Yes	Yes	Yes
550 - 599	Yes	Yes	Yes	Yes	Yes	Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

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

Intersection	Time Period	Through Volume	Right-Turn Volume	Right-Turn Lane Warranted (Yes / No)
Pelleaux Road at Road "A"	2031 AM	175	4	No
Pelleaux Road at Road "A"	2031 PM	120	13	No

2026 Existing Norris Freeway (U.S. 441) at Pelleaux Road:

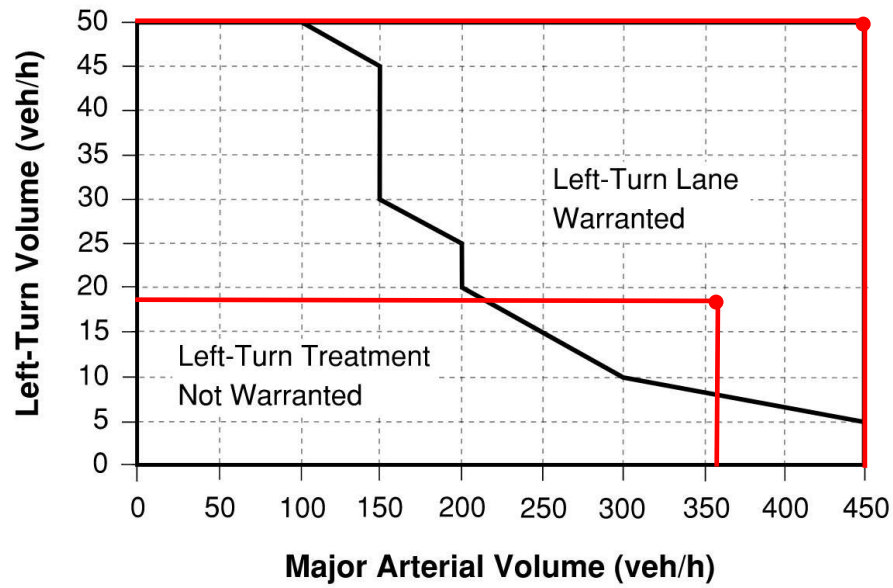
Major Road Volume AM: 359 Veh

Left Turn Volume AM: 19 Veh

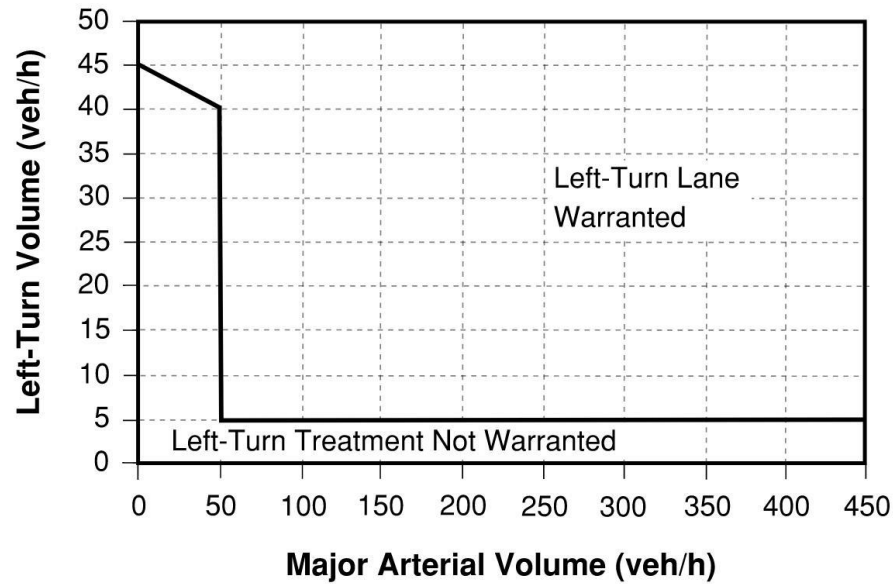
Major Road Volume PM: 462 Veh

Left Turn Volume PM: 50 Veh

APPENDIX B | TDOT HIGHWAY SYSTEM ACCESS M



(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)

