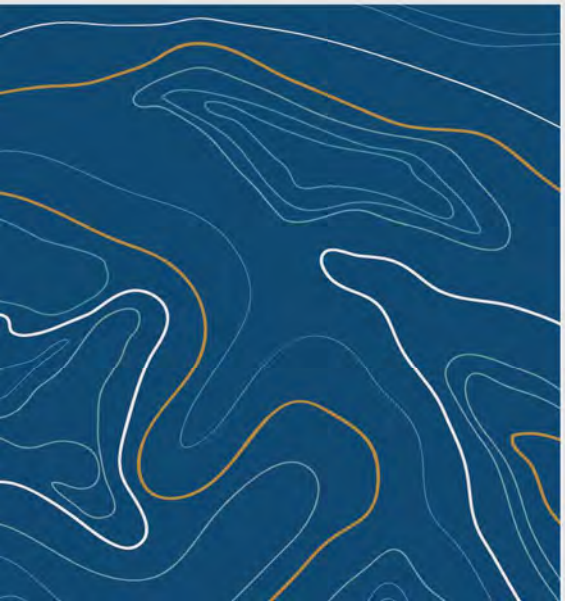
11-SD-26-C / 11-G-26-DP
TIS Version 2
10/19/2026

ARDURRA

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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October 16
2026

TABLE OF CONTENTS

SECTION 1	EXECUTIVE SUMMARY	1
SECTION 2	INTRODUCTION & PURPOSE OF STUDY	2
SECTION 3	EXISTING CONDITIONS	3
SECTION 4	BACKGROUND CONDITIONS	8
SECTION 5	FUTURE CONDITIONS	10
SECTION 6	EVALUATIONS	15
SECTION 7	CONCLUSIONS & RECOMMENDATIONS	19
SECTION 8	APPENDIX	20

FIGURES

FIGURE 1	LOCATION MAP	2
FIGURE 2	EXISTING SITE CONDITIONS	4
FIGURE 3	2026 EXISTING TRAFFIC VOLUMES	6
FIGURE 4	2031 BACKGROUND TRAFFIC VOLUMES	9
FIGURE 5	TRIP DISTRIBUTION PATTERNS	12
FIGURE 6	TRIP ASSIGNMENT	13
FIGURE 7	2031 COMBINED TRAFFIC VOLUMES	14
FIGURE 8	SIGHT DISTANCE ASSESSMENT	18

TABLES

TABLE 1	ANNUAL AVERAGE DAILY TRAFFIC COUNT SUMMARY	5
TABLE 2	TRIP GENERATION SUMMARY	10
TABLE 3	CAPACITY ANALYSIS SUMMARY	15

APPENDICES

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

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. A northbound left turn lane on Norris Freeway (U.S. 441) is warranted per the TDOT Highway System Access Manual during existing, background and combined conditions. Based on the results of the capacity analysis and existing site constraints including the nearby creek crossing, a left turn lane is not recommended to be constructed as a part of the Norris Freeway Subdivision.

3. A southbound right turn lane on Norris Freeway (U.S. 441) is warranted per the TDOT Highway System Access Manual during combined conditions. Based on the results of the capacity analysis and existing site constraints including the nearby creek crossing, a right turn lane is not recommended.

4. Any future improvements need to be reviewed, coordinated and approved by Knox County Engineering & Public Works and 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 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.

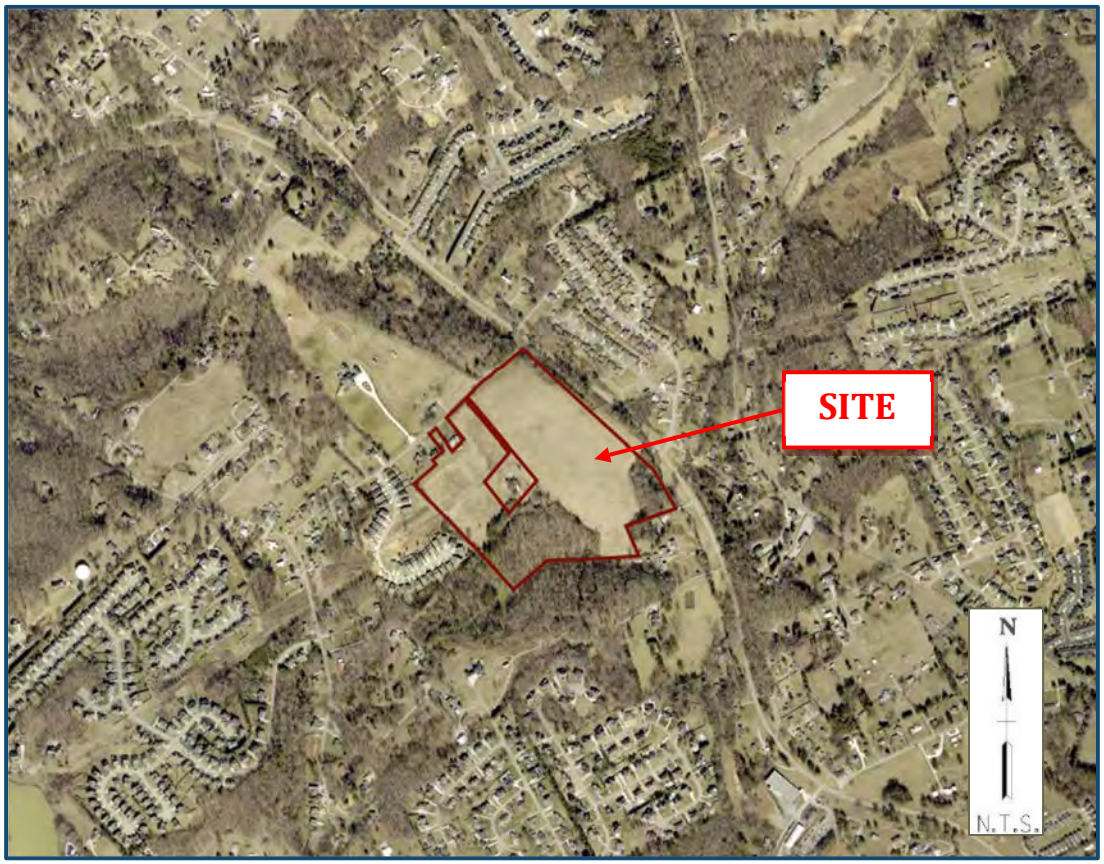

FIGURE 2
EXISTING SITE CONDITIONS

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

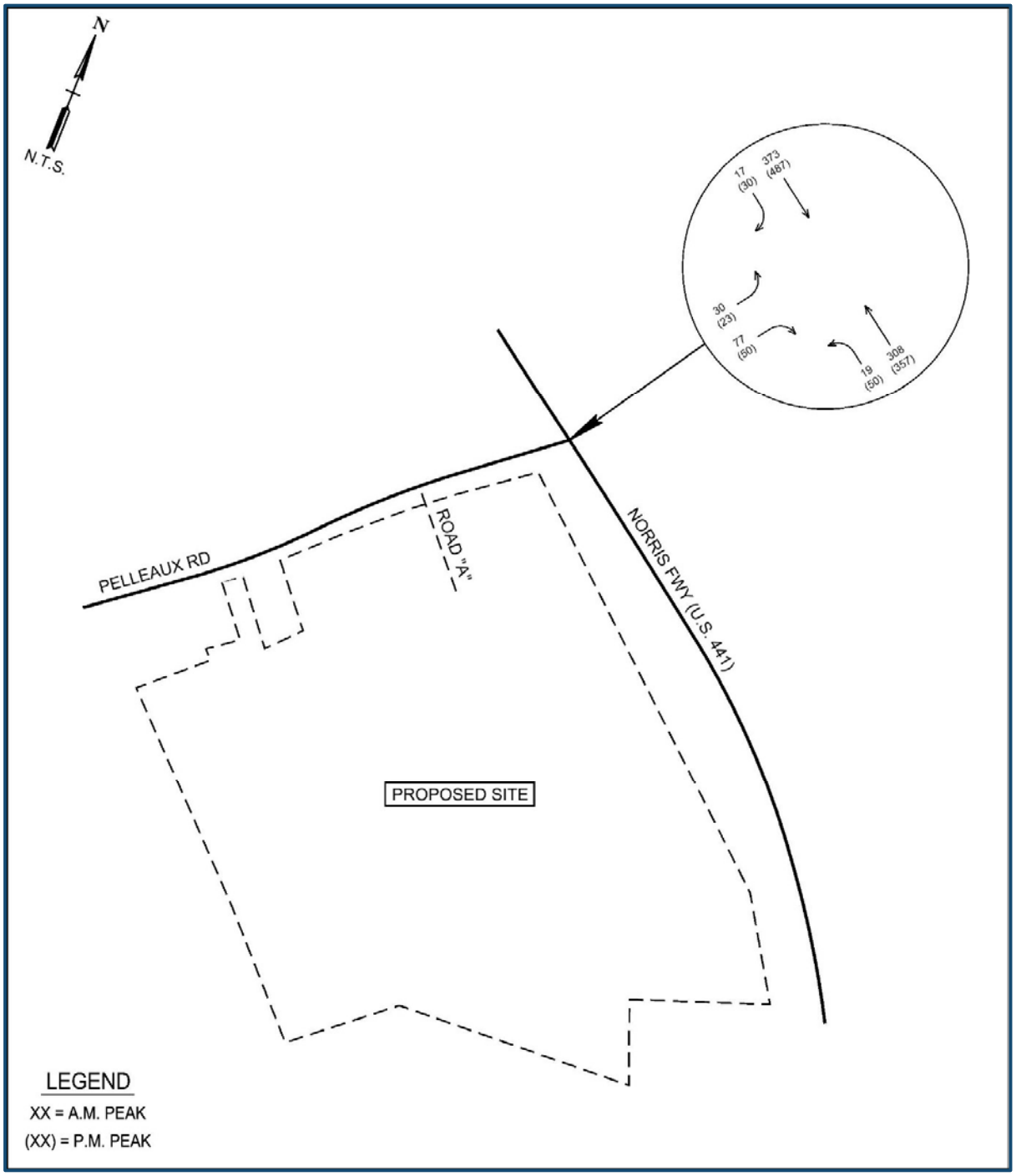

FIGURE 3
2026 EXISTING TRAFFIC VOLUMES

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.

