

final report

September 16, 2021
Revised November 11, 2021

Traffic Impact Study

Oak Grove Subdivision
10212 Oak Grove Road
Louisville, KY

Prepared for

Louisville Metro Planning Commission



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Table of Contents

INTRODUCTION	2
Figure 1. Site Map.....	2
EXISTING CONDITIONS	2
Figure 2. Existing Peak Hour Volumes.....	3
FUTURE CONDITIONS	3
Figure 3. 2027 No Build Peak Hour Volumes.....	4
TRIP GENERATION	5
Table 1. Peak Hour Trips Generated by Site.....	5
Figure 4. Trip Distribution Percentages.....	5
Figure 5. Peak Hour Trips Generated by Site.....	6
Figure 6. 2027 Build Peak Hour Volumes	7
ANALYSIS	8
Table 2. Peak Hour Level of Service.....	8
Table 3. Bardstown Road at Thixton Lane with a right turn lane on Thixton Lane	9
CONCLUSIONS	9
APPENDIX	10

INTRODUCTION

The site plan for the proposed Oak Grove subdivision shows 263 single-family lots on Oak Grove Road in Louisville, KY. **Figure 1** displays a map of the site. Access to the site will be from Oak Grove Road. The subdivision also connects to Mossy Creek Way. 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 Oak Grove Road with Thixton Lane, Thixton Lane with Pebble Trace and Bardstown Road, and Independence School Road with Cedar Creek Road.

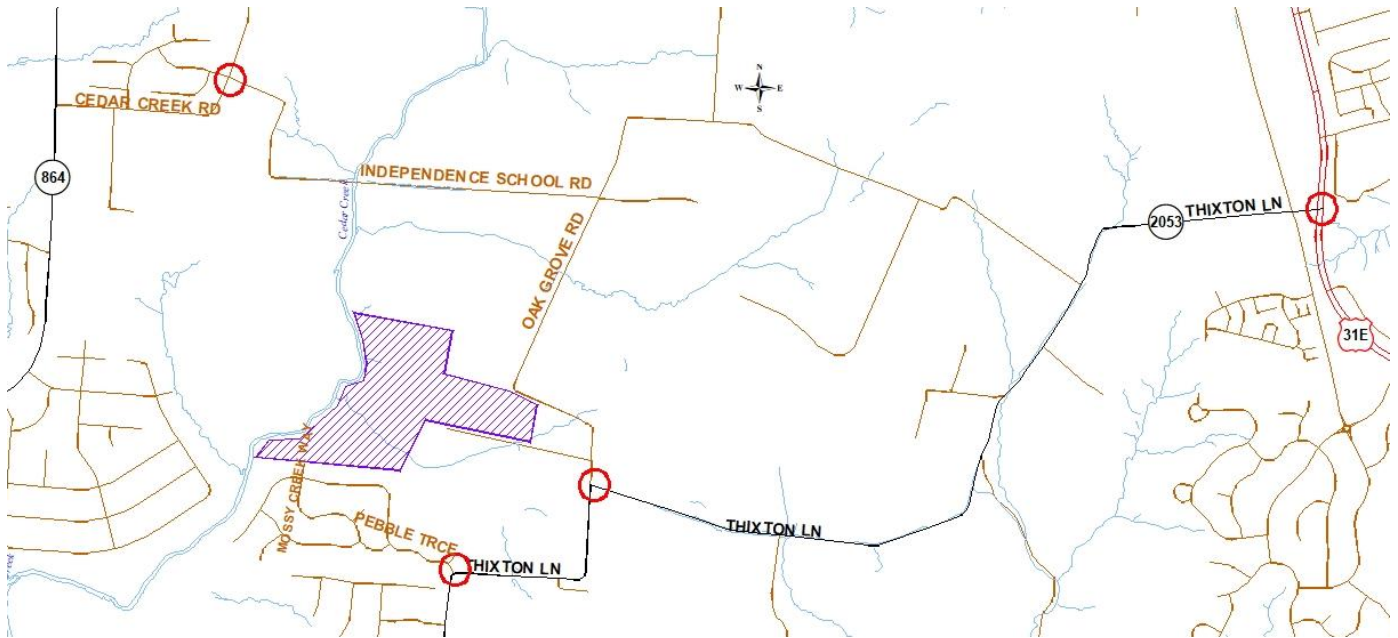


Figure 1. Site Map

EXISTING CONDITIONS

Oak Grove Road is a Metro-maintained road with an estimated 2021 ADT of 400 vehicles per day north of Thixton Lane, as estimated from the turning movement count. The road is a two-lane highway with nine-foot lanes with one-foot stabilized shoulders. The speed limit is 35 mph. There are no sidewalks. The intersection with Thixton Lane is controlled with a stop sign on the westbound approach of Thixton Lane.

Peak hour traffic counts for the intersections were obtained on Tuesday, August 24, 2021. The a.m. and p.m. peak hour varied between the intersections. **Figure 2** illustrates the existing a.m. and p.m. peak hour traffic volumes. The Appendix contains the full count data.

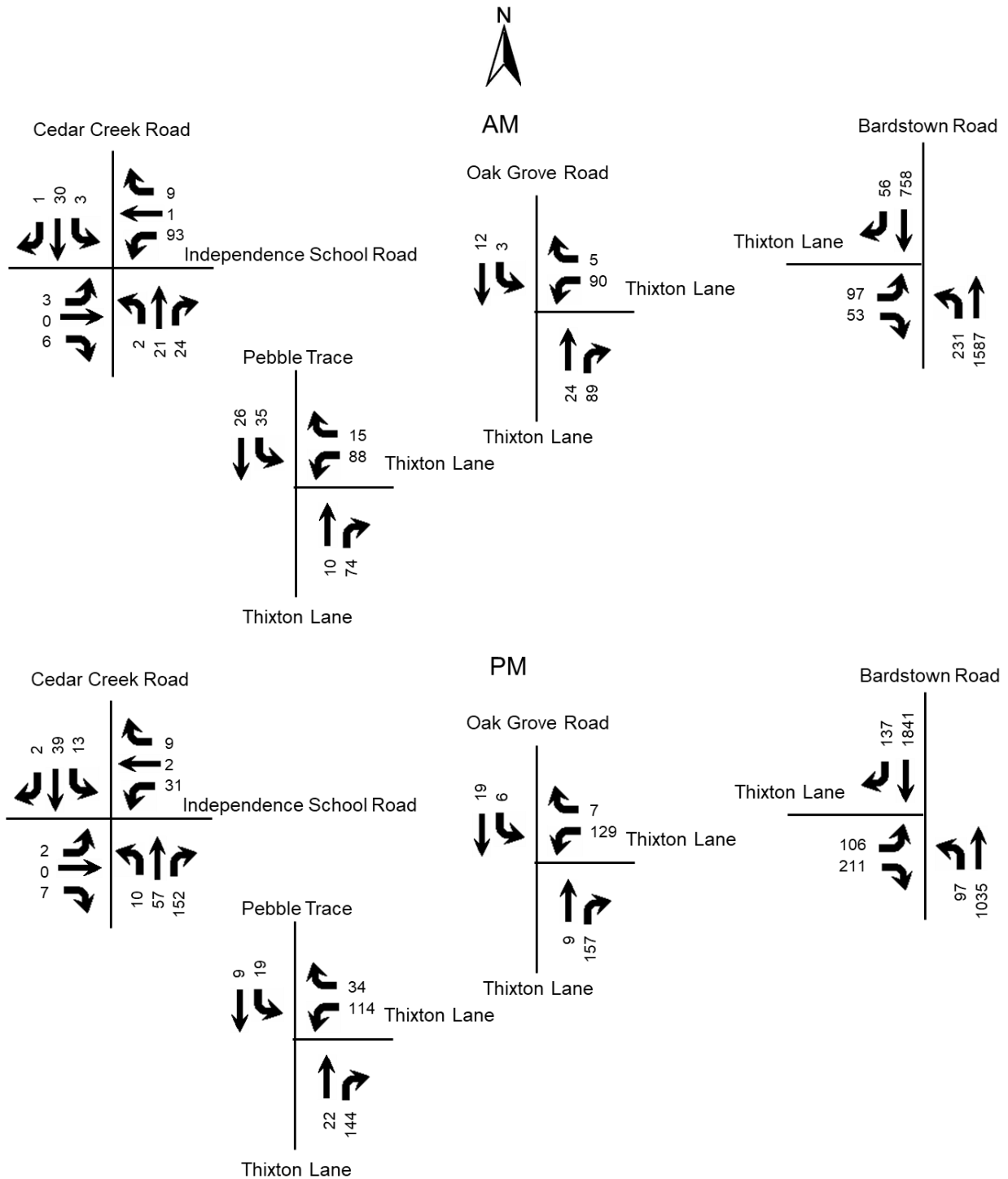


Figure 2. Existing Peak Hour Volumes

FUTURE CONDITIONS

The project completion date is 2027. An annual growth rate of 2 percent was applied to the 2021 thru volumes on Thixton Lane and Cedar Creek Road. This was determined by the historical growth at KYTC station 274. One percent