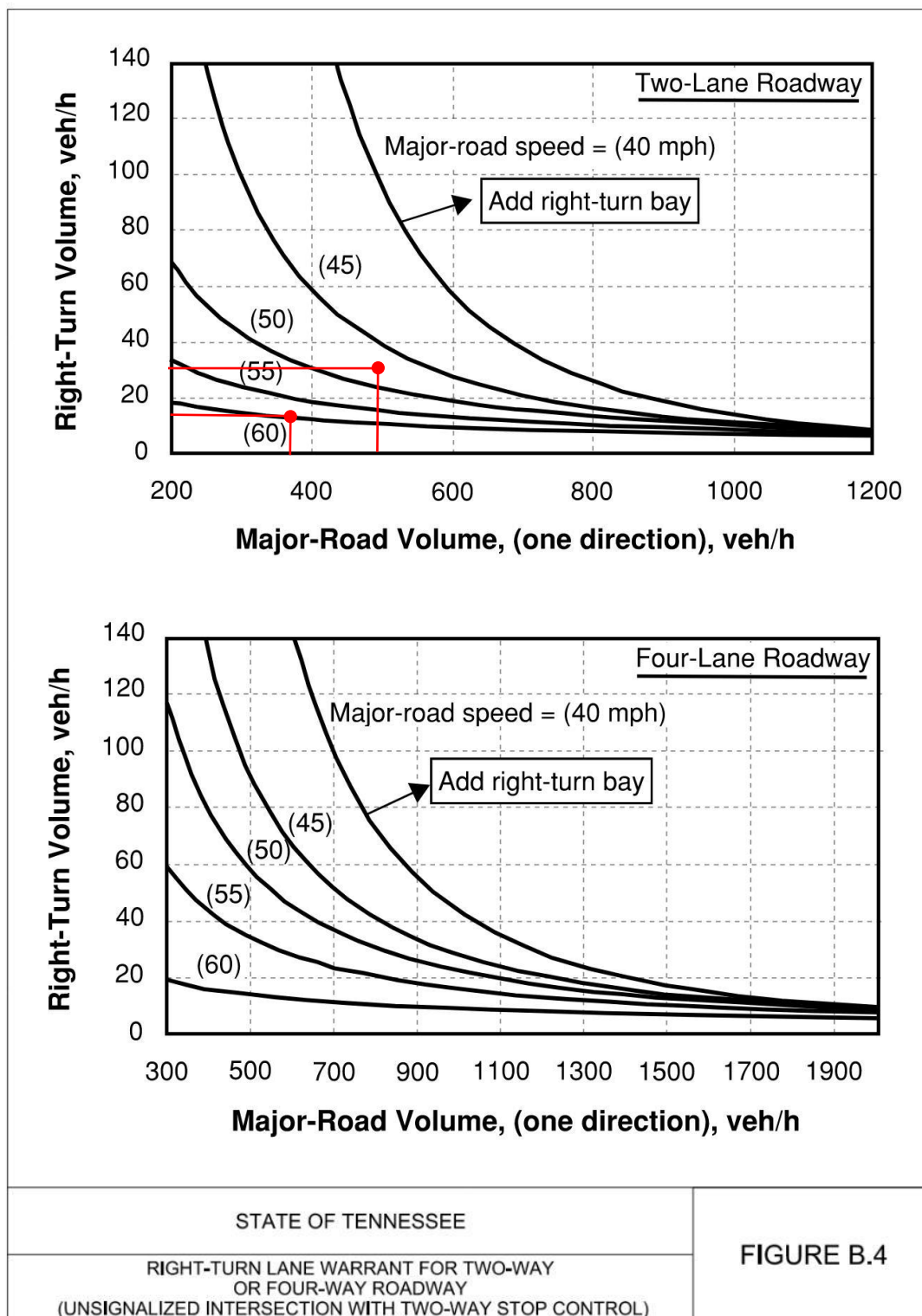


Figure B.4: Right-Turn Lane Warrant for Two-Way or Four-Way Roadway (Unsignalized Intersection with Two-Way Stop Control)

