



11-F-21-RZ / 11-B-21-SP
TIL Version 5
12/1/2021

December 1, 2021

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

Re: Traffic Letter for 8802 Sevierville Pike Subdivision

Dear Mr. Conger:

Thunder Mountain Properties is proposing a residential development at 8802 Sevierville Pike in Knoxville, Tennessee. The total area of development is 158.64 acres and the property is currently zoned a mixture of CA (General Business Zone), CB (Business and Manufacturing Zone) and A (Agricultural and Estate). The developer plans to rezone the entire property to Planned Residential with a density of 3.0 units/acre and the concept plan shows a total of 227 proposed single-family lots and a future development that would allow an additional 248 single family lots for a total of 475 single family lots. Construction is proposed to take place this year and this analysis assumes full build out for the development will occur in 2024.

The concept plan shows a proposed driveway connection to both Sevierville Pike and Valgro Road. The proposed intersection of Sevierville Pike at the driveway connection (Road "A") is located approximately 1,300 feet north of the intersection with Valgro Road/E Simpsons Road and the proposed intersection of Valgro Road at the driveway connection (Road "G") is located approximately 1,540 feet east of the intersection with Sevierville Pike. Figure 1: Site Plan is included in the attachments.

The purpose of this traffic analysis is to evaluate the roadway segment-level capacity for Hendron Chapel Road and Sevierville Pike and perform geometric assessments of adjoining roadways per the Growth Policy Plan rural area rezoning traffic impact requirements.

Existing Site Conditions

Sevierville Pike is a two-lane road with a minimum width of 18 feet. The Knoxville-Knox County Planning Commission classifies Sevierville Pike between Chapman Highway and E Governor John Sevier Highway as a Minor Collector with a 60 feet right-of-way per the Major Road Plan. The posted speed limit on Sevierville Pike is 30 mph. Sevierville Pike has no existing sidewalks or designated bike lanes in the vicinity of the proposed development. An aerial photo of the proposed driveway location is included in the attachments.

Valgro Road is a two-lane dead end road that provides access to commercial and industrial properties. The roadway width is approximately 30 feet for a length of 325 feet at the intersection with Sevierville Pike and then varies between 16 to 20 feet until the roadway

dead ends. The Knoxville-Knox County Planning Commission does not classify Valgro Road; therefore, it is considered a local street. Valgro Road east of the Valley Grove Baptist Church driveway connection is a private right-of-way and not maintained by city, county, state or federal government. The posted speed limit on Valgro Road is 30 mph. An aerial photo of the proposed driveway location is included in the attachments.

Hendron Chapel Road is a two-lane road with an approximate width of 22 feet. The Knoxville-Knox County Planning Commission classifies Hendron Chapel Road between Chapman Highway and Kimberlin Heights Road as a Minor Arterial with a 60 feet right-of-way per the Major Road Plan. The posted speed limit on Hendron Chapel Road is 40 mph. The existing intersection of Hendron Chapel Road at Sevierville Pike is a two-way stop controlled intersection with stop signs on Sevierville Pike.

The Knoxville Area Transit (KAT) does not operate in the vicinity of the proposed development.

Traffic Volumes

The Tennessee Department of Transportation and Knoxville Regional Transportation Organization (TPO) maintain count stations in the vicinity of the proposed development. TDOT count station ID: 000563 is located on Sevierville Pike north of the intersection with Valgro Road. TDOT conducted a 24-hour traffic count on Thursday January 3, 2019. The AM peak hour occurred between 7:30 a.m. and 8:30 a.m. with a total volume of 59 vehicles per hour and a PHF of 0.82. The PM peak hour occurred between 5:00 p.m. and 6:00 p.m. with total volume of 119 vehicles per hour and a PHF of 0.85. The TDOT count data is included in the attachments.

TPO Count Station ID: 093M251 is located on Sevierville Pike near the intersection with E Governor John Sevier Highway. TPO conducted a 24-hour traffic count on Thursday October 3, 2019. The AM peak hour occurred between 7:00 a.m. and 8:00 a.m. with total volume of 258 vehicles per hour and a PHF of 0.85. The PM peak hour occurred between 4:45 p.m. and 5:45 p.m. with total volume of 308 vehicles per hour and a PHF of 0.84. The 2019 ADT was 2,603 vehicles per day. The existing trip distribution on Sevierville Pike at this count station is 70% northbound and 30% southbound during the AM peak hour and 30% northbound and 70% southbound during the PM peak hour. The TPO count data is included in the attachments.

TDOT count station ID: 000376 is located on Hendron Chapel Drive north of Chapman Highway (SR 71). TDOT conducted a 24-hour traffic count on Wednesday January 24, 2018. The AM peak hour occurred between 7:00 a.m. and 8:00 a.m. with total volume of 302 vehicles per hour with a PHF of 0.83. The PM peak hour occurred between 5:00 p.m. and 6:00 p.m. with total volume of 377 vehicles per hour and a PHF of 0.83. The existing trip distribution on Hendron Chapel Road at this count station is 25% northbound and 75% southbound during the AM peak hour and 50% northbound and 50% southbound during the PM peak hour. The TDOT count data is included in the attachments.

Background Growth

The annual growth rate for the TDOT station #000563 between 2016 and 2019 is approximately 0.45% and the 2019 ADT was 1,118 vehicles per day. The annual growth rate for the TDOT station #000376 between 2013 and 2018 is approximately 0.38% and the 2018 ADT was 4,072 vehicles per day. In order to calculate traffic for the background year 2024 FMA assumed an annual growth rate of 0.5%. The projected 2024 ADT for Sevierville Pike was 1,146 vehicles per day. The projected 2024 ADT for Hendron Chapel Road was 4,196 vehicles per day. Figure 2: 2019 Existing Peak Hour Traffic, Figure 3: 2024 Background Peak Hour Traffic and the ADT trend line growth charts are included in the attachments.

TDOT Roadway Projects

The Tennessee Department of Transportation is currently under construction on a road widening project to add a center turn lane on Chapman Highway (SR 71) from Evans Road to Burnett Lane. This project had a proposed letting date of the 3rd quarter of 2019 and is currently nearing completion.

TDOT is also working on plans for a road widening project on Chapman Highway (SR 71) between Simpson Road and Hendron Chapel Road. The scope of work for the project will include widening Chapman Highway (SR 71) to preserve the (4) four thru lanes and construct a center turn lane that would enable left turn movement for county roads and businesses along the corridor. The proposed letting date for this project is the 1st quarter of 2022.

Trip Generation

FMA evaluated the trip generation for both the existing zoning of the property with a mixture of Commercial and Agricultural & Estates and the proposed rezoning of the property which will allow three dwelling units an acre. The existing CA zoning was assumed to be a convenience store and a gas station with 6 vehicle fueling positions, the existing CB zoning was assuming as manufacturing and the existing AG zoning was assuming to be one dwelling unit an acre.

The trip generation was calculated using the fitted curve equations and average rates where provided from the *Trip Generation, 11th Edition*, published by the Institute of Transportation Engineers. Single-Family Detached Housing or Land Use 210, Convenience Store/Gas Station – GFA (2-4K) or Land Use 945 and Manufacturing or Land Use 140 was used to calculate the daily trips, AM and PM peak hour trips. The land use worksheets are included in the attachments. A trip generation summary is shown in Table 1 – Trip Generation Summary.

**Table 1 - Trip Generation Summary
8802 Sevierville Pike Subdivision**

Land Use	Density	Daily Trips	AM Peak Hour Enter	AM Peak Hour Exit	PM Peak Hour Enter	PM Peak Hour Exit
Proposed - Planned Residential Zoning - 3.0 Units/Acre						
Single-Family Detached Housing (LUC 210)	475 lots	4,231	80	228	271	159
Existing - Agricultural & Estates Zoning – 1.0 Unit/Acre						
Single-Family Detached Housing (LUC 210)	152 lots	1,483	28	81	93	54
Existing - General Business Zone – 2.2 Acres						
Convenience Store/ Gas Station (LUC 945)	6 VFP	1,800	48	48	56	56
Pass-By Trips 60%		1,080	29	29	33	33
New Trips 40%		720	19	19	22	22
Existing - Business and Manufacturing Zone – 4.0 Acres						
Manufacturing (LUC 140)	4.0 Acres	209	28	4	16	26
Total Proposed Rezoning		4,231	80	228	271	159
Total Existing Zoning		2,412	75	104	131	102

The total number of new trips generated by the proposed residential development at 8802 Sevierville Pike is estimated to be 4,231 new daily trips, 308 trips during the AM peak hour and 430 trips during the PM peak hour. The 475 proposed single family lots includes the 227 single family lots shown on the concept plan and an additional 248 single family lots allowed with a density of 3.0 units/acre.

The existing 158.64 acre property is not currently developed, but the estimated number of trips that could be developed under the existing zoning is 2,412 new daily trips, 182 trips during the AM peak hour and 233 trips during the PM peak hour.

The rezoning of the property from a combination of Commercial and Agricultural & Estates (1.0 Unit/Acre) to Planned Residential Zoning (3.0 Units/Acre) will increase the zoning density and the number of trips generated. The difference between the existing zoning

(2,412 new trips) and the proposed rezoning (4,231 new trips) will result in an additional 1,819 new daily trips, 129 trips during the AM peak hour and 197 trips during the PM peak hour.

Trip Distribution

FMA assumed that 30% of traffic would enter/exit the intersection of Valgro Road at driveway connection (Road "G") and the remaining 70% of traffic would enter/exit the intersection of Sevierville Pike at driveway connection (Road "A").

FMA assumed that entering/exiting traffic from the proposed development would be 60% to/from Chapman Highway (SR 71) via Sevierville Pike, 10% to/from Chapman Highway (SR 71) via E. Simpsons Road, 20% Sevierville Pike northbound and 10% Hendron Chapel Road. Figure 4: Peak Hour Site Traffic – Existing Zoning, Figure 5: Peak Hour Trip Distribution, Figure 6: Peak Hour Site Traffic – Proposed Rezoning and Figure 7: Full Buildout Peak Hour Traffic – Proposed Rezoning are included in the attachments.

Roadway Capacity and Level of Service

Roadway segment capacities for the existing, 2024 background and 2024 full buildout conditions were analyzed using a generalized Florida criterion for an urbanized area. A capacity of 12,480 vpd for Sevierville Pike and Hendron Chapel Road was determined for a two-lane undivided roadway with no left-turn lanes. The capacity for a two-lane undivided roadway is 15,600 vpd and was reduced by 20% to 12,480 vpd without left turn lanes. The FDOT Table 4-1 "Generalized Annual Average Daily Volumes for Florida's Urbanized Areas" is included in the attachments. The Knoxville-Knox County Planning department provided guidance in determining level-of-service for the overall segment-level capacity using the volume-to-capacity ratios. Table 2 – LOS for V/C Ratios is included below.

Table 2 – LOS for Volume to Capacity Ratios

V/C > 1.0 = LOS "F"
V/C > 0.85 = LOS "E"
V/C > 0.70 = LOS "D"
V/C > 0.50 = LOS "C"
V/C > 0.25 = LOS "B"
V/C < 0.25 = LOS "A"

The capacity, V/C ratio and LOS for the roadway segments including the existing, background and full buildout conditions for both the Agricultural and Estates Zoning and Planned Residential Zoning are shown below in Table 3 – Roadway Segments.

**Table 3 - Roadway Segments
Level of Service (LOS) Summary**

	Capacity	ADT	V/C	Delay (sec)/LOS
Sevierville Pike (2019 Existing)	12,480	1,118	0.09	LOS A
Sevierville Pike (2024 Background)	12,480	1,146	0.09	LOS A
Sevierville Pike (2024 Existing Zoning)	12,480	2,593	0.21	LOS A
Sevierville Pike (2024 Full Buildout – 475 lots)	12,480	3,685	0.30	LOS B
Hendron Chapel Rd (2018 Existing)	12,480	4,072	0.33	LOS B
Hendron Chapel Rd (2024 Background)	12,480	4,196	0.34	LOS B
Hendron Chapel Rd (2024 Existing Zoning)	12,480	4,437	0.36	LOS B
Hendron Chapel Rd (2024 Full Buildout – 475 lots)	12,480	4,619	0.37	LOS B

Turn Lane Warrant

The Knox County Department of Engineering and Public Works handbook, “Access Control and Driveway Design Policy,” was used to determine if an eastbound left turn lane or a westbound right turn is warranted at the intersection of Sevierville Pike at the proposed driveway connection (Road “A”). After review there are no warranted turn lanes at the proposed intersection of Sevierville Pike at the driveway connection (Road “A”) during either the AM or PM peak hour conditions due to the existing low volume of traffic on Sevierville Pike. The turn lane 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 February 13, 2020. FMA recommends that the sight distance at the proposed intersection of Sevierville Pike at the driveway connection (Road “A”) and the proposed intersection of Valgro Road at driveway connection (Road “G”) be measured at 15 feet from the edge of pavement looking both directions in order to ensure that the proposed driveway location meets the minimum required sight distance per the subdivision regulations.

Conclusion and Recommendations

The rezoning of the property from a combination of Commercial and Agricultural & Estates to Planned Residential Zoning (3.0 Units/Acre) will increase the zoning density and the number of trips generated. The difference between the existing zoning (2,412 new trips) and the proposed rezoning (4,231 new trips) will result in an additional 1,819 new daily trips, 129 trips during the AM peak hour and 197 trips during the PM peak hour.

Sevierville Pike segment capacity is currently operating at an acceptable LOS A and Hendron Chapel Road segment capacity is currently operating at an acceptable LOS B. Sevierville Pike and Hendron Chapel Road are expected to continue operating at an acceptable LOS B after the rezoning to Planned Residential (3.0 Units/Acre) and the construction of the subdivision at 8802 Sevierville Pike with 227 proposed single family lots and an additional allowed 248 single family lots of future development; therefore, the proposed development will not unreasonably impair traffic flow in the traffic analysis zone along Sevierville Pike and Hendron Chapel Road.

