12-SD-23-C / 12-D-23-DP
TIL Version 1
11/17/2023

November 17, 2023

Mr. Mike Conger
Knoxville-Knox County Planning
400 Main Street, Suite 403
Knoxville, TN 37902

Re: Transportation Impact Letter for Fretz Road Subdivision

Dear Mr. Conger:

S&E Properties, LLC is proposing a residential development with 57 single family detached lots. The development is located at 1103 Fretz Road in Knoxville, Tennessee. The total area of development is approximately 12.72 acres and the property is currently zoned PR (Planned Residential) with a proposed density of 4.48 DU/AC. Construction is proposed to take place this year and this analysis assumes full build out for the development will occur in 2026.

The concept plan layout shows a single roadway connection to Fretz Road. The location of the proposed roadway connection (Road "A") is approximately 790 feet south of Cordial Lane and 290 feet north of Woodhollow Lane. A copy of the concept plan is included in the attachments.

The purpose of this report is to conduct a Transportation Impact Letter for the proposed Fretz Road Subdivision.

Existing Site Conditions
N Campbell Station Road is a two-way road at the intersection with Fretz Road. The road width is approximately 20 feet. Knoxville-Knox County Planning classifies N Campbell Station Road as a Minor Arterial with an 88 foot right-of-way per the Major Road Plan. The posted speed limit on N Campbell Station Road is 35 mph.

Fretz Road is a two-way road at the intersection with Woodhollow Lane. The road width is approximately 21 feet. Knoxville-Knox County Planning does not classify Fretz Road; therefore, it is considered a local street. The posted speed limit on Fretz Road is 30 mph.

Aerial photos of the existing intersections of N Campbell Station Road at Fretz Road and Fretz Road at Woodhollow Lane are included in the attachments.

Pedestrian / Bicycle Network
Fretz Road has an existing sidewalk on the west side of Fretz Road and an existing paved trail on the east side of the road between NCampbell Station Road and Cordial Lane. Fretz Road also has existing striped crosswalks at both the intersection with N Campbell Station Road and Cordial Lane.

Snyder Road has an existing bike lane and the closest greenways to the proposed development are the Grigsby Chapel Greenway and the Parkside Greenway located south of Interstate 40.

Traffic Volumes
Ardurra conducted a peak hour turning movement count at the intersection of Fretz Road at Woodhollow Lane on November 9, 2023. The AM peak hour occurred between 7:15 a.m. and 8:15 a.m. with a peak hour factor (PHF) of 0.81 and an AM peak hour volume of 223 vehicles per hour and the PM peak hour occurred between 3:30 p.m. and 4:30 p.m. with a peak hour factor (PHF) of 0.90 and a PM peak hour volume of 190 vehicles per hour.

The traffic data collected is included in the attachments.

Background Growth
TDOT count station #47000303 is located on N Campbell Station Road south of Edison Road and north of the proposed residential development. The annual growth rate for this station over the last ten years is approximately 2.87%. The 2022 ADT was 6,153 vehicles per day.

Knoxville Regional TPO count station #093M082 is located on N Campbell Station Road north of Snyder Road and south of the proposed residential development. The annual growth rate for this station over the last ten years is approximately 3.04%. The 2022 ADT was 8,770 vehicles per day.

In order to calculate traffic for the background year 2026, Ardurra assumed an annual growth rate of 3.0%. Figure 1: 2023 Existing Peak Hour Traffic, Figure 2: 2026 Background Peak Hour Traffic, and the ADT trend line growth charts are included in the attachments.

Knox County Improvement Project
Knox County Engineering and Public Works has prepared plans for intersection improvements at N Campbell Station Road at Fretz Road. The intersection improvements include widening N Campbell Station Road to add a two-way left turn lane between Fretz Road and Campbell Park Lane. The preliminary engineering phase is complete and the project is currently undergoing ROW acquisition.

Trip Generation
The Fretz Road residential development proposes 57 single-family detached housing lots.

Single-Family Detached Housing or Land Use 210 was used to calculate the daily trips, AM and PM peak hour trips. The site trips were calculated using the fitted curve equations from the *Trip Generation, 11th Edition,* published by the Institute of Transportation Engineers.

The land use worksheets are included in the attachments. A trip generation summary is shown below in Table 1 – Trip Generation Summary.

Table 1 - Trip Generation Summary
Fretz Road Subdivision

Land Use	Density	Daily Trips	AM Peak Hour Enter	AM Peak Hour Exit	PM Peak Hour Enter	PM Peak Hour Exit
Single-Family Detached Housing (LUC 210)	57 lots	602	12	33	37	22

The total new trips generated by the Fretz Road Subdivision residential development were estimated to be 602 daily trips. The estimated trips are 45 trips during the AM peak hour and 59 trips during the PM peak hour.

Trip Distribution
The existing trip distribution on Fretz Road north of the intersection with Woodhollow Lane is approximately 65% northbound and 35% southbound during the AM peak hour and approximately 40% northbound and 60% southbound during the PM peak hour.

The directional distribution of the trips generated by the Fretz Road Subdivision was determined using the existing traffic volumes at the intersection of Fretz Road at Woodhollow Lane in combination with the concept plan layout. Ardurra assumed an entering trip distribution that is 100% southbound from N Campbell Station Road and an exiting trip distribution that is 100% northbound towards N Campbell Station Road during both the AM and PM peak hours.

Figure 3: Peak Hour Subdivision Trip Distribution, Figure 4: Peak Hour Subdivision Site Traffic, and Figure 5: 2026 Full Buildout Site Traffic are included in the attachments.

Turn Lane Warrant
The intersection of Fretz Road at the proposed roadway connection was evaluated to determine if a northbound left turn lane or a southbound right turn lane are warranted. The Knox County Department of Engineering and Public Works handbook, "Access Control and Driveway Design Policy," was used to analyze the information.

At the intersection of Fretz Road at the proposed roadway connection (Road "A") neither a northbound left turn lane nor a southbound right turn lane are warranted during either the AM or PM peak hours after the full buildout of the Fretz Road Subdivision residential

development. The turn lane warrant worksheets and analysis are included in the attachments.

Sight Distance
The minimum required sight distance for a road with a posted speed limit of 30 mph is 300 feet in each direction in accordance with the "Knoxville-Knox County Subdivision Regulations" amended through March 9, 2023. Ardurra measured the sight distance at the proposed intersection of Fretz Road at the roadway connection (Road "A") in November 2023. At 15 feet from the edge of pavement the sight distance is approximately 470 feet looking to the north and approximately 775 feet looking to the south.

Photos of the intersection sight distance at the proposed intersection of Fretz Road at Road "A" are included in the attachments.

Ardurra recommends that the intersection sight distance be certified by a land surveyor prior to construction in order to verify that Fretz Road has adequate intersection sight distance at the proposed roadway connection (Road "A") in order to comply with Knoxville-Knox County Subdivision Regulations.

Intersection Spacing
Fretz Road is classified as a local street by the Major Road Plan. The minimum intersection spacing required on a local street is 125 feet per the "Knoxville-Knox County Subdivision Regulations" amended through March 9, 2023. Fretz Road at the proposed roadway connection (Road "A") is located approximately 790 feet south of Cordial Lane and 290 feet north of Woodhollow Lane; therefore, the minimum required separation on a local street is met and no change is necessary.