2031 Background Norris Freeway (U.S. 441) at Pelleaux Road:

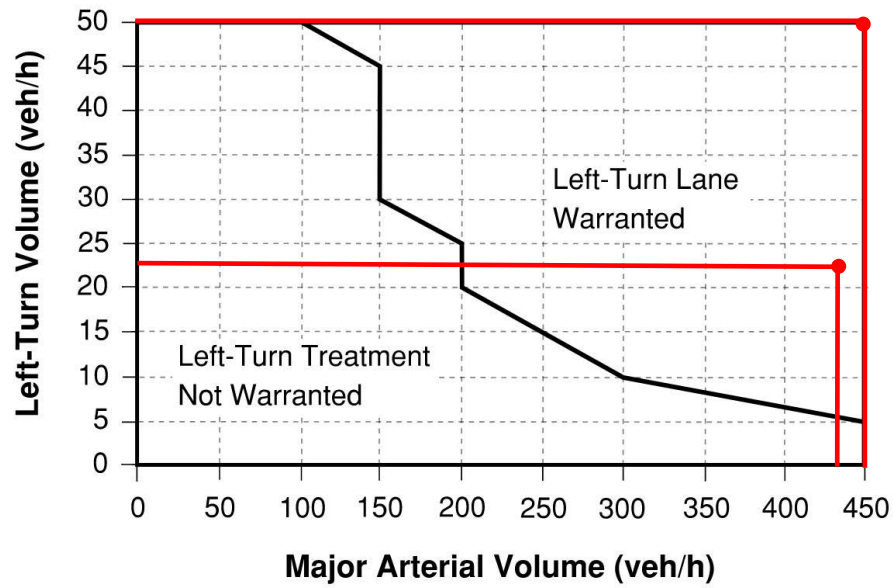
Major Road Volume AM: 437 Veh

Left Turn Volume AM: 23 Veh

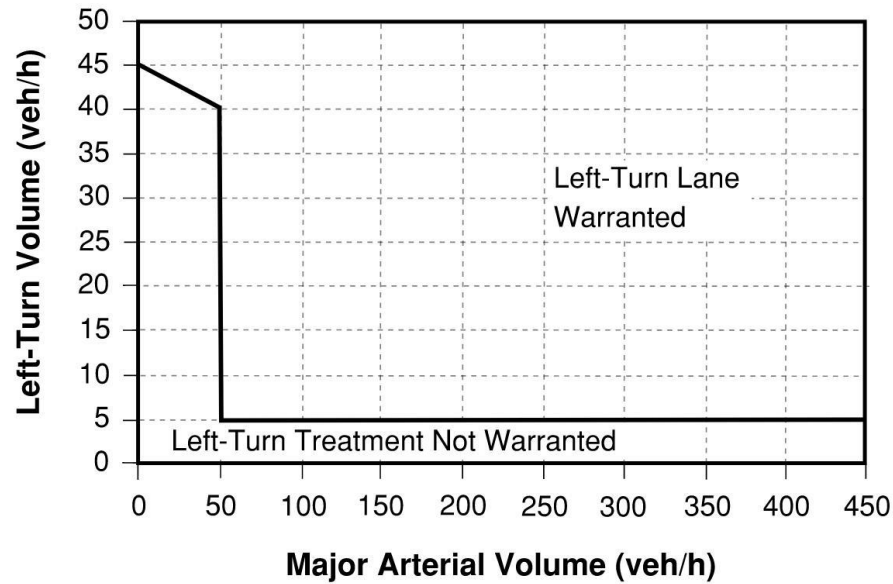
Major Road Volume PM: 562 Veh

Left Turn Volume PM: 61 Veh

APPENDIX B | TDOT HIGHWAY SYSTEM ACC



(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)