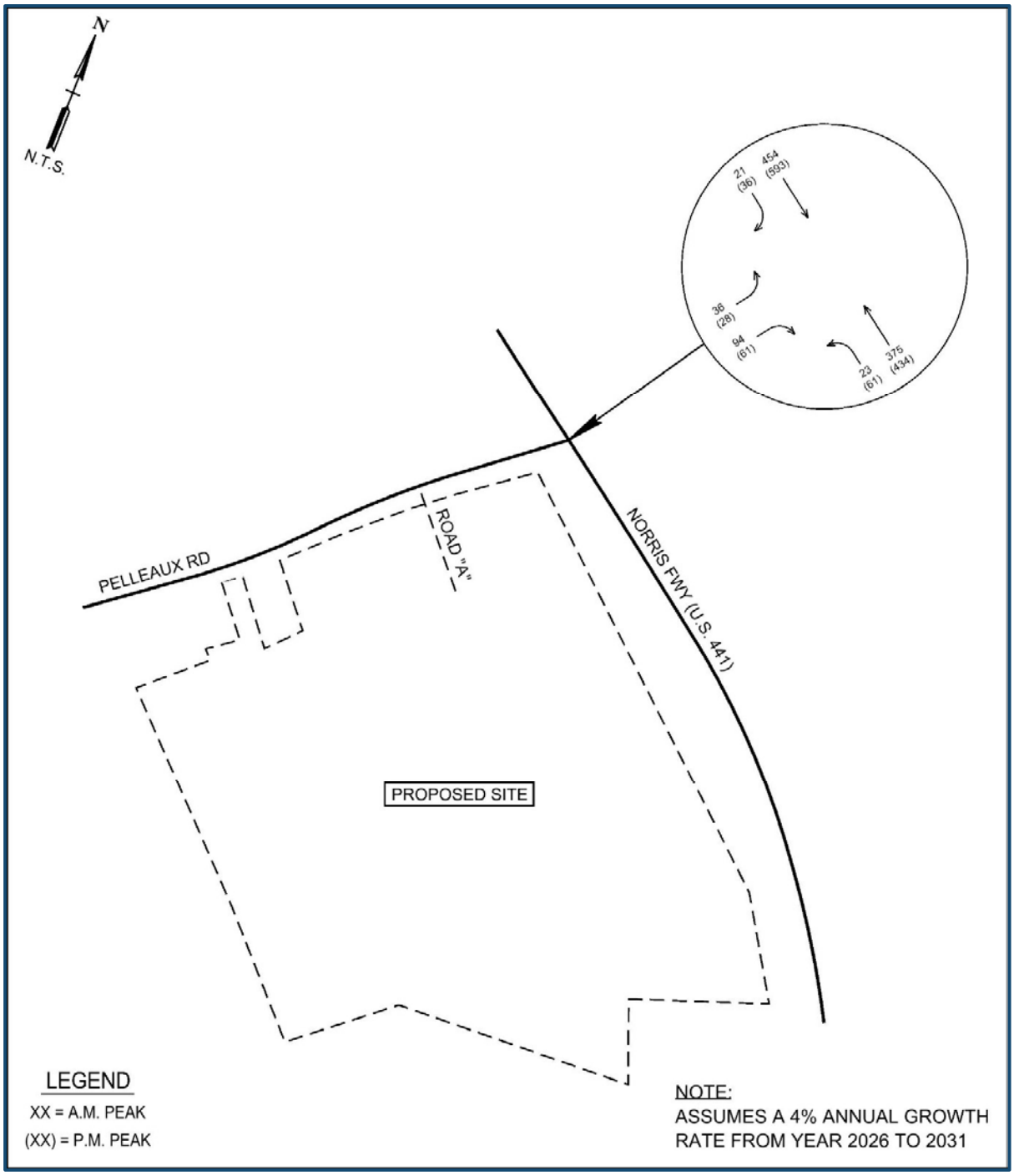

FIGURE 4
2031 BACKGROUND TRAFFIC VOLUMES

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			581	58	40
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.