ROW Signage
For northbound traffic between Hatmaker Lane and N Campbell Station Road the signage includes a W7-6 "Hill Blocks View" sign with a "20 MPH" plaque attached below, a W1-2R "Arrow Curving to the Right" and a R1-1 "Stop Sign" at the intersection at N Campbell Station Road. For southbound traffic the signs include a R2-1 "Speed Limit 30 MPH" sign, a W7-6 "Hill Blocks View" sign with a "20 MPH" plaque attached below and a W1-2R "Arrow Curving to the Right".

The existing signs located in the right-of-way are shown on Figure 6: Existing Right-of-Way Signage.

Conclusion and Recommendations
The total new trips generated by the Fretz Road Subdivision residential development were estimated to be 602 daily trips. The estimated trips are 45 trips during the AM peak hour and 59 trips during the PM peak hour. Ardurra estimated that 100% of the trips from the proposed subdivision would enter/exit from the existing intersection of Fretz Road at N Campbell Station Road.

At the intersection of Fretz Road at the roadway connection (Road "A") a northbound left

turn lane and a southbound right turn lane are not warranted during either the AM or PM peak hour per the Knox County Department of Engineering and Public Works handbook, "Access Control and Driveway Design Policy."

The minimum required sight distance for a road with a posted speed limit of 30 mph is 300 feet in each direction in accordance with the "Knoxville-Knox County Subdivision Regulations" amended through March 9, 2023. Ardurra measured the sight distance at the proposed intersection of Fretz Road at the roadway connection (Road "A") in November 2023 and at 15 feet from the edge of pavement the sight distance at the proposed intersection is approximately 470 feet looking to the north and approximately 775 feet looking to the south.

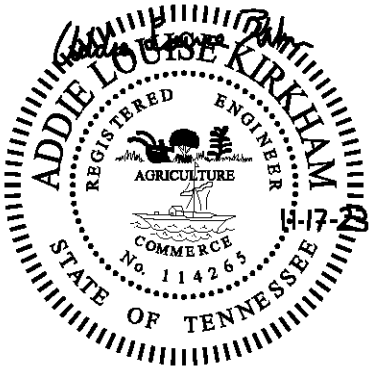
Ardurra recommends that the intersection sight distance be certified by a land surveyor prior to construction in order to verify that Fretz Road has adequate intersection sight distance at the proposed roadway connection (Road "A") to comply with Knoxville-Knox County Subdivision Regulations.

The existing ROW on Fretz Road has a southbound warning sign prior to the horizontal curve but there are no eastbound warning signs on Hatmaker Lane. Ardurra recommends that consideration be made to adding an eastbound W1-2 "Arrow Curving to the Left" prior to the horizontal curve on Hatmaker Lane. The Fretz Road Subdivision is not expected to add any measurable traffic to Hatmaker Lane; therefore, the recommendation is not a result of the proposed development.

All signs and pavement markings should be installed in accordance with the standards provided in the *Manual on Uniform Traffic Control Devices* (MUTCD).

I hope that this is helpful. Please contact me if you have any questions.

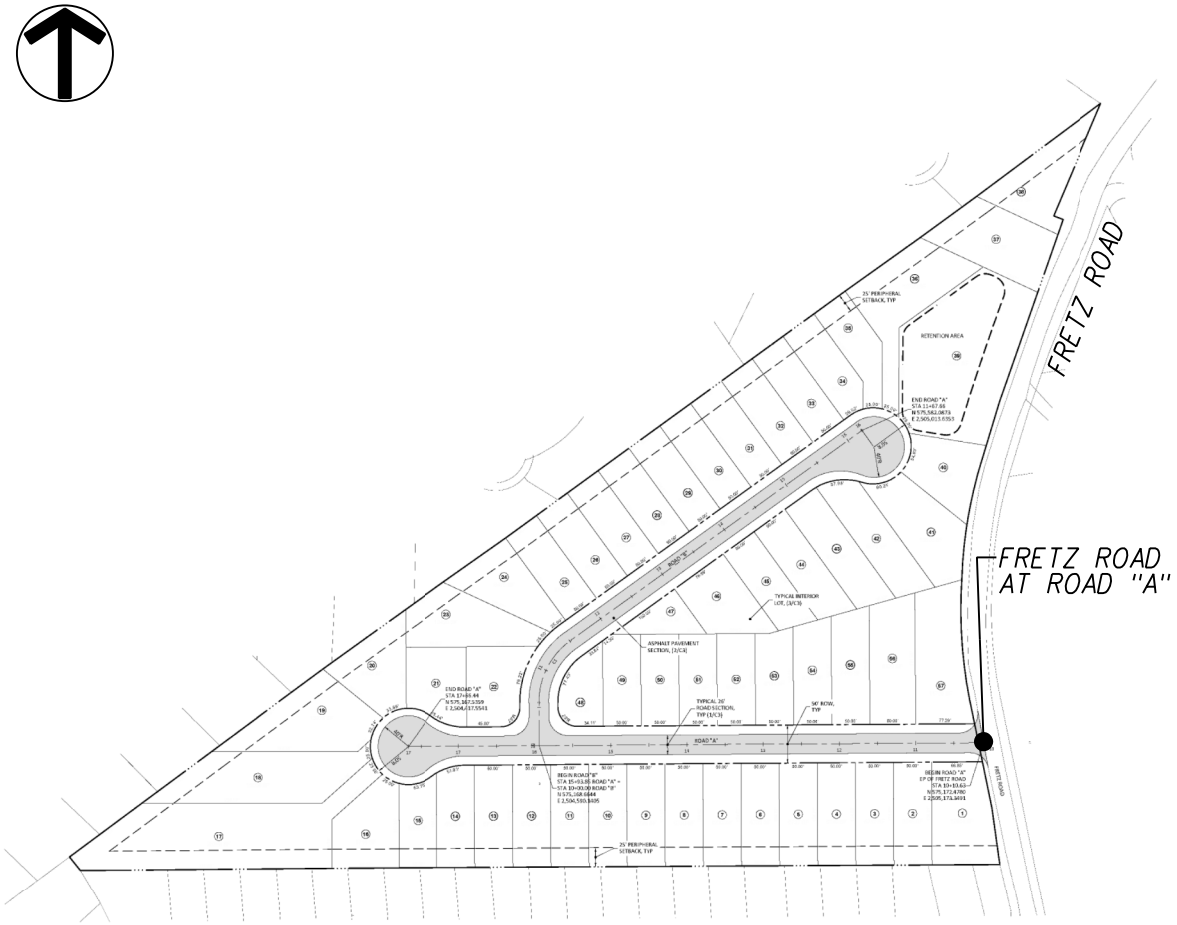
Thank you,



Addie Kirkham, P.E.