2031 Background Norris Freeway (U.S. 441) at Pelleaux Road:

Major Road Volume AM: 454 Veh

Right Turn Volume AM: 21 Veh

Major Road Volume PM: 593 Veh

Right Turn Volume PM: 36 Veh

APPENDIX B | TDOT HIGHWAY SYSTEM AC

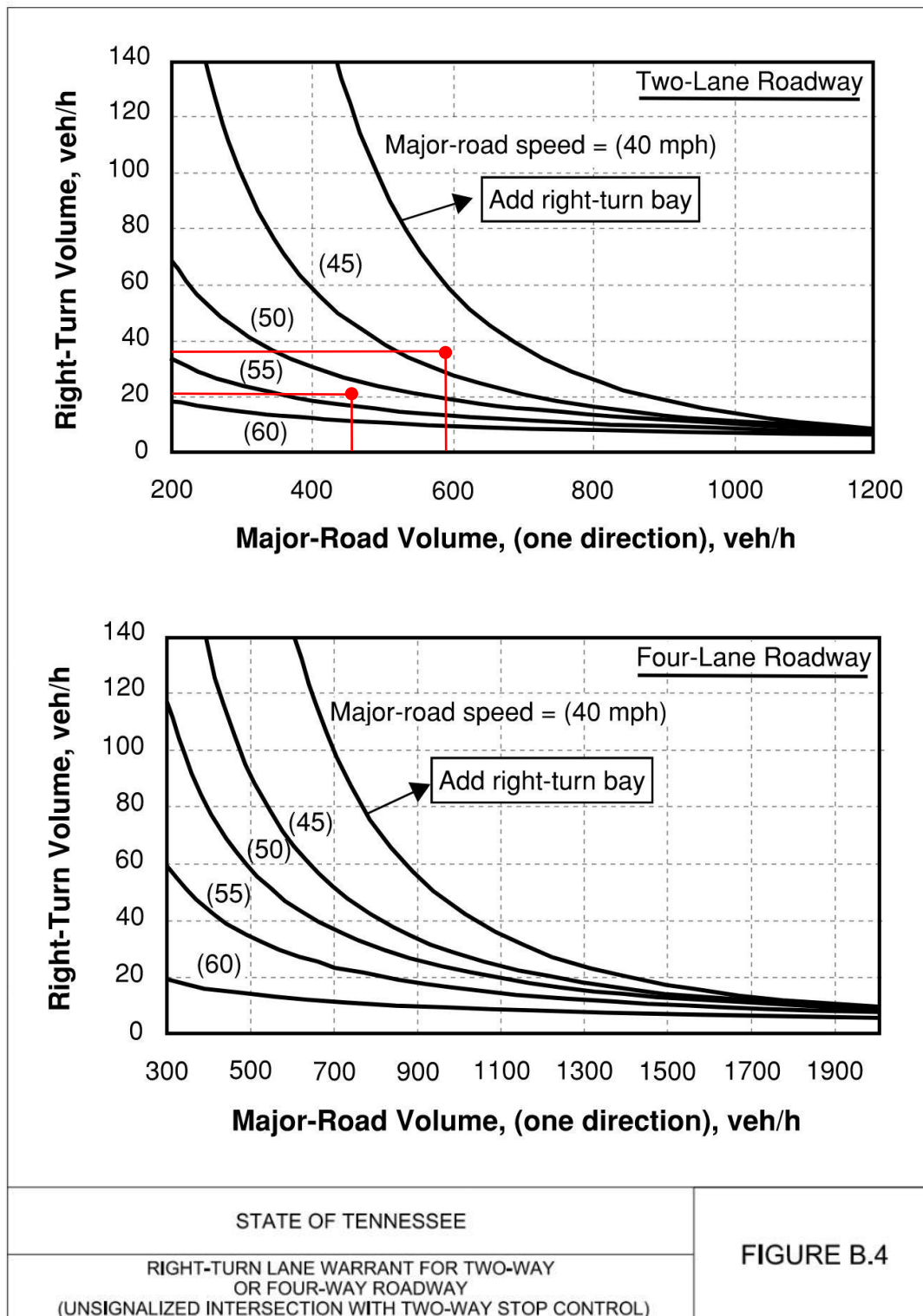


Figure B.4: Right-Turn Lane Warrant for Two-Way or Four-Way Roadway (Unsignalized Intersection with Two-Way Stop Control)