Some sections of Valgro Road between the Valley Grove Baptist Church parking lot and the proposed intersection with the driveway connection (Road "G") are in poor condition. FMA recommends any improvements on Valgro Road between Valley Grove Baptist Church connection (Road "G") and Sevierville Pike including driveway access and location, road widening, resurfacing, striping plan, etc. be coordinated with the property owner as the connection is a private right-of-way and not maintained by Knox County Engineering and Public Works.

The subdivision layout and design shall be in accordance with the "Knoxville-Knox County Subdivision Regulations" amended through February 13, 2020.

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

Thank you,



Addie Kirkham, P.E.

Enclosure: Attachments

Attachments

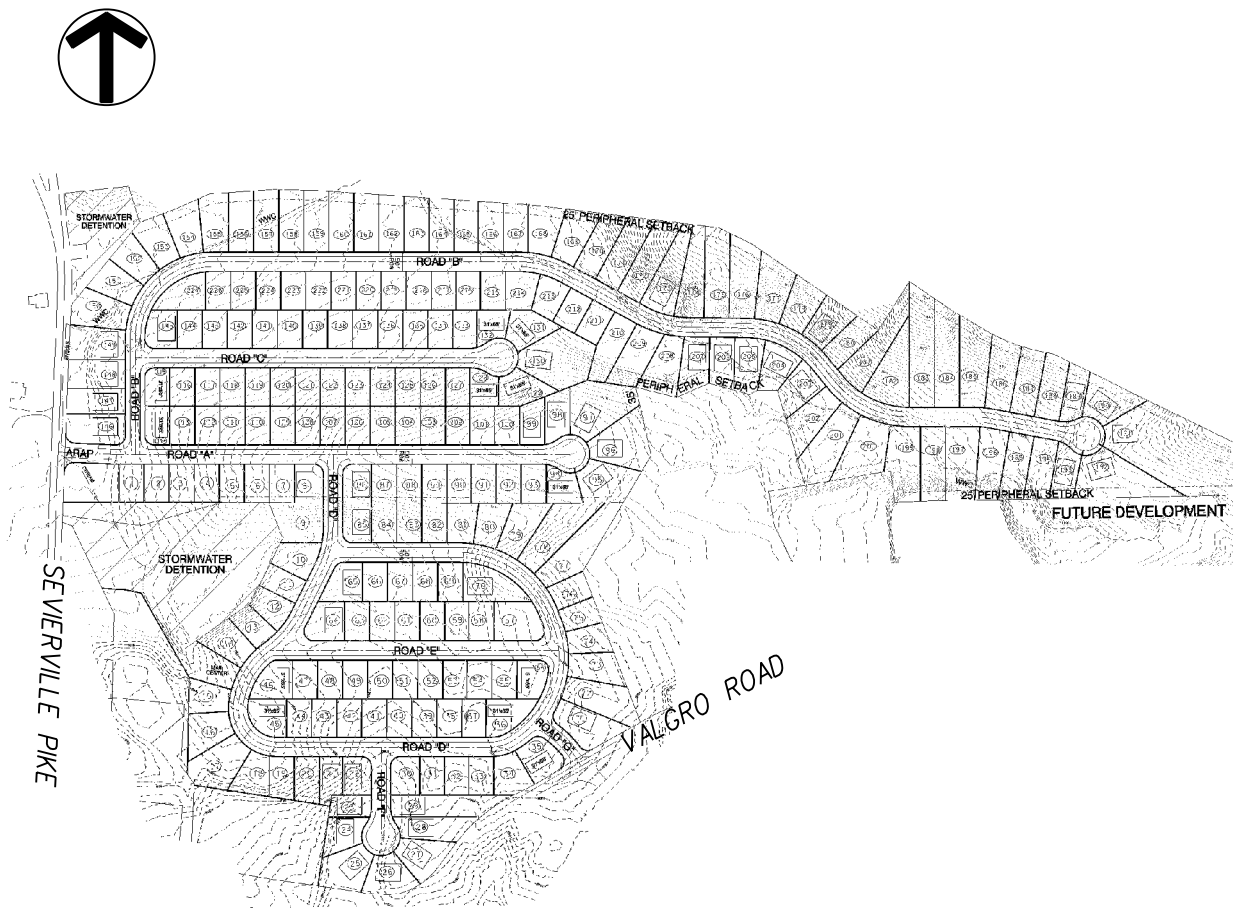
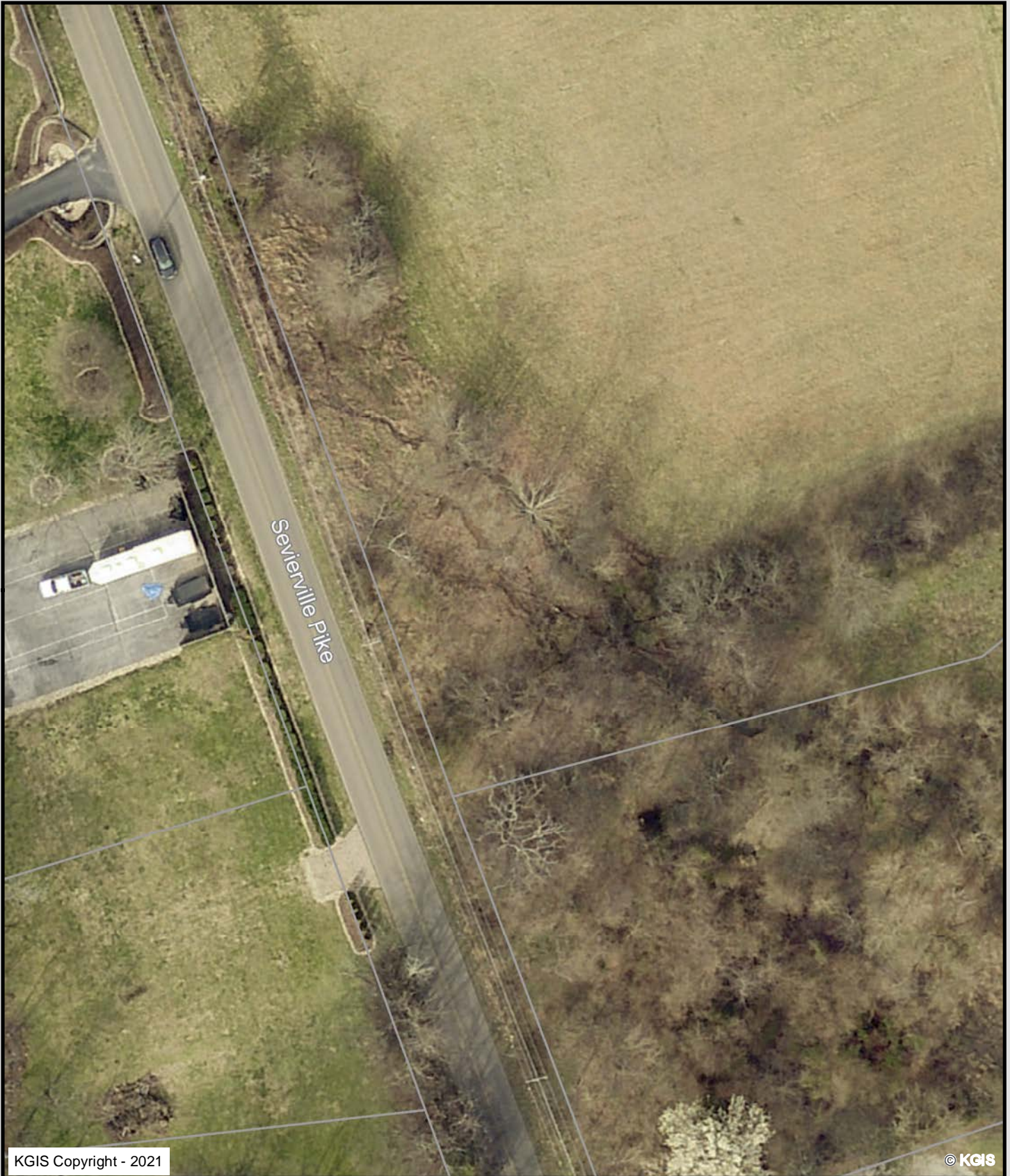


Figure 1: Site Plan

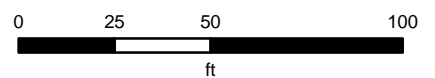


Sevierville Pike at Driveway

Knoxville - Knox County - KUB Geographic Information System



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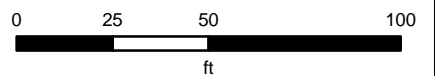


Valgro at Driveway

Knoxville - Knox County - KUB Geographic Information System



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Location Info							Count Data Info	
Location ID	47000563						Start Date	1/3/2019
Type	I-SECTION						End Date	1/4/2019
Functional Class	5						Start Time	12:00 PM
Located On	SEVIERVILLE PK.						End Time	12:00 PM
	NEAR SEVIER COUNTY LINE						Direction	
Direction	2-WAY						Notes	
Community	-						Count Source	
MPO_ID							File Name	Vol_Short
HPMS ID							Weather	
Agency	TDOT						Study	
							Owner	LEGACY
							QC Status	Accepted
Interval: 15 mins								
Time	15 Min				Hourly Count			
	1st	2nd	3rd	4th				
00:00 - 01:00	2	2	2	2	8			
01:00 - 02:00	1	0	2	0	3			
02:00 - 03:00	1	4	1	2	8			
03:00 - 04:00	0	1	1	1	3			
04:00 - 05:00	1	1	4	2	8			
05:00 - 06:00	2	3	8	9	22			
06:00 - 07:00	8	4	8	15	35			
07:00 - 08:00	9	11	15	18	53			
08:00 - 09:00	15	11	9	19	54			
09:00 - 10:00	16	11	13	10	50			
10:00 - 11:00	17	17	11	8	53			
11:00 - 12:00	16	19	23	20	78			
12:00 - 13:00	17	23	13	14	67			
13:00 - 14:00	17	22	12	17	68			
14:00 - 15:00	20	16	18	19	73			
15:00 - 16:00	22	16	20	24	82			
16:00 - 17:00	29	17	21	28	95			
17:00 - 18:00	26	35	30	28	119			
18:00 - 19:00	23	19	23	19	84			
19:00 - 20:00	14	13	13	6	46			
20:00 - 21:00	19	3	6	9	37			
21:00 - 22:00	10	10	3	10	33			
22:00 - 23:00	3	8	4	3	18			
23:00 - 24:00	4	3	7	7	21			
TOTAL					1118			

VOLUME

Sevierville Pike S/O SR 168/E Governor John Sevier Hwy(35.91433, -83.83035)

Day: Thursday
Date: 10/3/2019City: Knoxville
Site #: 093M251

DAILY TOTALS					NB	SB						EB	WB						Total
					1,184	1,419						0	0						2,603
AM Period	NB	SB	EB	WB	TOTAL		PM Period	NB	SB	EB	WB	TOTAL							
0:00	1	4			5		12:00	11	15			26							
0:15	2	6			8		12:15	14	15			29							
0:30	2	5			7		12:30	19	16			35							
0:45	1	6	0	15	1	21	12:45	15	59	22	68	37	127						
1:00	1	3			4		13:00	17	18			35							
1:15	0	0			0		13:15	17	16			33							
1:30	1	0			1		13:30	14	16			30							
1:45	1	3	2	5	3	8	13:45	16	64	15	65	31	129						
2:00	0	4			4		14:00	12	33			45							
2:15	0	2			2		14:15	17	20			37							
2:30	0	2			2		14:30	13	29			42							
2:45	2	2	1	9	3	11	14:45	27	69	29	111	56	180						
3:00	0	4			4		15:00	17	26			43							
3:15	4	0			4		15:15	15	25			40							
3:30	0	2			2		15:30	16	21			37							
3:45	2	6	1	7	3	13	15:45	15	63	40	112	55	175						
4:00	1	0			1		16:00	26	40			66							
4:15	1	1			2		16:15	15	29			44							
4:30	1	0			1		16:30	17	37			54							
4:45	1	4	0	1	1	5	16:45	26	84	66	172	92	256						
5:00	0	2			2		17:00	23	45			68							
5:15	3	0			3		17:15	21	53			74							
5:30	5	4			9		17:30	21	53			74							
5:45	6	14	1	7	7	21	17:45	20	85	35	186	55	271						
6:00	8	2			10		18:00	26	31			57							
6:15	17	5			22		18:15	20	26			46							
6:30	17	12			29		18:30	14	29			43							
6:45	20	62	8	27	28	89	18:45	24	84	28	114	52	198						
7:00	38	16			54		19:00	10	17			27							
7:15	54	17			71		19:15	16	23			39							
7:30	52	24			76		19:30	10	15			25							
7:45	38	182	19	76	57	258	19:45	6	42	26	81	32	123						
8:00	27	15			42		20:00	8	20			28							
8:15	19	15			34		20:15	3	13			16							
8:30	17	11			28		20:30	7	17			24							
8:45	21	84	17	58	38	142	20:45	6	24	7	57	13	81						
9:00	23	10			33		21:00	8	10			18							
9:15	16	16			32		21:15	4	11			15							
9:30	18	13			31		21:30	6	8			14							
9:45	17	74	16	55	33	129	21:45	9	27	6	35	15	62						
10:00	17	10			27		22:00	5	7			12							
10:15	17	14			31		22:15	3	6			9							
10:30	11	10			21		22:30	4	9			13							
10:45	13	58	12	46	25	104	22:45	3	15	3	25	6	40						
11:00	16	11			27		23:00	3	8			11							
11:15	14	17			31		23:15	3	4			7							
11:30	17	26			43		23:30	2	3			5							
11:45	12	59	14	68	26	127	23:45	6	14	4	19	10	33						
TOTALS	554	374			928		TOTALS	630	1045			1675							
SPLIT %	59.7%	40.3%			35.7%		SPLIT %	37.6%	62.4%			64.3%							