Enclosure: Attachments

Attachments



Subdivision Site Layout

N Campbell Station Rd

Printed: 11/14/2023 at 11:22:02 AM

0 25 50 100

ft

Knoxville - Knox County - KUB Geographic Information System

Fretz Rd

Printed: 11/14/2023 at 11:24:05 AM

0 50 100 200

ft

Knoxville - Knox County - KUB Geographic Information System

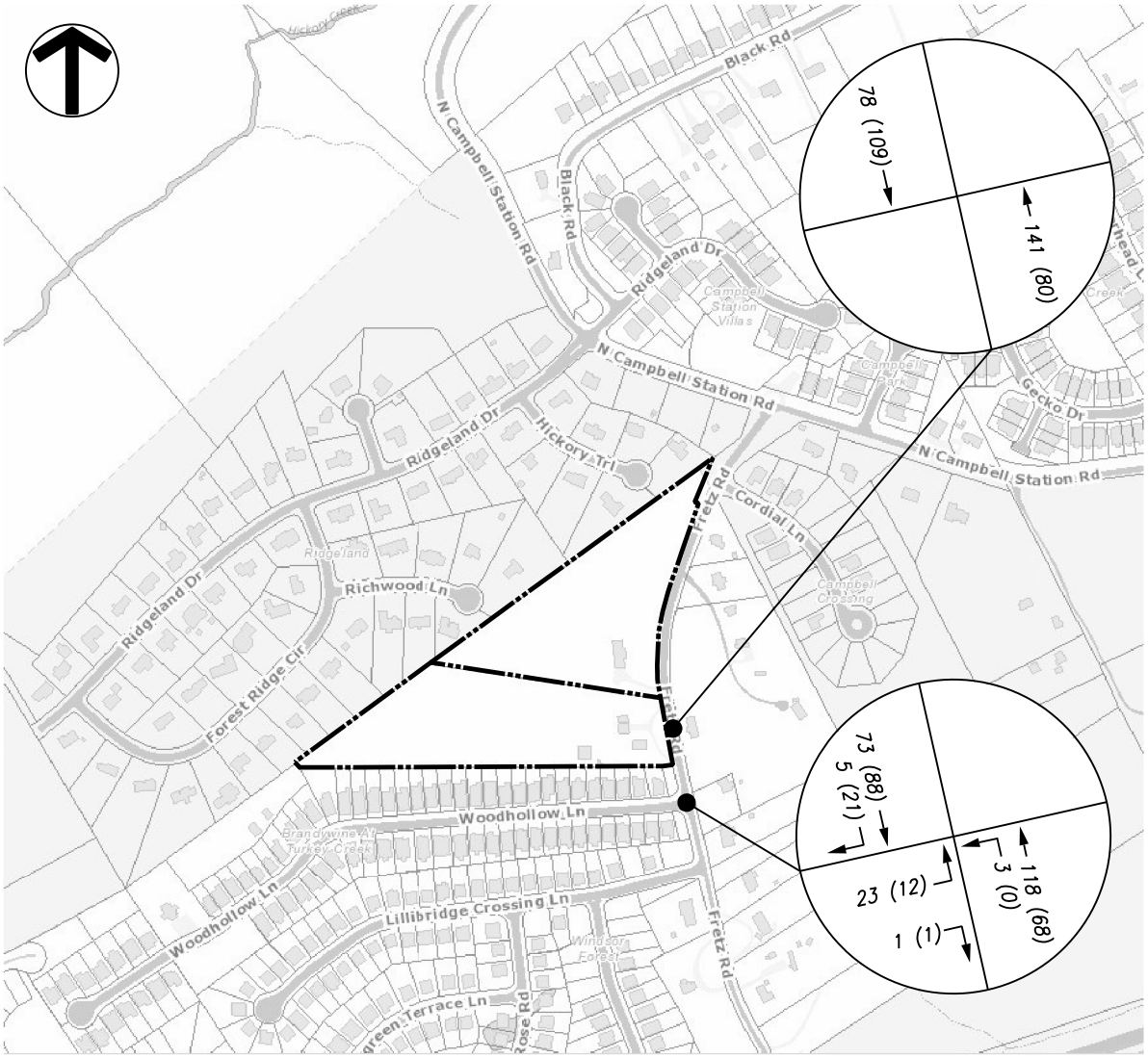
Project: 330.028 - Fretz Road Subdivision
Intersection: Fretz Road at Woodhollow Lane
Date Conducted: Thursday November 9, 2023

	Fretz Road Southbound			Fretz Road Northbound			Woodhollow Lane Eastbound			
Start	Thru	Right	Total	Left	Thru	Total	Left	Right	Total	Int. Total
7:00 AM	15	0	15	0	22	22	3	0	3	40
7:15 AM	15	1	16	0	47	47	6	0	6	69
7:30 AM	19	1	20	2	25	27	3	0	3	50
7:45 AM	23	1	24	1	25	26	11	0	11	61
Total	72	3	75	3	119	122	23	0	23	220
8:00 AM	16	2	18	0	21	21	3	1	4	43
8:15 AM	12	3	15	0	18	18	8	0	8	41
8:30 AM	11	2	13	0	14	14	3	0	3	30
8:45 AM	14	3	17	0	14	14	1	0	1	32
Total	53	10	63	0	67	67	15	1	16	146
2:00 PM	16	2	18	0	16	16	4	0	4	38
2:15 PM	10	7	17	0	19	19	1	0	1	37
2:30 PM	16	5	21	0	15	15	7	0	7	43
2:45 PM	14	6	20	0	17	17	4	0	4	41
Total	56	20	76	0	67	67	16	0	16	159
3:00 PM	17	4	21	1	9	10	2	1	3	34
3:15 PM	13	7	20	0	15	15	8	1	9	44
3:30 PM	19	2	21	0	21	21	1	0	1	43
3:45 PM	25	7	32	0	18	18	3	0	3	53
Total	74	20	94	1	63	64	14	2	16	174
4:00 PM	21	9	30	0	12	12	4	0	4	46
4:15 PM	23	3	26	0	17	17	4	1	5	48
4:30 PM	12	2	14	0	21	21	1	0	1	36
4:45 PM	13	8	21	0	13	13	0	0	0	34
Total	69	22	91	0	63	63	9	1	10	164
5:00 PM	16	5	21	0	13	13	2	0	2	36
5:15 PM	22	6	28	0	17	17	5	0	5	50
5:30 PM	27	6	33	0	15	15	5	1	6	54
5:45 PM	18	2	20	0	21	21	3	1	4	45
Total	83	19	102	0	66	66	15	2	17	185
Grand Total	407	94	501	4	445	449	92	6	98	1048
Approach %	81.2	18.8		0.9	99.1		93.9	6.1		
Total %	38.8	9.0	47.8	0.4	42.5	42.8	8.8	0.6	9.4	

Project: 330.028 - Fretz Road Subdivision
Intersection: Fretz Road at Woodhollow Lane
Date Conducted: Thursday November 9, 2023