2031 Combined Norris Freeway (U.S. 441) at Pelleaux Road:

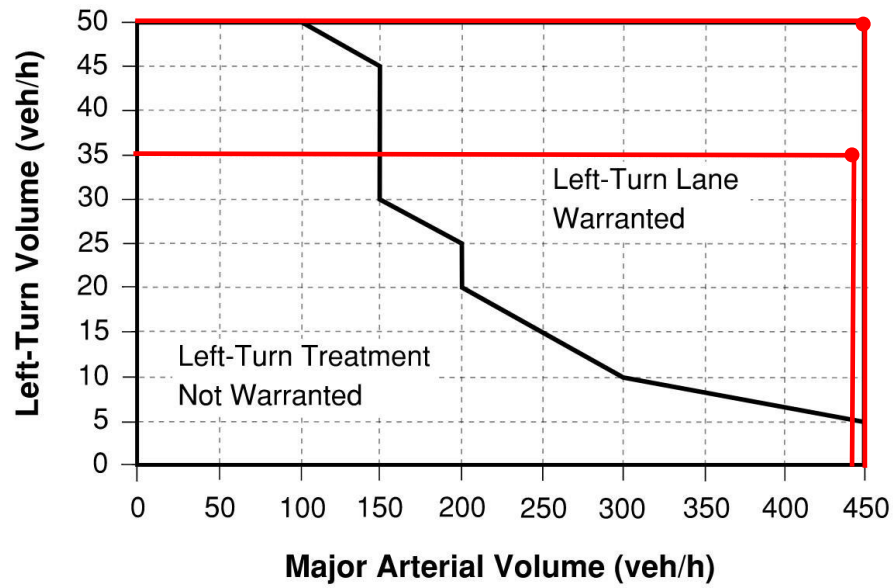
Major Road Volume AM: 446 Veh

Left Turn Volume AM: 35 Veh

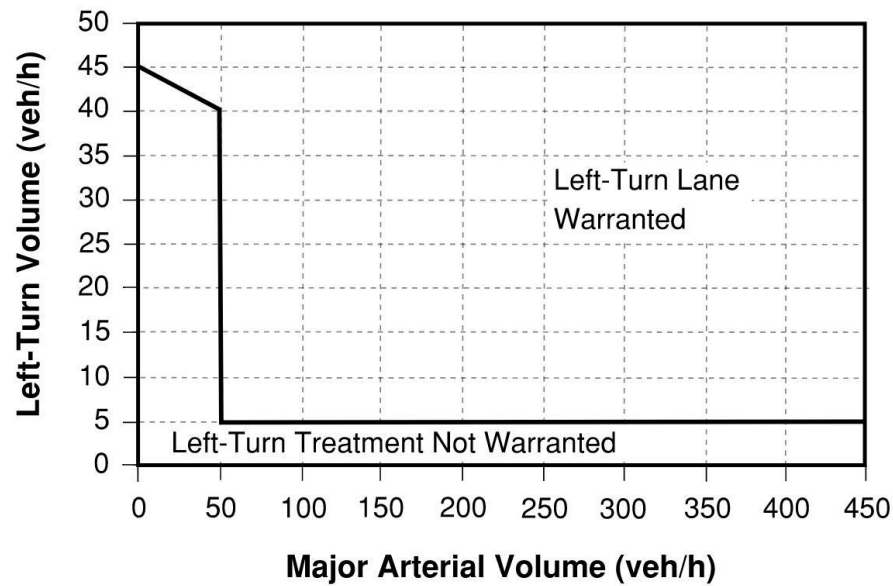
Major Road Volume PM: 589 Veh

Left Turn Volume PM: 97 Veh

APPENDIX B | TDOT HIGHWAY SYSTEM ACC



(a) Three-Leg Intersections



(b) Four-Leg Intersections

STATE OF TENNESSEE

LEFT-TURN LANE WARRANT FOR URBAN AND
SUBURBAN ARTERIALS (UNSIGNALIZED)