DAILY TOTALS					NB	SB						EB	WB						Total
					1,184	1,419						0	0						2,603
AM Peak Hour	7:00	7:00			7:00		PM Peak Hour	16:45	16:45			16:45							
AM Pk Volume	182	76			258		PM Pk Volume	91	217			308							
Pk Hr Factor	0.843	0.792			0.849		Pk Hr Factor	0.875	0.822			0.837							
7 - 9 Volume	266	134	0	0	400		4 - 6 Volume	169	358	0	0	527							
7 - 9 Peak Hour	7:00	7:00			7:00		4 - 6 Peak Hour	16:45	16:45			16:45							
7 - 9 Pk Volume	182	76	0	0	258		4 - 6 Pk Volume	91	217	0	0	308							
Pk Hr Factor	0.843	0.792	0.000	0.000	0.849		Pk Hr Factor	0.875	0.822	0.000	0.000	0.837							

Location Info							Count Data Info	
Location ID	47000376						Start Date	1/24/2018
Type	I-SECTION						End Date	1/25/2018
Functional Class	6						Start Time	10:00 AM
Located On	E. HENDRON CHAPEL DR.						End Time	10:00 AM
	NORTH OF SR-71						Direction	
Direction	2-WAY						Notes	
Community	-						Count Source	
MPO_ID							File Name	Vol_Short
HPMS ID							Weather	
Agency	TDOT						Study	
							Owner	LEGACY
							QC Status	Accepted
Interval: 15 mins								
Time	15 Min				Hourly Count			
	1st	2nd	3rd	4th				
00:00 - 01:00	5	3	1	5	14			
01:00 - 02:00	4	1	1	1	7			
02:00 - 03:00	3	3	3	1	10			
03:00 - 04:00	3	3	0	4	10			
04:00 - 05:00	4	12	4	6	26			
05:00 - 06:00	13	16	23	30	82			
06:00 - 07:00	23	29	40	48	140			
07:00 - 08:00	67	76	68	91	302			
08:00 - 09:00	67	66	54	53	240			
09:00 - 10:00	42	39	32	51	164			
10:00 - 11:00	36	46	51	41	174			
11:00 - 12:00	36	38	57	45	176			
12:00 - 13:00	50	40	46	59	195			
13:00 - 14:00	60	67	66	58	251			
14:00 - 15:00	58	49	65	75	247			
15:00 - 16:00	68	62	78	95	303			
16:00 - 17:00	110	75	80	106	371			
17:00 - 18:00	91	99	73	114	377			
18:00 - 19:00	77	83	78	70	308			
19:00 - 20:00	46	57	39	43	185			
20:00 - 21:00	49	43	48	37	177			
21:00 - 22:00	35	33	39	19	126			
22:00 - 23:00	23	21	17	15	76			
23:00 - 24:00	8	13	8	8	37			
TOTAL					3998			

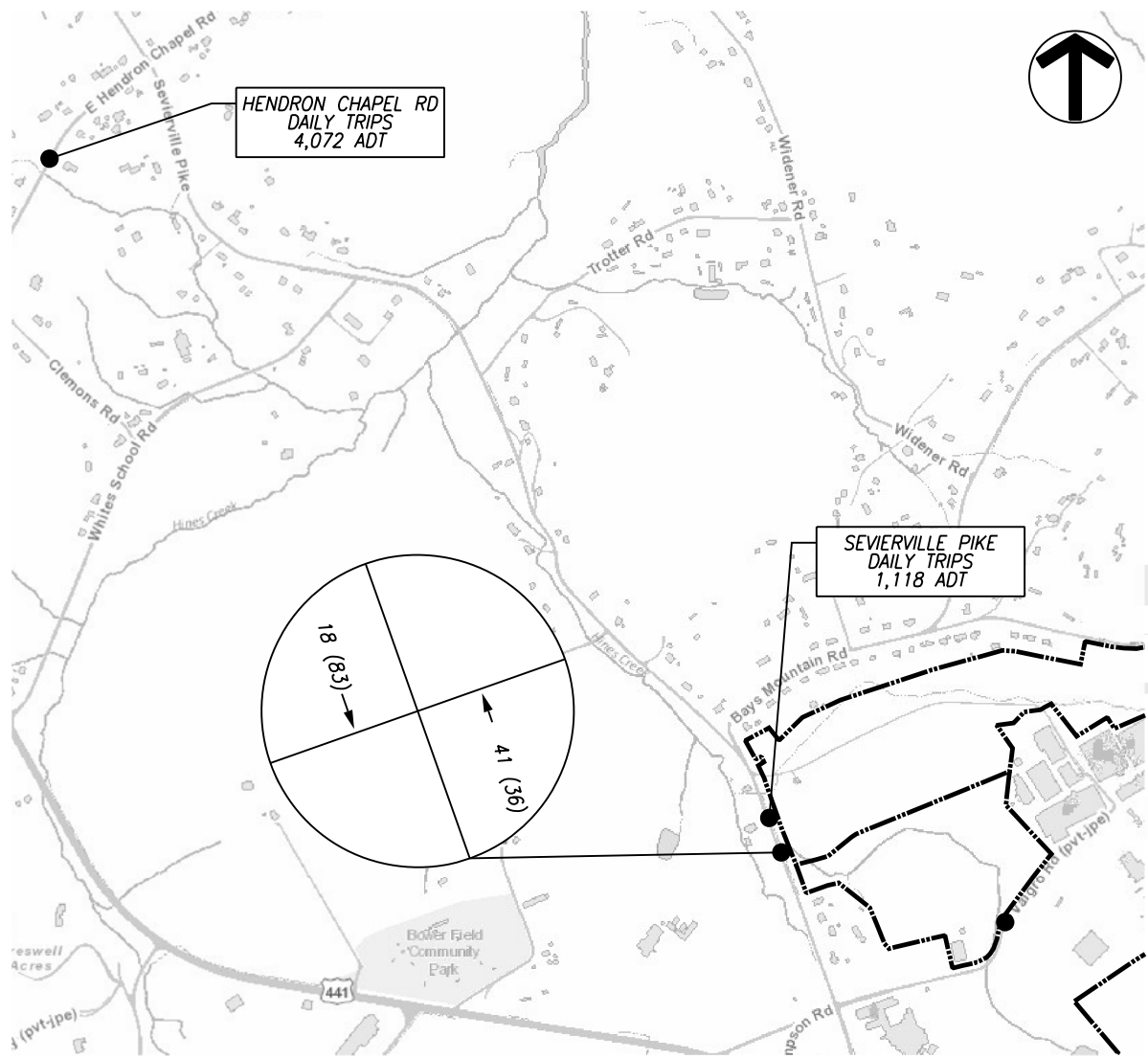


Figure 2: 2019 Existing Peak Hour Traffic

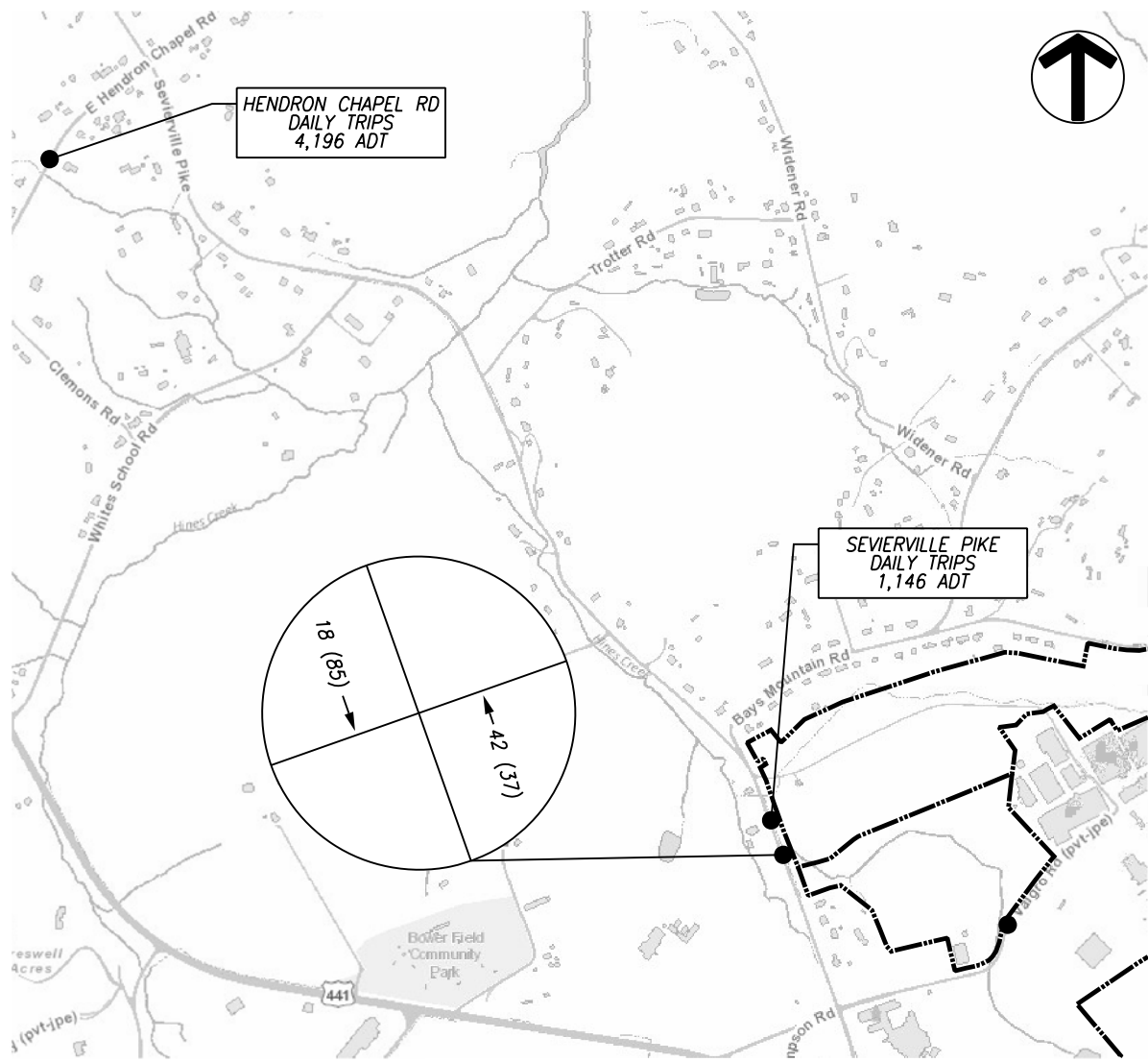
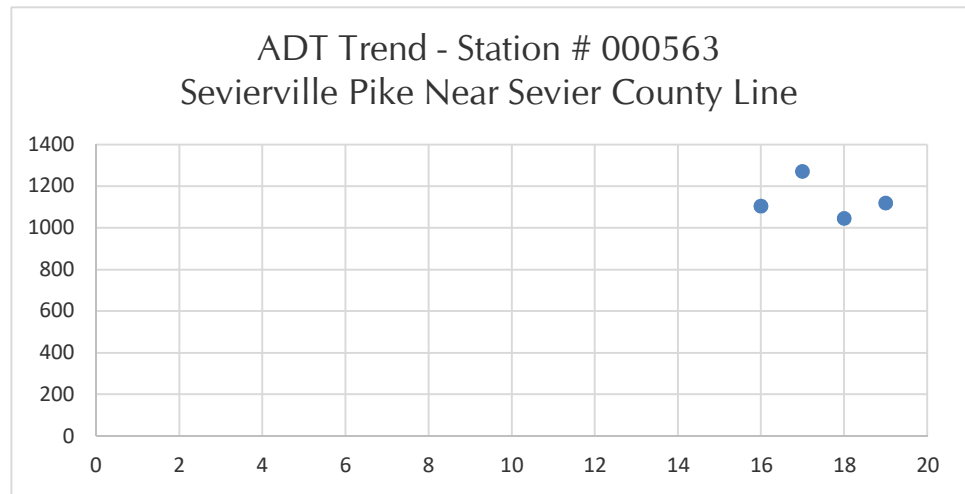


