



June 12, 2023
(Revised 6/20/23)

Mr. Josh Sanderson
Smithbilt Homes
4907 Ball Road
Knoxville, Tennessee 37931

RE: Traffic Impact Study Update for Whelahan Farm Subdivision (Unit 2)
Knox County, Tennessee

Dear Mr. Sanderson:

This correspondence provides a summary of a traffic impact study update that was performed for the referenced subdivision located in East Knox County, Tennessee. This subdivision has been under development for a number of years, and the intent of this study is to update anticipated traffic conditions for Unit 2.

When completed the Whelahan Farm Subdivision will consist of 122 single family homes. Access will come totally from Babelay Road, through a single intersection, Babelay Road at Whelahan Farm Road. This intersection is the study intersection for this project. FIGURE 1 is a Site Location Map that shows the proposed project site in relation to major roadways in the area.

The purpose of this evaluation is to assess the anticipated traffic impacts resulting from the additional traffic that will result from Unit 2 of the proposed project. The primary emphasis of this study is a turn lane assessment of the study intersection. Unsignalized intersection capacity analyses of anticipated peak hour conditions were also performed.

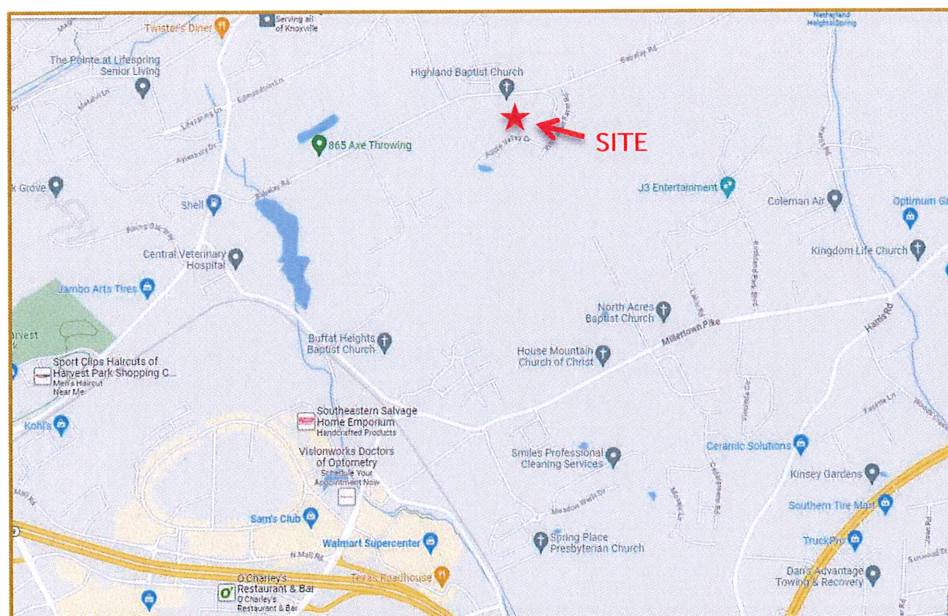


FIGURE 1 – SITE LOCATION MAP

TEL 865.670.8555
CANNON-CANNON.COM

KNOXVILLE 8550 Kingston Pike
Knoxville, TN 37919
MEMPHIS
BOWLING GREEN FAX 865.670.8866

Existing and Background Traffic Volumes

Average annual daily traffic (AADT) volume counts for Babelay Road in the project area were conducted on September 15, 2022, and were provided by Knoxville-Knox County Planning for use in this study. A summary of this data is contained in the attached Supplemental Information. The AM and PM peak hour volumes from these counts are assumed as the Existing Traffic (2022) to be used in the analyses of this study. These volumes are shown on FIGURE 2.

It is expected that the project will be completed no later than 2026, so 2026 is assumed as the evaluation year for this study. As a first step in evaluating future conditions, a 3.0% annual growth rate was applied to the existing peak hour traffic volumes to grow them from 2022 to a 2026 basis. These are the volumes that would be expected to exist in 2026 if the proposed development does not take place. These volumes are shown on FIGURE 2 as the Background Traffic (2026).