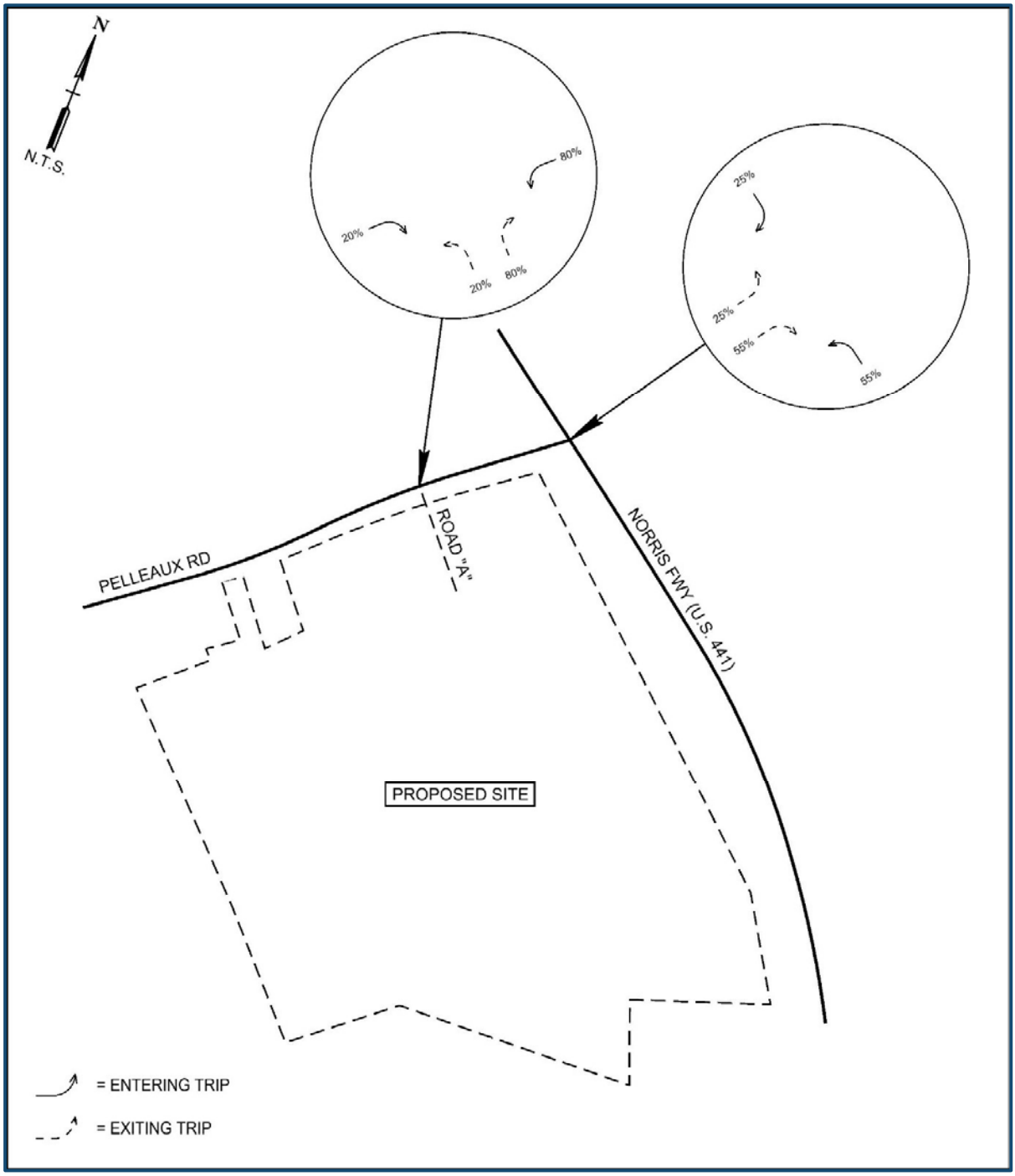

FIGURE 5
TRIP DISTRIBUTION PATTERNS

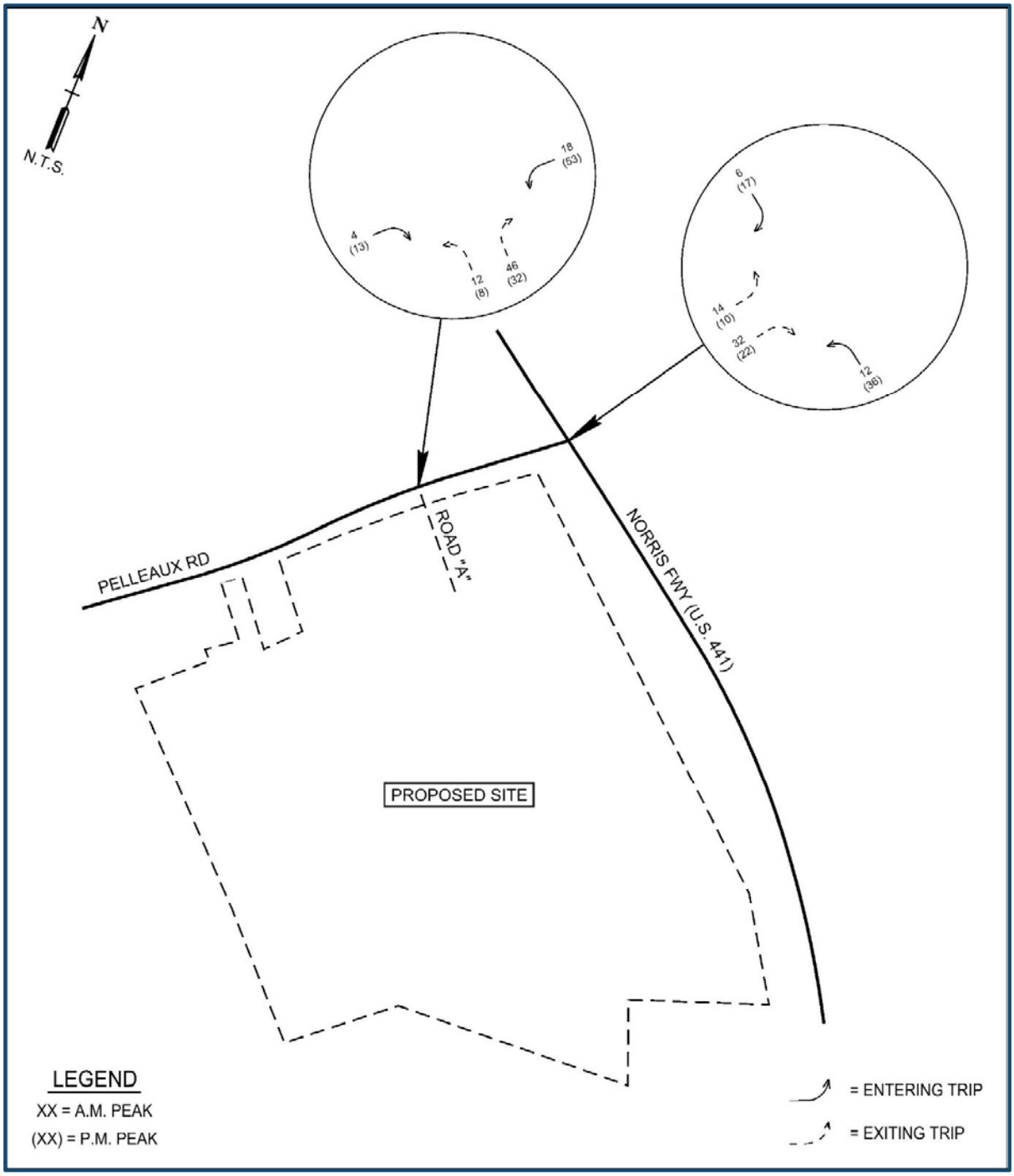

FIGURE 6
TRIP ASSIGNMENT

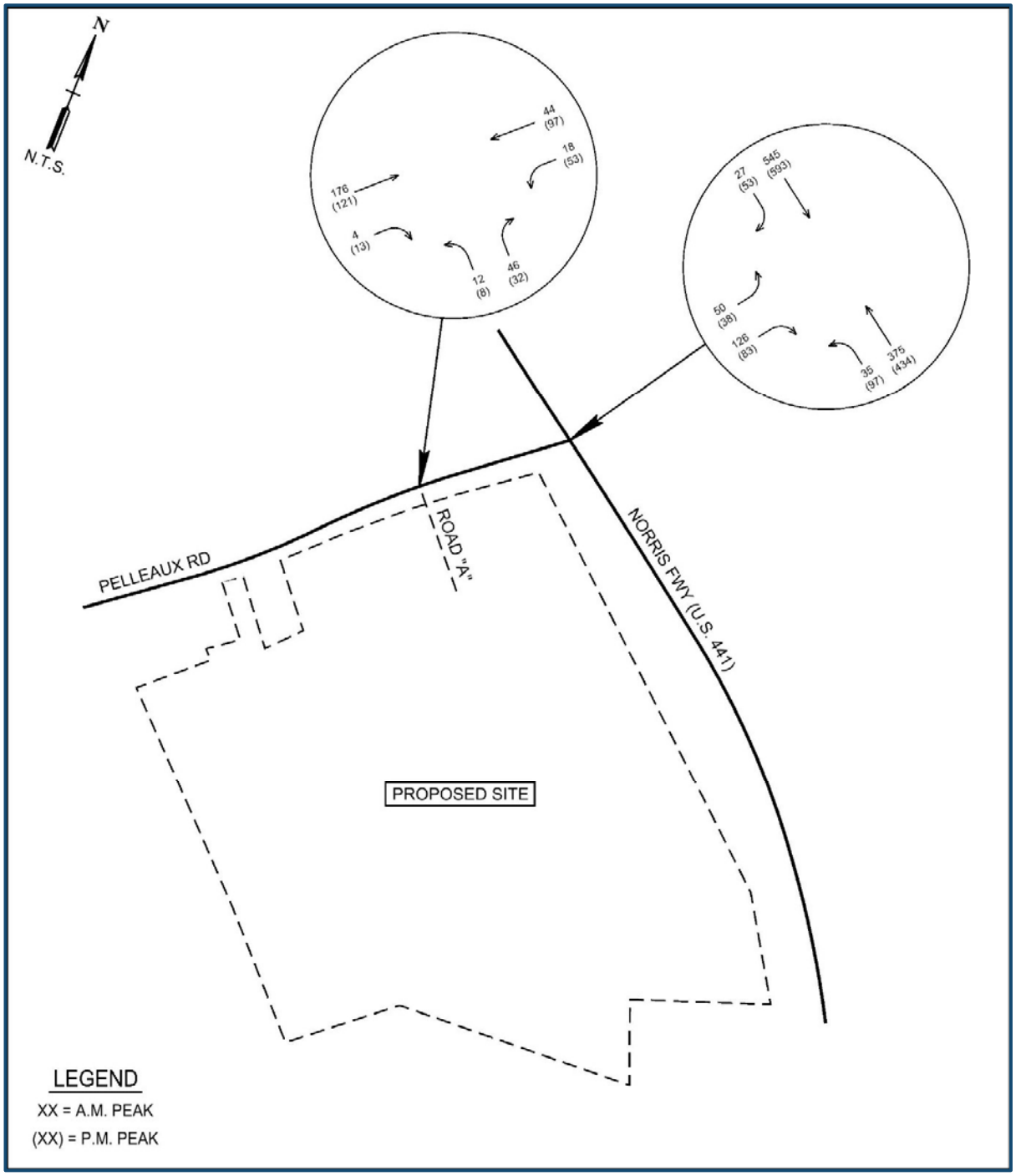

FIGURE 7
2031 COMBINED TRAFFIC VOLUMES

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

[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 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.

The recommended bay taper length for a roadway with a design speed of 50 mph and a lane width of 12 feet is 200 feet.

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. A northbound left turn lane on Norris Freeway (U.S. 441) is warranted per the TDOT Highway System Access Manual during existing, background and combined conditions. Based on the results of the capacity analysis and existing site constraints including the nearby creek crossing, a left turn lane is not recommended to be constructed as a part of the Norris Freeway Subdivision.

3. A southbound right turn lane on Norris Freeway (U.S. 441) is warranted per the TDOT Highway System Access Manual during combined conditions. Based on the results of the capacity analysis and existing site constraints including the nearby creek crossing, a right turn lane is not recommended.