FIGURE B.1

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

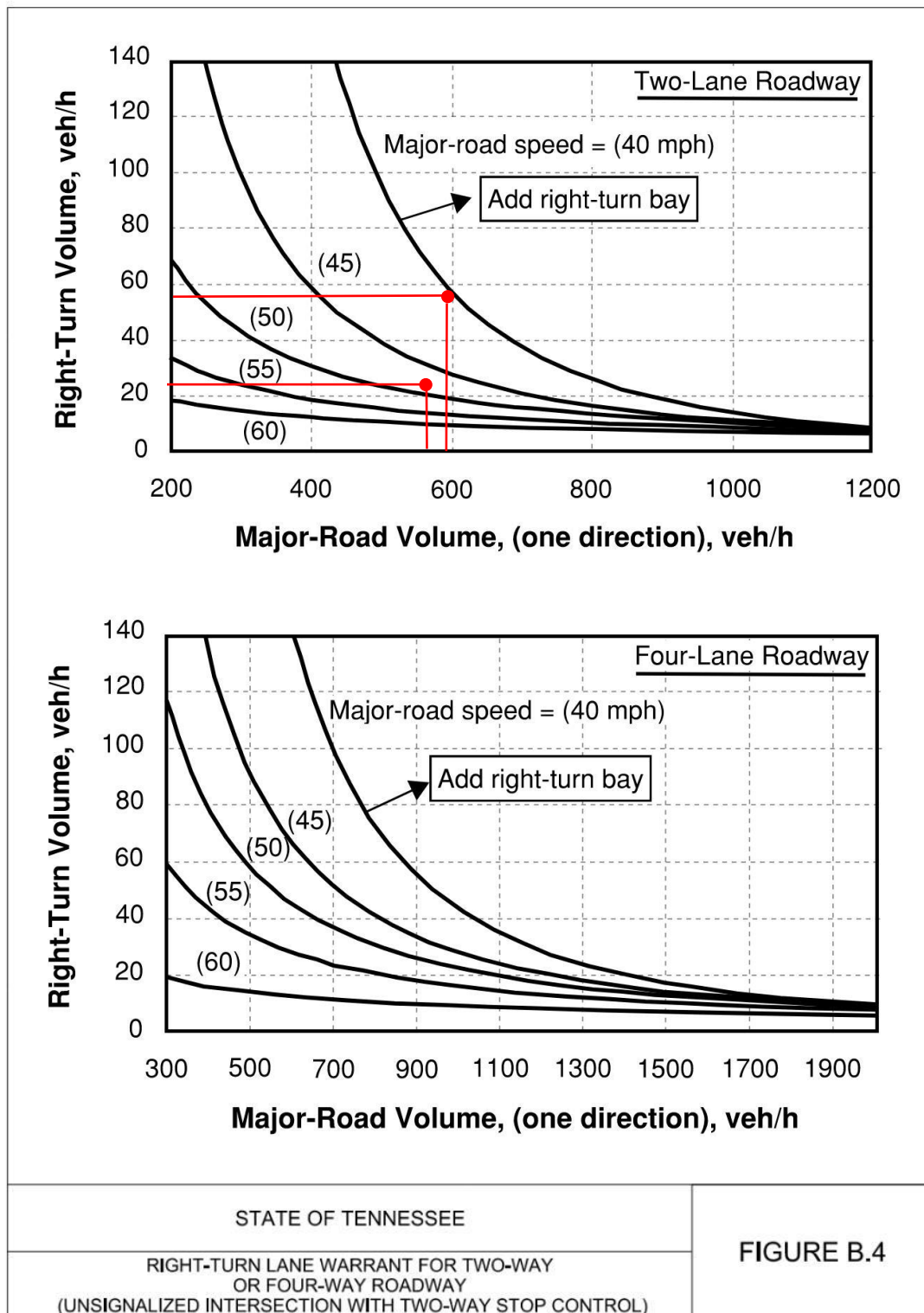


Figure B.4: Right-Turn Lane Warrant for Two-Way or Four-Way Roadway (Unsignalized Intersection with Two-Way Stop Control)