Combined Traffic Volumes

In order to evaluate likely traffic conditions with the proposed development fully built out, trip generation using the methods and data published by the Institute of Transportation Engineers (ITE) was utilized. Specifically, trip generation rates for ITE Land Use Code 210 (Single-Family Detached Housing) were employed to develop estimates of the traffic generated by the proposed development. See TABLE 1 for a summary of the traffic generated for this development at full build-out of all 122 units. Figure 2 shows these trips distributed to the study intersection in a fashion similar to existing traffic. Printouts of the current ITE Trip Generation Manual (11th Edition) rates for Land Use Code 210 are also contained in the attached Supplemental Information.

TABLE 1: TRIP GENERATION SUMMARY

LAND USE	ITE CODE	SIZE	WEEKDAY (TRIPS/DAY)	AM PEAK HOUR (TRIPS/HOUR)	PM PEAK HOUR (TRIPS/HOUR)
Single-Family Detached Housing	210	122 units	1212	89	120
Entering Trips			606 (50%)	22 (25%)	76 (63%)
Exiting Trips			606 (50%)	67 (75%)	44 (37%)

The future anticipated traffic volumes are shown at the bottom of FIGURE 2, which are the Combined Volumes (2026). These volumes include existing traffic, background growth traffic and new traffic generated by the proposed project. This traffic was then evaluated to see if the additional site related traffic results in any problematic traffic operational conditions for the 2026 analysis year.