AM Peak Hour	7:15 AM - 8:15 AM	223
PM Peak Hour	3:30 PM - 4:30 PM	190

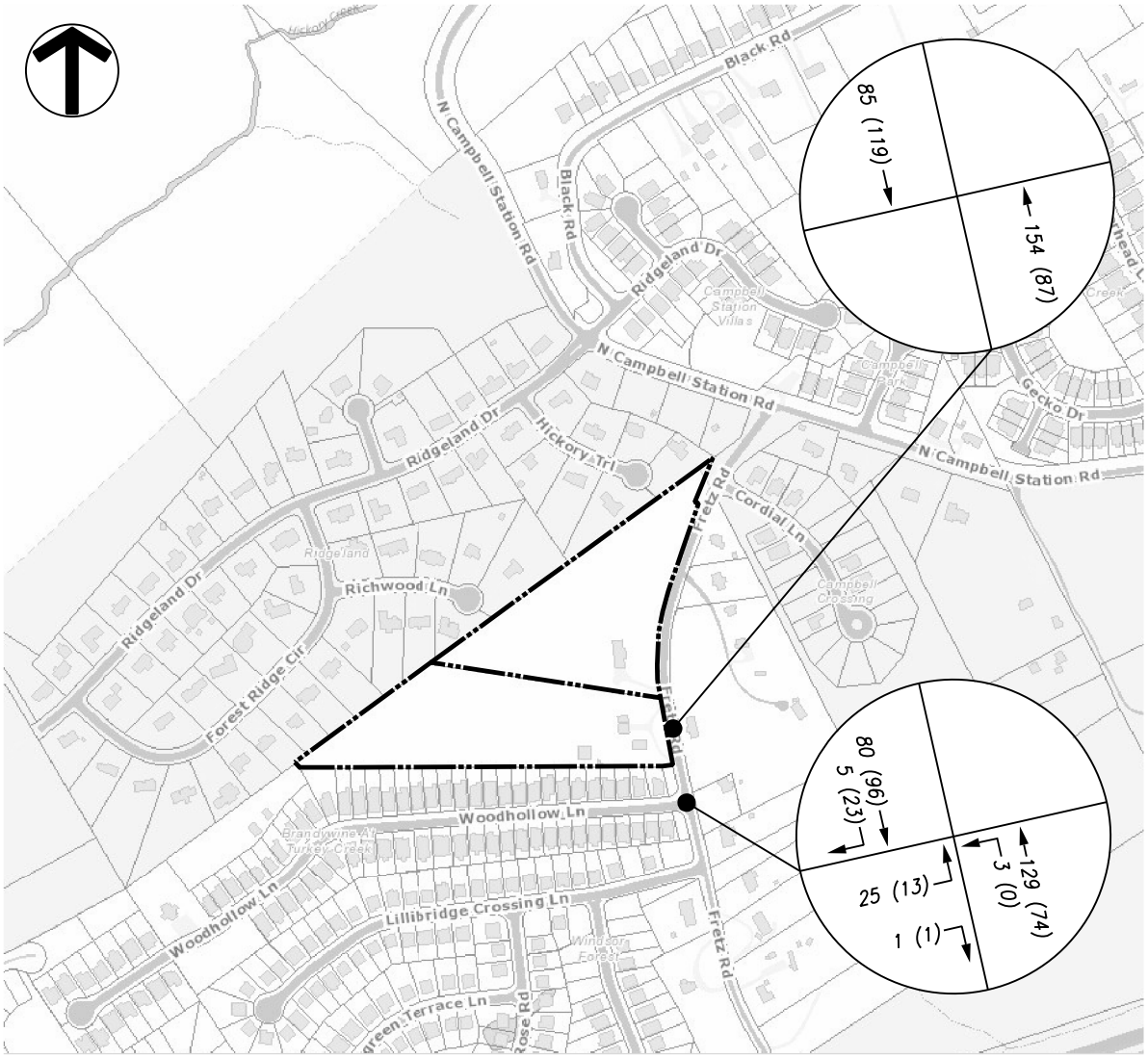
	Fretz Road Southbound			Fretz Road Northbound			Woodhollow Lane Eastbound			
Start	Thru	Right	Total	Left	Thru	Total	Left	Right	Total	Int. Total
Peak Hour Analysis from 7:00 AM to 9:00 AM										
AM Peak Hour begins at 7:15 AM										
7:15 AM	15	1	16	0	**47**	47	6	0	6	**69**
7:30 AM	19	1	20	**2**	25	27	3	0	3	50
7:45 AM	**23**	1	24	1	25	26	**11**	0	11	61
8:00 AM	16	**2**	18	0	21	21	3	**1**	4	43
Total Volume	73	5	78	3	118	121	23	1	24	223
Future (3% over 3 yrs)	80	5		3	129		25	1		244
PHF	0.79	0.63		0.38	0.63		0.52	0.25		0.81
Peak Hour Analysis from 2:00 PM to 6:00 PM										
PM Peak Hour begins at 3:30 PM										
3:30 PM	19	2	21	0	**21**	21	1	0	1	43
3:45 PM	**25**	7	32	0	18	18	3	0	3	**53**
4:00 PM	21	**9**	30	0	12	12	**4**	0	4	46
4:15 PM	23	3	26	0	17	17	4	**1**	5	48
Total Volume	88	21	109	0	68	68	12	1	13	190
Future (3% over 3 yrs)	96	23		0	74		13	1		208
PHF	0.88	0.58		-	0.81		0.75	0.25		0.90



LEGEND:

← (23) TURNING MOVEMENT VOLUME (PM)

Figure 1: 2023 Existing Peak Hour Traffic



LEGEND:

← (23) TURNING MOVEMENT VOLUME (PM)

Figure 2: 2026 Background Peak Hour Traffic

Project: Fretz Road Subdivision
Date Conducted: 11/8/2023

Single Family Detached Housing (LUC 210)
57 Lots

Average Daily Traffic
Ln(T) = 0.92Ln(X)+ 2.68
Ln(T) = 0.92Ln(57) + 2.68
T = 602

Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.
Ln(T) = 0.91Ln(X) + 0.12
Ln(T) = 0.91Ln(57) + 0.12
T = 45

Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.
Ln(T) = 0.94Ln(X) + 0.27
Ln(T) = 0.94Ln(57) + 0.27
T = 59

Time Period	Total Trips	Percent		Number	
		Enter	Exit	Enter	Exit
Weekday (24 hours)	602	50%	50%	301	301
AM Peak Hour	45	25%	75%	11	34
PM Peak Hour	59	63%	37%	37	22

Single-Family Detached Housing
(210)

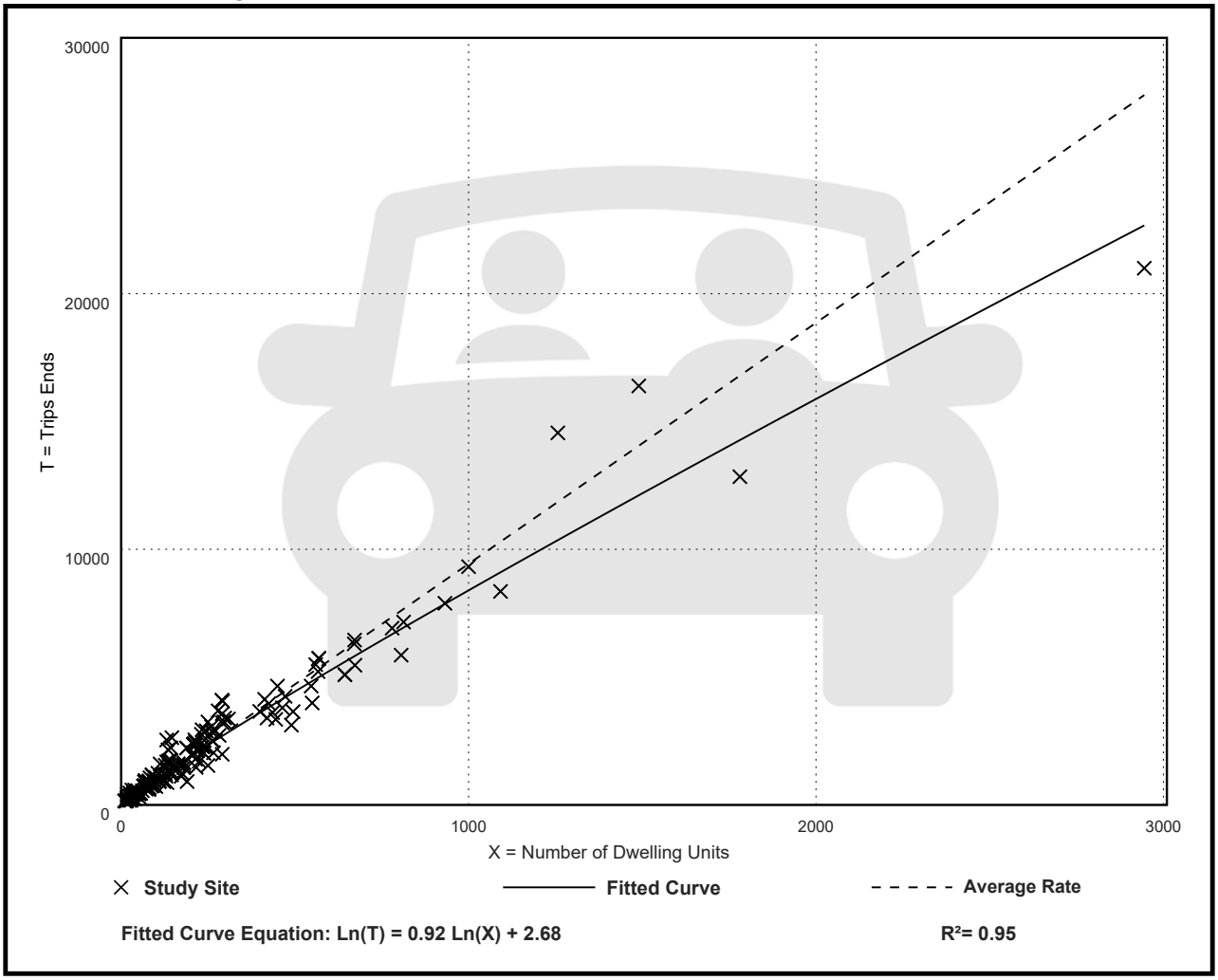
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 174
Avg. Num. of Dwelling Units: 246
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.43	4.45 - 22.61	2.13