annual growth was applied to the thru traffic on Bardstown Road. **Figure 3** displays the 2027 No Build peak hour volumes.

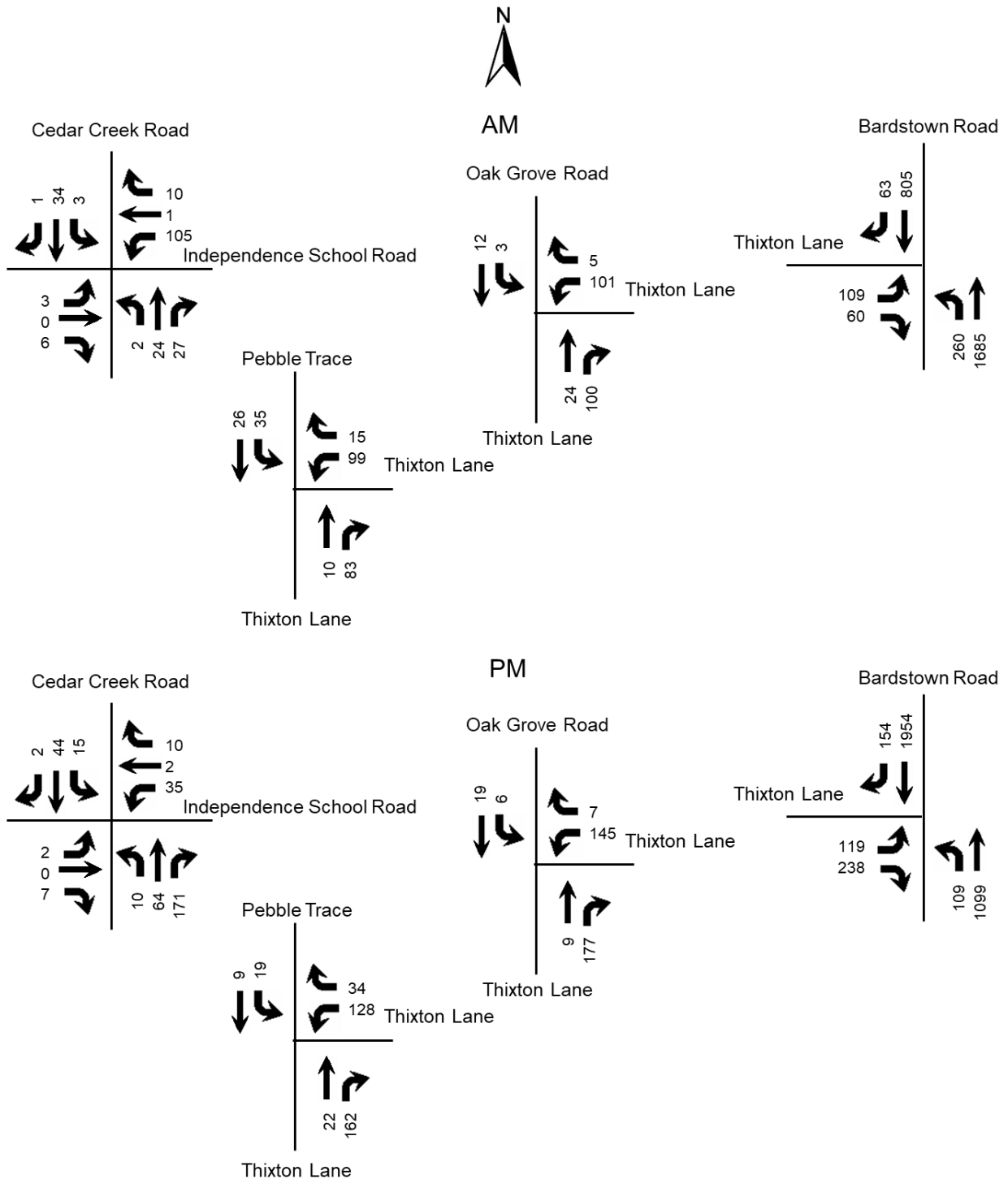


Figure 3. 2027 No Build Peak Hour Volumes

TRIP GENERATION

The Institute of Transportation Engineers Trip Generation Manual, 10th 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. The entrance is shown in the diagram with a north/south orientation for simplicity on the figures. At the entrance Oak Grove Road is the southbound approach and the westbound approach and the entrance is the northbound approach.

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 (263 units)	192	48	144	257	162	95