4. Any future improvements need to be reviewed, coordinated and approved by Knox County Engineering & Public Works and 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

PELLEAUX ROAD
ROAD B'
ROAD 'C' (PRIVATE)
TURNAROUND
ROAD 'D'
ROAD 'E'
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Prepared by National Data & Surveying Services

US 441/Norris Fwy & Pelleaux Rd

Peak Hour Turning Movement Count

ID: 26-190040-001
City: Knoxville

Day: Tuesday
Date: 9/1/2026

PEAK HOURS	
AM	07:15 AM - 08:15 AM
NOON	01:00 PM - 02:00 PM
PM	04:45 PM - 05:45 PM

COUNT PERIODS	
AM	7:00 AM - 10:00 AM
NOON	10:00 AM - 02:00 PM
PM	2:00 PM - 07:00 PM

SOUTHBOUND (US 441/Norris Fwy)

AM	17	373	0	0	338	AM
NOON	12	239	0	0	278	NOON
PM	30	487	0	0	380	PM

EASTBOUND (Pelleaux Rd)

AM	NOON	PM	
36	43	80	
0	0	0	0
30	14	23	0
0	0	0	1
77	28	50	0

WESTBOUND (Pelleaux Rd)

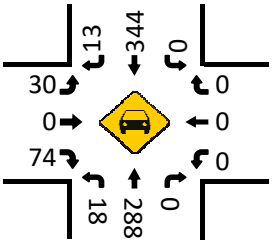
PM	NOON	AM	
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	

NORTHBOUND (US 441/Norris Fwy)

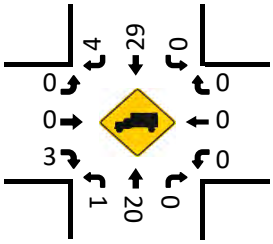
PM	537	0	50	357	0	PM
NOON	267	0	31	264	0	NOON
AM	450	0	19	308	0	AM

CONTROL			
1-Way Stop(EB)			
TEV	824	588	997
	AM	NOON	PM
PHF	0.94	0.90	0.86

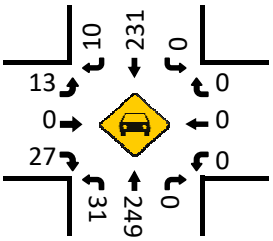
Cars (AM)



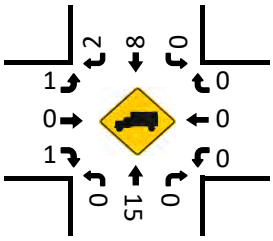
HT (AM)



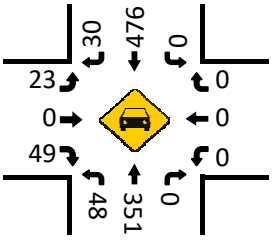
Cars (NOON)



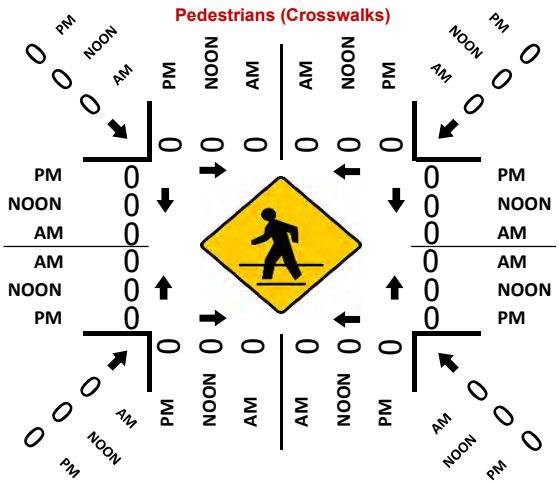
HT (NOON)



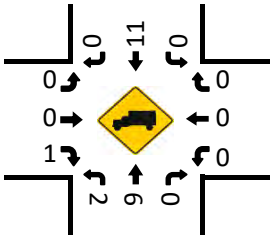
Cars (PM)



Pedestrians (Crosswalks)



HT (PM)



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	Int. 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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	156
6:45 PM	11	66	0	0	0	77	0	56	5	0	0	61	3	0	7	0	0	10	0	0	0	0	0	0	148
Total	53	262	0	0	0	315	0	298	13	0	0	311	14	0	31	0	0	45	0	0	0	0	0	0	671
Grand Total	451	3167	0	0	0	3618	0	3496	174	0	0	3670	203	0	447	0	0	650	0	0	0	0	0	0	7938
Apprch %	12.5	87.5	0.0	0.0	0.0		0.0	95.3	4.7	0.0	0.0		31.2	0.0	68.8	0.0	0.0		0.0	0.0	0.0	0.0	0.0		
Total %	5.7	39.9	0.0	0.0	0.0	45.6	0.0	44.0	2.2	0.0	0.0	46.2	2.6	0.0	5.6	0.0	0.0	8.2	0.0	0.0	0.0	0.0	0.0	0.0	
Cars, PU, Vans	434	2980	0	0		3414	0	3309	162	0		3471	196	0	430	0		626	0	0	0	0		0	7511
% Cars, PU, Vans	96.2	94.1	0.0	0.0		94.4	0.0	94.7	93.1	0.0		94.6	96.6	0.0	96.2	0.0		96.3	0.0	0.0	0.0	0.0		0.0	94.6
Heavy trucks	17	187	0	0		204	0	187	12	0		199	7	0	17	0		24	0	0	0	0		0	427
%Heavy trucks	3.8	5.9	0.0	0.0		5.6	0.0	5.3	6.9	0.0		5.4	3.4	0.0	3.8	0.0		3.7	0.0	0.0	0.0	0.0		0.0	5.4

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	
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	
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	
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)

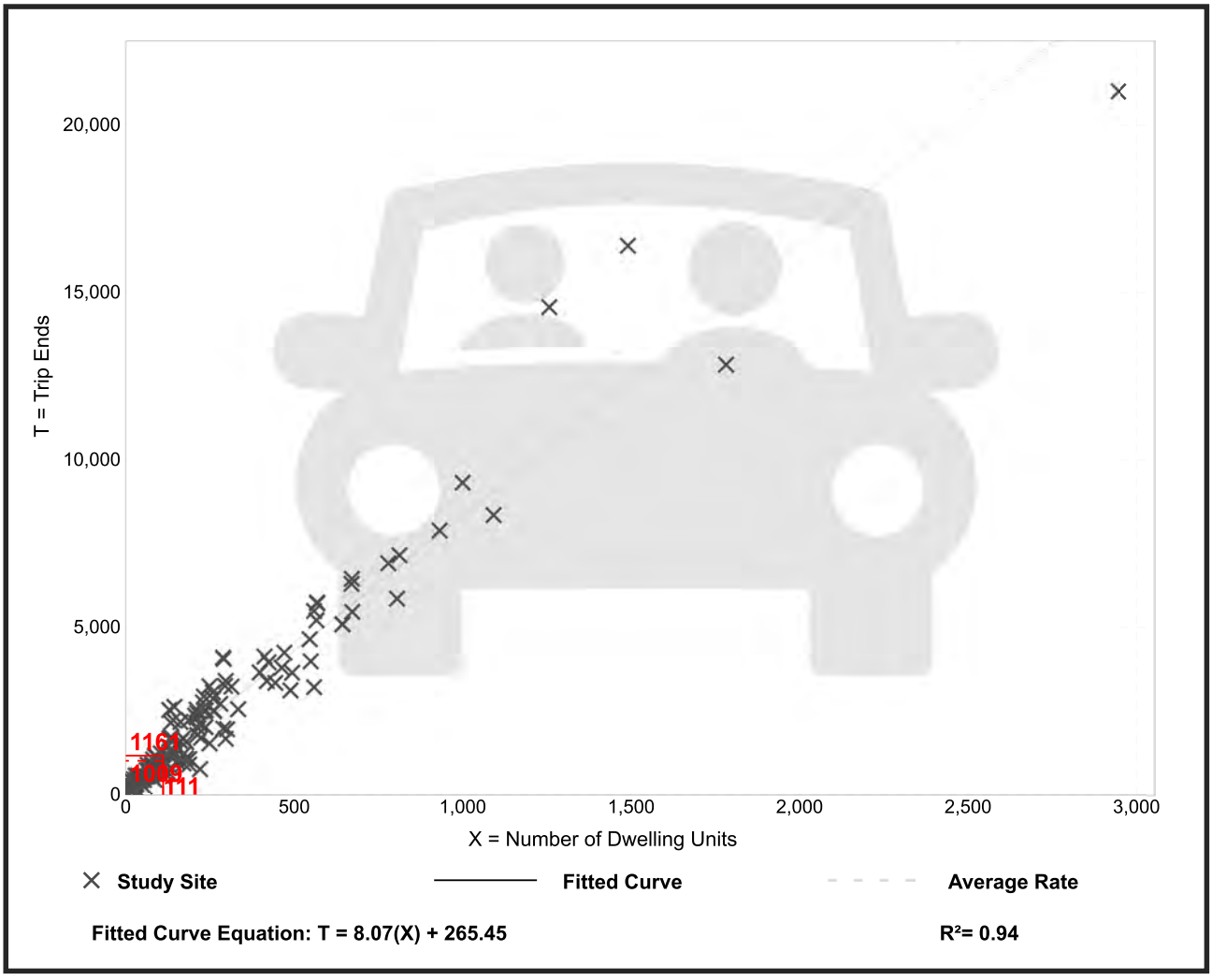
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