Data Plot and Equation



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

R^2= 0.95

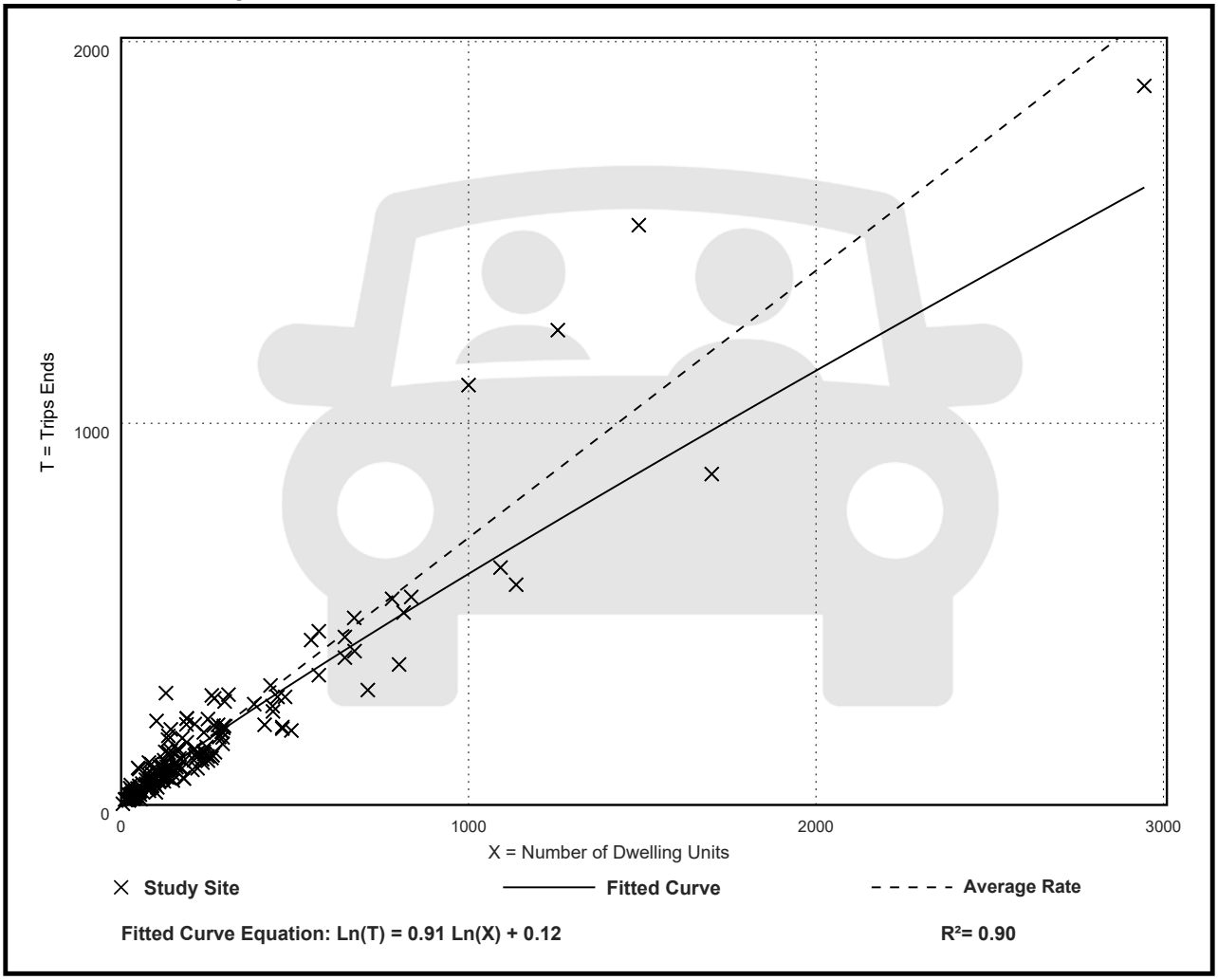
Single-Family Detached Housing
(210)

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: 192
Avg. Num. of Dwelling Units: 226
Directional Distribution: 26% entering, 74% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.70	0.27 - 2.27	0.24