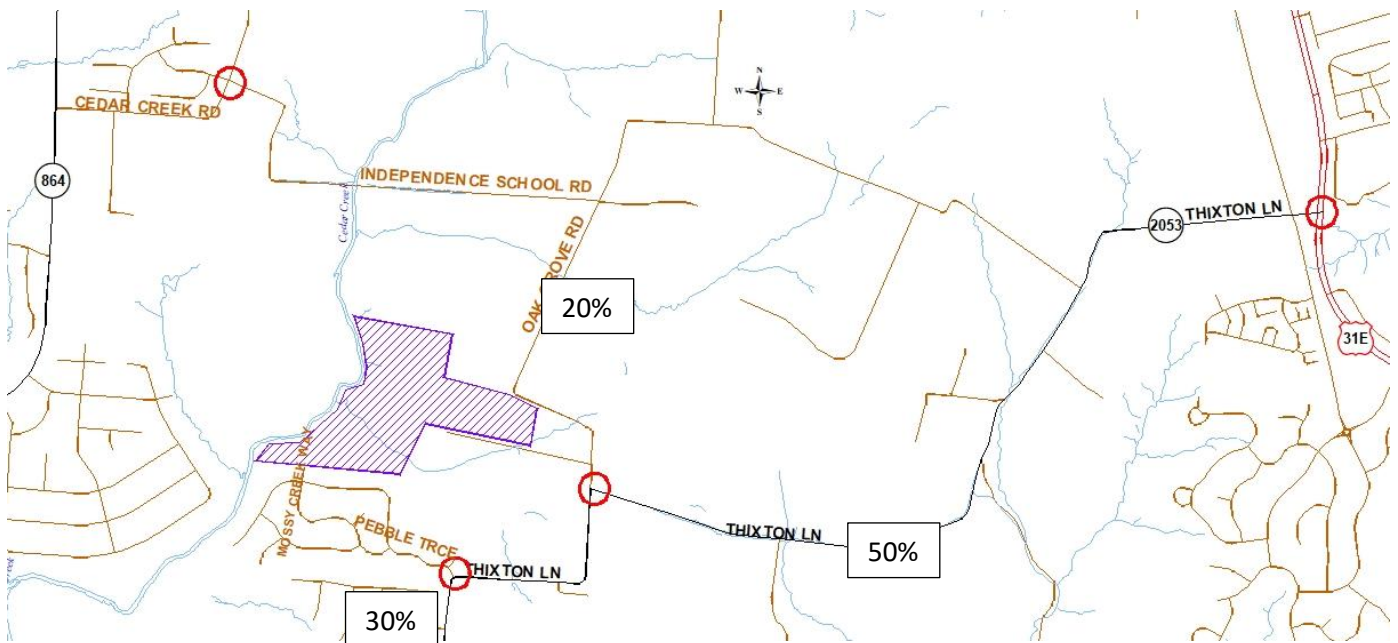


Figure 4. Trip Distribution Percentages

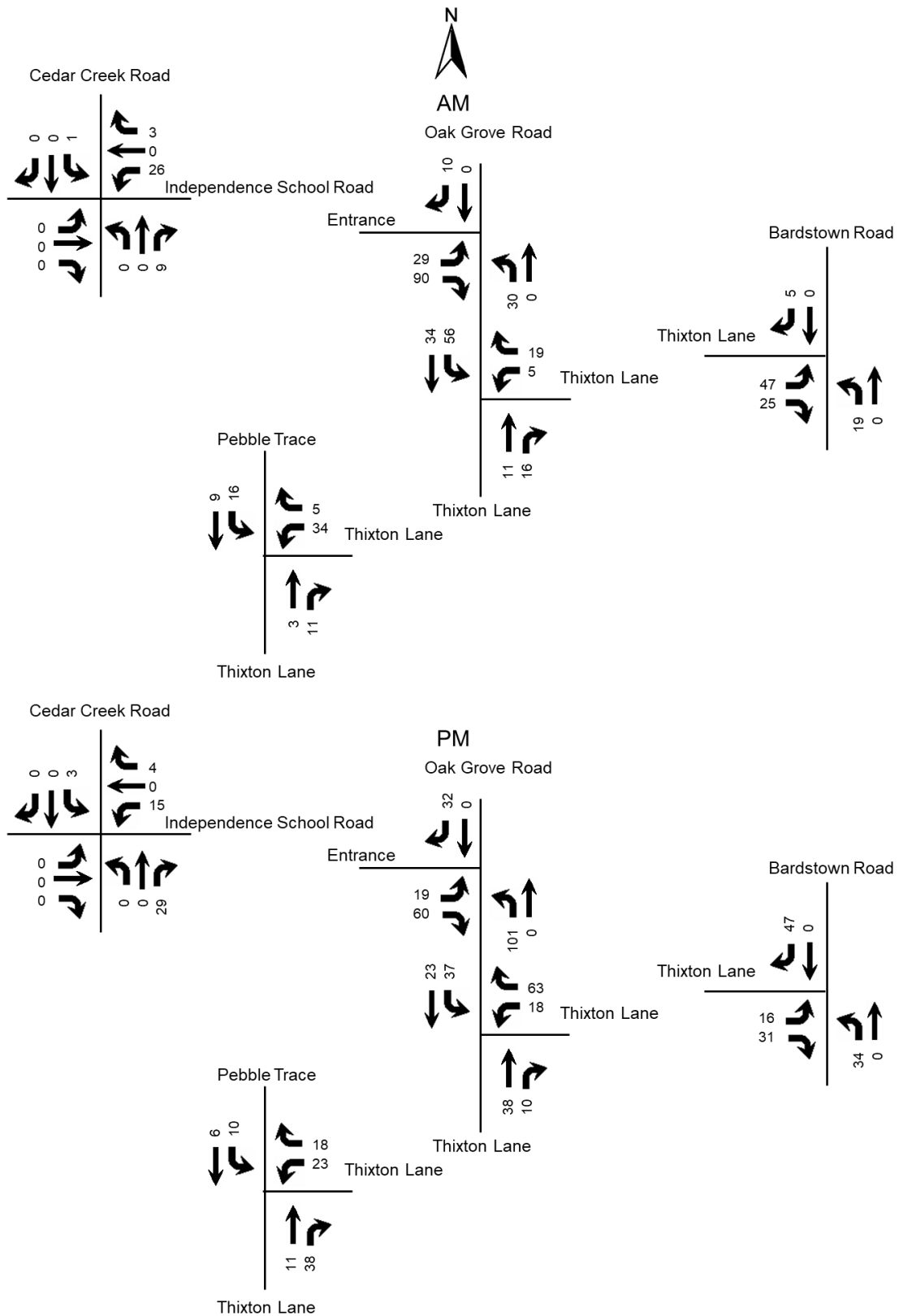


Figure 5. Peak Hour Trips Generated by Site

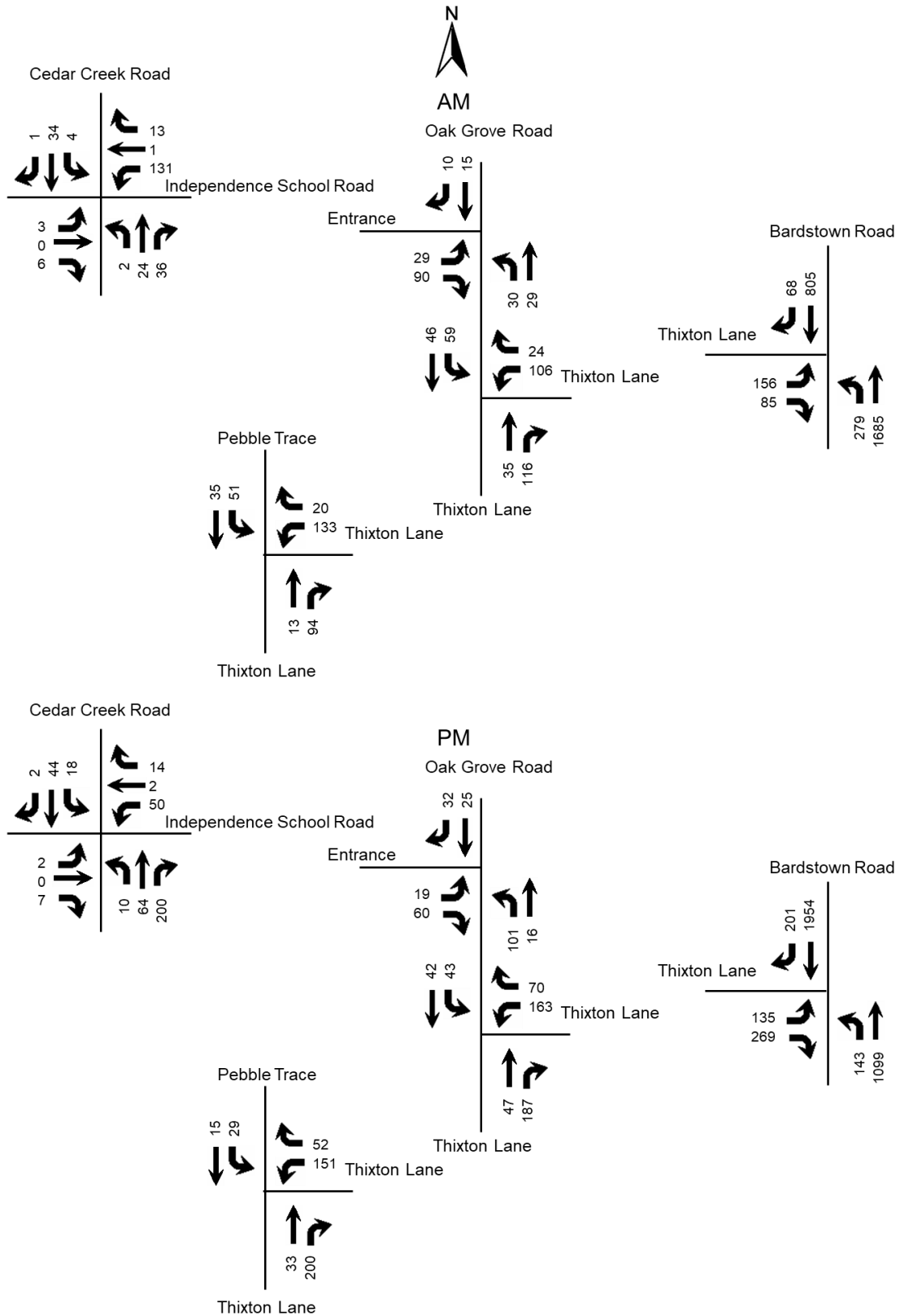


Figure 6. 2027 Build Peak Hour Volumes

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 for lanes at stop-controlled intersections.