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



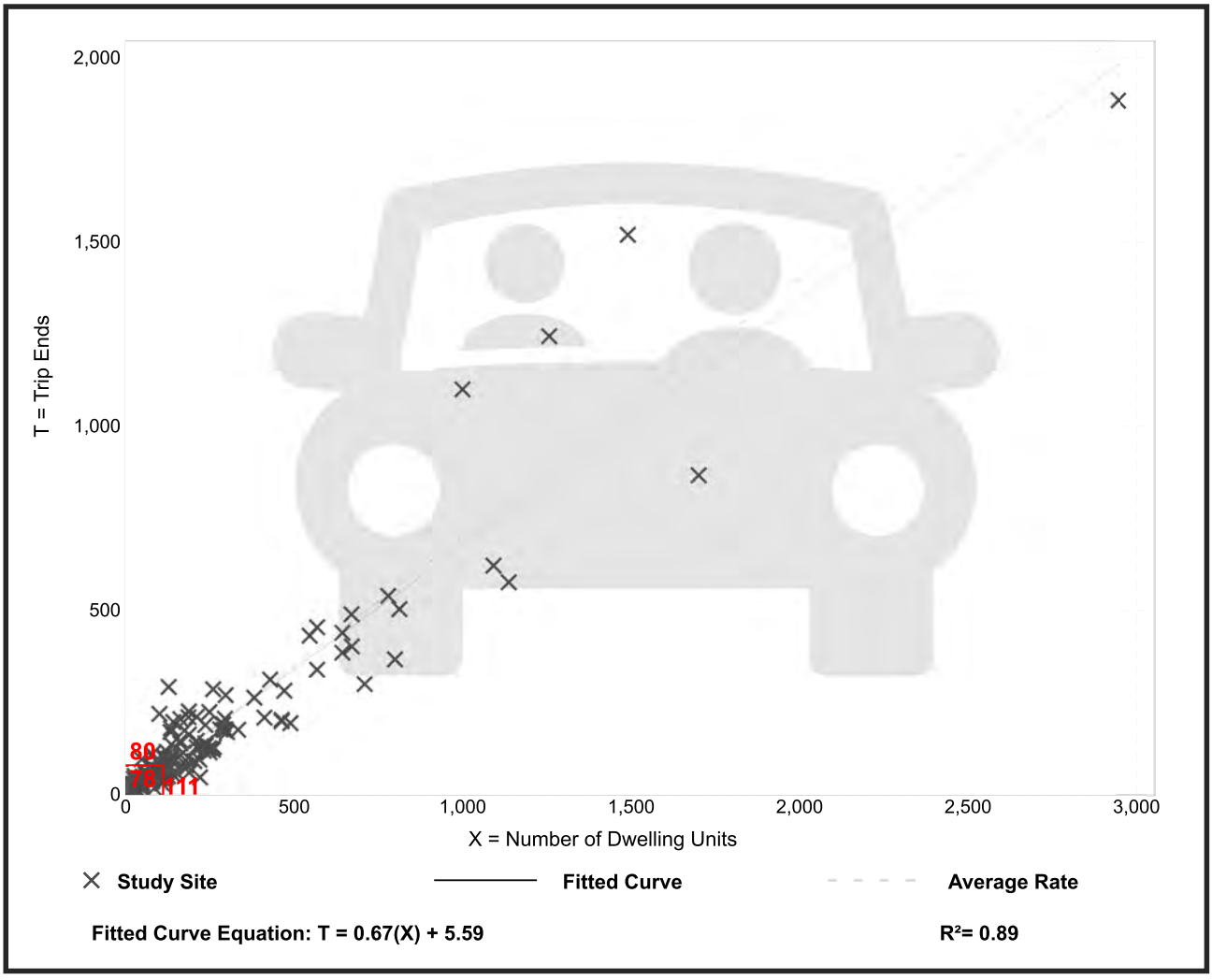
Single-Family Detached Housing
(210)

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



Trip Gen Manual, 12th Edition ● Institute of Transportation Engineers

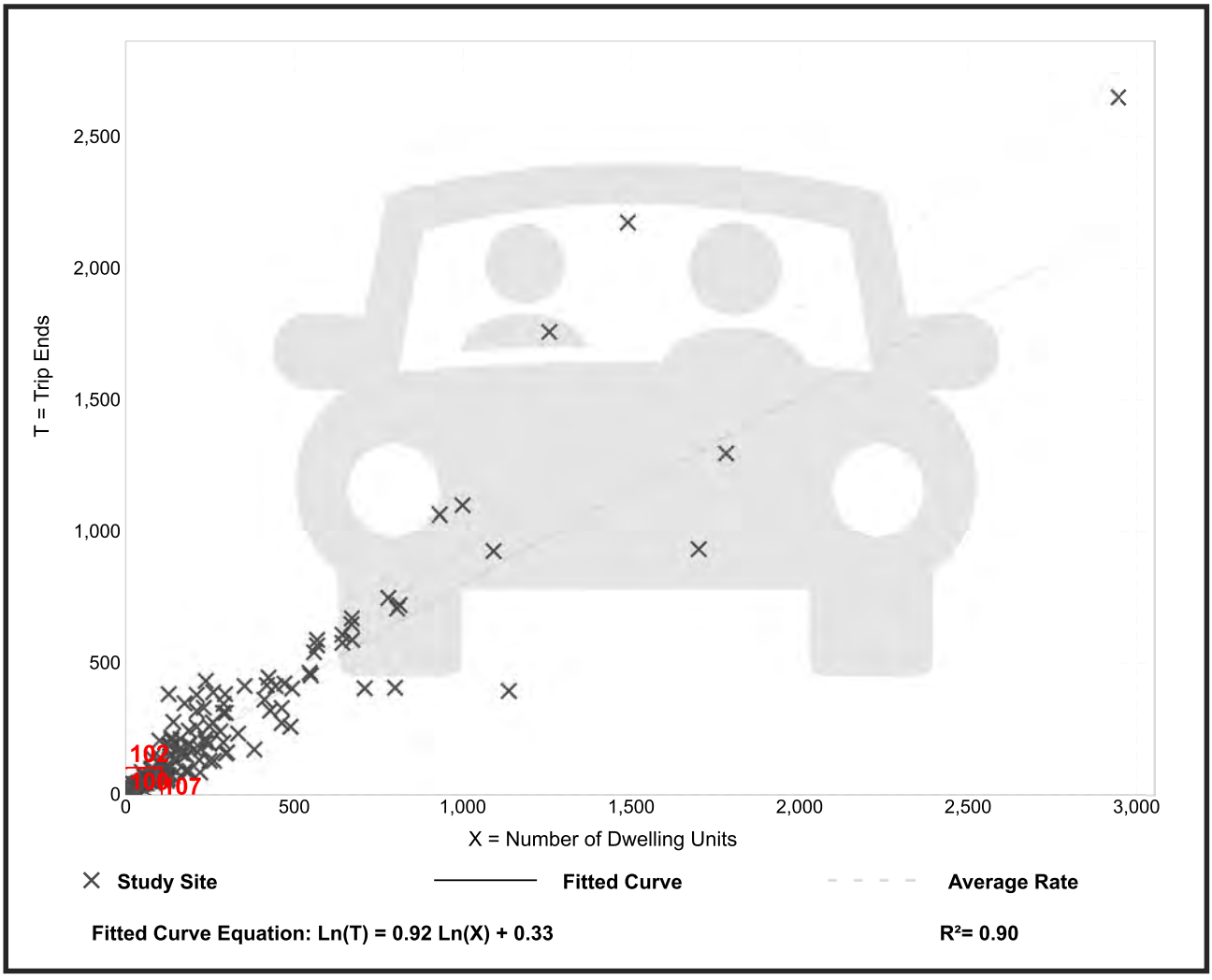
Single-Family Detached Housing
(210)

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) = 0.92Ln(X) + 0.33
Ln(T) = 0.92Ln(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

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	-	-

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	-	-

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	-	-

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	-	-

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	-

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	-

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	0	-	0
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	-	-

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:

(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

Source: Knox County Department of Engineering and Public Works "Access Control and Driveway Design Policy"

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

Source: Knox County Department of Engineering and Public Works "Access Control and Driveway Design Policy"