Data Plot and Equation



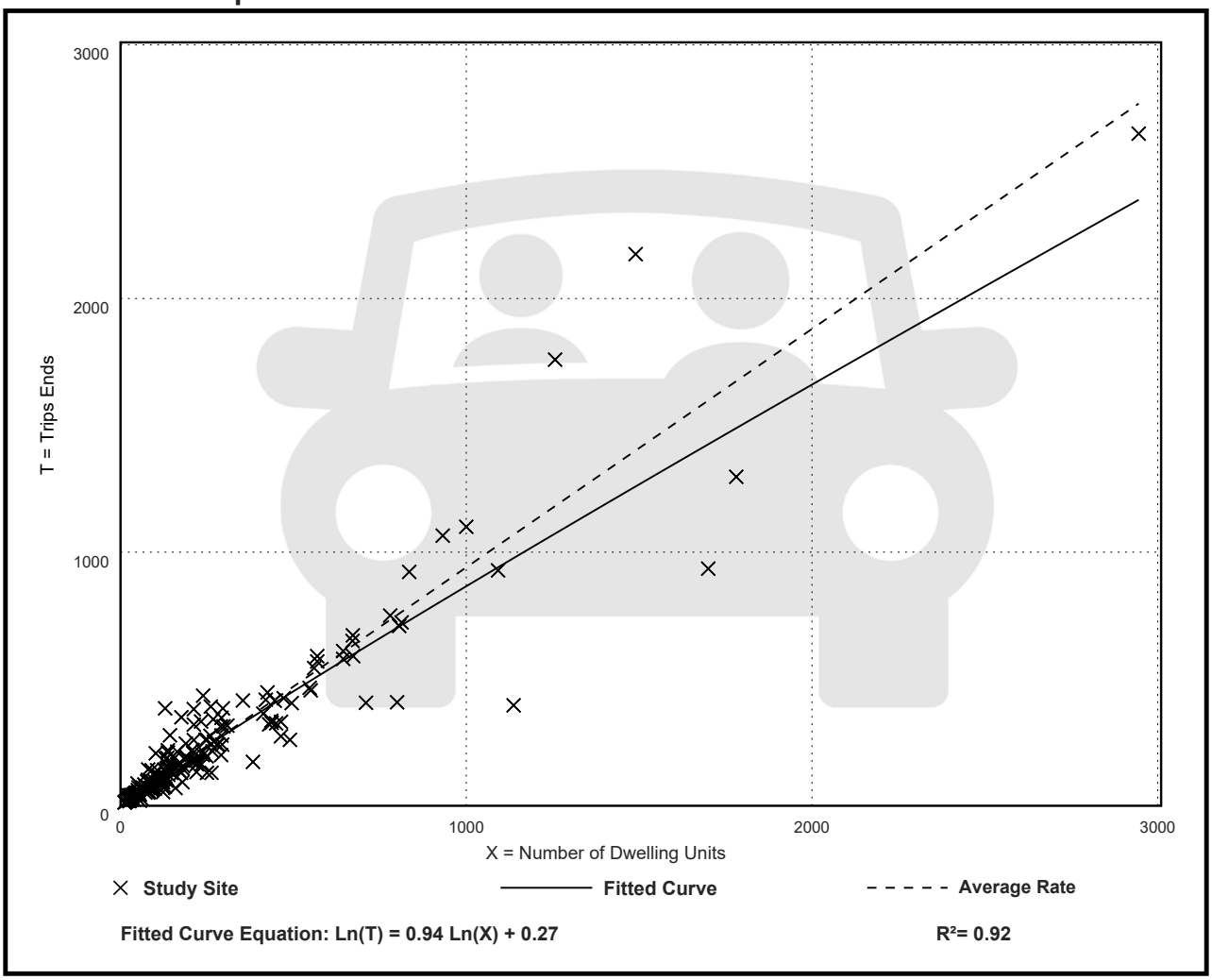
Single-Family Detached Housing
(210)

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: 208
Avg. Num. of Dwelling Units: 248
Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.94	0.35 - 2.98	0.31