To evaluate the impact of the proposed development, the vehicle delays at the intersections were determined using procedures detailed in the Highway Capacity Manual, 6th edition. Future delays and Level of Service were determined for the intersections using the HCS Streets (version 7.9.5) software. The delays and Level of Service are summarized in **Table 2**.

Table 2. Peak Hour Level of Service

Approach	A.M.			P.M.		
	2021 Existing	2027 No Build	2027 Build	2021 Existing	2027 No Build	2027 Build
Cedar Creek Road at Independence School						
Independence School Road Eastbound	A 8.8	A 8.9	A 8.9	A 9.1	A 9.2	A 9.3
Independence School Road Westbound	B 10.1	B 10.4	B 10.9	B 10.9	B 11.3	B 11.9
Cedar Creek Road Northbound	A 7.3	A 7.3	A 7.3	A 7.3	A 7.3	A 7.3
Cedar Creek Road Southbound	A 7.7	A 7.7	A 7.6	A 7.9	A 8.0	A 8.1
Oak Grove Road at Thixton Lane						
Thixton Lane Westbound	A 9.5	A 9.6	B 11.3	B 10.0	B 10.2	B 12.6
Oak Grove Road Southbound	A 8.1	A 8.2	A 8.5	A 7.8	A 7.8	A 7.8
Oak Grove Road at Entrance						
Oak Grove Road Westbound			A 9.2			A 9.9
Oak Grove Road Southbound			A 7.5			A 7.4
Thixton Lane at Pebble Trace						
Thixton Lane Eastbound	A 7.4	A 7.5	A 7.6	A 7.6	A 7.7	A 7.8
Pebble Trace Southbound	A 9.7	A 9.8	B 10.4	B 10.4	B 10.6	B 11.6
Bardstown Road at Thixton Lane	B 14.9	B 16.0	B 16.7	C 29.3	C 32.4	D 48.3
Thixton Lane Eastbound	D 43.3	D 44.4	E 72.2	E 64.8	E 69.1	E 66.6

Approach	A.M.			P.M.		
	2021 Existing	2027 No Build	2027 Build	2021 Existing	2027 No Build	2027 Build
Bardstown Road Northbound	B 12.3	B 13.4	B 11.0	B 13.7	B 16.2	B 21.2
Bardstown Road Southbound	B 15.4	B 16.3	B 14.3	C 32.6	D 35.4	E 60.5

Key: Level of Service, Delay in seconds per vehicle

The 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 are recommended at the entrance on Oak Grove Road. The spreadsheet results for the turn lanes are in the Appendix. The recommended traffic control is that westbound Oak Grove Road be controlled with a stop sign. This is the same traffic control as the intersection of Thixton Lane and Oak Grove Road.

The Kentucky Transportation Cabinet requested an evaluation of the Bardstown Road intersection at Thixton Lane to include a right turn lane on Thixton Lane. The results are listed in Table 3.

Table 3. Bardstown Road at Thixton Lane with a right turn lane on Thixton Lane

Approach	A.M.		P.M.	
	2027 Build	2027 Build Thixton Ln Right	2027 Build	2027 Build Thixton Ln Right
Bardstown Road at Thixton Lane	B 16.7	B 11.5	D 48.3	C 24.7
Thixton Lane Eastbound	E 72.2	D 51.3	E 66.6	E 63.6
Bardstown Road Northbound	B 11.0	A 7.3	B 21.2	B 12.9
Bardstown Road Southbound	B 14.3	B 10.1	E 60.5	C 24.2

CONCLUSIONS

Based upon the volume of traffic generated by the development and the amount of traffic forecasted for the year 2027, there will be a slight impact to the existing highway network. No improvements are required.

APPENDIX

Traffic Counts



Classified Turn Movement Count || All vehicles

Jefferson County, KY

www.marrtraffic.com

Site 4 of 4

Cedar Creek Rd (South)
Cedar Creek Rd (North)
Independence School Rd (West)
Independence School Rd (East)

Date

Tuesday, August 24, 2021

Weather

Fair
87°F

Lat/Long

38.104664°, -85.607391°

0700 - 0900 (Weekday 2h Session) (08-24-2021)

All vehicles

TIME	Northbound Cedar Creek Rd (South)					Southbound Cedar Creek Rd (North)					Eastbound Independence School Rd (West)					Westbound Independence School Rd (East)					Int Total
	Left 4.1	Thru 4.2	Right 4.3	U-Turn 4.4	App Total	Left 4.5	Thru 4.6	Right 4.7	U-Turn 4.8	App Total	Left 4.9	Thru 4.10	Right 4.11	U-Turn 4.12	App Total	Left 4.13	Thru 4.14	Right 4.15	U-Turn 4.16	App Total	
	0700 - 0715	0	5	3	0	8	1	6	0	0	7	0	1	3	0	4	21	0	2	0	
0715 - 0730	1	2	3	0	6	1	5	0	0	6	0	0	1	0	1	22	0	2	0	24	37
0730 - 0745	2	7	3	0	12	0	11	0	0	11	0	0	3	0	3	46	0	2	0	48	74
0745 - 0800	0	3	7	0	10	0	1	0	0	1	0	0	0	0	0	16	1	3	0	20	31
Hourly Total	3	17	16	0	36	2	23	0	0	25	0	1	7	0	8	105	1	9	0	115	184
0800 - 0815	0	5	6	0	11	3	6	1	0	10	2	0	2	0	4	19	0	2	0	21	46
0815 - 0830	0	6	8	0	14	0	12	0	0	12	1	0	1	0	2	12	0	2	0	14	42
0830 - 0845	0	7	5	0	12	0	7	0	0	7	0	0	0	0	0	7	0	3	0	10	29
0845 - 0900	0	2	9	0	11	1	13	0	0	14	0	0	2	0	2	9	0	3	0	12	39
Hourly Total	0	20	28	0	48	4	38	1	0	43	3	0	5	0	8	47	0	10	0	57	156
Grand Total	3	37	44	0	84	6	61	1	0	68	3	1	12	0	16	152	1	19	0	172	340
Approach %	3.57	44.05	52.38	0.00	-	8.82	89.71	1.47	0.00	-	18.75	6.25	75.00	0.00	-	88.37	0.58	11.05	0.00	-	
Intersection %	0.88	10.88	12.94	0.00	24.71	1.76	17.94	0.29	0.00	20.00	0.88	0.29	3.53	0.00	4.71	44.71	0.29	5.59	0.00	50.59	
PHF	0.25	0.75	0.75	0.00	0.84	0.25	0.63	0.25	0.00	0.71	0.38	0.00	0.50	0.00	0.56	0.51	0.25	0.75	0.00	0.54	0.65

1600 - 1800 (Weekday 2h Session) (08-24-2021)