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

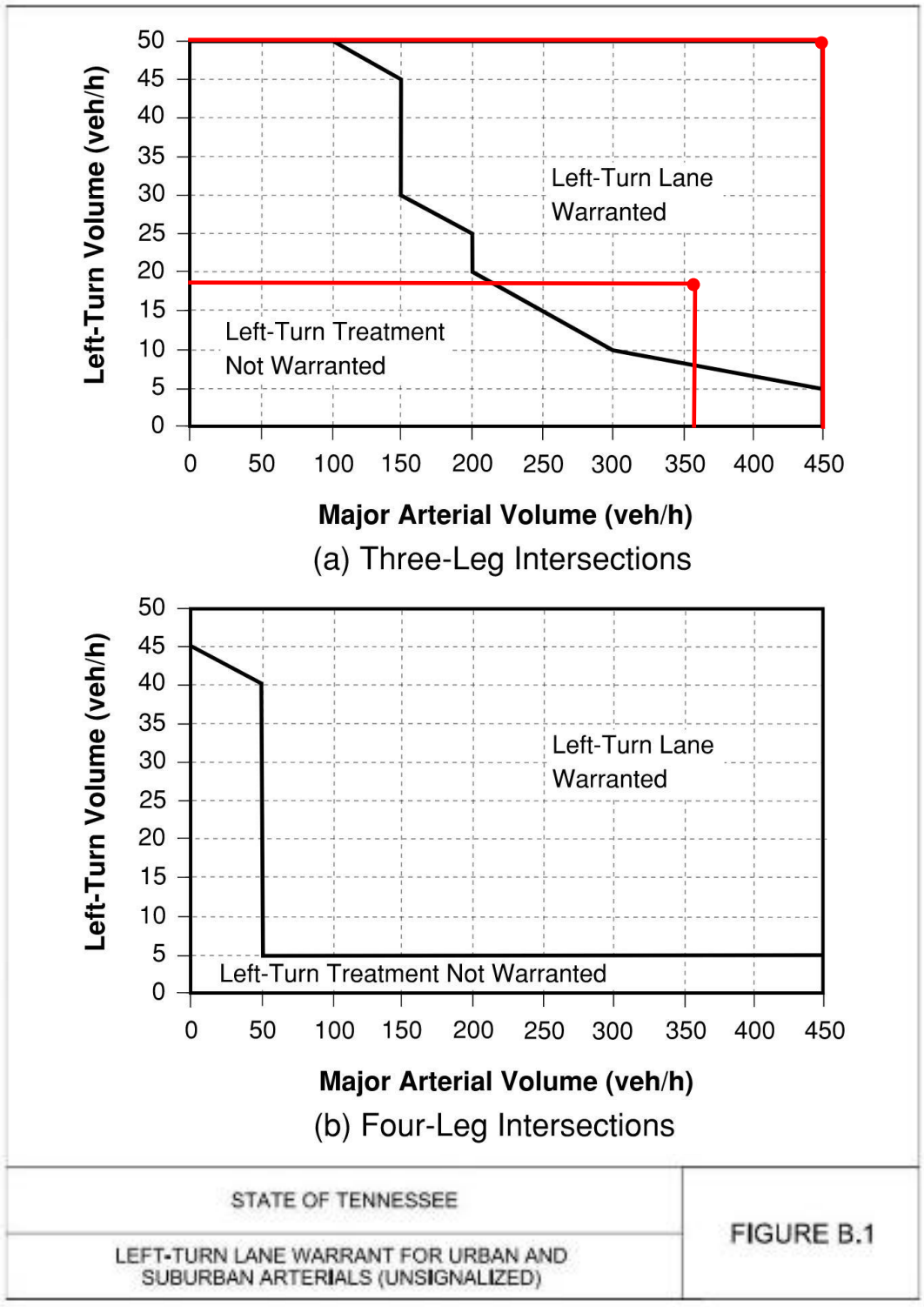


Figure B.1: Left-Turn Lane Warrant for Urban and Suburban Arterials (Unsignalized)

2026 Existing Norris Freeway (U.S. 441) at Pelleaux Road:
Major Road Volume AM: 373 Veh
Right Turn Volume AM: 17 Veh
Major Road Volume PM: 487 Veh
Right Turn Volume PM: 30 Veh

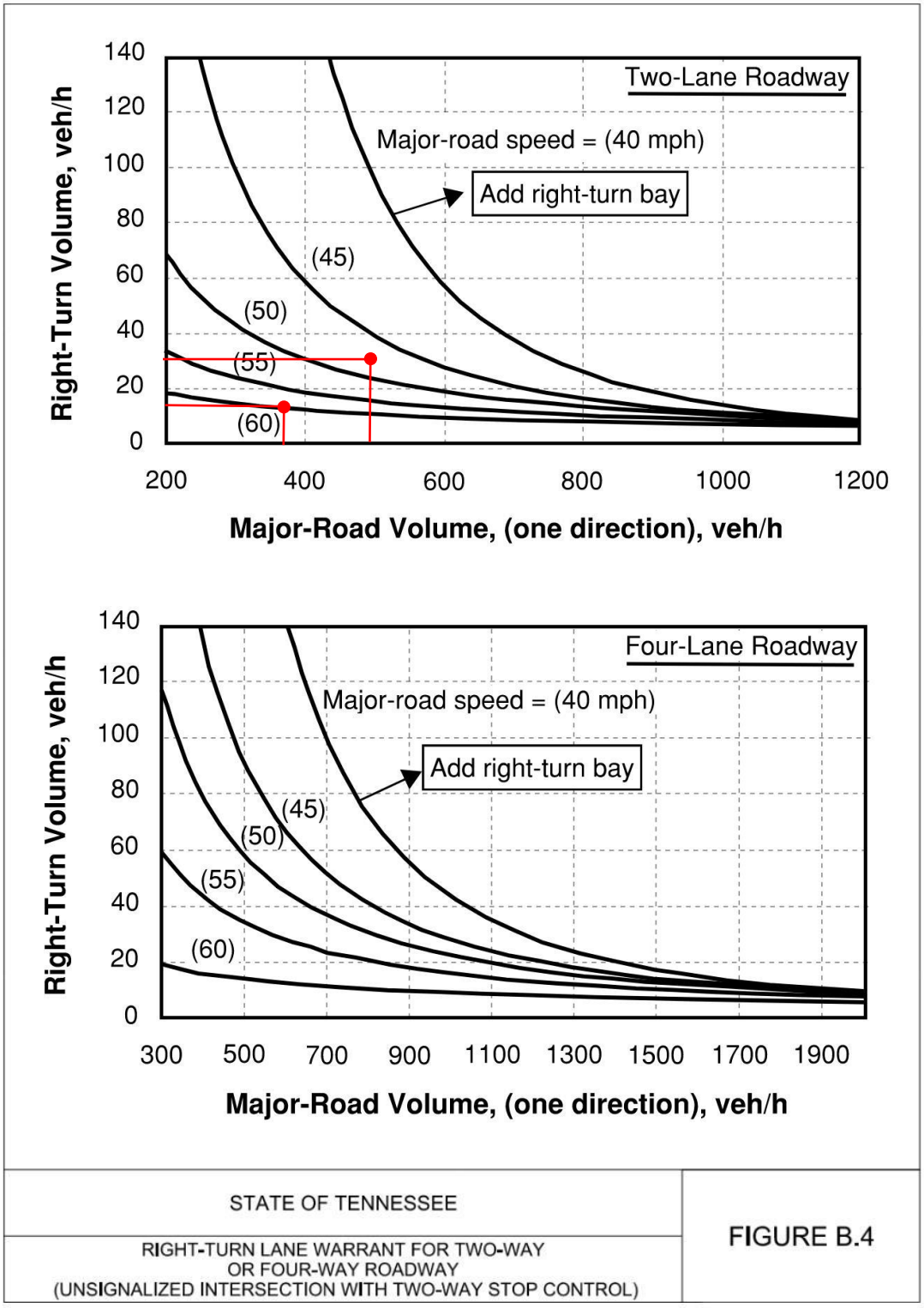


Figure B.4: Right-Turn Lane Warrant for Two-Way or Four-Way Roadway (Unsignalized Intersection with Two-Way Stop Control)

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

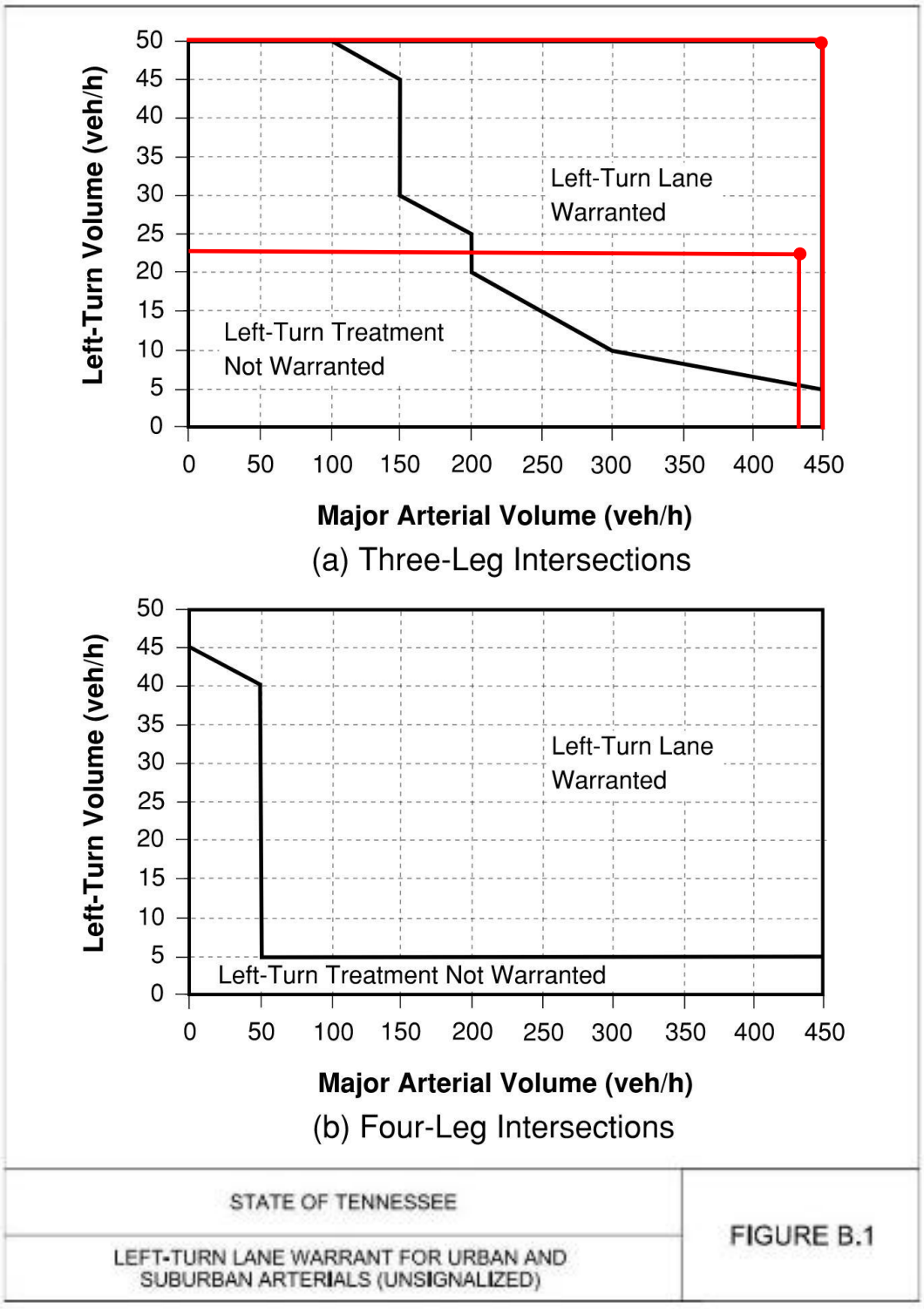


Figure B.1: Left-Turn Lane Warrant for Urban and Suburban Arterials (Unsignalized)