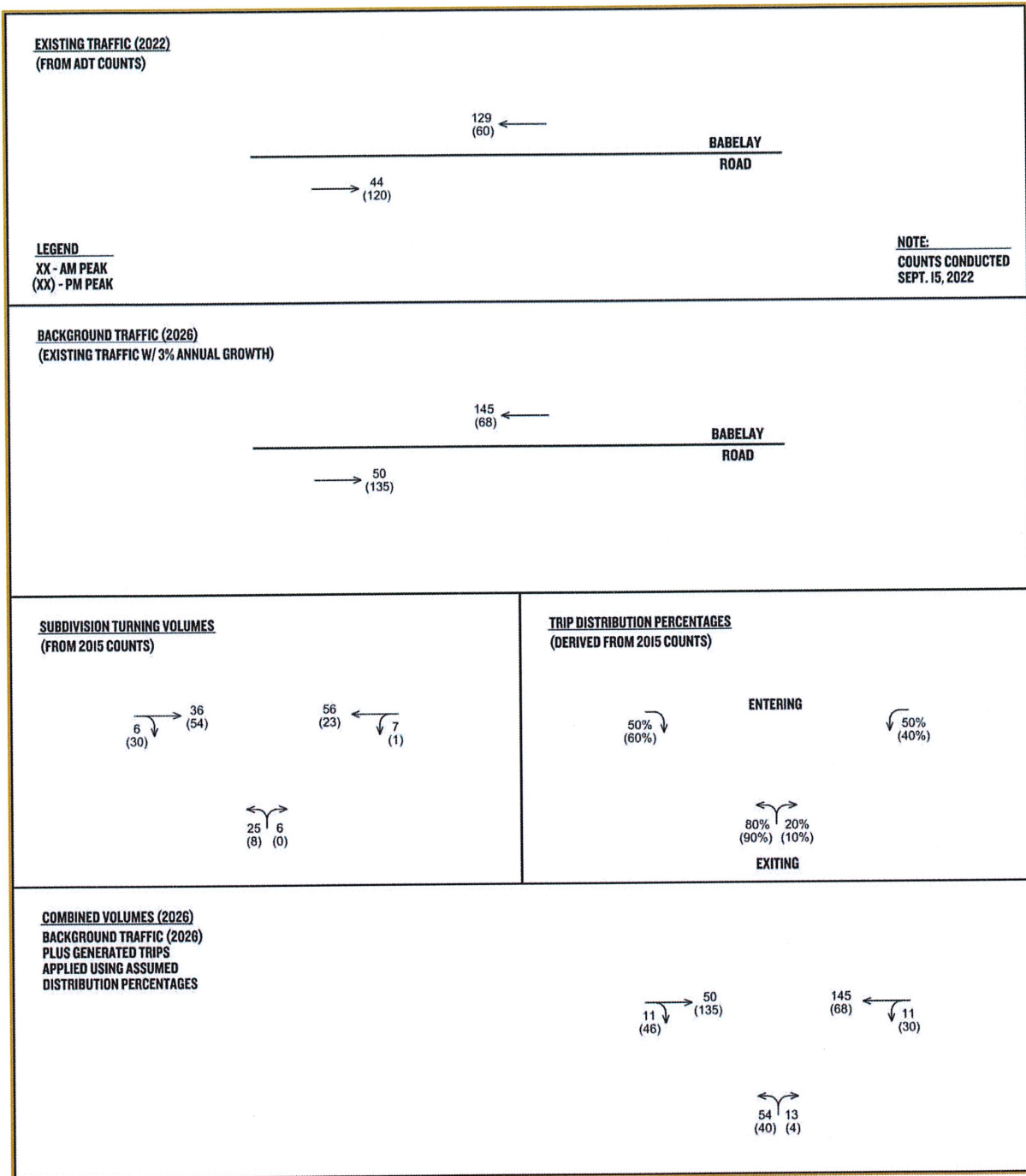


FIGURE 2
 EXISTING TRAFFIC (2022), BACKGROUND TRAFFIC (2026), TRIP DISTRIBUTION
 PERCENTAGES AND COMBINED VOLUMES (2026)

Turn Lane Assessment

The study intersection was evaluated to determine if any justification exists for a left or right turn lane into the project site from Babelay Road. This assessment utilized the Knox County Left and Right Turn Lane Volume Threshold criteria. As shown on the summary sheets contained in the attached Supplemental Information, neither a left or right turn lane is justified based on the anticipated Combined Volumes (2026).

Project Capacity Analyses

Intersection capacity analyses were conducted for the Combined Volumes (2026) for the study intersection. These analyses utilized the methods promulgated in the Highway Capacity Manual for two-way stop unsignalized intersections, which is the existing traffic control. The results for the critical stop- controlled intersection approach on Whelahan Farm Road at Babelay Road are summarized below, which include the approach Level-of-Service (LOS) and the associated vehicular average delay. LOS is a measure of the quality of traffic flow, and for this intersection, LOS A, B, C or D would all be considered acceptable for peak hour operations.

Summary of Results:

AM Peak - 2026 Combined Traffic: Northbound LOS B (10.2 sec.)

PM Peak - 2026 Combined Traffic: Northbound LOS B (10.9 sec.)

As can be seen from the above capacity results, the combined traffic Levels-of-Service are considered acceptable, and in fact very good (LOS B). The summary report print-outs from the Highway Capacity Software (HCS) are contained in the attached Supplemental Information and may be referenced for more detailed summaries.

Conclusions and Recommendations

It is concluded from this traffic impact study update that completion of the proposed Whelahan Farm Subdivision (Unit 2), which constitutes full project build-out, will not result in any significant traffic operational concerns at the study intersection. Specifically, no intersection turn lanes will be justified and the side street approach levels-of-service are anticipated to be no worse than LOS B. Therefore, no recommendations are made regarding the need for intersection turn lanes or modified traffic control.

Please do not hesitate to contact us with any questions you may have or if you require additional information.

Sincerely,



Wesley Stokes, P.E.
Project Manager

Attachment

cc: Project File: 01203-0002.0



SUPPLEMENTAL INFORMATION

VOLUME

Babley Rd E/O Washington Pike (36.044882,-83.876007)