All vehicles

TIME	Northbound Cedar Creek Rd (South)					Southbound Cedar Creek Rd (North)					Eastbound Independence School Rd (West)					Westbound Independence School Rd (East)					Int Total
	Left 4.1	Thru 4.2	Right 4.3	U-Turn 4.4	App Total	Left 4.5	Thru 4.6	Right 4.7	U-Turn 4.8	App Total	Left 4.9	Thru 4.10	Right 4.11	U-Turn 4.12	App Total	Left 4.13	Thru 4.14	Right 4.15	U-Turn 4.16	App Total	
	1600 - 1615	3	6	26	0	35	3	10	2	0	15	0	0	1	0	1	15	0	2	0	
1615 - 1630	3	11	25	0	39	3	7	0	0	10	0	0	0	0	0	6	1	3	0	10	59
1630 - 1645	1	17	50	0	68	3	19	2	0	24	1	0	1	0	2	12	0	4	0	16	110
1645 - 1700	1	6	35	0	42	2	6	0	0	8	1	0	1	0	2	10	1	4	0	15	67
Hourly Total	8	40	136	0	184	11	42	4	0	57	2	0	3	0	5	43	2	13	0	58	304
1700 - 1715	5	20	37	0	62	4	8	0	0	12	0	0	5	0	5	6	1	1	0	8	87
1715 - 1730	3	14	30	0	47	4	6	0	0	10	0	0	0	0	0	3	0	0	0	3	60
1730 - 1745	2	8	22	0	32	2	7	2	0	11	1	0	4	0	5	7	0	4	0	11	59
1745 - 1800	4	4	17	0	25	1	7	1	0	9	3	0	2	0	5	5	0	2	0	7	46
Hourly Total	14	46	106	0	166	11	28	3	0	42	4	0	11	0	15	21	1	7	0	29	252
Grand Total	22	86	242	0	350	22	70	7	0	99	6	0	14	0	20	64	3	20	0	87	556
Approach %	6.29	24.57	69.14	0.00	-	22.22	70.71	7.07	0.00	-	30.00	0.00	70.00	0.00	-	73.56	3.45	22.99	0.00	-	
Intersection %	3.96	15.47	43.53	0.00	62.95	3.96	12.59	1.26	0.00	17.81	1.08	0.00	2.52	0.00	3.60	11.51	0.54	3.60	0.00	15.65	
PHF	0.50	0.71	0.76	0.00	0.81	0.81	0.51	0.25	0.00	0.56	0.50	0.00	0.35	0.00	0.45	0.65	0.50	0.56	0.00	0.66	0.74

Oak Grove Subdivision
Traffic Impact Study



Classified Turn Movement Count || All vehicles

Jefferson County, KY

Site 2 of 4
KY-2053 Thixton Ln (South)
Oak Grove Rd

Date
Tuesday, August 24, 2021

Weather
Fair
87°F

KY-2053 Thixton Ln (East)

Lat/Long
38.09235°, -85.593529°

0700 - 0900 (Weekday 2h Session) (08-24-2021)

All vehicles

TIME	Northbound KY-2053 Thixton Ln (South)				Southbound Oak Grove Rd				Westbound KY-2053 Thixton Ln (East)				
	Thru	Right	U-Turn	App Total	Left	Thru	U-Turn	App Total	Left	Right	U-Turn	App Total	Int Total
	2.1	2.2	2.3		2.4	2.5	2.6		2.7	2.8	2.9		
0700 - 0715	4	26	0	30	0	3	0	3	13	2	0	15	48
0715 - 0730	6	29	0	35	0	5	0	5	14	1	0	15	55
0730 - 0745	6	18	0	24	1	1	0	2	30	2	0	32	58
0745 - 0800	6	18	0	24	1	4	0	5	20	2	0	22	51
Hourly Total	22	91	0	113	2	13	0	15	77	7	0	84	212
0800 - 0815	6	24	0	30	1	2	0	3	26	0	0	26	59
0815 - 0830	2	18	0	20	1	3	0	4	16	2	0	18	42
0830 - 0845	3	22	0	25	0	2	0	2	8	0	0	8	35
0845 - 0900	1	20	0	21	1	3	0	4	12	1	0	13	38
Hourly Total	12	84	0	96	3	10	0	13	62	3	0	65	174
Grand Total	34	175	0	209	5	23	0	28	139	10	0	149	386
Approach %	16.27	83.73	0.00	-	17.86	82.14	0.00	-	93.29	6.71	0.00	-	
Intersection %	8.81	45.34	0.00	54.15	1.30	5.96	0.00	7.25	36.01	2.59	0.00	38.60	
PHF	1.00	0.77	0.00	0.81	0.75	0.60	0.00	0.75	0.75	0.63	0.00	0.74	0.94

1600 - 1800 (Weekday 2h Session) (08-24-2021)

All vehicles

TIME	Northbound KY-2053 Thixton Ln (South)				Southbound Oak Grove Rd				Westbound KY-2053 Thixton Ln (East)				
	Thru	Right	U-Turn	App Total	Left	Thru	U-Turn	App Total	Left	Right	U-Turn	App Total	Int Total
	2.1	2.2	2.3		2.4	2.5	2.6		2.7	2.8	2.9		
1600 - 1615	3	29	0	32	3	6	0	9	22	1	0	23	64
1615 - 1630	1	24	0	25	2	8	0	10	18	0	0	18	53
1630 - 1645	6	43	0	49	3	5	0	8	30	2	0	32	89
1645 - 1700	1	45	0	46	1	1	0	2	38	2	0	40	88
Hourly Total	11	141	0	152	9	20	0	29	108	5	0	113	294
1700 - 1715	1	37	0	38	2	7	0	9	32	3	0	35	82
1715 - 1730	1	32	0	33	0	6	0	6	29	0	0	29	68
1730 - 1745	3	29	0	32	3	6	0	9	32	0	0	32	73
1745 - 1800	4	23	0	27	2	5	0	7	30	0	0	30	64
Hourly Total	9	121	0	130	7	24	0	31	123	3	0	126	287
Grand Total	20	262	0	282	16	44	0	60	231	8	0	239	581
Approach %	7.09	92.91	0.00	-	26.67	73.33	0.00	-	96.65	3.35	0.00	-	
Intersection %	3.44	45.09	0.00	48.54	2.75	7.57	0.00	10.33	39.76	1.38	0.00	41.14	
PHF	0.38	0.87	0.00	0.85	0.50	0.68	0.00	0.69	0.85	0.58	0.00	0.85	0.92

Classified Turn Movement Count || All vehicles

Jefferson County, KY

Site 3 of 4
KY-2053 Thixton Ln (South)
Pebble Trace

Date
Tuesday, August 24, 2021

Weather
Fair
87°F

KY-2053 Thixton Ln (East)

Lat/Long
38.089712°, -85.598788°

0700 - 0900 (Weekday 2h Session) (08-24-2021)

All vehicles

TIME	Northbound KY-2053 Thixton Ln (South)				Southbound Pebble Trace			
	Thru	Right	U-Turn	App Total	Left	Thru	U-Turn	App Total
	3.1	3.2	3.3		3.4	3.5	3.6	
0700 - 0715	0	20	0	20	11	5	0	16
0715 - 0730	1	18	0	19	11	6	0	17
0730 - 0745	4	17	0	21	8	6	0	14
0745 - 0800	2	19	0	21	6	6	0	12
Hourly Total	7	74	0	81	36	23	0	59
0800 - 0815	3	20	0	23	10	8	0	18
0815 - 0830	1	14	0	15	8	10	0	18
0830 - 0845	0	17	0	17	6	2	0	8
0845 - 0900	0	15	0	15	4	2	0	6
Hourly Total	4	66	0	70	28	22	0	50
Grand Total	11	140	0	151	64	45	0	109
Approach %	7.28	92.72	0.00	-	58.72	41.28	0.00	-
Intersection %	2.61	33.18	0.00	35.78	15.17	10.66	0.00	25.83
PHF	0.63	0.93	0.00	0.91	0.80	0.81	0.00	0.85

TIME	Westbound KY-2053 Thixton Ln (East)				
	Left	Right	U-Turn	App Total	Int Total
	3.7	3.8	3.9		
12	2	0	0	14	50
12	5	0	0	17	53
32	2	0	0	34	69
20	4	0	0	24	57
76	13	0	0	89	229
24	4	0	0	28	69
17	3	0	0	20	53
6	3	0	0	9	34
14	2	0	0	16	37
61	12	0	0	73	193
137	25	0	0	162	422
84.57	15.43	0.00	-	-	-
32.46	5.92	0.00	38.39	-	-
0.69	0.75	0.00	0.76	0.90	-

1600 - 1800 (Weekday 2h Session) (08-24-2021)