Figure 3: 2024 Background Peak Hour Traffic

Adjusted
Average Daily
Traffic

Year
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

1103
1271
1044
1118

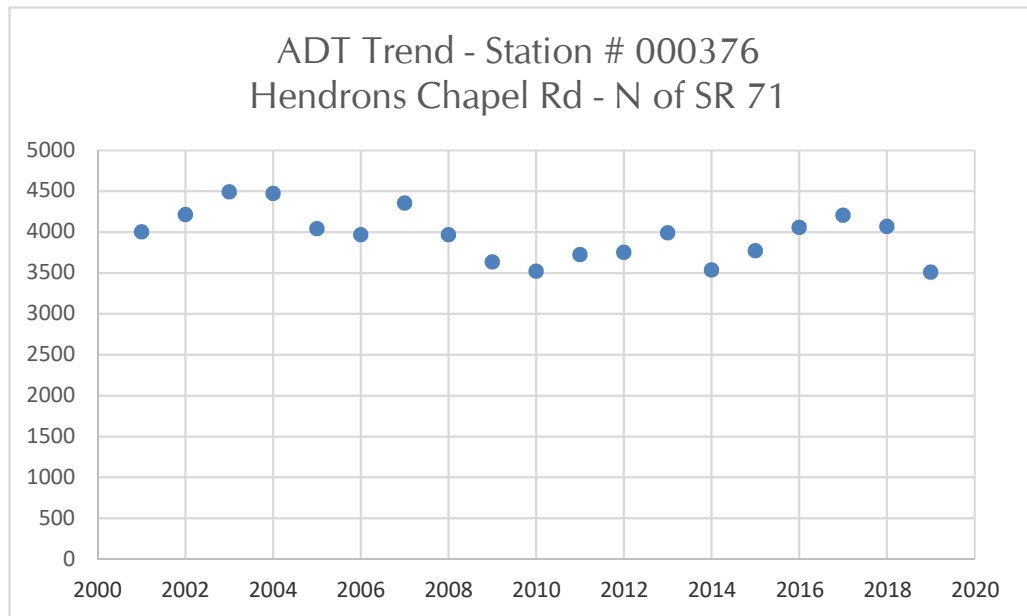


Most Recent Trend Line Growth

Year	ADT
2016	1103
2019	1118

Annual Percent Growth	0.45%
-----------------------	-------

Year	Adjusted Average Daily Traffic
2001	4006
2002	4214
2003	4495
2004	4474
2005	4045
2006	3967
2007	4357
2008	3968
2009	3636
2010	3523
2011	3725
2012	3754
2013	3994
2014	3537
2015	3774
2016	4060
2017	4207
2018	4072
2019	3510



Most Recent Trend Line Growth

Year	ADT
2013	3994
2018	4072

Annual Percent Growth	0.38%
-----------------------	-------

Trip Generation

Project: 8802 Sevierville Pike

Date Conducted: 11/8/2021

Single-Family Detached Housing (LUC 210)

475 Single Family Lots

Average Daily Traffic

$$\ln(T) = 0.92\ln(X) + 2.68$$

$$\ln(T) = 0.92\ln(475) + 2.68$$

$$T = 4231$$

Peak Hour of Adjacent Street Traffic

One Hour Between 7 and 9 a.m.

$$\ln(T) = 0.91\ln(X) + 0.12$$

$$\ln(T) = 0.91\ln(475) + 0.12$$

$$T = 308$$

Peak Hour of Adjacent Street Traffic

One Hour Between 4 and 6 p.m.

$$\ln(T) = 0.94\ln(X) + 0.27$$

$$\ln(T) = 0.94\ln(475) + 0.27$$

$$T = 430$$

Time Period	Total Trips	Percent		Number	
		Enter	Exit	Enter	Exit
Weekday (24 hours)	4231	50%	50%	2116	2116
AM Peak Hour	308	26%	74%	80	228
PM Peak Hour	430	63%	37%	271	159

Project: 8802 Sevierville Pike

Date Conducted: 11/10/2021

Single-Family Detached Housing (LUC 210)

152 Single Family Lots

Average Daily Traffic

$$\ln(T) = 0.92\ln(X) + 2.68$$

$$\ln(T) = 0.92\ln(152) + 2.68$$

$$T = 1483$$

Peak Hour of Adjacent Street Traffic

One Hour Between 7 and 9 a.m.

$$\ln(T) = 0.91\ln(X) + 0.12$$

$$\ln(T) = 0.91\ln(152) + 0.12$$

$$T = 109$$

Peak Hour of Adjacent Street Traffic

One Hour Between 4 and 6 p.m.

$$\ln(T) = 0.94\ln(X) + 0.27$$

$$\ln(T) = 0.94\ln(152) + 0.27$$

$$T = 147$$

Time Period	Total Trips	Percent		Number	
		Enter	Exit	Enter	Exit
Weekday (24 hours)	1483	50%	50%	742	742
AM Peak Hour	109	26%	74%	28	81
PM Peak Hour	147	63%	37%	93	54

Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 174

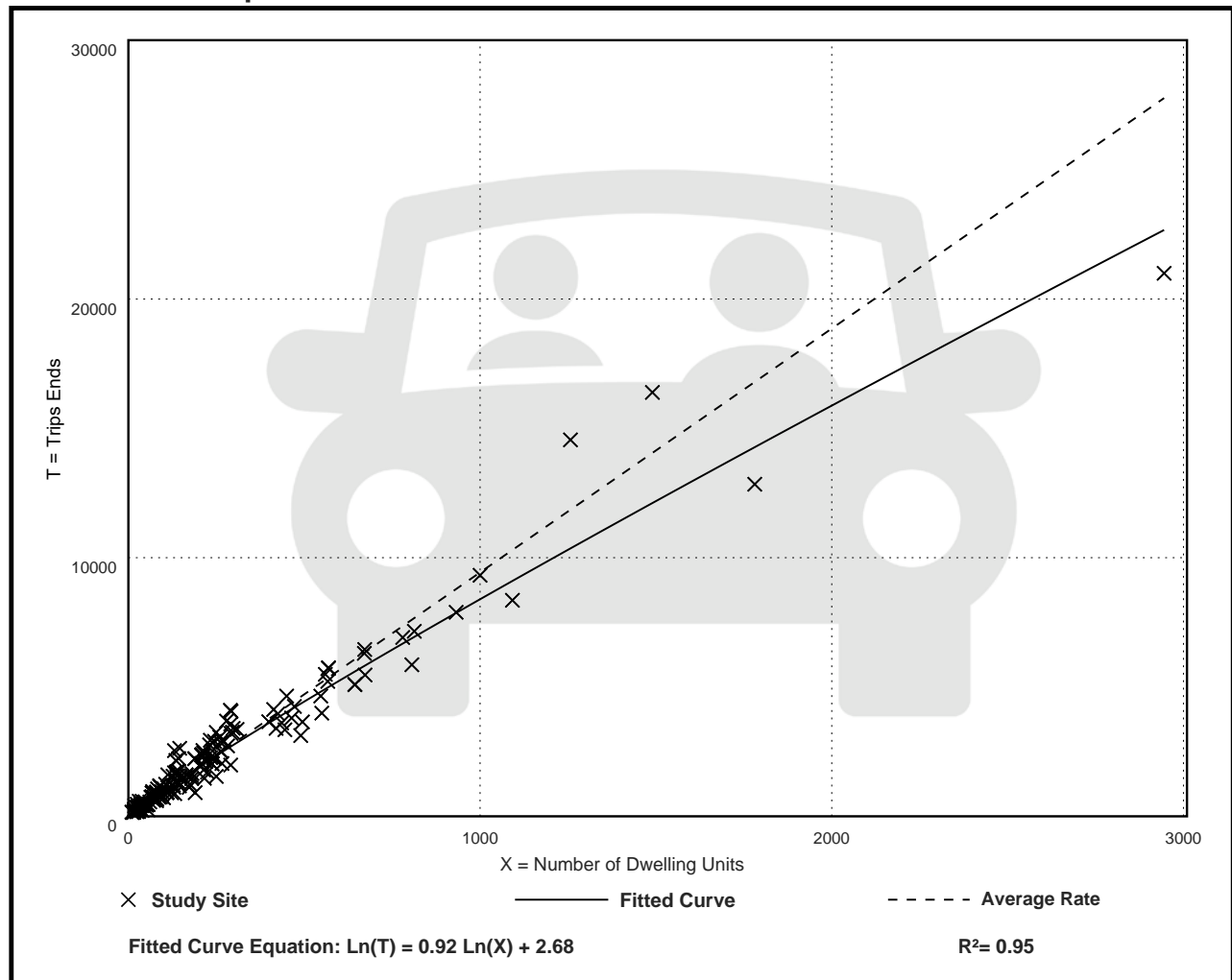
Avg. Num. of Dwelling Units: 246

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



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

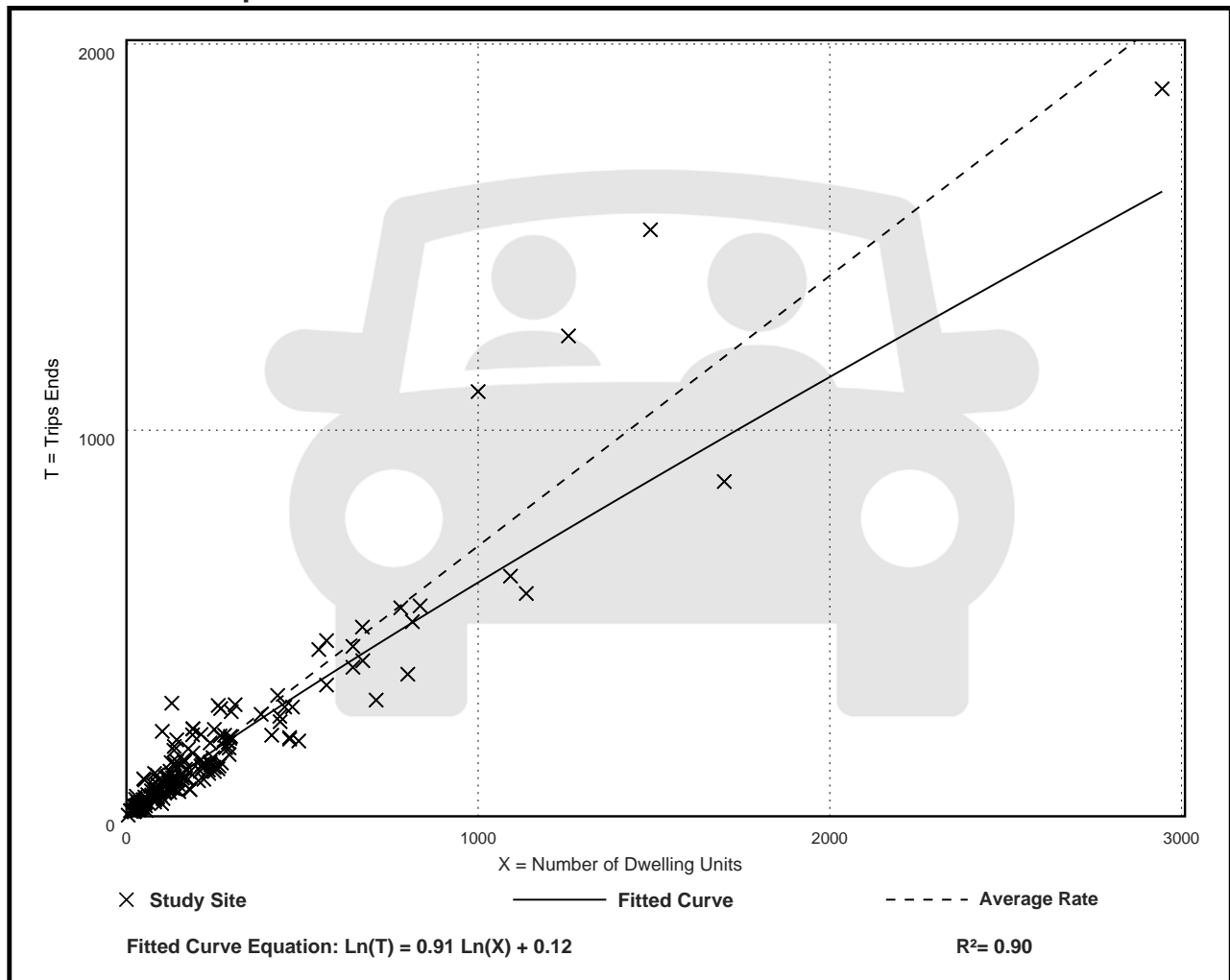
Avg. Num. of Dwelling Units: 226

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

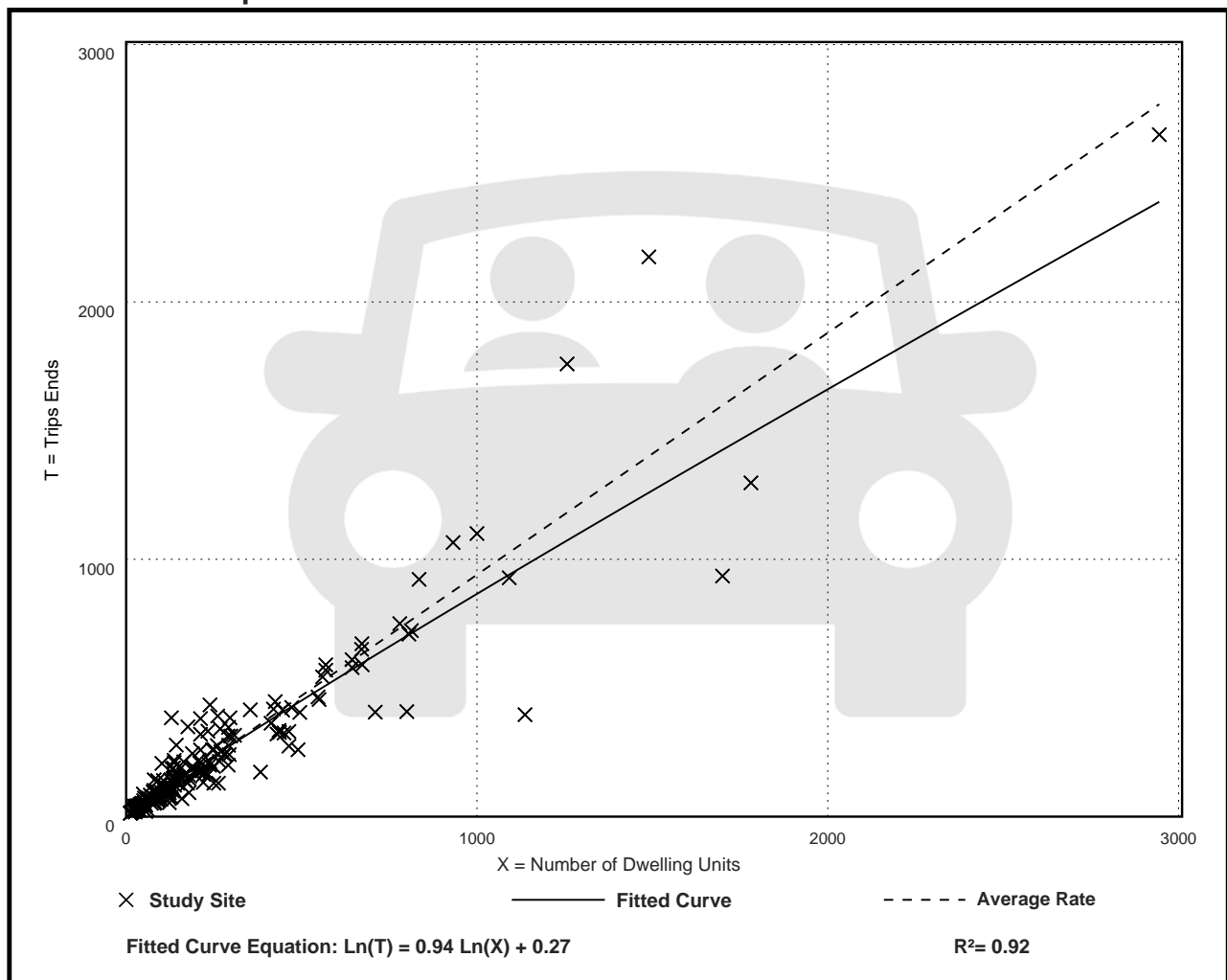
Avg. Num. of Dwelling Units: 248

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



Project: 8802 Sevierville Pike

Date Conducted: 11/10/2021

Convenience Store/Gas Station - GFA (2-4K) (LUC 945)