Data Plot and Equation



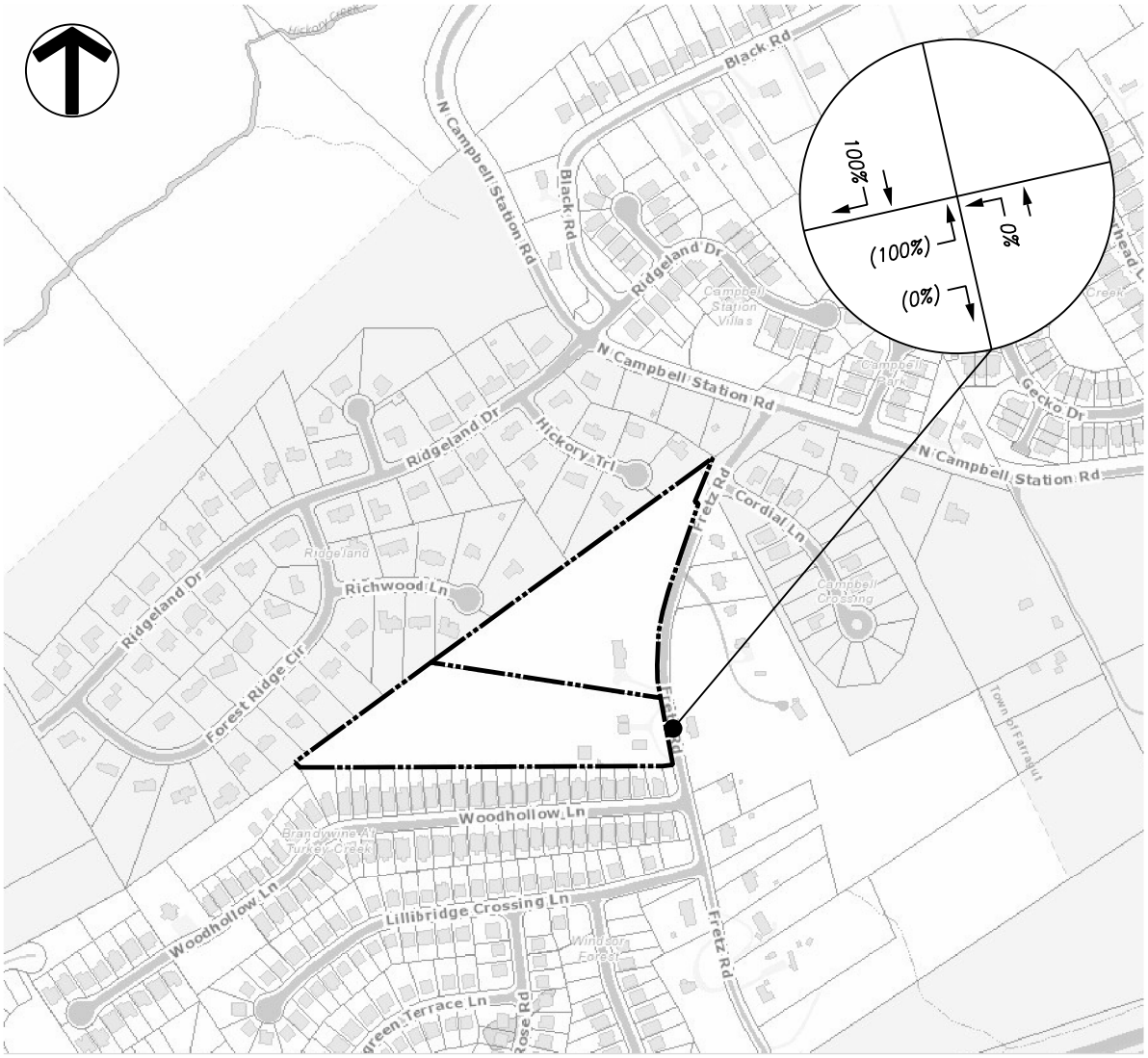


Figure 3: Peak Hour Subdivision Trip Distribution

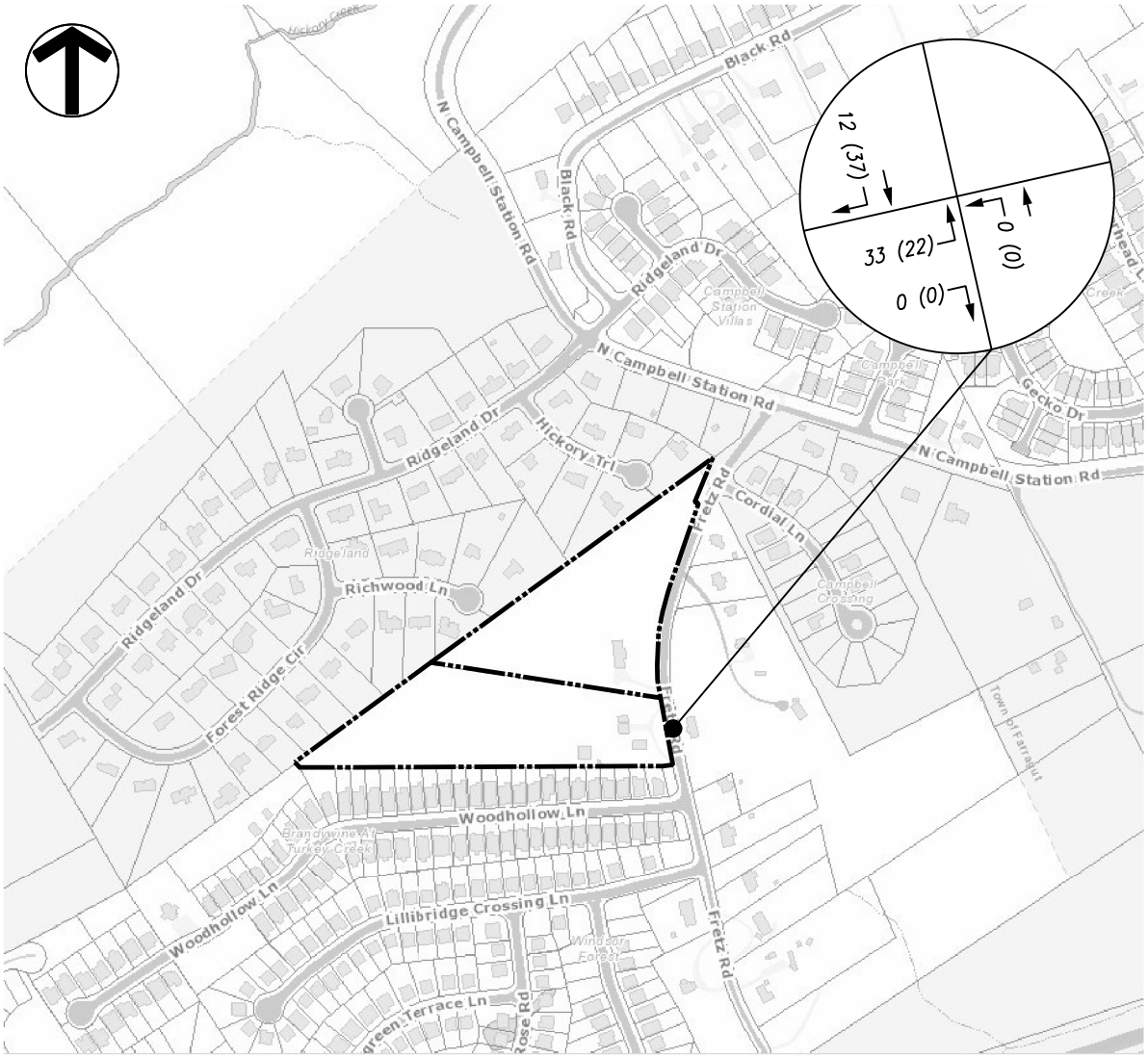
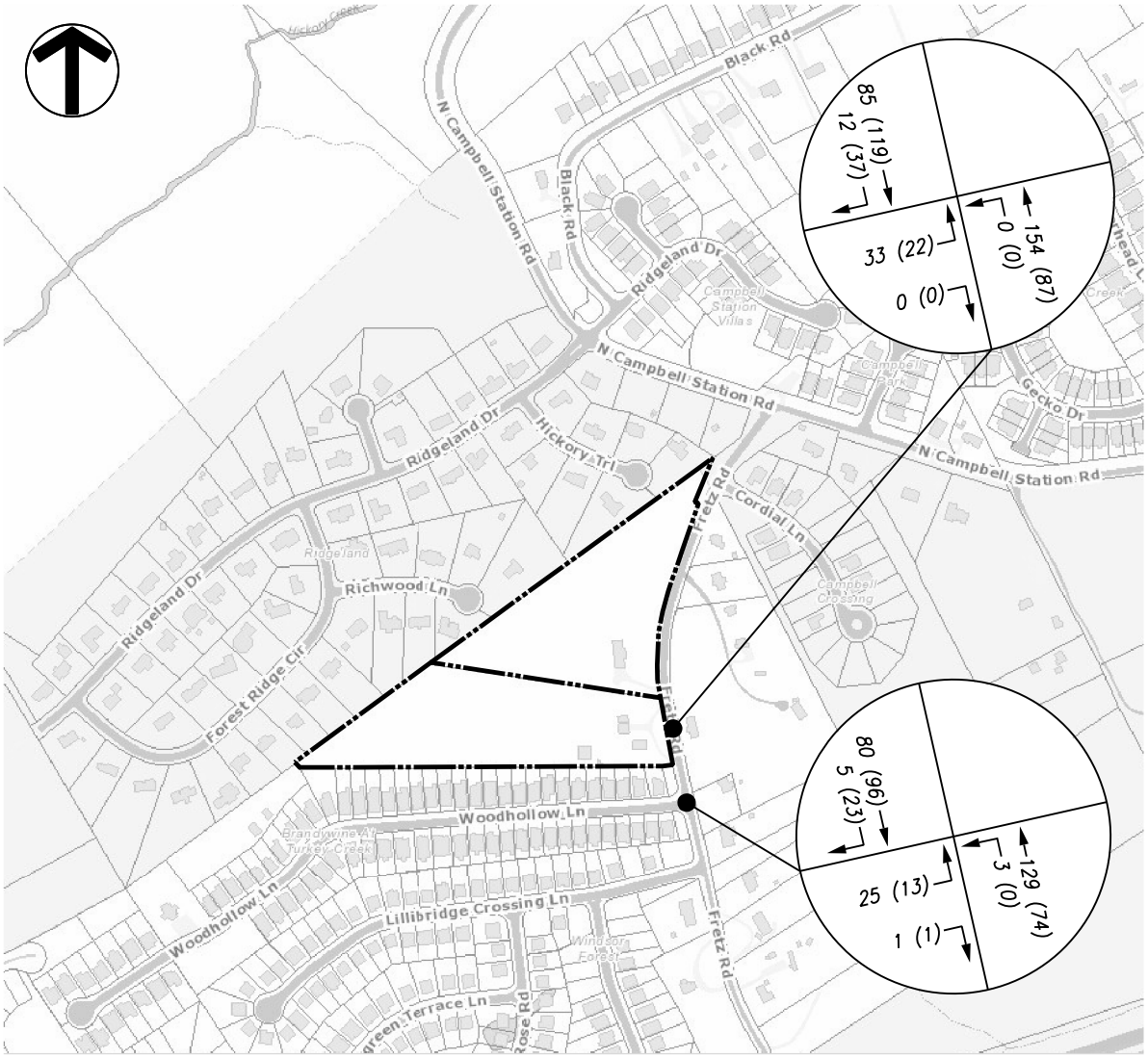


Figure 4: Peak Hour Subdivision Site Traffic



LEGEND:

← 123 (23) TURNING MOVEMENT VOLUME AM (PM)

Figure 5: 2026 Full Buildout Site Traffic

Project: Fretz Road Subdivision

Fretz Road at Roadway Connection (Road "A")

Fretz Road VOLUMES
at Roadway Connection (Road "A")

LEFT TURN	Opposing	Thru	LT	LT MAX	Warrant Met
AM	97	154	0	235	NO
PM	156	87	0	245	NO

Fretz Road VOLUMES
at Roadway Connection (Road "A")