All vehicles

TIME	Northbound KY-2053 Thixton Ln (South)				Southbound Pebble Trace			
	Thru	Right	U-Turn	App Total	Left	Thru	U-Turn	App Total
	3.1	3.2	3.3		3.4	3.5	3.6	
1600 - 1615	1	25	0	26	6	1	0	7
1615 - 1630	3	23	0	26	4	4	0	8
1630 - 1645	7	44	0	51	5	2	0	7
1645 - 1700	4	38	0	42	5	2	0	7
Hourly Total	15	130	0	145	20	9	0	29
1700 - 1715	4	33	0	37	4	2	0	6
1715 - 1730	7	29	0	36	5	3	0	8
1730 - 1745	8	29	0	37	4	2	0	6
1745 - 1800	9	22	0	31	5	2	0	7
Hourly Total	28	113	0	141	18	9	0	27
Grand Total	43	243	0	286	38	18	0	56
Approach %	15.03	84.97	0.00	-	67.86	32.14	0.00	-
Intersection %	6.97	39.38	0.00	46.35	6.16	2.92	0.00	9.08
PHF	0.79	0.82	0.00	0.81	0.95	0.75	0.00	0.88

TIME	Westbound KY-2053 Thixton Ln (East)				
	Left	Right	U-Turn	App Total	Int Total
	3.7	3.8	3.9		
20	9	0	0	29	62
18	7	0	0	25	59
30	5	0	0	35	93
24	9	0	0	33	82
92	30	0	0	122	296
29	15	0	0	44	87
31	5	0	0	36	80
21	17	0	0	38	81
26	9	0	0	35	73
107	46	0	0	153	321
199	76	0	0	275	617
72.36	27.64	0.00	-	-	-
32.25	12.32	0.00	44.57	-	-
0.92	0.57	0.00	0.84	0.92	-

Oak Grove Subdivision
Traffic Impact Study



Classified Turn Movement Count || All vehicles

Jefferson County, KY

Site 1 of 4

US-150 Bardstown Rd (South)
US-150 Bardstown Rd (North)
KY-2053 Thixton Ln

Date

Tuesday, August 24, 2021

Weather

Fair
87°F

Lat/Long

38.100655°, -85.565656°

0700 - 0900 (Weekday 2h Session) (08-24-2021)

All vehicles

TIME	Northbound				Southbound				Eastbound				Int Total
	US-150 Bardstown Rd (South)				US-150 Bardstown Rd (North)				KY-2053 Thixton Ln				
	Left 1.1	Thru 1.2	U-Turn 1.3	App Total	Thru 1.4	Right 1.5	U-Turn 1.6	App Total	Left 1.7	Right 1.8	U-Turn 1.9	App Total	
0700 - 0715	40	455	0	495	178	8	0	186	28	17	0	45	726
0715 - 0730	76	459	0	535	157	9	0	166	30	9	0	39	740
0730 - 0745	75	335	0	410	196	26	0	222	25	14	0	39	671
0745 - 0800	40	338	0	378	227	13	1	241	14	13	0	27	646
Hourly Total	231	1587	0	1818	758	56	1	815	97	53	0	150	2783
0800 - 0815	20	336	0	356	198	27	0	225	29	10	0	39	620
0815 - 0830	24	351	0	375	194	16	0	210	26	10	0	36	621
0830 - 0845	17	347	0	364	159	8	0	167	34	13	0	47	578
0845 - 0900	20	308	0	328	169	13	0	182	26	13	0	39	549
Hourly Total	81	1342	0	1423	720	64	0	784	115	46	0	161	2368
Grand Total	312	2929	0	3241	1478	120	1	1599	212	99	0	311	5151
Approach %	9.63	90.37	0.00	-	92.43	7.50	0.06	-	68.17	31.83	0.00	-	
Intersection %	6.06	56.86	0.00	62.92	28.69	2.33	0.02	31.04	4.12	1.92	0.00	6.04	
PHF	0.76	0.86	0.00	0.85	0.83	0.54	0.25	0.85	0.81	0.78	0.00	0.83	0.94

1600 - 1800 (Weekday 2h Session) (08-24-2021)

All vehicles

TIME	Northbound				Southbound				Eastbound				Int Total
	US-150 Bardstown Rd (South)				US-150 Bardstown Rd (North)				KY-2053 Thixton Ln				
	Left 1.1	Thru 1.2	U-Turn 1.3	App Total	Thru 1.4	Right 1.5	U-Turn 1.6	App Total	Left 1.7	Right 1.8	U-Turn 1.9	App Total	
1600 - 1615	23	274	0	297	375	37	0	412	23	50	0	73	782
1615 - 1630	18	257	0	275	422	44	0	466	18	44	0	62	803
1630 - 1645	23	258	0	281	426	37	0	463	27	58	0	85	829
1645 - 1700	34	294	0	328	414	40	0	454	35	62	0	97	879
Hourly Total	98	1083	0	1181	1637	158	0	1795	103	214	0	317	3293
1700 - 1715	22	249	0	271	503	32	0	535	22	43	0	65	871
1715 - 1730	23	240	0	263	441	32	0	473	23	58	0	81	817
1730 - 1745	18	252	0	270	483	33	0	516	26	48	0	74	860
1745 - 1800	19	251	0	270	463	40	0	503	28	34	0	62	835
Hourly Total	82	992	0	1074	1890	137	0	2027	99	183	0	282	3383
Grand Total	180	2075	0	2255	3527	295	0	3822	202	397	0	599	6676
Approach %	7.98	92.02	0.00	-	92.28	7.72	0.00	-	33.72	66.28	0.00	-	
Intersection %	2.70	31.08	0.00	33.78	52.83	4.42	0.00	57.25	3.03	5.95	0.00	8.97	
PHF	0.71	0.88	0.00	0.86	0.92	0.86	0.00	0.92	0.76	0.85	0.00	0.82	0.97

HCS Reports

HCS7 Two-Way Stop-Control Report																	
General Information								Site Information									
Analyst	DBZ							Intersection	Cedar Creek at Ind School								
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction									
Date Performed	9/19/2021							East/West Street	Independence School Road								
Analysis Year	2021							North/South Street	Cedar Creek Road								
Time Analyzed	AM Peak							Peak Hour Factor	0.65								
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25								
Project Description	Oak Grove																
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	1	0		0	1	0	0	0	1	0	0	0	1	0	
Configuration			LTR				LTR				LTR				LTR		
Volume (veh/h)		3	0	6		93	1	9		2	21	24		3	30	1	
Percent Heavy Vehicles (%)		0	0	0		1	0	0		0				33			
Proportion Time Blocked																	
Percent Grade (%)		0				0											
Right Turn Channelized																	
Median Type Storage		Undivided															
Critical and Follow-up Headways																	
Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1			
Critical Headway (sec)		7.10	6.50	6.20		7.11	6.50	6.20		4.10				4.43			
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2			
Follow-Up Headway (sec)		3.50	4.00	3.30		3.51	4.00	3.30		2.20				2.50			
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)			14				158			3				5			
Capacity, c (veh/h)			958				861			1573				1356			
v/c Ratio			0.01				0.18			0.00				0.00			
95% Queue Length, Q ₉₅ (veh)			0.0				0.7			0.0				0.0			
Control Delay (s/veh)			8.8				10.1			7.3				7.7			
Level of Service (LOS)			A				B			A				A			
Approach Delay (s/veh)		8.8				10.1				0.3				0.7			
Approach LOS		A				B											