6 Vehicle Fueling Positions

Average Daily Traffic

$$T = 158.28(X) + 850.23$$

$$T = 158.28(X) + 850.23$$

$$T = 1,800$$

Peak Hour of Adjacent Street Traffic

One Hour Between 7 and 9 a.m.

$$\text{Average Rate} = 16.06$$

$$T = 16.06 * (6)$$

$$T = 96$$

Peak Hour of Adjacent Street Traffic

One Hour Between 4 and 6 p.m.

$$\text{Average Rate} = 18.42$$

$$T = 18.42 * (6)$$

$$T = 111$$

Time Period	Total Trips	Percent		Number	
		Enter	Exit	Enter	Exit
Weekday (24 hours)	1800	50%	50%	900	900
AM Peak Hour	96	50%	50%	48	48
PM Peak Hour	111	50%	50%	56	56

60% Pass-By Trips

Time Period	Total Trips	Percent		Number	
		Enter	Exit	Enter	Exit
Weekday (24 hours)	1080	50%	50%	540	540
AM Peak Hour	58	50%	50%	29	29
PM Peak Hour	67	50%	50%	33	33

40% New Trips

Time Period	Total Trips	Percent		Number	
		Enter	Exit	Enter	Exit
Weekday (24 hours)	720	50%	50%	360	360
AM Peak Hour	38	50%	50%	19	19
PM Peak Hour	44	50%	50%	22	22

Convenience Store/Gas Station - GFA (2-4k) (945)

Vehicle Trip Ends vs: Vehicle Fueling Positions
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 48

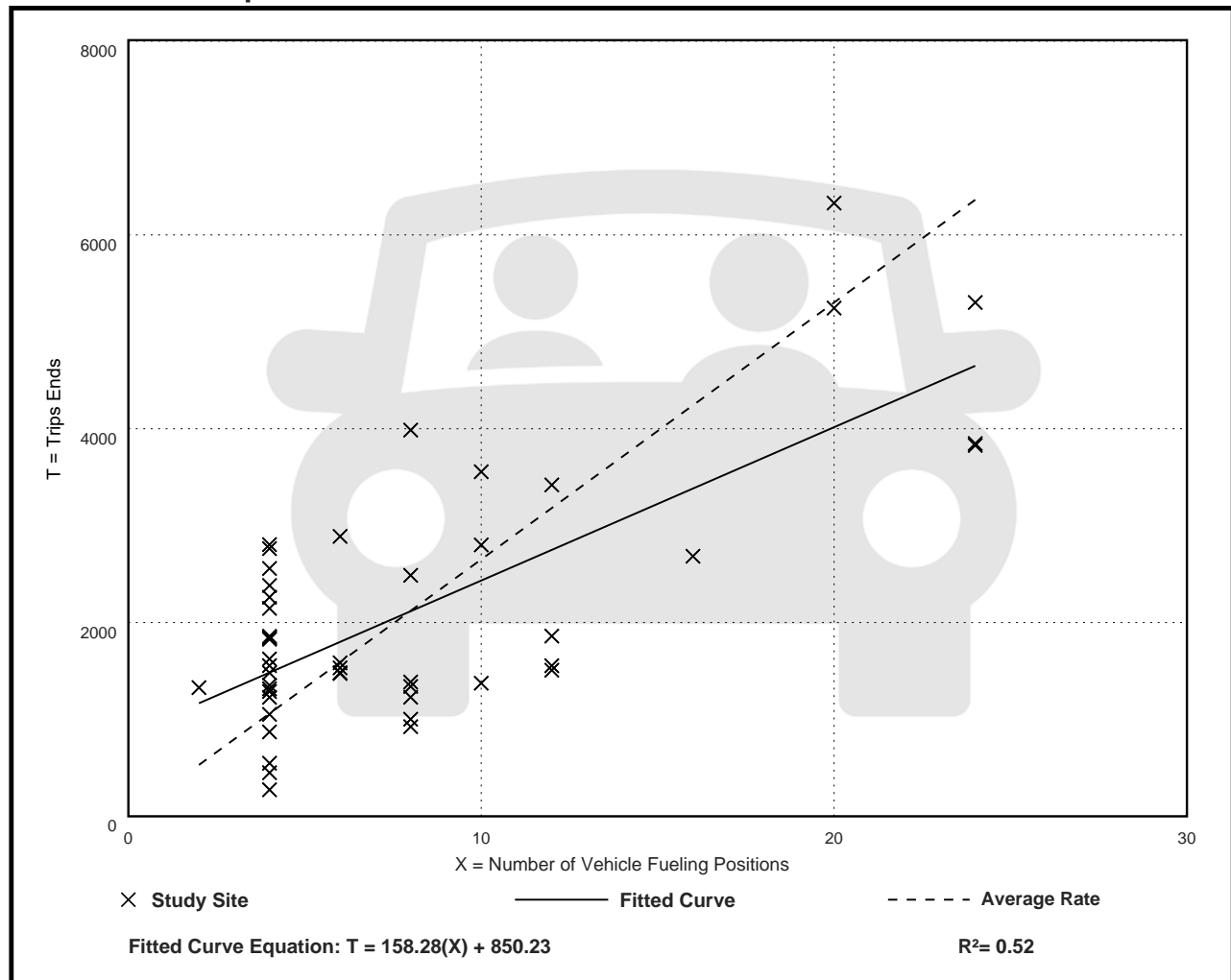
Avg. Num. of Vehicle Fueling Positions: 8

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
265.12	68.50 - 701.00	142.37

Data Plot and Equation



Convenience Store/Gas Station - GFA (2-4k) (945)

Vehicle Trip Ends vs: Vehicle Fueling Positions

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: 76

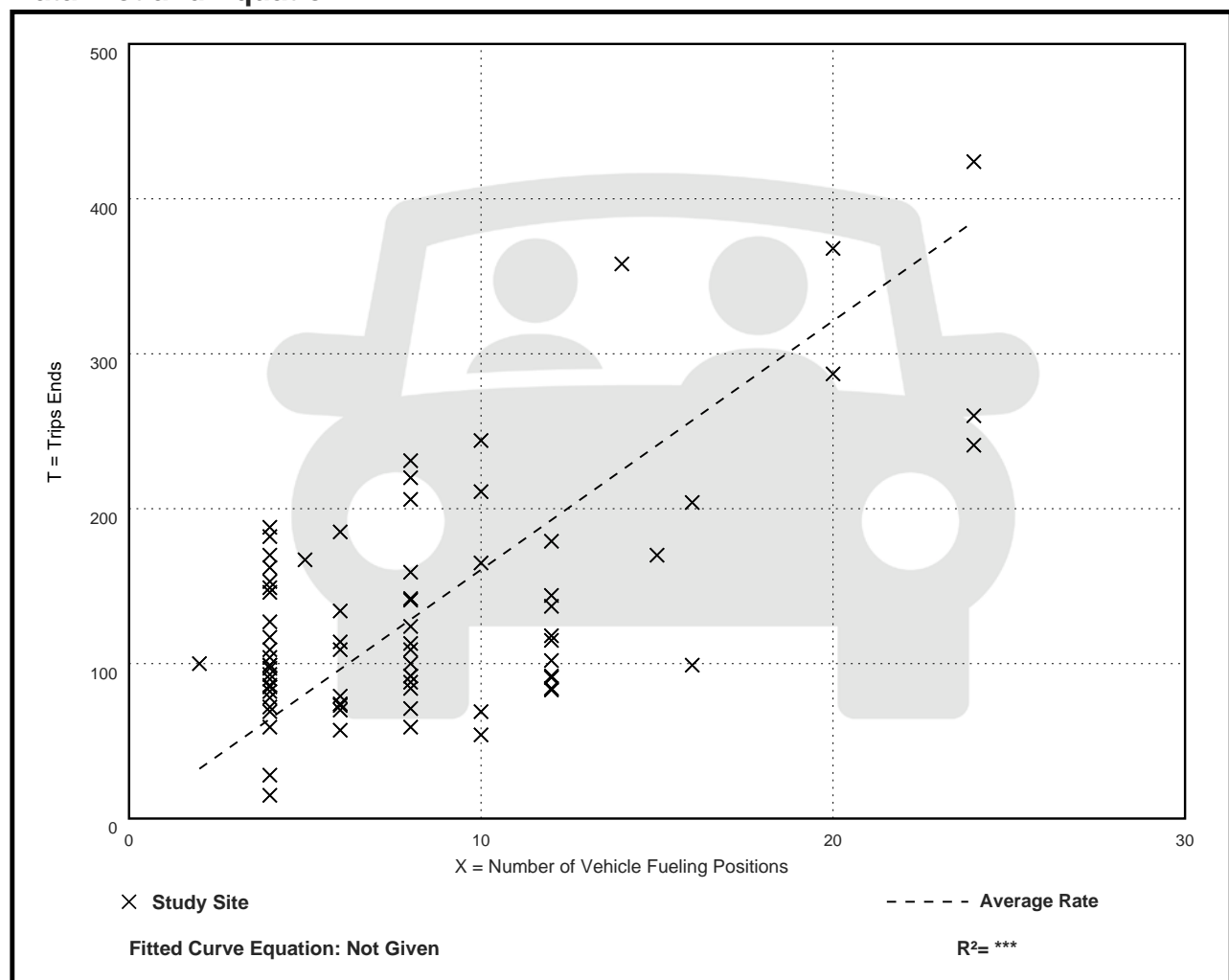
Avg. Num. of Vehicle Fueling Positions: 8

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
16.06	3.75 - 50.00	8.79

Data Plot and Equation



Convenience Store/Gas Station - GFA (2-4k) (945)

Vehicle Trip Ends vs: Vehicle Fueling Positions

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: 93

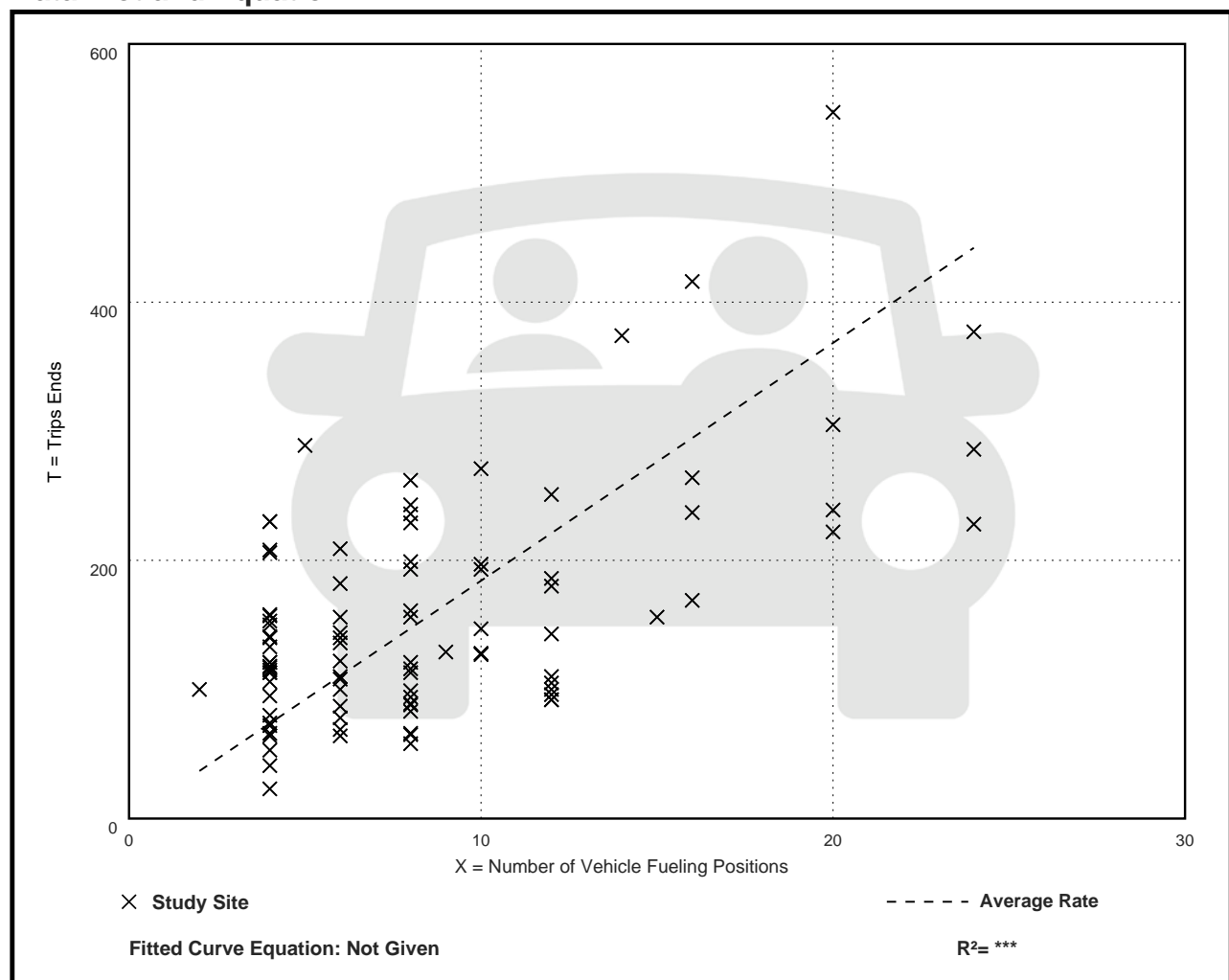
Avg. Num. of Vehicle Fueling Positions: 8

