

final report

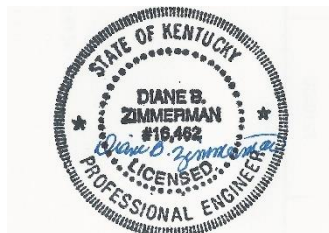
January 3, 2022

Traffic Impact Study

*Echo Trail Subdivision
2605 Echo Trail
Louisville, KY*

Prepared for

Louisville Metro Planning Commission



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INTRODUCTION

The development plan for a new section of a previously approved subdivision on Echo Trail in Louisville, KY shows 103 new single-family lots, which brings the total to 680 single-family lots. **Figure 1** displays a map of the site. Access to the subdivision will be from two entrances on Echo Trail and an entrance on Eastwood Fisherville Road. There will not be a bridge over Long Run Creek. This study focuses on 103 lots proposed at the southern entrance (Street A). The purpose of this study is to examine the traffic impacts of the development upon the adjacent highway system. For this study, the impact area was defined to be the intersections of Echo Trail with the two entrances.

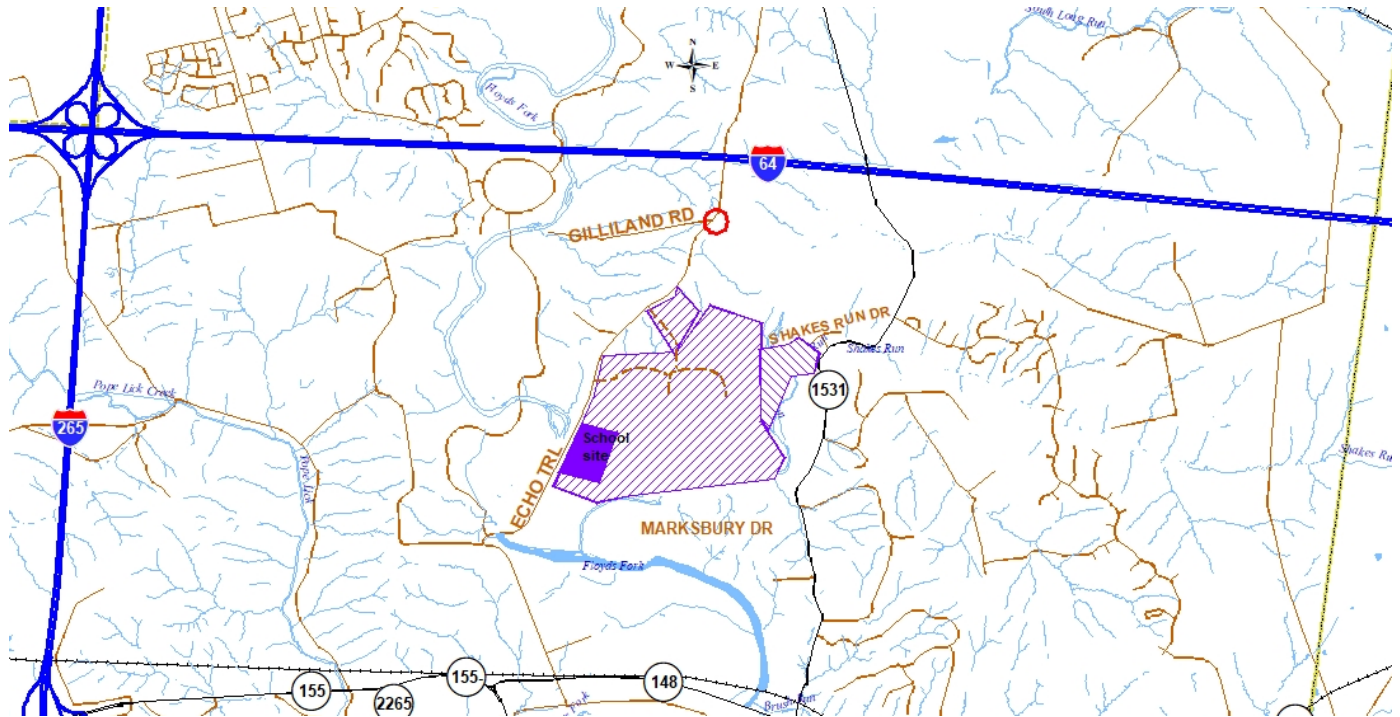


Figure 1. Site Map

EXISTING CONDITIONS

Echo Trail, is a Metro-maintained road with an estimated 2022 ADT of 1,000 vehicles per day between South English Station Road and Eastwood Cutoff Road, as estimated from the Kentucky Transportation Cabinet 2019 count at station 366. The road is a two-lane highway with nine-foot lanes with two-foot shoulders through the study area. The speed limit is 35 mph. There are no sidewalks. The intersection with South English Station Road, is controlled as an all-way stop. There are no turn lanes.

Peak hour traffic counts for the intersection of Gilliland Road and Echo Trail were obtained on September 28, 2022. The a.m. peak hour is 8:00 to 9:00 and the p.m. peak hour is 5:00 to 6:00. **Figure 2** illustrates the existing a.m. and p.m. peak hour traffic volumes. The Appendix contains the full count data for each intersection.