HCS7 Two-Way Stop-Control Report																	
General Information								Site Information									
Analyst	DBZ							Intersection	Cedar Creek at Ind School								
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction									
Date Performed	9/19/2021							East/West Street	Independence School Road								
Analysis Year	2027							North/South Street	Cedar Creek Road								
Time Analyzed	AM Peak No Build							Peak Hour Factor	0.65								
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25								
Project Description	Oak Grove																
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	1	0		0	1	0	0	0	1	0	0	0	1	0	
Configuration			LTR				LTR				LTR				LTR		
Volume (veh/h)		3	0	6		105	1	10		2	24	27		3	34	1	
Percent Heavy Vehicles (%)		0	0	0		1	0	0		0				33			
Proportion Time Blocked																	
Percent Grade (%)		0				0											
Right Turn Channelized																	
Median Type Storage		Undivided															
Critical and Follow-up Headways																	
Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1			
Critical Headway (sec)		7.10	6.50	6.20		7.11	6.50	6.20		4.10				4.43			
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2			
Follow-Up Headway (sec)		3.50	4.00	3.30		3.51	4.00	3.30		2.20				2.50			
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)			14			178				3				5			
Capacity, c (veh/h)			945			845				1564				1345			
v/c Ratio			0.01			0.21				0.00				0.00			
95% Queue Length, Q ₉₅ (veh)			0.0			0.8				0.0				0.0			
Control Delay (s/veh)			8.9			10.4				7.3				7.7			
Level of Service (LOS)			A			B				A				A			
Approach Delay (s/veh)		8.9				10.4				0.3				0.6			
Approach LOS		A				B											

HCS7 Two-Way Stop-Control Report																	
General Information								Site Information									
Analyst	DBZ							Intersection	Cedar Creek at Ind School								
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction									
Date Performed	9/19/2021							East/West Street	Independence School Road								
Analysis Year	2027							North/South Street	Cedar Creek Road								
Time Analyzed	AM Peak Build							Peak Hour Factor	0.65								
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25								
Project Description	Oak Grove																
Lanes																	
<p>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	1	0		0	1	0	0	0	1	0	0	0	1	0	
Configuration			LTR				LTR				LTR				LTR		
Volume (veh/h)		3	0	6		131	1	13		2	24	36		4	34	1	
Percent Heavy Vehicles (%)		0	0	0		1	0	0		0				25			
Proportion Time Blocked																	
Percent Grade (%)		0				0											
Right Turn Channelized																	
Median Type Storage		Undivided															
Critical and Follow-up Headways																	
Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1			
Critical Headway (sec)		7.10	6.50	6.20		7.11	6.50	6.20		4.10				4.35			
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2			
Follow-Up Headway (sec)		3.50	4.00	3.30		3.51	4.00	3.30		2.20				2.43			
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)			14				223			3				6			
Capacity, c (veh/h)			936				833			1564				1370			
v/c Ratio			0.01				0.27			0.00				0.00			
95% Queue Length, Q ₉₅ (veh)			0.0				1.1			0.0				0.0			
Control Delay (s/veh)			8.9				10.9			7.3				7.6			
Level of Service (LOS)			A				B			A				A			
Approach Delay (s/veh)		8.9				10.9				0.3				0.8			
Approach LOS		A				B											

HCS7 Two-Way Stop-Control Report																		
General Information								Site Information										
Analyst	DBZ							Intersection	Cedar Creek at Ind School									
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction										
Date Performed	9/19/2021							East/West Street	Independence School Road									
Analysis Year	2021							North/South Street	Cedar Creek Road									
Time Analyzed	PM Peak							Peak Hour Factor	0.74									
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25									
Project Description	Oak Grove																	
Lanes																		
<p>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	1	0		0	1	0	0	0	1	0	0	0	1	0		
Configuration			LTR				LTR				LTR				LTR			
Volume (veh/h)		2	0	7		31	2	9		10	57	152		13	39	2		
Percent Heavy Vehicles (%)		0	0	0		0	0	11		0				8				
Proportion Time Blocked																		
Percent Grade (%)		0				0												
Right Turn Channelized																		
Median Type Storage		Undivided																
Critical and Follow-up Headways																		
Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1				
Critical Headway (sec)		7.10	6.50	6.20		7.10	6.50	6.31		4.10				4.18				
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2				
Follow-Up Headway (sec)		3.50	4.00	3.30		3.50	4.00	3.40		2.20				2.27				
Delay, Queue Length, and Level of Service																		
Flow Rate, v (veh/h)			12				57			14				18				
Capacity, c (veh/h)			895				670			1562				1246				
v/c Ratio			0.01				0.08			0.01				0.01				
95% Queue Length, Q ₉₅ (veh)			0.0				0.3			0.0				0.0				
Control Delay (s/veh)			9.1				10.9			7.3				7.9				
Level of Service (LOS)			A				B			A				A				
Approach Delay (s/veh)		9.1				10.9					0.4				2.0			
Approach LOS		A				B												

HCS7 Two-Way Stop-Control Report																		
General Information								Site Information										
Analyst	DBZ							Intersection	Cedar Creek at Ind School									
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction										
Date Performed	9/19/2021							East/West Street	Independence School Road									
Analysis Year	2027							North/South Street	Cedar Creek Road									
Time Analyzed	PM Peak No Build							Peak Hour Factor	0.74									
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25									
Project Description	Oak Grove																	
Lanes																		
<p>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	1	0		0	1	0	0	0	1	0	0	0	1	0		
Configuration			LTR				LTR				LTR				LTR			
Volume (veh/h)		2	0	7		35	2	10		10	64	171		15	44	2		
Percent Heavy Vehicles (%)		0	0	0		0	0	11		0				8				
Proportion Time Blocked																		
Percent Grade (%)		0				0												
Right Turn Channelized																		
Median Type Storage		Undivided																
Critical and Follow-up Headways																		
Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1				
Critical Headway (sec)		7.10	6.50	6.20		7.10	6.50	6.31		4.10				4.18				
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2				
Follow-Up Headway (sec)		3.50	4.00	3.30		3.50	4.00	3.40		2.20				2.27				
Delay, Queue Length, and Level of Service																		
Flow Rate, v (veh/h)			12				64			14				20				
Capacity, c (veh/h)			874				637			1554				1209				
v/c Ratio			0.01				0.10			0.01				0.02				
95% Queue Length, Q ₉₅ (veh)			0.0				0.3			0.0				0.1				
Control Delay (s/veh)			9.2				11.3			7.3				8.0				
Level of Service (LOS)			A				B			A				A				
Approach Delay (s/veh)		9.2				11.3					0.4				2.1			
Approach LOS		A				B												

HCS7 Two-Way Stop-Control Report																	
General Information								Site Information									
Analyst	DBZ							Intersection	Cedar Creek at Ind School								
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction									
Date Performed	9/19/2021							East/West Street	Independence School Road								
Analysis Year	2027							North/South Street	Cedar Creek Road								
Time Analyzed	PM Peak Build							Peak Hour Factor	0.74								
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25								
Project Description	Oak Grove																
Lanes																	
<p>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	1	0		0	1	0	0	0	1	0	0	0	1	0	
Configuration			LTR				LTR				LTR				LTR		
Volume (veh/h)		2	0	7		50	2	14		10	64	200		18	44	2	
Percent Heavy Vehicles (%)		0	0	0		0	0	11		0				8			
Proportion Time Blocked																	
Percent Grade (%)		0				0											
Right Turn Channelized																	
Median Type Storage		Undivided															
Critical and Follow-up Headways																	
Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1			
Critical Headway (sec)		7.10	6.50	6.20		7.10	6.50	6.31		4.10				4.18			
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2			
Follow-Up Headway (sec)		3.50	4.00	3.30		3.50	4.00	3.40		2.20				2.27			
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)			12				89			14				24			
Capacity, c (veh/h)			857				611			1554				1169			
v/c Ratio			0.01				0.15			0.01				0.02			
95% Queue Length, Q ₉₅ (veh)			0.0				0.5			0.0				0.1			
Control Delay (s/veh)			9.3				11.9			7.3				8.1			
Level of Service (LOS)			A				B			A				A			
Approach Delay (s/veh)		9.3				11.9				0.3				2.4			
Approach LOS		A				B											

HCS7 Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Thixton at Oak Grove							
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction								
Date Performed	9/19/2021							East/West Street	Thixton							
Analysis Year	2021							North/South Street	Oak Grove/Thixton							
Time Analyzed	AM Peak							Peak Hour Factor	0.94							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Oak Grove															
Lanes																
<p>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)						90		5			24	89		3	12	
Percent Heavy Vehicles (%)						6		0						67		
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)						6.46		6.20						4.77		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.55		3.30						2.80		
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)							101							3		
Capacity, c (veh/h)							901							1147		
v/c Ratio							0.11							0.00		
95% Queue Length, Q ₉₅ (veh)							0.4							0.0		
Control Delay (s/veh)							9.5							8.1		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)						9.5						1.6				
Approach LOS						A										