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

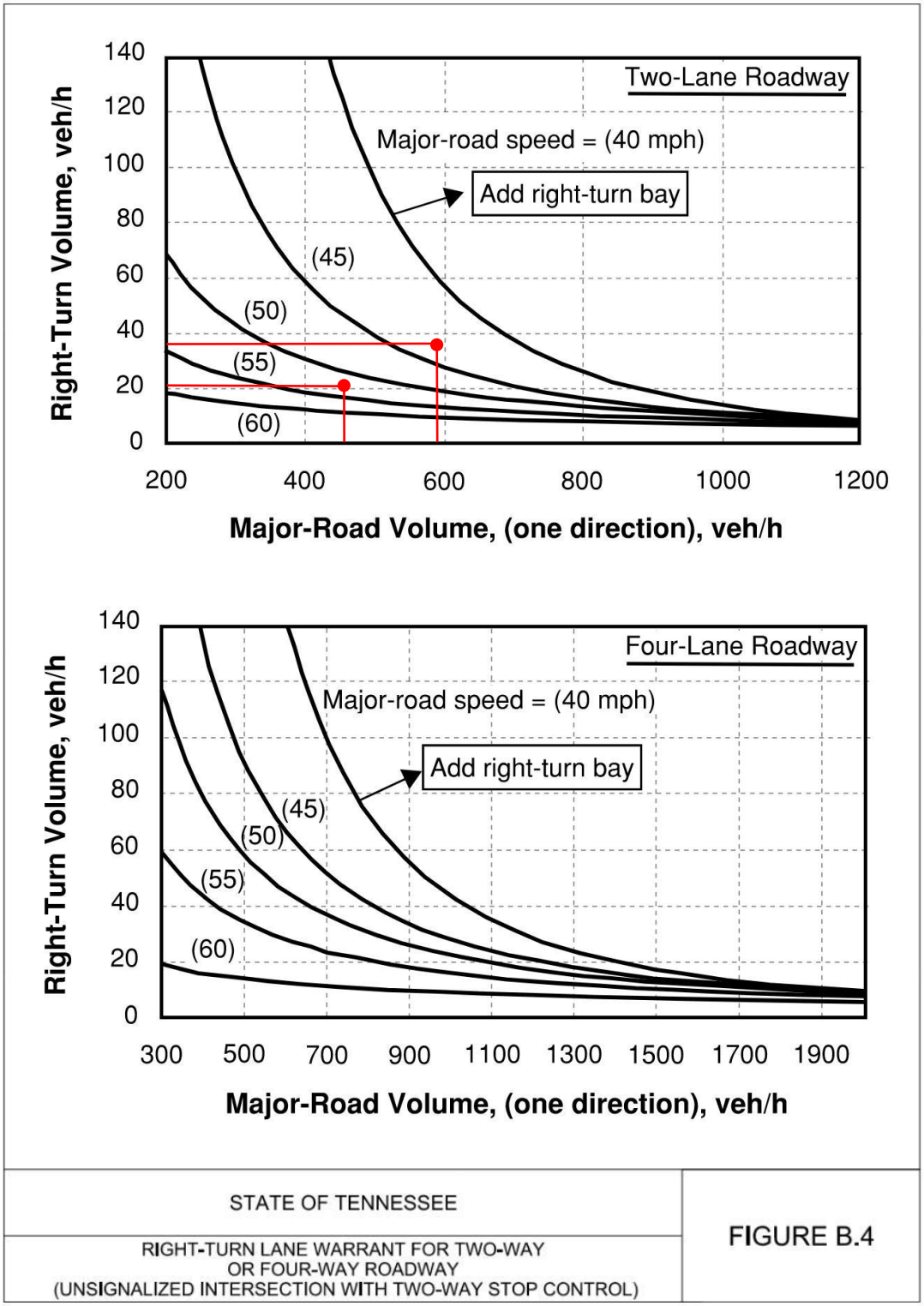


Figure B.4: Right-Turn Lane Warrant for Two-Way or Four-Way Roadway (Unsignalized Intersection with Two-Way Stop Control)

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

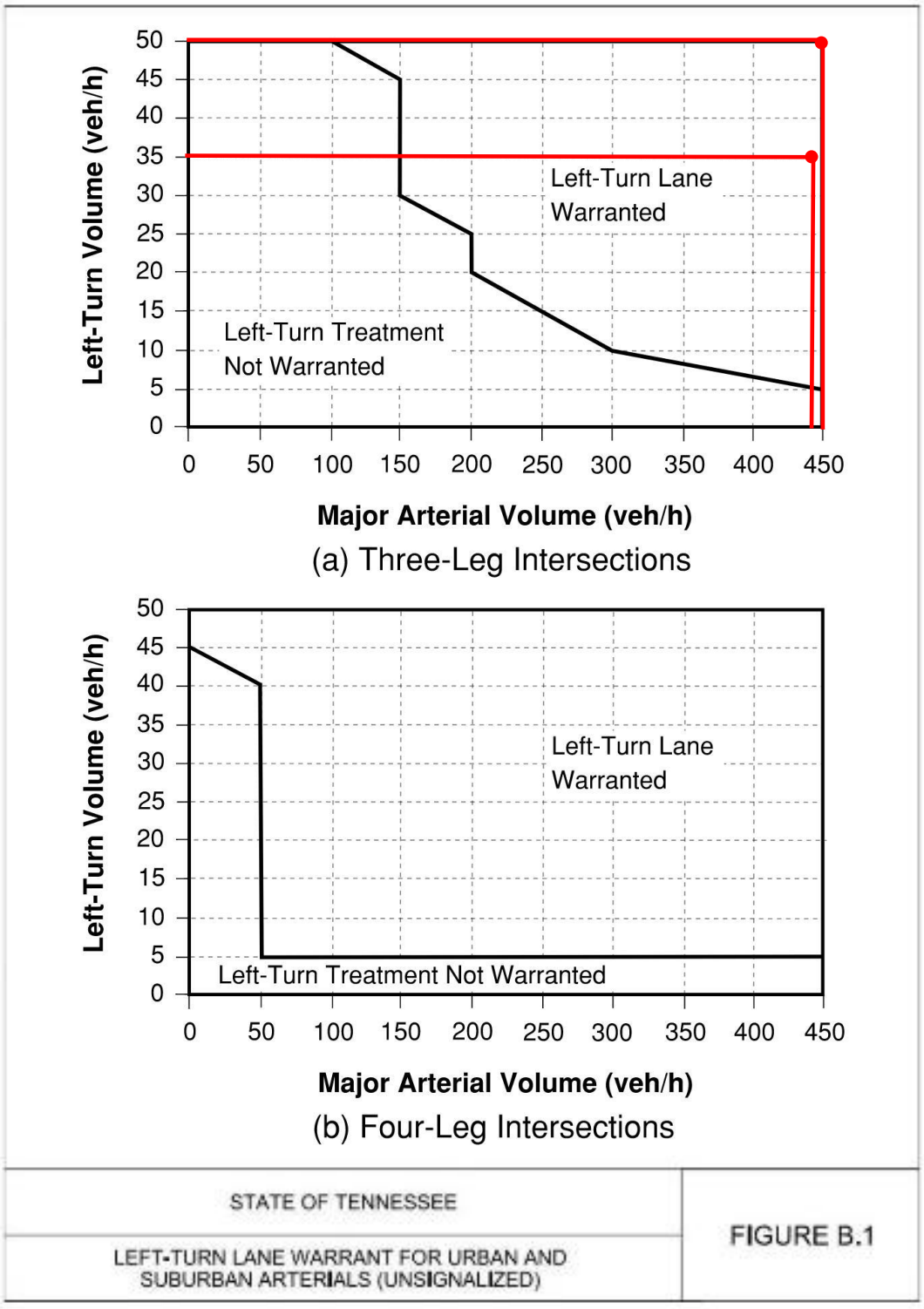


Figure B.1: Left-Turn Lane Warrant for Urban and Suburban Arterials (Unsignalized)

2031 Combined Norris Freeway (U.S. 441) at Pelleaux Road:
Major Road Volume AM: 545 Veh
Right Turn Volume AM: 27 Veh
Major Road Volume PM: 593 Veh
Right Turn Volume PM: 53 Veh