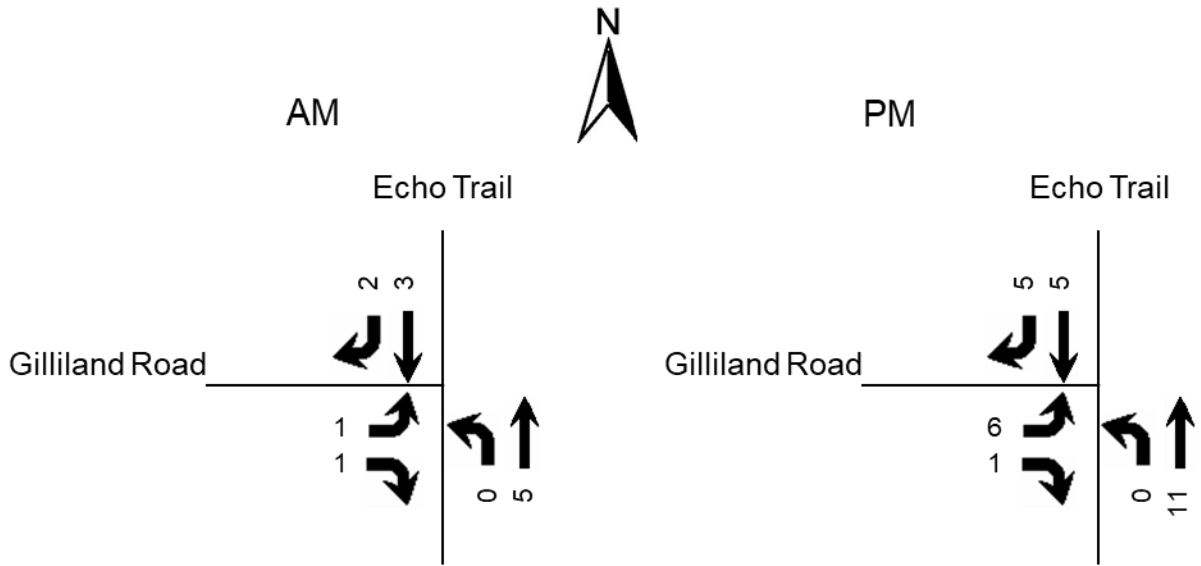


Figure 2. Existing Peak Hour Volumes

FUTURE CONDITIONS

The project completion date is 2033. Trip generation for the previously approved 577 lots with access to Echo Trail and middle school are included. The trip distribution for the previously approved lots is taken from the Echo Trail Subdivision Traffic Impact Study, October 22, 2018. **Figure 3** displays the 2033 No Build peak hour volumes.