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
18.42	5.75 - 57.80	10.16

Data Plot and Equation



Project: 8802 Sevierville Pike

Date Conducted: 11/10/2021

Manufacturing (LUC 140)

4.0 Acres

Average Daily Traffic

$$T = 37.05 (X) + 60.72$$

$$T = 37.05 (4.0) + 60.72$$

$$T = 209$$

Peak Hour of Adjacent Street Traffic

One Hour Between 7 and 9 a.m.

$$T = 4.05(X) + 16.16$$

$$T = 4.05(4.0) + 16.16$$

$$T = 32$$

Peak Hour of Adjacent Street Traffic

One Hour Between 4 and 6 p.m.

$$T = 3.32(X) + 28.91$$

$$T = 3.32(4.0) + 28.91$$

$$T = 42$$

Time Period	Total Trips	Percent		Number	
		Enter	Exit	Enter	Exit
Weekday (24 hours)	209	50%	50%	105	105
AM Peak Hour	32	86%	14%	28	4
PM Peak Hour	42	39%	61%	16	26

Manufacturing (140)

Vehicle Trip Ends vs: Acres
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 37

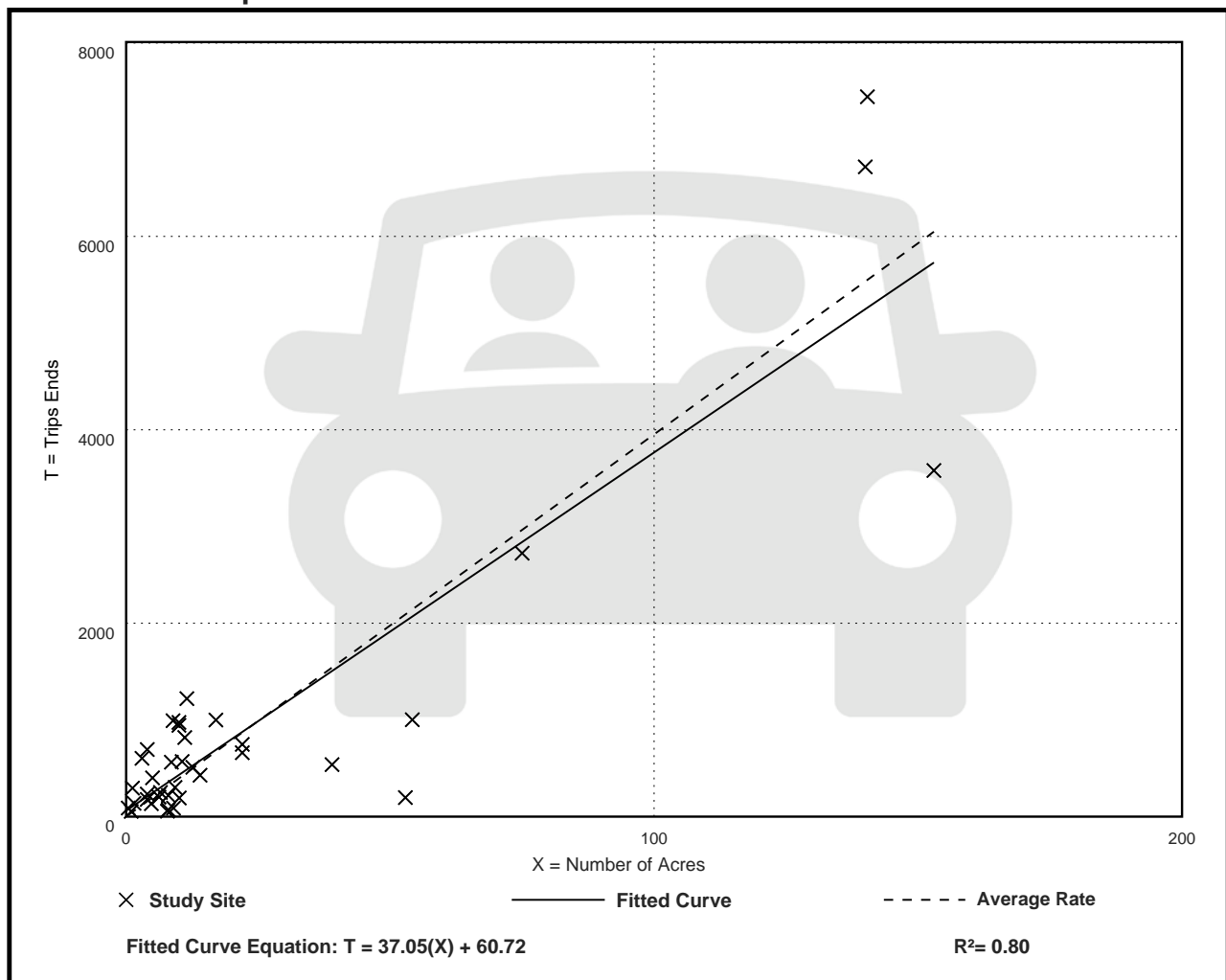
Avg. Num. of Acres: 24

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
39.53	3.72 - 245.83	27.04

Data Plot and Equation



Manufacturing (140)

Vehicle Trip Ends vs: Acres

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: 32

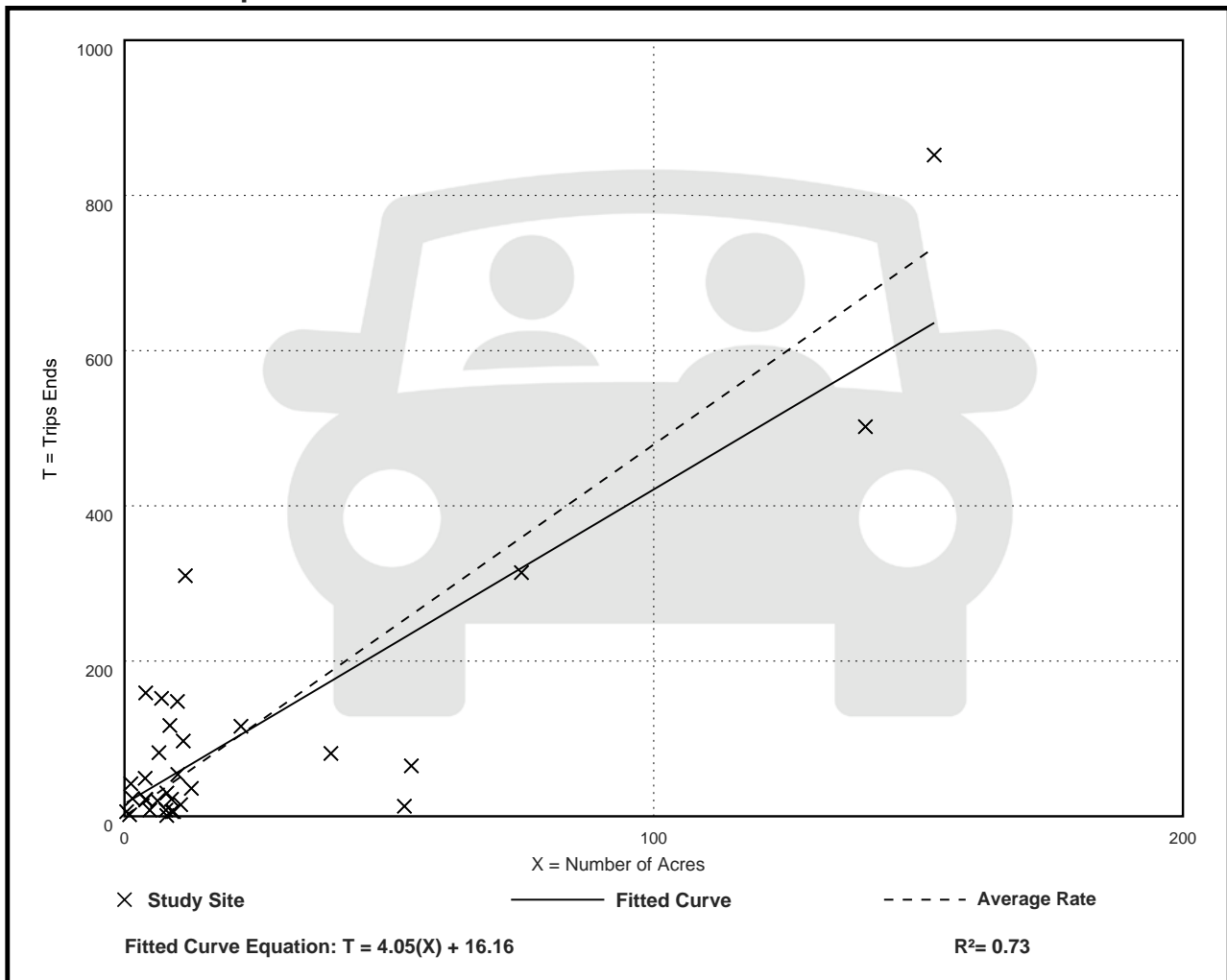
Avg. Num. of Acres: 22

Directional Distribution: 86% entering, 14% exiting

Vehicle Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
4.79	0.13 - 39.75	5.36

Data Plot and Equation



Manufacturing (140)