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

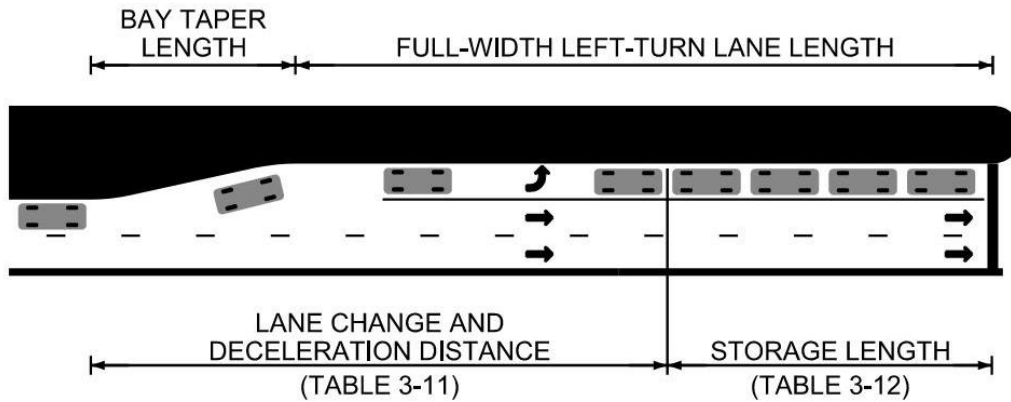


Figure 3-20: Functional Area, for an Exclusive Turn Lane.²⁷

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).

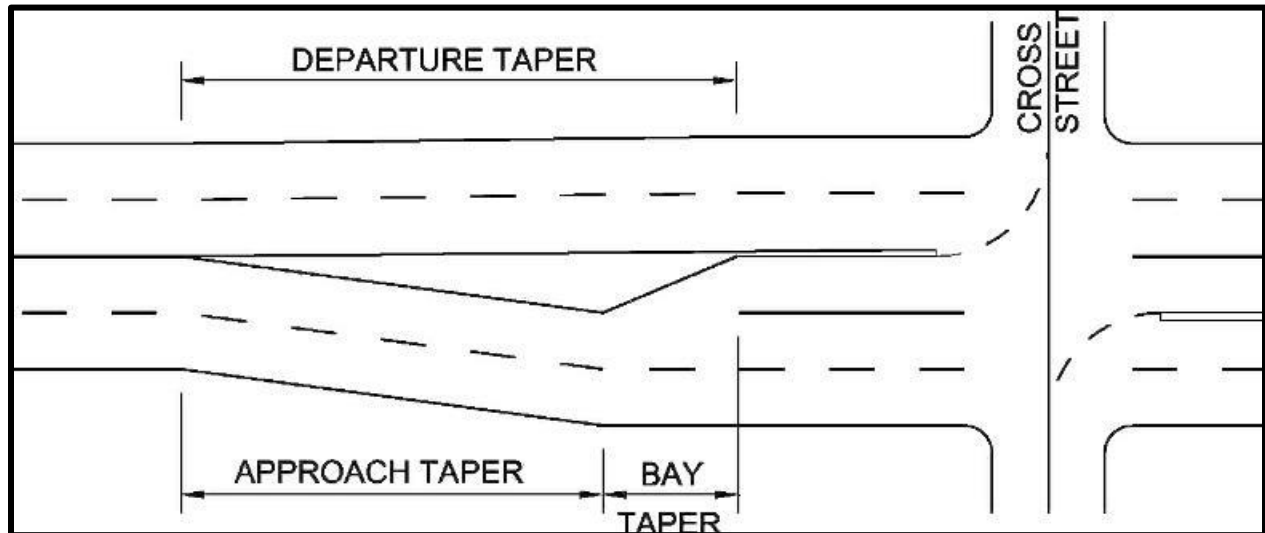


Figure 3-21: Turning Lane Taper Terminology

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

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

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

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

$$L = (12 \text{ feet})(50 \text{ mph}) / 3$$

$$L = 200 \text{ ft}$$

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.