Day: Thursday
Date: 9/15/2022City: Knoxville
Station ID: 093M225

DAILY TOTALS					NB	SB	EB					WB	Total
					0	0	1,057					945	2,002
AM Period	NB	SB	EB	WB	TOTAL		PM Period	NB	SB	EB	WB	TOTAL	
00:00	0	0	4	0	4		12:00	0	0	14	14	28	
00:15	0	0	0	1	1		12:15	0	0	12	12	24	
00:30	0	0	3	1	4		12:30	0	0	16	15	31	
00:45	0	0	2	9	1	3	12:45	0	0	16	58	29	112
01:00	0	0	2	0	2		13:00	0	0	8	18	26	
01:15	0	0	2	0	2		13:15	0	0	14	13	27	
01:30	0	0	1	0	1		13:30	0	0	16	9	25	
01:45	0	0	1	6	1	1	13:45	0	0	15	53	25	103
02:00	0	0	3	0	3		14:00	0	0	16	6	22	
02:15	0	0	0	0	0		14:15	0	0	12	9	21	
02:30	0	0	1	0	1		14:30	0	0	12	12	24	
02:45	0	0	0	4	1	1	14:45	0	0	18	58	32	99
03:00	0	0	0	0	0		15:00	0	0	21	13	34	
03:15	0	0	0	3	3		15:15	0	0	17	16	33	
03:30	0	0	0	0	0		15:30	0	0	17	14	31	
03:45	0	0	1	1	0	3	15:45	0	0	31	86	47	145
04:00	0	0	2	0	2		16:00	0	0	21	18	39	
04:15	0	0	1	1	2		16:15	0	0	32	16	48	
04:30	0	0	0	1	1		16:30	0	0	24	12	36	
04:45	0	0	0	3	2	4	16:45	0	0	26	103	40	163
05:00	0	0	1	3	4		17:00	0	0	18	15	33	
05:15	0	0	1	6	7		17:15	0	0	32	19	51	
05:30	0	0	2	7	9		17:30	0	0	33	17	50	
05:45	0	0	1	5	11	27	17:45	0	0	21	104	33	167
06:00	0	0	2	12	14		18:00	0	0	34	12	46	
06:15	0	0	3	12	15		18:15	0	0	25	9	34	
06:30	0	0	5	11	16		18:30	0	0	27	16	43	
06:45	0	0	8	18	12	47	18:45	0	0	20	106	36	159
07:00	0	0	6	25	31		19:00	0	0	21	13	34	
07:15	0	0	9	23	32		19:15	0	0	28	12	40	
07:30	0	0	11	37	48		19:30	0	0	12	14	26	
07:45	0	0	11	37	38	123	19:45	0	0	26	87	31	131
08:00	0	0	13	31	44		20:00	0	0	17	5	22	
08:15	0	0	8	12	20		20:15	0	0	12	9	21	
08:30	0	0	16	18	34		20:30	0	0	21	5	26	
08:45	0	0	9	46	25	86	20:45	0	0	15	65	28	97
09:00	0	0	9	14	23		21:00	0	0	10	9	19	
09:15	0	0	12	12	24		21:15	0	0	10	6	16	
09:30	0	0	11	15	26		21:30	0	0	16	5	21	
09:45	0	0	8	40	8	49	21:45	0	0	9	45	14	70
10:00	0	0	11	12	23		22:00	0	0	4	1	5	
10:15	0	0	10	13	23		22:15	0	0	3	0	3	
10:30	0	0	11	16	27		22:30	0	0	7	2	9	
10:45	0	0	13	45	10	51	22:45	0	0	3	17	4	21
11:00	0	0	11	18	29		23:00	0	0	1	3	4	
11:15	0	0	12	10	22		23:15	0	0	6	0	6	
11:30	0	0	17	14	31		23:30	0	0	2	2	4	
11:45	0	0	10	50	15	57	23:45	0	0	2	11	5	19
TOTALS			264	452	716		TOTALS			793	493	1286	
SPLIT %			36.9%	63.1%	35.8%		SPLIT %			61.7%	38.3%	64.2%	

DAILY TOTALS					NB	SB						EB	WB						Total
					0	0						1057	945						2002
AM Peak Hour			10:45	07:15	07:15		PM Peak Hour			17:15	16:45	17:15							
AM Pk Volume			53	129	173		PM Pk Volume			120	65	180							
Pk Hr Factor			0.779	0.849	0.883		Pk Hr Factor			0.882	0.855	0.882							
7 - 9 Volume	0	0	83	209	292		4 - 6 Volume	0	0	207	123	330							
7 - 9 Peak Hour			07:45	07:15	07:15		4 - 6 Peak Hour			16:45	16:45	16:45							
7 - 9 Pk Volume	0	0	48	129	173		4 - 6 Pk Volume	0	0	109	65	174							
Pk Hr Factor	0.000	0.000	0.750	0.849	0.883		Pk Hr Factor	0.000	0.000	0.826	0.855	0.853							

Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 174

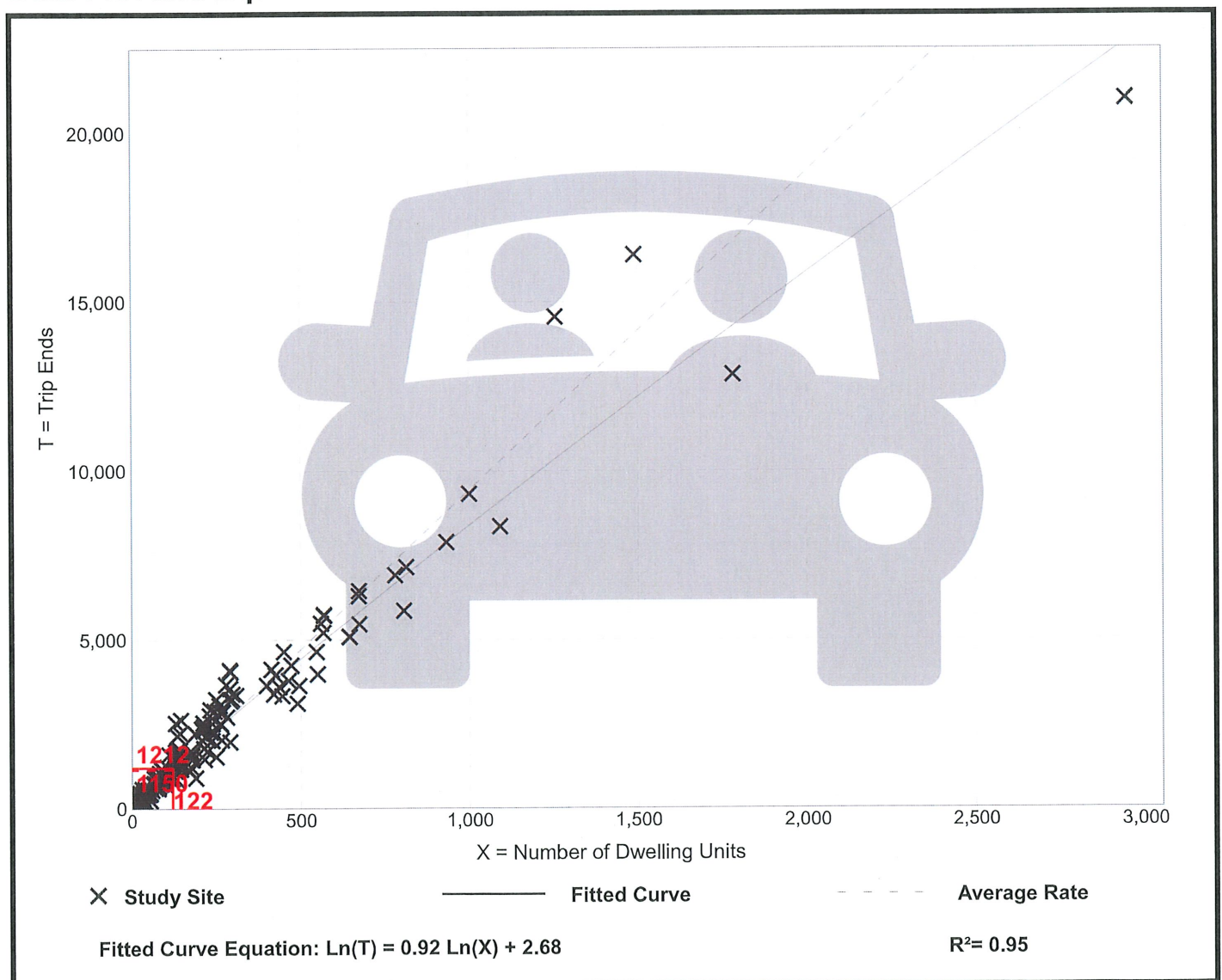
Avg. Num. of Dwelling Units: 246

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