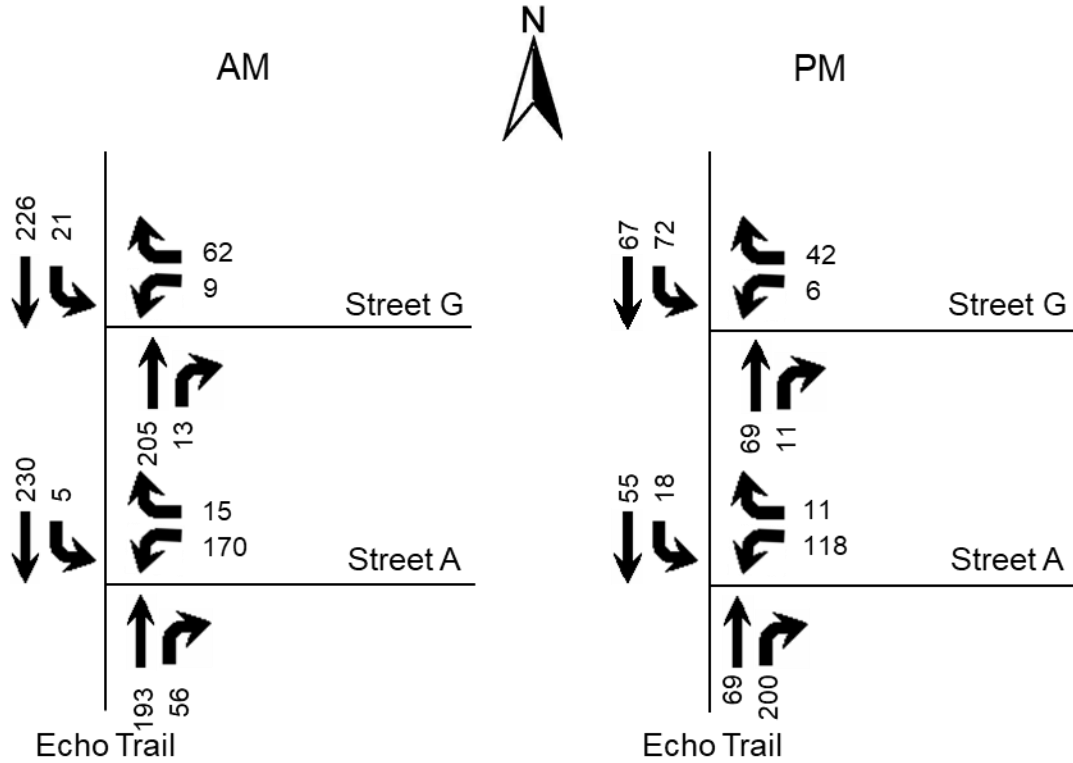


Figure 3. 2033 No Build Peak Hour Volumes

TRIP GENERATION

The Institute of Transportation Engineers Trip Generation Manual, 11th Edition contains trip generation rates for a wide range of developments. The land use of “Single Family Detached (210)” was reviewed and determined to be the best match. The trip generation results are listed in **Table 1**. The trips were assigned to the highway network with the percentages shown in **Figure 4**. **Figure 5** shows the trips generated by this development and distributed throughout the road network during the peak hours. **Figure 6** displays the individual turning movements for the peak hours when the development is completed.

Table 1. Peak Hour Trips Generated by Site

Land Use	A.M. Peak Hour			P.M. Peak Hour		
	Trips	In	Out	Trips	In	Out
Single-Family Detached (103 lots)	77	19	58	102	64	38