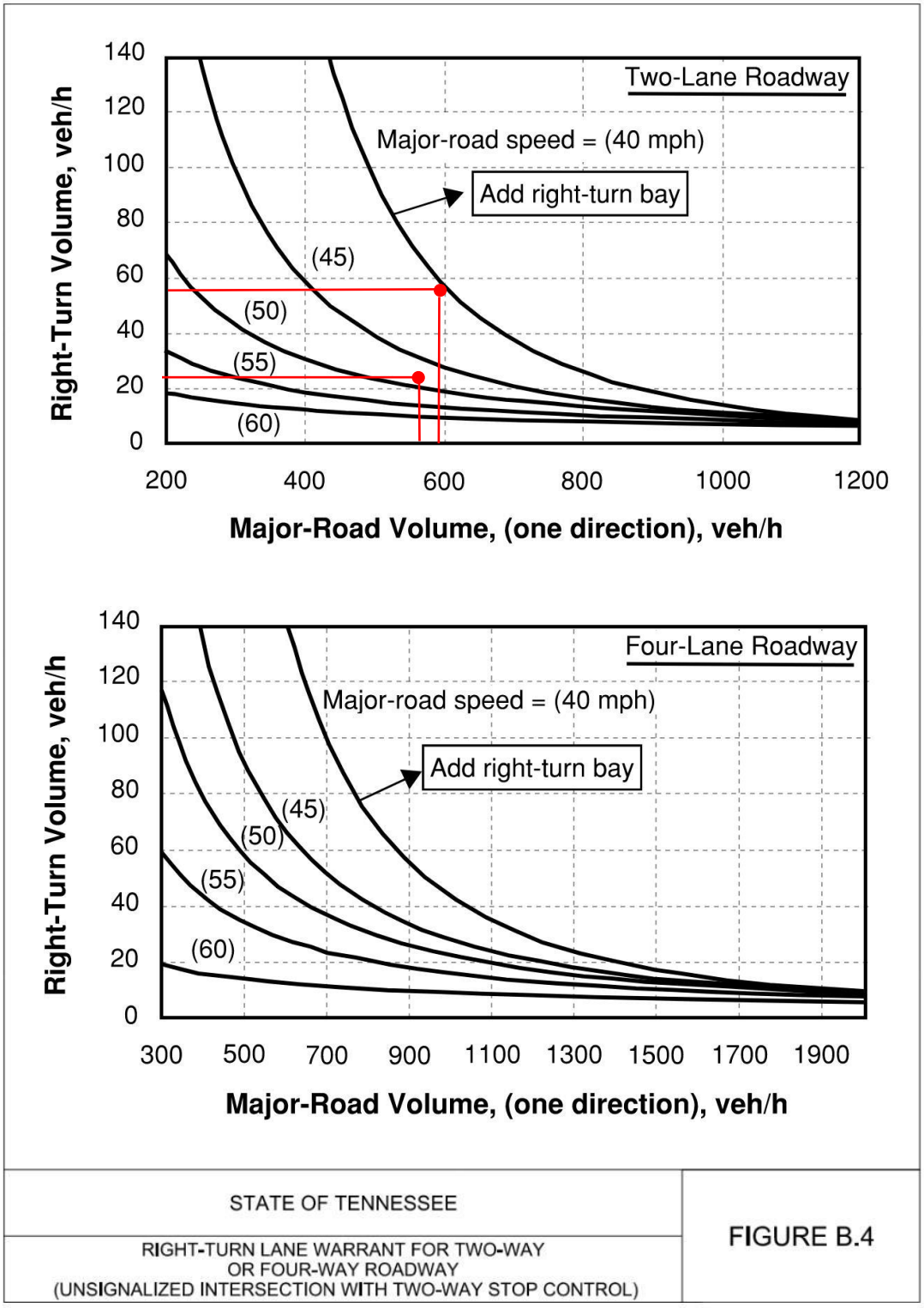


Figure B.4: Right-Turn Lane Warrant for Two-Way or Four-Way Roadway (Unsignalized Intersection with Two-Way Stop Control)

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

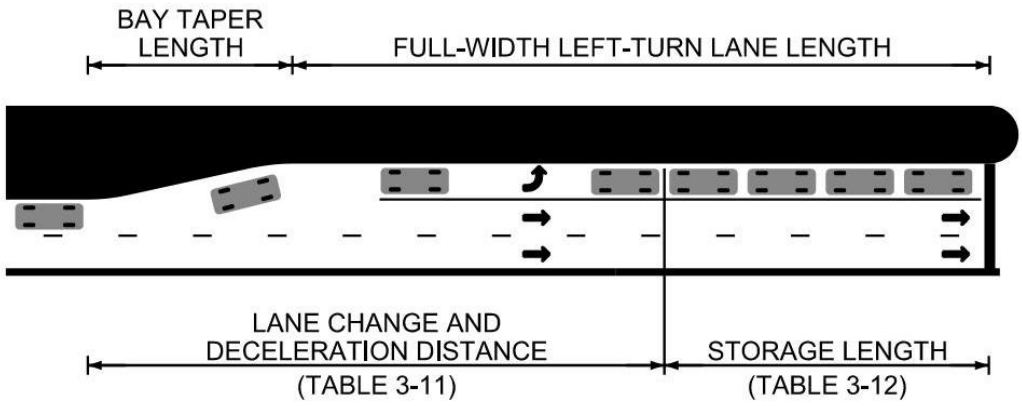


Figure 3-20: Functional Area, for an Exclusive Turn Lane.[27]

Table 3-11: Lane Change and Deceleration Distance[27]

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 Intersections[27]

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 form 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).

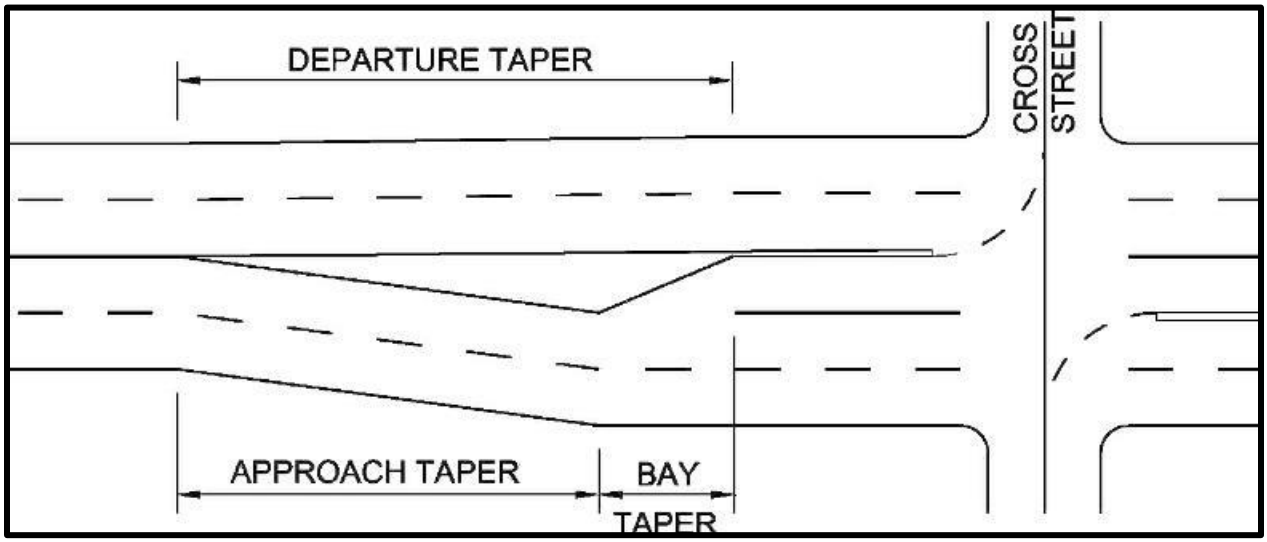


Figure 3-21: Turning Lane Taper Terminology

1) APPROACH TAPER

   a) $L = W \times S$, Speed ≥ 45 mph

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

   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 feet)(50 mph) / 3

L = 200 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.

Date: October 16, 2026

To: Mike Conger, PE, Knoxville-Knox County Planning

Subject: Review Comments – TIS for Norris Freeway Subdivision (11-SD-26-C/11-G-26-DP)

Dear Knoxville-Knox County Planning Staff,

The following comment response document is submitted to address comments dated October 13, 2026:

1. **Reviewer Comment**: It is preferred that more definitive terminology is used for recommendations rather than using the word "consider" as with Recommendation #2 that begins with "Consider the installation of a southbound left turn lane…" The recommendation can reflect the fact that the TDOT turn lane warrants are met due to existing traffic as a caveat, but otherwise should be designated similarly as recommendations #1 and #3 that don't leave it somewhat open-ended as being necessary or not.

   Response: Updated recommendation #2 and removed the word "consider."

2. **Reviewer Comment**: Please provide additional clarification regarding the recommendation of the total turn lane length also described in Recommendation #2 in the report. It is not clear how the total length of 465 feet matches with the storage length of 50 feet and bay taper length of 200 feet – the provision of a figure such as the one in the TDOT HSAM (figure 3-20) with dimensions labeled would assist the reader's understanding of what is specifically being recommended. As a separate note, TDOT staff have indicated that the final parameters can be worked out in permitting stages on the design as these are often handled on a case-by-case situation based on various considerations and constraints for each turn lane's ultimate storage and taper length needs.

   Response: Removed the turn lane length recommendations from the executive summary.

3. **Reviewer Comment**: It may be worth noting that in addition to the southbound right turn lane necessitating modifications/widening to the small bridge it would also likely

need to be widened for the left-turn lane since it is on the other side of the intersection where the pavement will need to be widened at the beginning of the departure taper.

Response: Noted site constraints for both right and left turn lanes.

Sincerely,

Addie Kirkham

Addie Kirkham, P.E.