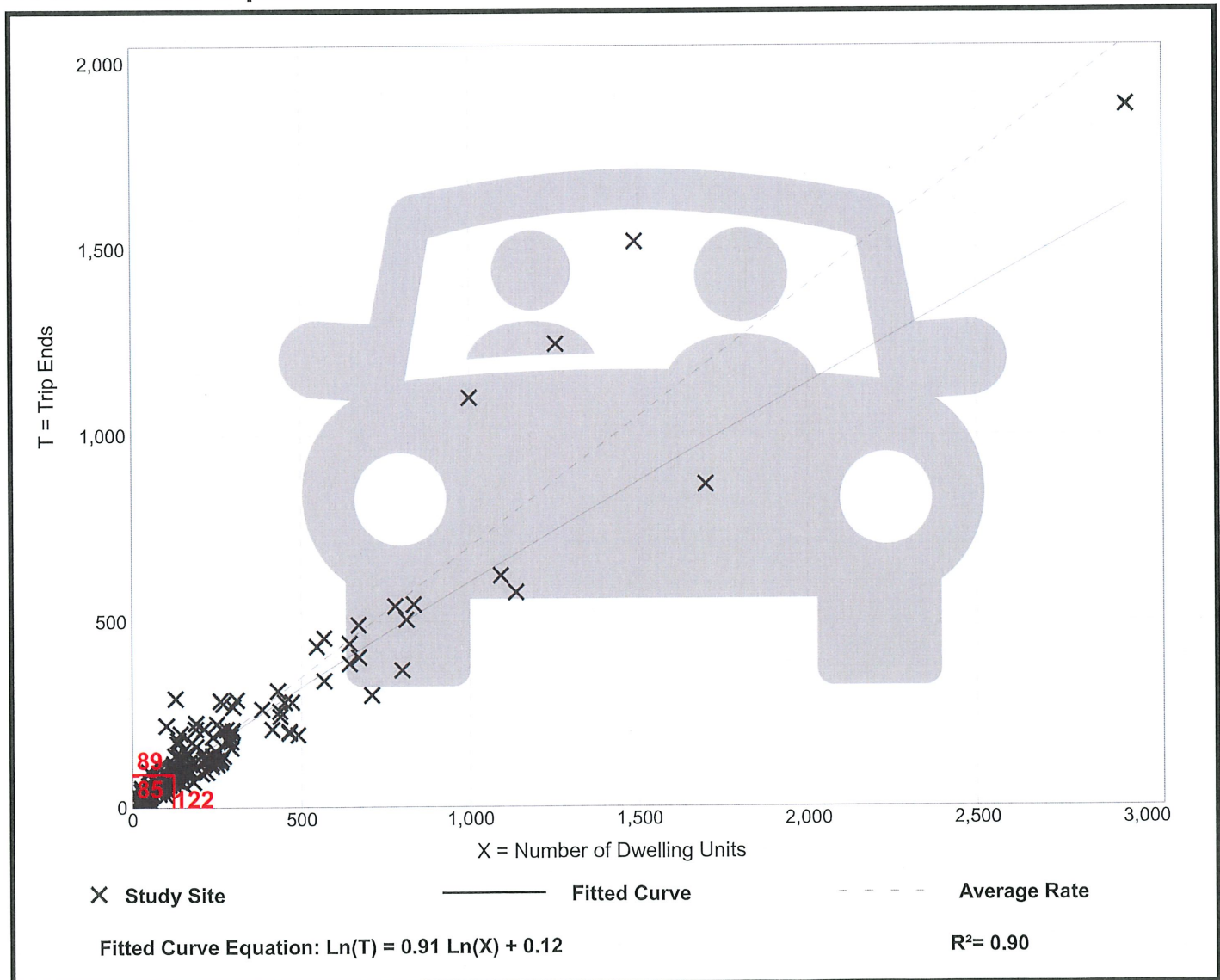
Avg. Num. of Dwelling Units: 226

Directional Distribution: 25% entering, 75% 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