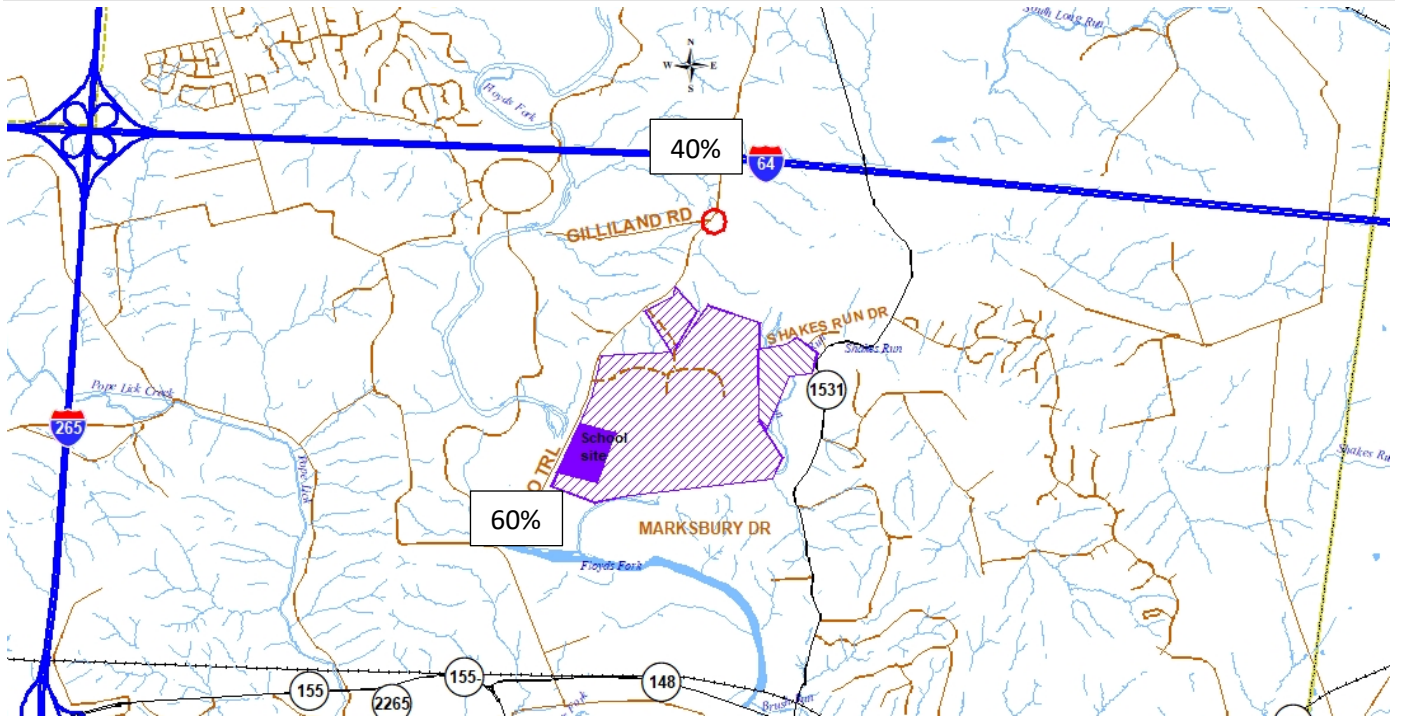


Figure 4. Trip Distribution Percentages

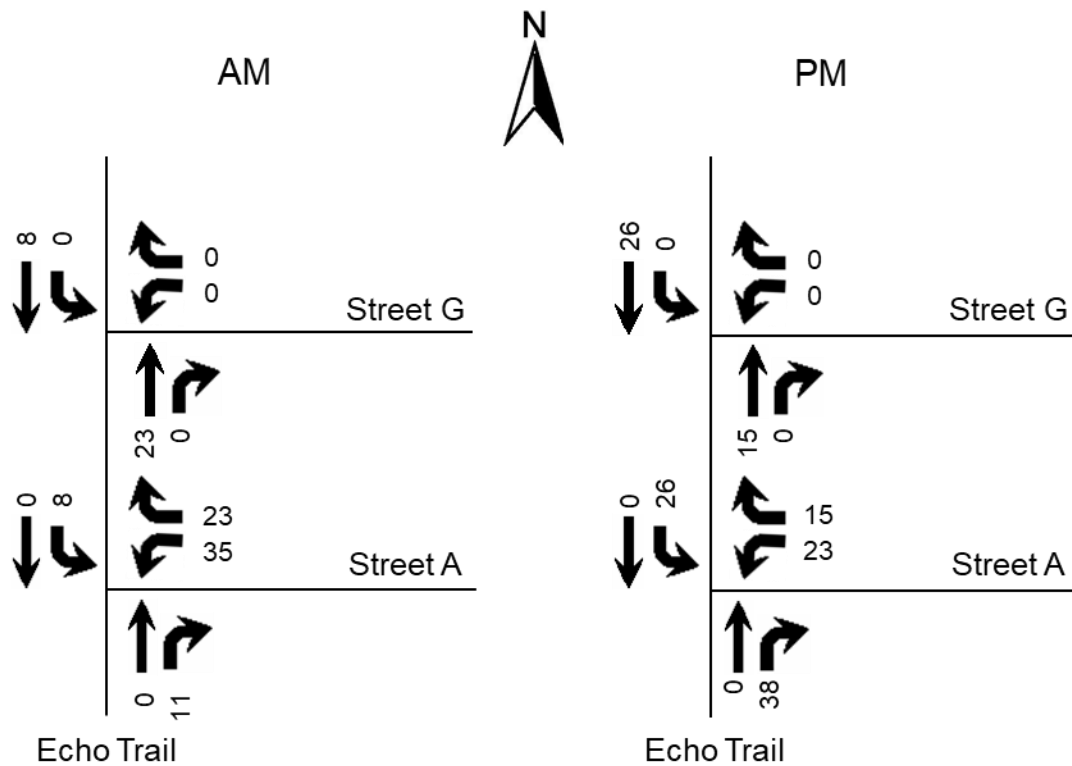


Figure 5. Peak Hour Trips Generated by Site

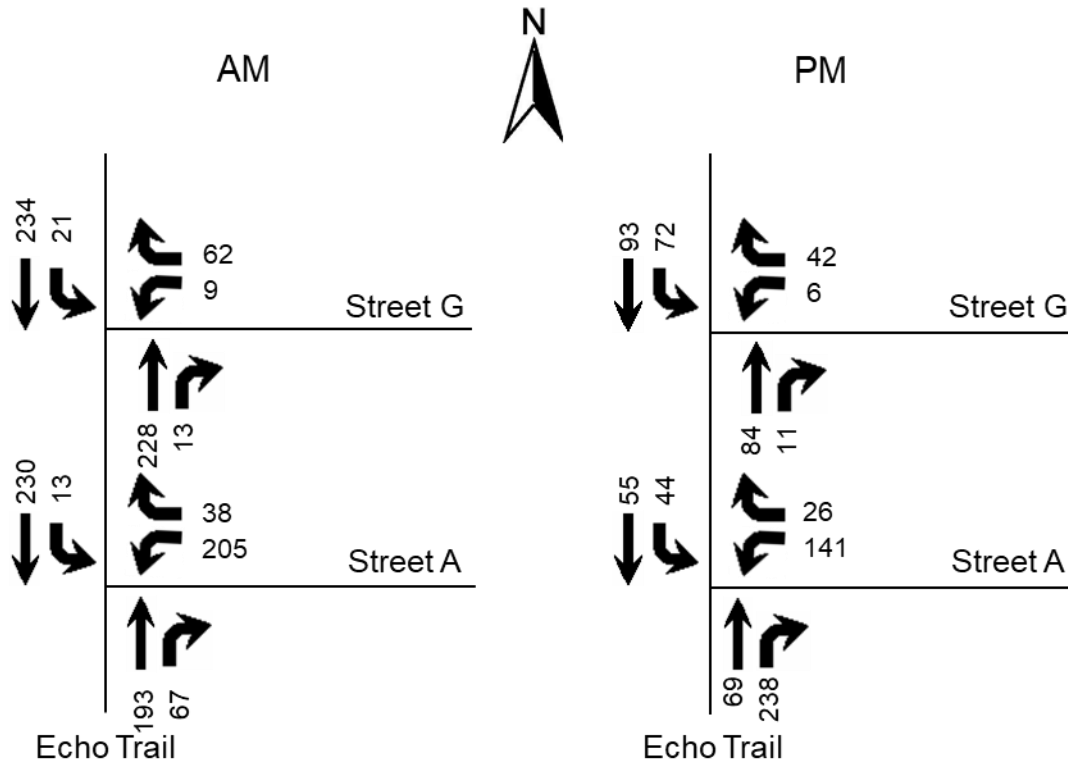


Figure 6. 2033 Build Peak Hour Volumes

ANALYSIS

The qualitative measure of operation for a roadway facility or intersection is evaluated by assigning a “Level of Service”. Level of Service is a ranking scale from A through F, “A” is the best operating condition and “F” is the worst. Level of Service results depend upon the facility that is analyzed. In this case, the Level of Service is based upon the total delay experienced at an intersection.