Vehicle Trip Ends vs: Acres

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: 32

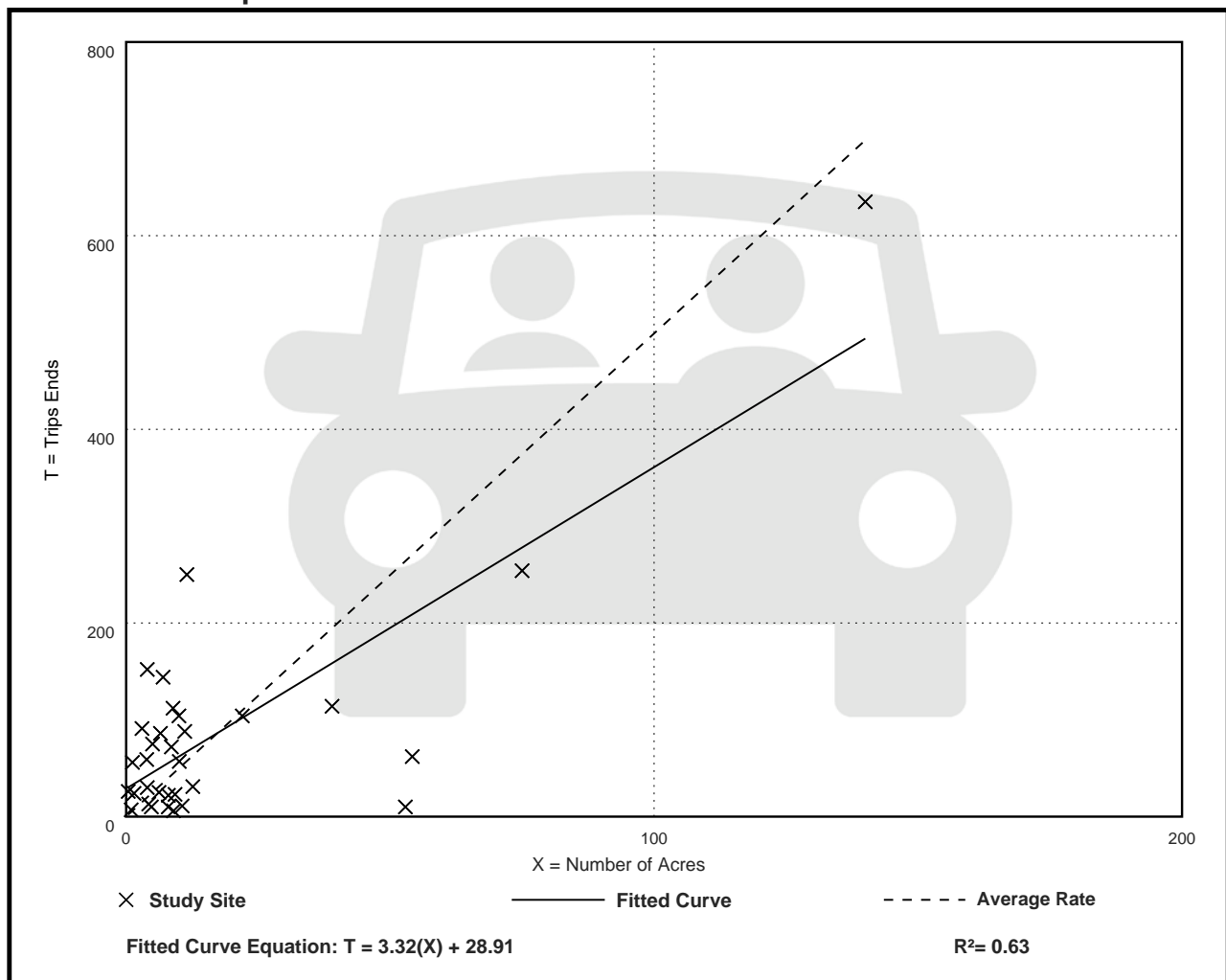
Avg. Num. of Acres: 17

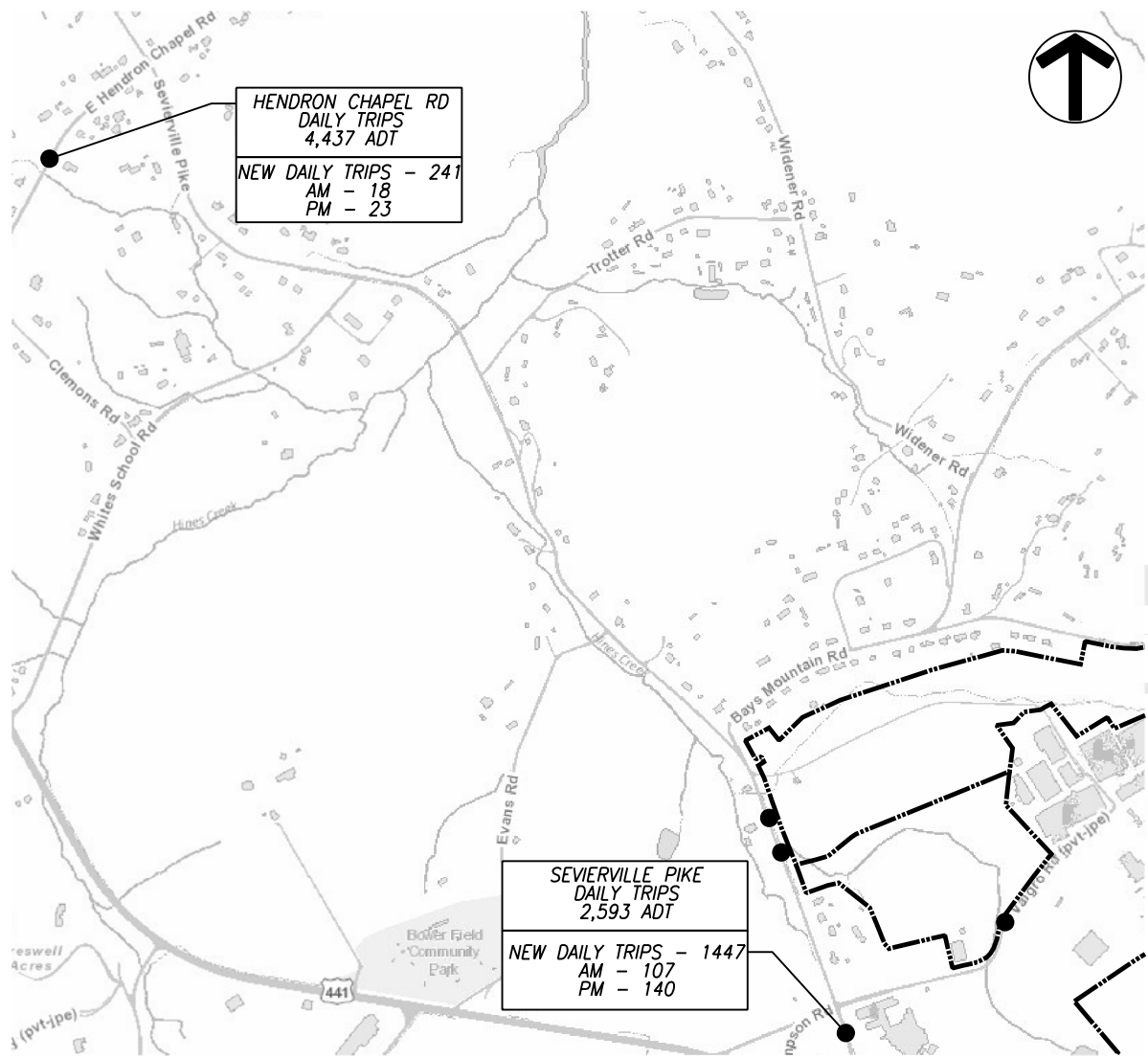
Directional Distribution: 39% entering, 61% exiting

Vehicle Trip Generation per Acre

Average Rate	Range of Rates	Standard Deviation
4.99	0.19 - 65.00	6.17

Data Plot and Equation





LEGEND:

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

Figure 4: Peak Hour Site Traffic - Existing Zoning

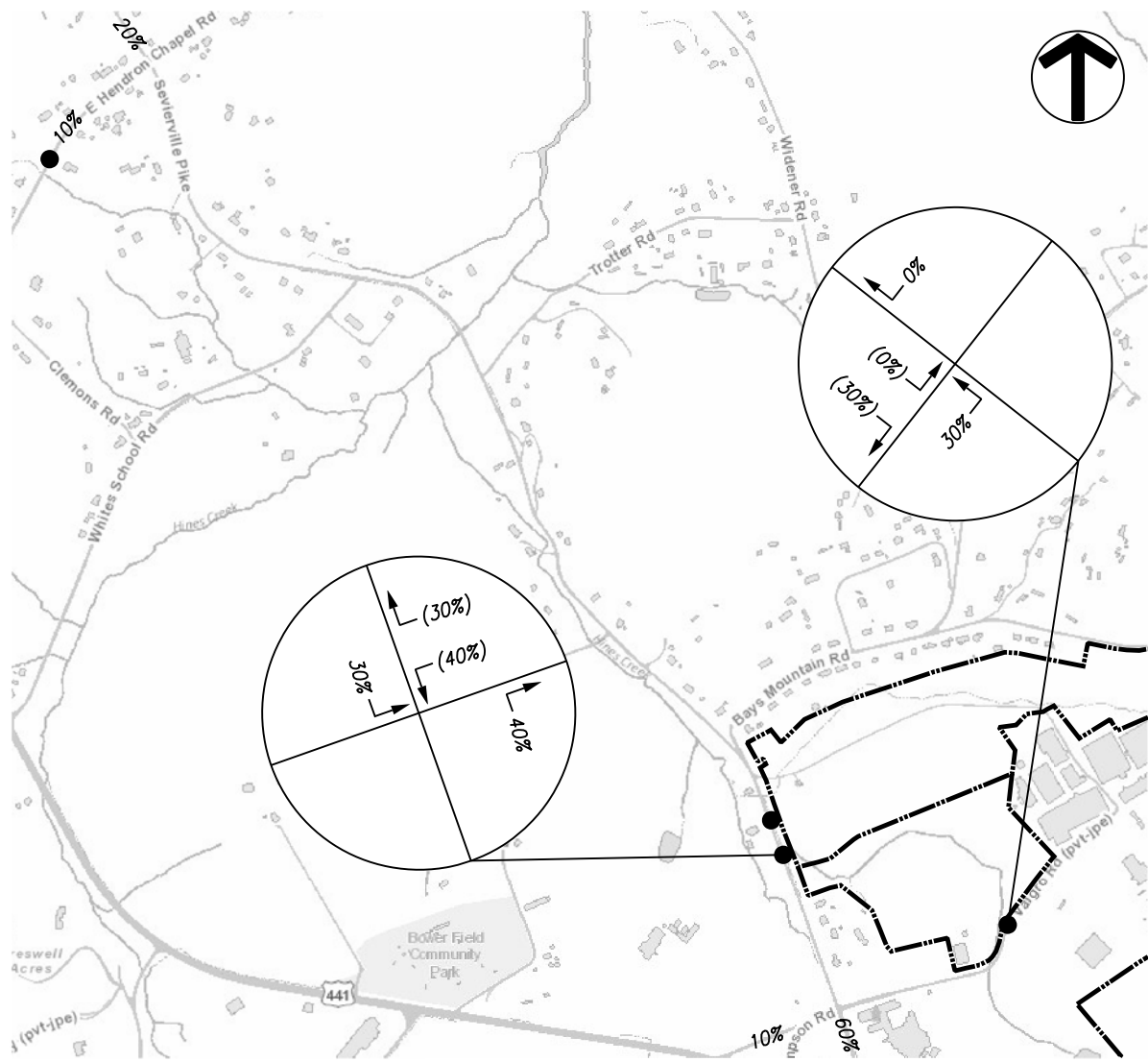
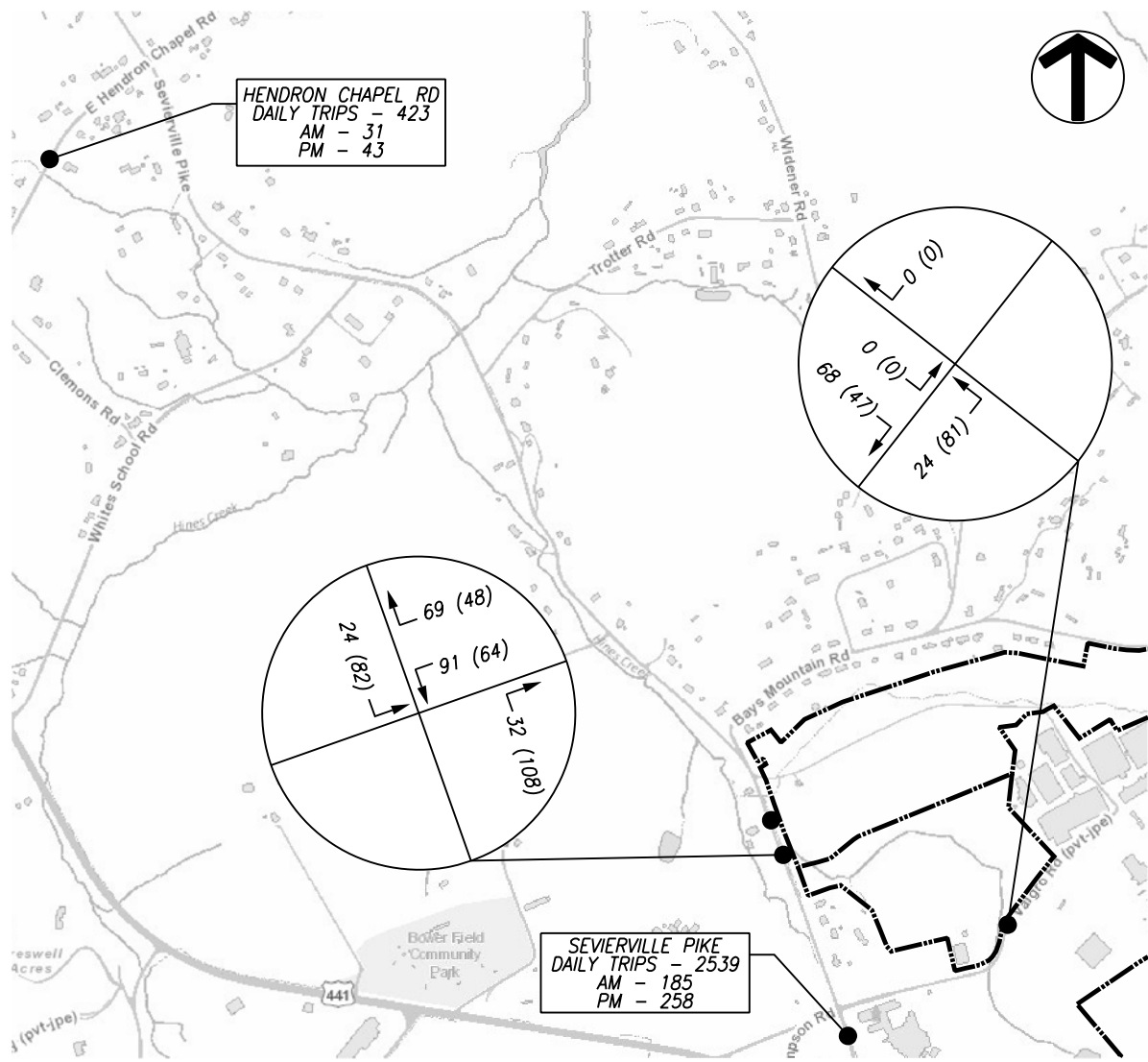