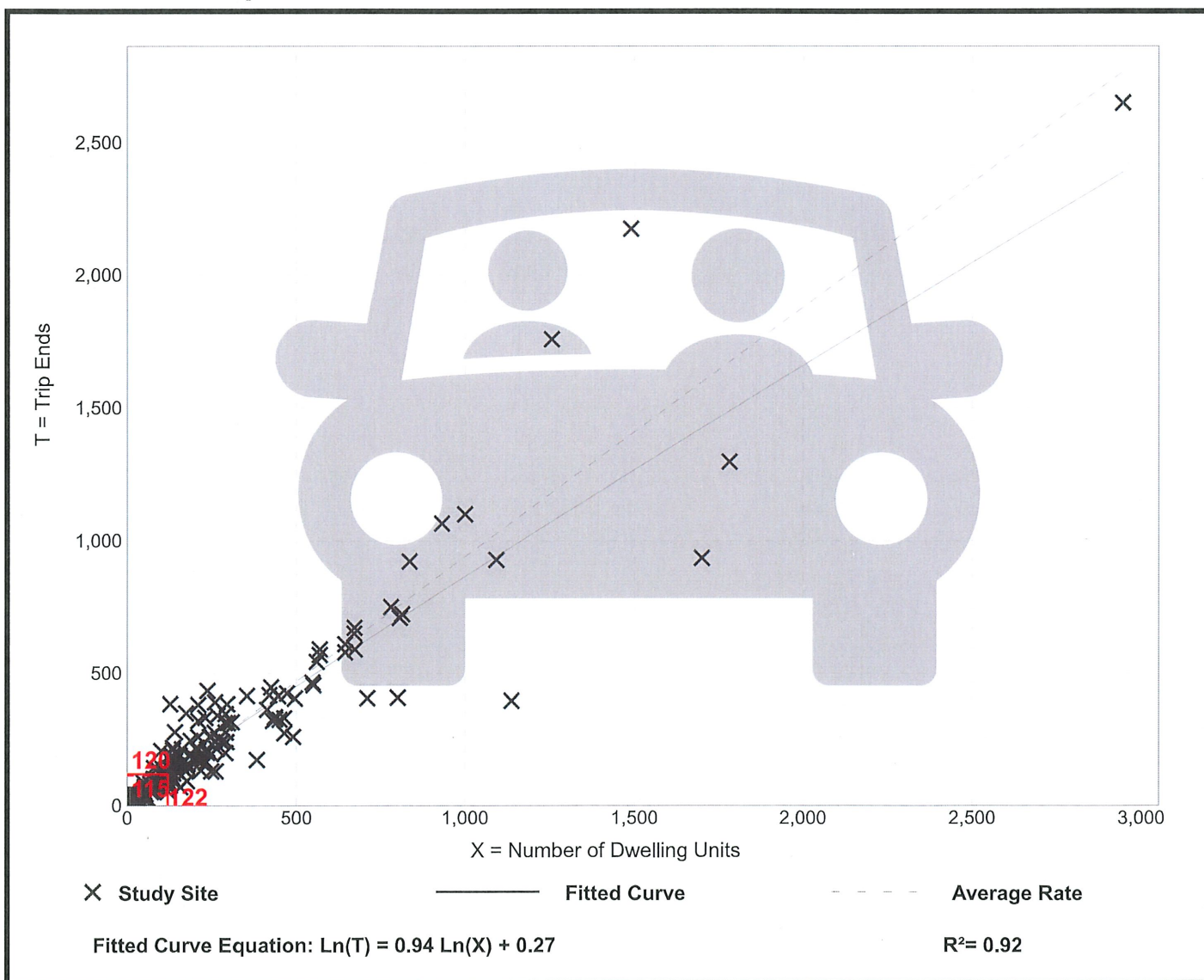


TABLE 5A
KNOX COUNTY LEFT-TURN LANE VOLUME THRESHOLDS
FOR 2-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH

Project No: 01203-0002.0
Project Name: Whelahan Farms - Phase 2 (2026)
Notes: Babelay Road Entrance

(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	*250(AM)*	180	140	110	80	70
150 - 199	*200(PM)*	140	105	90	70	60
200 - 249	160	115	85	75	65	55
250 - 299	130	100	75	65	60	50
300 - 349	110	90	70	60	55	45
350 - 399	100	80	65	55	50	40
400 - 449	90	70	60	50	45	35
450 - 499	80	65	55	45	40	30
500 - 549	70	60	45	35	35	25
550 - 599	65	55	40	35	30	25
600 - 649	60	45	35	30	25	25
650 - 699	55	35	35	30	25	20
700 - 749	50	35	30	25	20	20
750 or More	45	35	25	25	20	20

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= / > 600
100 - 149	70	60	50	45	40	35
150 - 199	60	55	45	40	35	30
200 - 249	55	50	40	35	30	30
250 - 299	50	45	35	30	30	30
300 - 349	45	40	35	30	25	25
350 - 399	40	35	30	25	25	20
400 - 449	35	30	30	25	20	20
450 - 499	30	25	25	20	20	20
500 - 549	25	25	20	20	20	15
550 - 599	25	20	20	20	20	15
600 - 649	25	20	20	20	20	15
650 - 699	20	20	20	20	20	15
700 - 749	20	20	20	15	15	15
750 or More	20	20	20	15	15	15