To evaluate the impact of the proposed development, the vehicle delays at the intersections were determined using procedures detailed in the Highway Capacity Manual, 7th edition. Future delays and Level of Service were determined for the intersections using the HCS Streets (version 2023) software. The delays and Level of Service are summarized in **Table 2**.

Table 2. Peak Hour Level of Service

Approach	A.M.			P.M.		
	2022 Existing	2033 No Build	2033 Build	2022 Existing	2033 No Build	2033 Build
Echo Trail at Street A						
Street A Westbound		C 17.0	C 20.7		B 11.7	B 13.6
Echo Trail Southbound		A 7.8	A 7.9		A 7.9	A 8.1
Echo Trail at Street G						
Street G Westbound		B 10.6	B 10.8		A 9.2	A 9.4
Echo Trail Southbound		A 7.8	A 7.9		A 7.5	A 7.6

Key: Level of Service, Delay in seconds per vehicle

Both entrances were evaluated for turn lanes using the Kentucky Transportation Cabinet Highway Design Guidance Manual dated July, 2020. Using the volumes in Figure 6, no turn lanes will be required at either entrance. The development plan shows a stub to a residual tract south and east of the middle school, which potentially will provide a third street connection to Echo Trail. This will reduce the turning traffic at both Street A and G upon completion.

CONCLUSIONS

Based upon the volume of traffic generated by the development and the amount of traffic forecasted for the year 2033, there will be an impact to the existing highway network. No turn lanes will be required at the entrances.

APPENDIX

Traffic Counts

Classified Turn Movement Count || All vehicles



Louisville, KY

www.marrtraffic.com

Site 1 of 1

Echo Trail
Echo Trail Rd
Gilliland Rd
Driveway

Date

Wednesday, September 28, 2022

Weather

Fair
56°F

Lat/Long

38.217683°, -85.460465°

0700 - 0900 (Weekday 2h Session) (09-28-2022)

All vehicles

TIME	Northbound					Southbound					Eastbound					Westbound					Int Total
	Echo Trail					Echo Trail Rd					Gilliland Rd					Driveway					
	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total	Left 1.5	Thru 1.6	Right 1.7	U-Turn 1.8	App Total	Left 1.9	Thru 1.10	Right 1.11	U-Turn 1.12	App Total	Left 1.13	Thru 1.14	Right 1.15	U-Turn 1.16	App Total	
0700 - 0715	0	1	0	0	1	0	1	0	0	1	2	0	0	0	2	0	0	0	0	0	4
0715 - 0730	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
0730 - 0745	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2
0745 - 0800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	2	0	0	2	0	1	0	0	1	4	0	0	0	4	0	0	0	0	0	7
0800 - 0815	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
0815 - 0830	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
0830 - 0845	0	2	0	0	2	0	1	0	0	1	1	1	0	0	2	0	0	0	0	0	5
0845 - 0900	0	2	0	0	2	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	4
Hourly Total	0	5	0	0	5	0	3	2	0	5	1	1	0	0	2	0	0	0	0	0	12
Grand Total	0	7	0	0	7	0	4	2	0	6	5	1	0	0	6	0	0	0	0	0	19
Approach %	0.00	100.00	0.00	0.00	-	0.00	66.67	33.33	0.00	-	83.33	16.67	0.00	0.00	-	0.00	0.00	0.00	0.00	-	
Intersection %	0.00	36.84	0.00	0.00	36.84	0.00	21.05	10.53	0.00	31.58	26.32	5.26	0.00	0.00	31.58	0.00	0.00	0.00	0.00	0.00	
PHF	0.00	0.63	0.00	0.00	0.63	0.00	0.75	0.25	0.00	0.63	0.25	0.25	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.60

1600 - 1800 (Weekday 2h Session) (09-28-2022)