RIGHT TURN	Thru	RT	RT MAX	Warrant Met
AM	85	12	599	NO
PM	119	37	499	NO

Fretz Road at Roadway Connection (Road "A")

TABLE 4A

LEFT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

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

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149 150 - 199	300 245	235 200		145 130	120 110	100 90
200 - 249 250 - 299	205 175		140 125	115 105	100 90	80 70
300 - 349 350 - 399	155 135	135 120	110 100	95 85	80 70	65 60
400 - 449 450 - 499	120 105	105 90	90 80	75 70	65 60	55 50
500 - 549 550 - 599	95 85	80 70	70 65	65 60	55 50	50 45
600 - 649 650 - 699	75 70	65 60	60 55	55 50	45 40	40 35
700 - 749 750 or More	65 60	55 50	50 45	45 40	35 35	30 30

AM Peak - 0 LT

PM Peak - 0 LT

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= / > 600
100 - 149 150 - 199	100 90	80 75	70 65	60 55	55 50	50 45
200 - 249 250 - 299	80 70	72 65	460 55	55 50	50 45	45 40
300 - 349 350 - 399	65 60	60 55	50 50	50 45	45 40	40 40
400 - 449 450 - 499	55 50	50 45	45 45	45 40	40 35	35 35
500 - 549 550 - 599	50 45	45 40	40 40	40 35	35 35	35 35
600 - 649 650 - 699	40 35	35 35	35 35	35 30	35 30	30 30
700 - 749 750 or More	30 30	30 30	30 30	30 30	30 30	30 30

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

Fretz Road at Roadway Connection (Road "A")

TABLE 4B

RIGHT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

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 - 349 350 - 399				Yes	Yes Yes	Yes Yes
400 - 449 450 - 499			Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599		Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

AM Peak - 12 RT

PM Peak - 37 RT

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

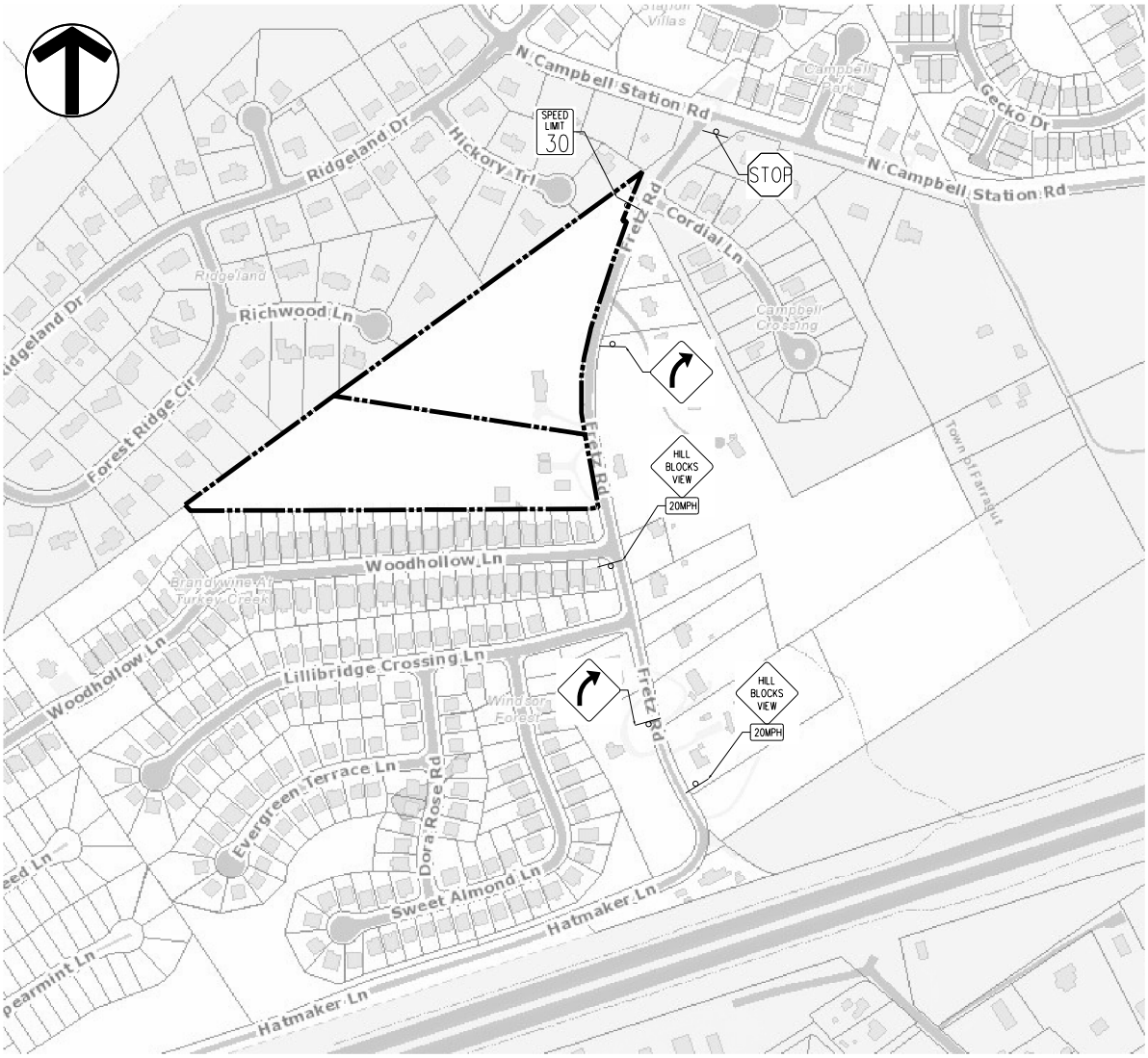
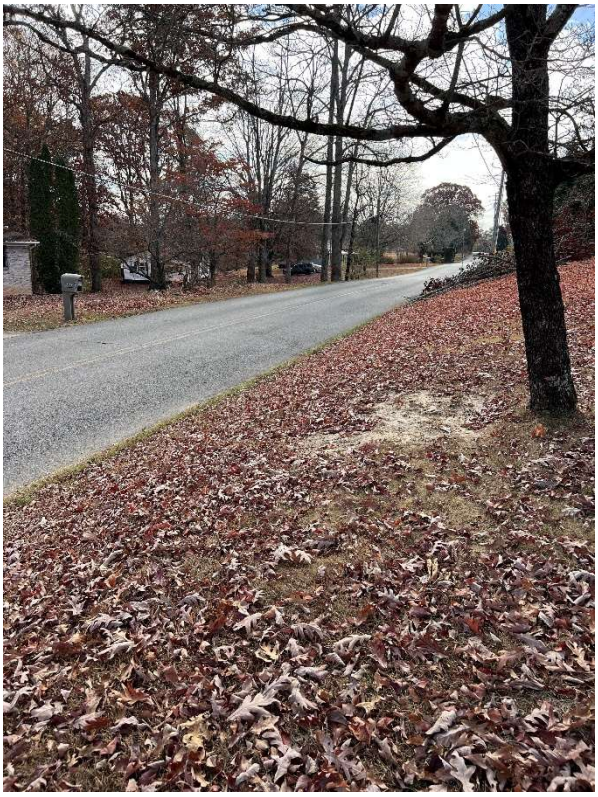


Figure 6: Existing Right-of-Way Signage

Fretz Road at Roadway Connection (Road "A") – Looking Left



Fretz Road at Roadway Connection (Road "A") – Looking Right