* 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)
Subd. Entrance	AM Peak	61	145	11	250	No
Subd. Entrance	PM Peak	181	68	30	200	No

<p>TABLE 5B</p> <p>KNOX COUNTY RIGHT-TURN LANE VOLUME THRESHOLDS</p> <p>FOR 2-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH</p>	<p>Project No: 01203-0002.0</p> <p>Project Name: Whelahan Farms - Phase 2 (2026)</p> <p>Notes: Babelay Road Entrance</p>
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RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	< 100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25	AM Peak					
25 - 49		PM Peak				
50 - 99						
100 - 149						
150 - 199						
200 - 249						Yes
250 - 299					Yes	Yes
300 - 349				Yes	Yes	Yes
350 - 399			Yes	Yes	Yes	Yes
400 - 449			Yes	Yes	Yes	Yes
450 - 499		Yes	Yes	Yes	Yes	Yes
500 - 549		Yes	Yes	Yes	Yes	Yes
550 - 599	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 - 599	= / > 600
Fewer Than 25						
25 - 49					Yes	Yes
50 - 99				Yes	Yes	Yes
100 - 149			Yes	Yes	Yes	Yes
150 - 199		Yes	Yes	Yes	Yes	Yes
200 - 249	Yes	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

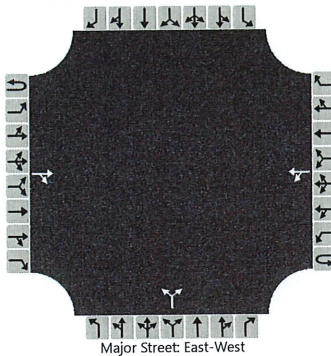
* Or through volume only if a left-turn lane exists

Intersection	Time Period	Through Volume	Right-Turn Volume	Right-Turn Lane Warranted (Yes / No)
Subd. Entrance	AM Peak	50	11	No
Subd. Entrance	PM Peak	135	46	No

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	AC	Intersection	Babelay/Whelahan Farm Rd
Agency/Co.	Cannon & Cannon, Inc.	Jurisdiction	Knox County
Date Performed	6/20/2023	East/West Street	Babelay Road
Analysis Year	2023	North/South Street	Whelahan Farm Road
Time Analyzed	AM Peak	Peak Hour Factor	0.88
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Whelahan Farms Phase 2 TIS		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			50	11		11	145			54		13				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1					7.1		6.2			
Critical Headway (sec)						4.13					6.43		6.23			
Base Follow-Up Headway (sec)						2.2					3.5		3.3			
Follow-Up Headway (sec)						2.23					3.53		3.33			

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						13					76					
Capacity, c (veh/h)						1525					767					
v/c Ratio						0.01					0.10					
95% Queue Length, Q ₉₅ (veh)						0.0					0.3					
Control Delay (s/veh)						7.4	0.1				10.2					
Level of Service (LOS)						A	A				B					
Approach Delay (s/veh)					0.6				10.2							
Approach LOS					A				B							

HCS Two-Way Stop-Control Report

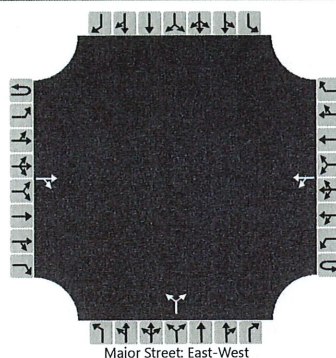
General Information

Analyst	AC
Agency/Co.	Cannon & Cannon, Inc.
Date Performed	6/20/2023
Analysis Year	2023
Time Analyzed	PM Peak
Intersection Orientation	East-West
Project Description	Whelahan Farms Phase 2 TIS

Site Information

Intersection	Babelay/Whelahan Farm Rd
Jurisdiction	Knox County
East/West Street	Babelay Road
North/South Street	Whelahan Farm Road
Peak Hour Factor	0.88
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			135	46		30	68			40		4				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized																
Median Type Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						34					50					
Capacity, c (veh/h)						1360					664					
v/c Ratio						0.03					0.08					
95% Queue Length, Q ₉₅ (veh)						0.1					0.2					
Control Delay (s/veh)						7.7	0.2				10.9					
Level of Service (LOS)						A	A				B					
Approach Delay (s/veh)					2.5				10.9							
Approach LOS					A				B							