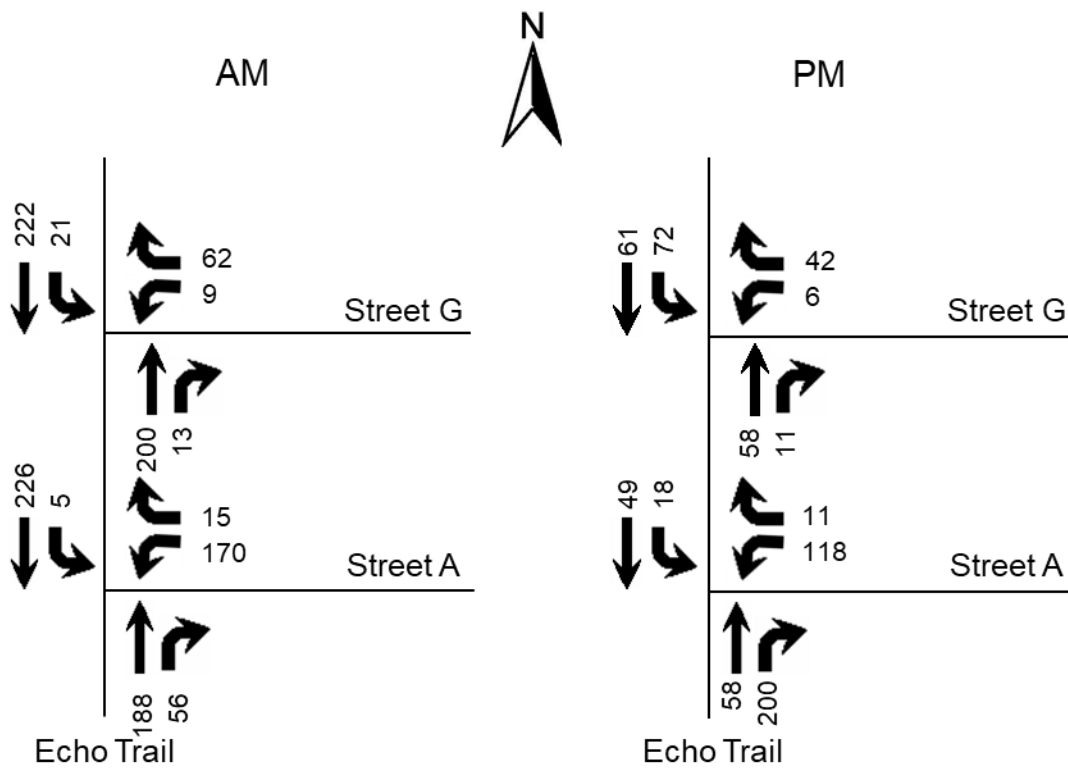
All vehicles

TIME	Northbound					Southbound					Eastbound					Westbound					Int Total
	Echo Trail					Echo Trail Rd					Gilliland Rd					Driveway					
	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total	Left 1.5	Thru 1.6	Right 1.7	U-Turn 1.8	App Total	Left 1.9	Thru 1.10	Right 1.11	U-Turn 1.12	App Total	Left 1.13	Thru 1.14	Right 1.15	U-Turn 1.16	App Total	
1600 - 1615	0	0	1	0	1	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	3
1615 - 1630	0	0	0	0	0	1	2	1	0	4	0	0	0	0	0	0	0	0	0	0	4
1630 - 1645	0	1	0	0	1	0	0	2	1	3	0	0	0	0	0	0	0	0	0	0	4
1645 - 1700	0	0	0	0	0	1	4	1	0	6	0	0	0	0	0	0	0	0	0	0	6
Hourly Total	0	1	1	0	2	2	6	6	1	15	0	0	0	0	0	0	0	0	0	0	17
1700 - 1715	0	3	0	0	3	1	1	2	1	5	2	0	0	0	2	0	0	0	0	0	10
1715 - 1730	0	3	0	0	3	0	1	2	0	3	1	0	1	0	2	0	0	0	0	0	8
1730 - 1745	0	2	1	0	3	0	0	1	1	2	1	0	0	0	1	0	0	0	0	0	6
1745 - 1800	0	3	0	0	3	0	3	0	0	3	2	0	0	0	2	0	0	0	0	0	8
Hourly Total	0	11	1	0	12	1	5	5	2	13	6	0	1	0	7	0	0	0	0	0	32
Grand Total	0	12	2	0	14	3	11	11	3	28	6	0	1	0	7	0	0	0	0	0	49
Approach %	0.00	85.71	14.29	0.00	-	10.71	39.29	39.29	10.71	-	85.71	0.00	14.29	0.00	-	0.00	0.00	0.00	0.00	-	
Intersection %	0.00	24.49	4.08	0.00	28.57	6.12	22.45	22.45	6.12	57.14	12.24	0.00	2.04	0.00	14.29	0.00	0.00	0.00	0.00	0.00	
PHF	0.00	0.92	0.25	0.00	1.00	0.25	0.42	0.63	0.50	0.65	0.75	0.00	0.25	0.00	0.88	0.00	0.00	0.00	0.00	0.00	0.80

TRIP GENERATION AND DISTRIBUTION FOR 577 LOTS AND MIDDLE SCHOOL

The Echo Trail Subdivision TIS assigned 30% to/from the north. For the middle school 60% to/from the north was used.