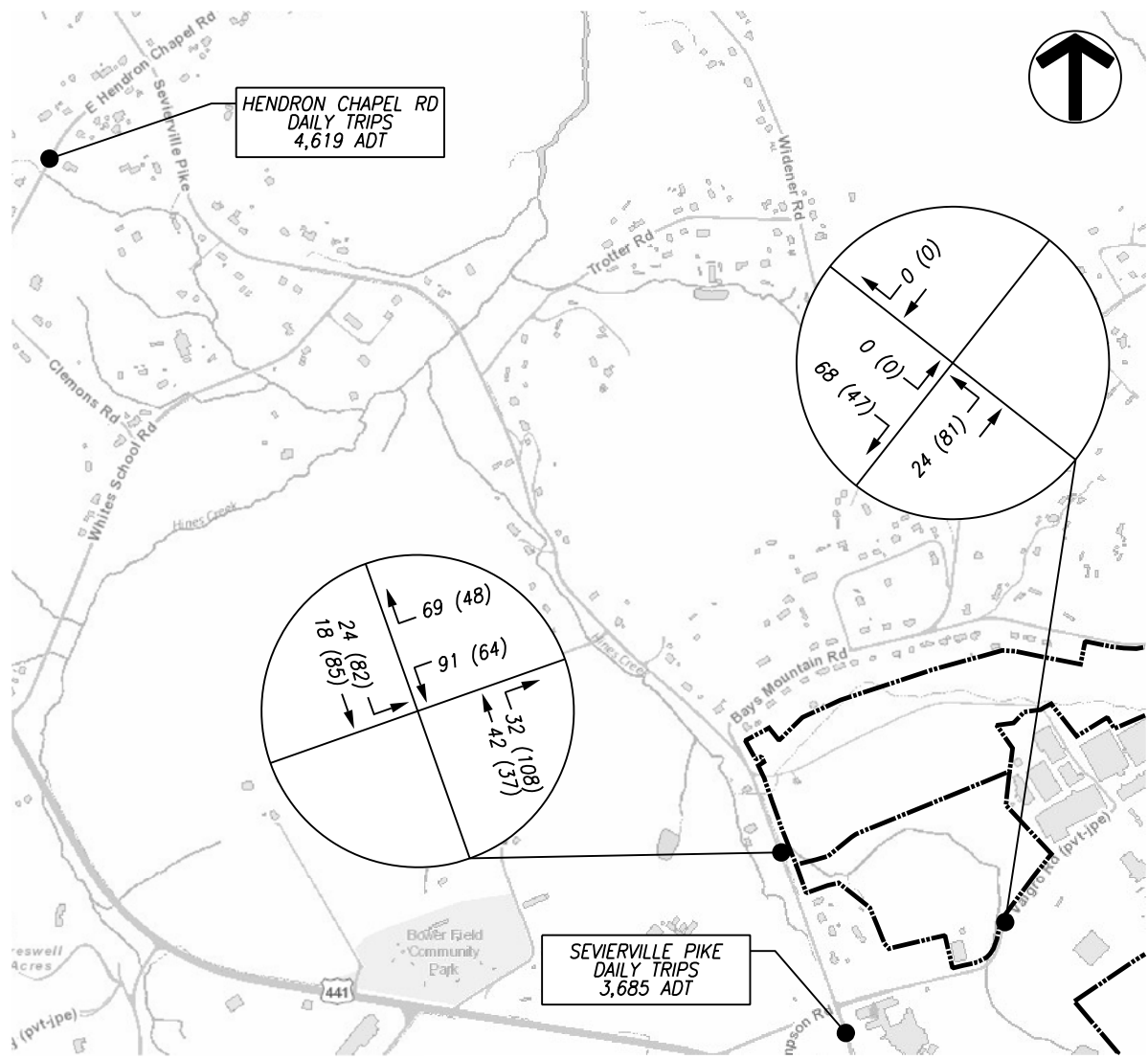
Figure 5: Peak Hour Trip Distribution



LEGEND:

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

Figure 6: Peak Hour Site Traffic - Proposed Rezoning



LEGEND:

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

Figure 7: Full Buildout Peak Hour Traffic - Proposed Rezoning

TABLE 4 - 1
GENERALIZED ANNUAL AVERAGE DAILY VOLUMES FOR FLORIDA'S
URBANIZED AREAS*

UNINTERRUPTED FLOW HIGHWAYS					
		Level of Service			
Lanes Divided		A	B	C	D E
2	Undivided	2,000	7,000	13,800	19,600 27,000
4	Divided	20,400	33,000	47,800	61,800 70,200
6	Divided	30,500	49,500	71,600	92,700 105,400
STATE TWO-WAY ARTERIALS					
Class I (>0.00 to 1.99 signalized intersections per mile)					
		Level of Service			
Lanes Divided		A	B	C	D E
2	Undivided	**	4,200	13,800	16,400 16,900
4	Divided	4,800	29,300	34,700	35,700 ***
6	Divided	7,300	44,700	52,100	53,500 ***
8	Divided	9,400	58,000	66,100	67,800 ***
Class II (2.00 to 4.50 signalized intersections per mile)					
		Level of Service			
Lanes Divided		A	B	C	D E
2	Undivided	**	1,900	11,200	15,400 16,300
4	Divided	**	4,100	26,000	32,700 34,500
6	Divided	**	6,500	40,300	49,200 51,800
8	Divided	**	8,500	53,300	63,800 67,000
Class III (more than 4.5 signalized intersections per mile and not within primary city central business district of an urbanized area over 750,000)					
		Level of Service			
Lanes Divided		A	B	C	D E
2	Undivided	**	**	5,300	12,600 15,500
4	Divided	**	**	12,400	28,900 32,800
6	Divided	**	**	19,500	44,700 49,300
8	Divided	**	**	25,800	58,700 63,800
Class IV (more than 4.5 signalized intersections per mile and within primary city central business district of an urbanized area over 750,000)					
		Level of Service			
Lanes Divided		A	B	C	D E
2	Undivided	**	**	5,200	13,700 15,000
4	Divided	**	**	12,300	30,300 31,700
6	Divided	**	**	19,100	45,800 47,600
8	Divided	**	**	25,900	59,900 62,200
NON-STATE ROADWAYS					
Major City/County Roadways					
		Level of Service			
Lanes Divided		A	B	C	D E
2	Undivided	**	**	9,100	14,600 15,600
4	Divided	**	**	21,400	31,100 32,900
6	Divided	**	**	33,400	46,800 49,300
Other Signalized Roadways (signalized intersection analysis)					
		Level of Service			
Lanes Divided		A	B	C	D E
2	Undivided	**	**	4,800	10,000 12,600
4	Divided	**	**	11,100	21,700 25,200
Source:		Florida Department of Transportation Systems Planning Office 605 Suwannee Street, MS 19 Tallahassee, FL 32399-0450 http://www11.myflorida.com/planning/systems/sm/los/default.htm			
		02/22/02			

FREEWAYS					
Interchange spacing ≥ 2 mi. apart					
		Level of Service			
Lanes		A	B	C	D E
4		23,800	39,600	55,200	67,100 74,600
6		36,900	61,100	85,300	103,600 115,300
8		49,900	82,700	115,300	140,200 156,000
10		63,000	104,200	145,500	176,900 196,400
12		75,900	125,800	175,500	213,500 237,100
Interchange spacing < 2 mi. apart					
		Level of Service			
Lanes		A	B	C	D E
4		22,000	36,000	52,000	67,200 76,500
6		34,800	56,500	81,700	105,800 120,200
8		47,500	77,000	111,400	144,300 163,900
10		60,200	97,500	141,200	182,600 207,600
12		72,900	118,100	170,900	221,100 251,200
BICYCLE MODE					
(Note: Level of service for the bicycle mode in this table is based on roadway geometrics at 40 mph posted speed and traffic conditions, not number of bicyclists using the facility.) (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)					
Paved Shoulder/ Bicycle Lane		Level of Service			
Coverage		A	B	C	D E
0-49%	**	**	3,200	13,800	>13,800
50-84%	**	2,500	4,100	>4,100	***
85-100%	3,100	7,200	>7,200	***	***
PEDESTRIAN MODE					
(Note: Level of service for the pedestrian mode in this table is based on roadway geometrics at 40 mph posted speed and traffic conditions, not number of pedestrians using the facility.) (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)					
Sidewalk Coverage		Level of Service			
		A	B	C	D E
0-49%	**	**	6,400	15,500	
50-84%	**	**	9,900	19,000	
85-100%	**	2,200	11,300	>11,300	***
BUS MODE (Scheduled Fixed Route)					
(Buses per hour)					
(Note: Buses per hour shown are only for the peak hour in the single direction of the higher traffic flow.)					
Sidewalk Coverage		Level of Service			
		A	B	C	D E
0-84%	**	>5	≥4	≥3	≥2
85-100%	>6	>4	≥3	≥2	≥1
ARTERIAL/NON-STATE ROADWAY ADJUSTMENTS					
DIVIDED/UNDIVIDED					
(alter corresponding volume by the indicated percent)					
Lanes	Median	Left Turns	Lanes	Adjustment Factors	
2	Divided	Yes		+5%	
2	Undivided	No		-20%	
Multi	Undivided	Yes		-5%	
Multi	Undivided	No		-25%	
ONE-WAY FACILITIES					
Decrease corresponding two-directional volumes in this table by 40% to obtain the equivalent one directional volume for one-way facilities.					

*This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should be used for more specific planning applications. The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Values shown are two-way annual average daily volumes (based on K_{100} factors) for levels of service and are for the automobile/truck modes unless specifically stated. Level of service letter grade thresholds are probably not comparable across modes and, therefore, cross modal comparisons should be made with caution. Furthermore, combining levels of service of different modes into one overall roadway level of service is not recommended. The table's input value defaults and level of service criteria appear on the following page. Calculations are based on planning applications of the Highway Capacity Manual, Bicycle LOS Model, Pedestrian LOS Model and Transit Capacity and Quality of Service Manual, respectively for the automobile/truck, bicycle, pedestrian and bus modes.

**Cannot be achieved using table input value defaults.

***Not applicable for that level of service letter grade. For automobile/truck modes, volumes greater than level of service D become F because intersection capacities have been reached. For bicycle and pedestrian modes, the level of service letter grade (including F) is not achievable, because there is no maximum vehicle volume threshold using table input value defaults.

Turn Lane Warrants

Project: 8802 Sevierville Pike Subdivision

Sevierville Pike at Driveway Connection

Sevierville Pike
at Driveway Connection

VOLUMES

LEFT TURN

AM

PM

Opposing	Thru	LT	LT MAX	Warrant Met
74	18	24	300	NO
145	85	82	300	NO

Sevierville Pike

at Driveway Connection

VOLUMES

RIGHT TURN

AM

PM

Thru	RT	RT MAX	Warrant Met
42	32	599	NO
37	108	599	NO

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	AM Peak - 24 LT PM Peak - 82 LT	185 160	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 30	30 30

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.

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		AM Peak - 32 RT PM Peak - 108 RT				
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

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.



Date: December 1, 2021

Project Name: 8802 Sevierville Pike

To: Knoxville-Knox County Planning

Subject: Traffic Letter Review for 8802 Sevierville Pike

Dear Knoxville-Knox County Planning staff,

The following comment response document is submitted to address comments dated October 7, 2021, comments dated November 10, 2021 to address the change in total acreage per the rezoning application and an additional comment on November 30, 2021:

- 1. Reviewer Comment:** We are still refining the overall segment-level capacity analysis for these TIL's and will likely provide further guidance to the TIA Preparer group in the future, but for now please make the following assumption regarding V/C ratio and its associated "planning-level" LOS levels:

V/C > 1.0 is "F"
V/C > 0.85 is "E"
V/C > 0.70 is "D"
V/C > 0.50 is "C"
V/C > 0.25 is "B"
V/C < 0.25 is "A"

Response: Added Table 2 – LOS for Volume-to-Capacity Ratios and updated the LOS in Table 3 – Roadway Segments to reflect the V/C ratio assumptions.

- 2. Reviewer Comment:** Please provide an additional statement in the Conclusion sections of what the specific increase in number of trips generated will result from increased proposed zoning density versus the base Ag zoning (1 unit per acre) and that the additional trips have been found to "not unreasonably impair traffic flow along the arterial roads through the adjacent Planned Growth Area" as specifically required by the Growth Policy Plan. (see Section 3.5 in the screenshot below in case you do not already have a copy of the Growth Plan).

Response: Added the following statement to Conclusion and Recommendations on page 6 and page 7. "The rezoning of the property from a combination of Commercial and Agricultural & Estates to Planned Residential Zoning (3.0 Units/Acre) will increase the zoning density and the number of trips generated. The increase in trip generation will result in an additional 1,819 new daily trips, 129 trips during the AM peak hour and 197 trips during the PM peak hour."

Sevierville Pike segment capacity is currently operating at an acceptable LOS A and Hendron Chapel Road segment capacity is currently operating at an acceptable LOS B. Sevierville Pike and Hendron Chapel Road are expected to continue operating at an acceptable LOS B after the rezoning to Planned Residential (3.0 Units/Acre) and the construction of the subdivision at 8802 Sevierville Pike with 227 proposed single family lots and an additional allowed 248 single family lots of future development; therefore, the proposed development will not unreasonably impair traffic flow in the traffic analysis zone along Sevierville Pike and Hendron Chapel Road.

Additional Comments Dated November 10, 2021

1. **Reviewer Comment:** Update the Traffic Letter to address the increase in acreage shown on the revised rezoning application.

Response: Revised the traffic letter including trip generation calculations and figures to include a total 158.64 acres with a proposed Planned Residential Zoning (3.0 Units/Acre).

2. **Reviewer Comment:** The traffic letter should address that the Valgro Road frontage along the site is a private road and not a County road. It will be important for the development to work with the property owner to determine driveway access and any road widening needs.

Response: Updated the recommendation to include the following: "FMA recommends any improvements on Valgro Road between Valley Grove Baptist Church connection (Road "G") and Sevierville Pike including driveway access and location, road widening, resurfacing, striping plan, etc. be coordinated with the property owner as the connection is a private right-of-way and not maintained by Knox County Engineering and Public Works."

3. **Review Comment:** Add figure for the 2024 Full Buildout of 158 lots. All the other scenarios within Table 3 have figures except for Sevierville Pike and Hendron Chapel Road at 2024 Full Buildout – 158 lots.

Response: Added Figure 4: Peak Hour Site Traffic – Existing Zoning to the attachments.

Additional Comment Dated November 30, 2021

1. **Reviewer Comment:** Update the Traffic Letter to make it more abundantly clear about the total trips generated and stating that the **difference** between the 3 units/acre rezoning (4,231 new trips) and the existing zoning (2,412 new trips) is

1,819 new trips. Please update the sections referenced in the comment below to clarify as suggested.

Response: Updated the Trip Generation section and Conclusion and Recommendations section to clarify the impact of the rezoning to the existing and proposed trip generation.

Sincerely,



Addie Kirkham, P.E.