Land Use	A.M. Peak Hour			P.M. Peak Hour		
	Trips	In	Out	Trips	In	Out
Single-Family Detached (532 lots)	341	85	256	478	301	177
Middle School (1,000 student)	670	362	308	150	72	78



HCS Reports

HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection			Echo Trail at Street A					
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC							Jurisdiction								
Date Performed	1/5/2023							East/West Street			Echo Trail					
Analysis Year	2033							North/South Street			Street A					
Time Analyzed	AM Peak No Build							Peak Hour Factor			0.85					
Intersection Orientation	North-South							Analysis Time Period (hrs)			0.25					
Project Description	Echo Trail															
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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						170		15			193	56		5	230	
Percent Heavy Vehicles (%)						1		1						1		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type Storage	Undivided															
Critical and Follow-up Headways																
Base Critical Headway (sec)						7.1		6.2							4.1	
Critical Headway (sec)						6.41		6.21							4.11	
Base Follow-Up Headway (sec)						3.5		3.3							2.2	
Follow-Up Headway (sec)						3.51		3.31							2.21	
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						218									6	
Capacity, c (veh/h)						515									1274	
v/c Ratio						0.42									0.00	
95% Queue Length, Q ₉₅ (veh)						2.1									0.0	
Control Delay (s/veh)						17.0									7.8	0.0
Level of Service (LOS)						C									A	A
Approach Delay (s/veh)						17.0								0.2		
Approach LOS						C								A		

HCS Two-Way Stop-Control Report																	
General Information									Site Information								
Analyst	DBZ								Intersection	Echo Trail at Street A							
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC								Jurisdiction								
Date Performed	1/5/2023								East/West Street	Echo Trail							
Analysis Year	2033								North/South Street	Street A							
Time Analyzed	AM Peak Build								Peak Hour Factor	0.85							
Intersection Orientation	North-South								Analysis Time Period (hrs)	0.25							
Project Description	Echo Trail																
Lanes																	
<p style="text-align: center;">Major Street North-South</p>																	
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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0	
Configuration							LR					TR		LT			
Volume (veh/h)						205		38			193	67		13	230		
Percent Heavy Vehicles (%)						1		1						1			
Proportion Time Blocked																	
Percent Grade (%)						0											
Right Turn Channelized																	
Median Type Storage						Undivided											
Critical and Follow-up Headways																	
Base Critical Headway (sec)						7.1		6.2						4.1			
Critical Headway (sec)						6.41		6.21						4.11			
Base Follow-Up Headway (sec)						3.5		3.3						2.2			
Follow-Up Headway (sec)						3.51		3.31						2.21			
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)						286								15			
Capacity, c (veh/h)						510								1261			
v/c Ratio						0.56								0.01			
95% Queue Length, Q ₉₅ (veh)						3.4								0.0			
Control Delay (s/veh)						20.7								7.9	0.1		
Level of Service (LOS)						C								A	A		
Approach Delay (s/veh)						20.7								0.5			
Approach LOS						C								A			

HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Echo Trail at Street A							
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC							Jurisdiction								
Date Performed	1/5/2023							East/West Street	Echo Trail							
Analysis Year	2033							North/South Street	Street A							
Time Analyzed	PM Peak No Build							Peak Hour Factor	0.85							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Echo Trail															
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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						118		11			69	200		18	55	
Percent Heavy Vehicles (%)						1		1						1		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type Storage						Undivided										
Critical and Follow-up Headways																
Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.41		6.21						4.11		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.51		3.31						2.21		
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						152								21		
Capacity, c (veh/h)						688								1249		
v/c Ratio						0.22								0.02		
95% Queue Length, Q ₉₅ (veh)						0.8								0.1		
Control Delay (s/veh)						11.7								7.9	0.1	
Level of Service (LOS)						B								A	A	
Approach Delay (s/veh)						11.7								2.1		
Approach LOS						B								A		

HCS Two-Way Stop-Control Report																	
General Information								Site Information									
Analyst	DBZ							Intersection	Echo Trail at Street A								
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC							Jurisdiction									
Date Performed	1/5/2023							East/West Street	Echo Trail								
Analysis Year	2033							North/South Street	Street A								
Time Analyzed	PM Peak Build							Peak Hour Factor	0.85								
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25								
Project Description	Echo Trail																
Lanes																	
<p style="text-align: center;">Major Street: North-South</p>																	
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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0	
Configuration							LR					TR		LT			
Volume (veh/h)						141		26			69	238		44	55		
Percent Heavy Vehicles (%)						1		1						1			
Proportion Time Blocked																	
Percent Grade (%)						0											
Right Turn Channelized																	
Median Type Storage	Undivided																
Critical and Follow-up Headways																	
Base Critical Headway (sec)						7.1		6.2							4.1		
Critical Headway (sec)						6.41		6.21							4.11		
Base Follow-Up Headway (sec)						3.5		3.3							2.2		
Follow-Up Headway (sec)						3.51		3.31							2.21		
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)						196								52			
Capacity, c (veh/h)						616								1203			
v/c Ratio						0.32								0.04			
95% Queue Length, Q ₉₅ (veh)						1.4								0.1			
Control Delay (s/veh)						13.6								8.1	0.4		
Level of Service (LOS)						B								A	A		
Approach Delay (s/veh)						13.6								3.8			
Approach LOS						B								A			

HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Echo Trail at Street G							
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC							Jurisdiction								
Date Performed	1/5/2023							East/West Street	Echo Trail							
Analysis Year	2033							North/South Street	Street A							
Time Analyzed	AM Peak No Build							Peak Hour Factor	0.85							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Echo Trail															
Lanes																
<p style="text-align: center;">Major Street North-South</p>																
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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						9		62			205	13		21	226	
Percent Heavy Vehicles (%)						1		1						1		
Proportion Time Blocked																
Percent Grade (%)							0									
Right Turn Channelized																
Median Type Storage						Undivided										
Critical and Follow-up Headways																
Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.41		6.21						4.11		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.51		3.31						2.21		
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						84								25		
Capacity, c (veh/h)						731								1314		
v/c Ratio						0.11								0.02		
95% Queue Length, Q ₉₅ (veh)						0.4								0.1		
Control Delay (s/veh)						10.6								7.8	0.2	
Level of Service (LOS)						B								A	A	
Approach Delay (s/veh)						10.6								0.8		
Approach LOS						B								A		

HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Echo Trail at Street G							
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC							Jurisdiction								
Date Performed	1/5/2023							East/West Street	Echo Trail							
Analysis Year	2033							North/South Street	Street A							
Time Analyzed	AM Peak Build							Peak Hour Factor	0.85							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Echo Trail															
Lanes																
<p style="text-align: center;">Major Street North-South</p>																
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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						9		62			228	13		21	234	
Percent Heavy Vehicles (%)						1		1						1		
Proportion Time Blocked																
Percent Grade (%)							0									
Right Turn Channelized																
Median Type Storage						Undivided										
Critical and Follow-up Headways																
Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.41		6.21						4.11		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.51		3.31						2.21		
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						84								25		
Capacity, c (veh/h)						704								1285		
v/c Ratio						0.12								0.02		
95% Queue Length, Q ₉₅ (veh)						0.4								0.1		
Control Delay (s/veh)						10.8								7.9	0.2	
Level of Service (LOS)						B								A	A	
Approach Delay (s/veh)						10.8						0.8				
Approach LOS						B						A				

HCS Two-Way Stop-Control Report																	
General Information									Site Information								
Analyst	DBZ								Intersection	Echo Trail at Street G							
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC								Jurisdiction								
Date Performed	1/5/2023								East/West Street	Echo Trail							
Analysis Year	2033								North/South Street	Street A							
Time Analyzed	PM Peak No Build								Peak Hour Factor	0.85							
Intersection Orientation	North-South								Analysis Time Period (hrs)	0.25							
Project Description	Echo Trail																
Lanes																	
<p style="text-align: center;">Major Street North-South</p>																	
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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0	
Configuration							LR					TR		LT			
Volume (veh/h)						6		42			69	11		72	67		
Percent Heavy Vehicles (%)						1		1						1			
Proportion Time Blocked																	
Percent Grade (%)						0											
Right Turn Channelized																	
Median Type Storage						Undivided											
Critical and Follow-up Headways																	
Base Critical Headway (sec)						7.1		6.2						4.1			
Critical Headway (sec)						6.41		6.21						4.11			
Base Follow-Up Headway (sec)						3.5		3.3						2.2			
Follow-Up Headway (sec)						3.51		3.31						2.21			
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)						56								85			
Capacity, c (veh/h)						909								1506			
v/c Ratio						0.06								0.06			
95% Queue Length, Q ₉₅ (veh)						0.2								0.2			
Control Delay (s/veh)						9.2								7.5	0.4		
Level of Service (LOS)						A								A	A		
Approach Delay (s/veh)						9.2								4.1			
Approach LOS						A								A			

HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection			Echo Trail at Street G					
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC							Jurisdiction								
Date Performed	1/5/2023							East/West Street			Echo Trail					
Analysis Year	2033							North/South Street			Street A					
Time Analyzed	PM Peak Build							Peak Hour Factor			0.85					
Intersection Orientation	North-South							Analysis Time Period (hrs)			0.25					
Project Description	Echo Trail															
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		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration								LR					TR	LT		
Volume (veh/h)						6		42			84	11		72	93	
Percent Heavy Vehicles (%)						1		1						1		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized																
Median Type Storage	Undivided															
Critical and Follow-up Headways																
Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.41		6.21						4.11		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.51		3.31						2.21		
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						56								85		
Capacity, c (veh/h)						882								1484		
v/c Ratio						0.06								0.06		
95% Queue Length, Q ₉₅ (veh)						0.2								0.2		
Control Delay (s/veh)						9.4								7.6	0.5	
Level of Service (LOS)						A								A	A	
Approach Delay (s/veh)						9.4								3.6		
Approach LOS						A								A		

Left Turn Lane Warrants

Input Fields

Left Turn Volume (vph)	44	Speed Limit (mph)	35
Advancing Volume (vph)	99	No. of through lanes	1
Opposing Volume (vph)	307	Percent Heavy Vehicles (decimal percent)	0.01



Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

Right Turn Lane Warrants

Input Fields

Right Turn Volume (vph)	238	Speed Limit (mph)	35
Advancing Volume (vph)	307		



Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.