HCS7 Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Thixton at Oak Grove							
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction								
Date Performed	9/19/2021							East/West Street	Thixton							
Analysis Year	2027							North/South Street	Oak Grove/Thixton							
Time Analyzed	AM Peak No Build							Peak Hour Factor	0.94							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Oak Grove															
Lanes																
<p>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)						101		5			24	100		3	12	
Percent Heavy Vehicles (%)						6		0						67		
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)						6.46		6.20						4.77		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.55		3.30						2.80		
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)							113							3		
Capacity, c (veh/h)							893							1135		
v/c Ratio							0.13							0.00		
95% Queue Length, Q ₉₅ (veh)							0.4							0.0		
Control Delay (s/veh)							9.6							8.2		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)							9.6							1.7		
Approach LOS							A									

HCS7 Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Thixton at Oak Grove							
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction								
Date Performed	9/19/2021							East/West Street	Thixton							
Analysis Year	2027							North/South Street	Oak Grove/Thixton							
Time Analyzed	AM Peak Build							Peak Hour Factor	0.94							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Oak Grove															
Lanes																
<p>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)						106		24			35	116		59	46	
Percent Heavy Vehicles (%)						6		0						67		
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)						6.46		6.20						4.77		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.55		3.30						2.80		
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						138								63		
Capacity, c (veh/h)						706								1104		
v/c Ratio						0.20								0.06		
95% Queue Length, Q ₉₅ (veh)						0.7								0.2		
Control Delay (s/veh)						11.3								8.5		
Level of Service (LOS)						B								A		
Approach Delay (s/veh)						11.3								5.0		
Approach LOS						B								A		

HCS7 Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Thixton at Oak Grove							
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction								
Date Performed	9/19/2021							East/West Street	Thixton							
Analysis Year	2021							North/South Street	Oak Grove/Thixton							
Time Analyzed	PM Peak							Peak Hour Factor	0.92							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Oak Grove															
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)						129		7			9	157		6	19	
Percent Heavy Vehicles (%)						3		0						17		
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)						6.43		6.20						4.27		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.53		3.30						2.35		
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						148								7		
Capacity, c (veh/h)						864								1309		
v/c Ratio						0.17								0.00		
95% Queue Length, Q ₉₅ (veh)						0.6								0.0		
Control Delay (s/veh)						10.0								7.8		
Level of Service (LOS)						B								A		
Approach Delay (s/veh)						10.0								1.9		
Approach LOS						B										

Oak Grove Subdivision
Traffic Impact Study

HCS7 Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Thixton at Oak Grove							
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction								
Date Performed	9/19/2021							East/West Street	Thixton							
Analysis Year	2027							North/South Street	Oak Grove/Thixton							
Time Analyzed	PM Peak No Build							Peak Hour Factor	0.92							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Oak Grove															
Lanes																
<p>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	10U	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)						145		7			9	177		6	19	
Percent Heavy Vehicles (%)						3		0						17		
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)						6.43		6.20						4.27		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.53		3.30						2.35		
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						165								7		
Capacity, c (veh/h)						851								1285		
v/c Ratio						0.19								0.01		
95% Queue Length, Q ₉₅ (veh)						0.7								0.0		
Control Delay (s/veh)						10.2								7.8		
Level of Service (LOS)						B								A		
Approach Delay (s/veh)						10.2								1.9		
Approach LOS						B										

Oak Grove Subdivision
Traffic Impact Study

HCS7 Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Thixton at Oak Grove							
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction								
Date Performed	9/19/2021							East/West Street	Thixton							
Analysis Year	2027							North/South Street	Oak Grove/Thixton							
Time Analyzed	PM Peak Build							Peak Hour Factor	0.92							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Oak Grove															
Lanes																
<p>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)						163		70			47	187		43	42	
Percent Heavy Vehicles (%)						3		0						2		
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)						6.43		6.20						4.12		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.53		3.30						2.22		
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						253								47		
Capacity, c (veh/h)						727								1311		
v/c Ratio						0.35								0.04		
95% Queue Length, Q ₉₅ (veh)						1.6								0.1		
Control Delay (s/veh)						12.6								7.8		
Level of Service (LOS)						B								A		
Approach Delay (s/veh)						12.6								4.1		
Approach LOS						B								A		

Oak Grove Subdivision
Traffic Impact Study

HCS7 Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Oak Grove at Entrance							
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction								
Date Performed	9/19/2021							East/West Street	Oak Grove							
Analysis Year	2027							North/South Street	Oak Grove/Entrance							
Time Analyzed	AM Peak Build							Peak Hour Factor	0.94							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Oak Grove															
Lanes																
<p>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)						30		29			29	90		15	9	
Percent Heavy Vehicles (%)						0		3						7		
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)						6.40		6.23						4.17		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.50		3.33						2.26		
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)								63							16	
Capacity, c (veh/h)								921							1429	
v/c Ratio								0.07							0.01	
95% Queue Length, Q ₉₅ (veh)								0.2							0.0	
Control Delay (s/veh)								9.2							7.5	
Level of Service (LOS)								A							A	
Approach Delay (s/veh)						9.2						4.7				
Approach LOS						A										

HCS7 Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Oak Grove at Entrance							
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction								
Date Performed	9/19/2021							East/West Street	Oak Grove							
Analysis Year	2027							North/South Street	Oak Grove/Entrance							
Time Analyzed	PM Peak Build							Peak Hour Factor	0.92							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Oak Grove															
Lanes																
<p>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)						101		16			19	60		25	32	
Percent Heavy Vehicles (%)						0		0						4		
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)						6.40		6.20						4.14		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.50		3.30						2.24		
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						127								27		
Capacity, c (veh/h)						860								1498		
v/c Ratio						0.15								0.02		
95% Queue Length, Q ₉₅ (veh)						0.5								0.1		
Control Delay (s/veh)						9.9								7.4		
Level of Service (LOS)						A								A		
Approach Delay (s/veh)						9.9								3.3		
Approach LOS						A										

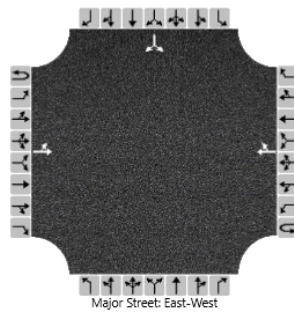
HCS7 Two-Way Stop-Control Report																	
General Information								Site Information									
Analyst	DBZ							Intersection	Thixton at Pebble Trace								
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction									
Date Performed	9/19/2021							East/West Street	Thixton Lane								
Analysis Year	2021							North/South Street	Pebble Trace								
Time Analyzed	AM Peak							Peak Hour Factor	0.90								
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25								
Project Description	Oak Grove																
Lanes																	
<p style="text-align: center;">Major Street: East-West</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	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	0	0		0	1	0	
Configuration		LT						TR							LR		
Volume (veh/h)		10	74				88	15						35		26	
Percent Heavy Vehicles (%)		0												0		4	
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)		4.10												6.40		6.24	
Base Follow-Up Headway (sec)		2.2												3.5		3.3	
Follow-Up Headway (sec)		2.20												3.50		3.34	
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)		11													68		
Capacity, c (veh/h)		1487													839		
v/c Ratio		0.01													0.08		
95% Queue Length, Q ₉₅ (veh)		0.0													0.3		
Control Delay (s/veh)		7.4													9.7		
Level of Service (LOS)		A													A		
Approach Delay (s/veh)		0.9												9.7			
Approach LOS		A												A			

HCS7 Two-Way Stop-Control Report																	
General Information								Site Information									
Analyst	DBZ							Intersection	Thixton at Pebble Trace								
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction									
Date Performed	9/19/2021							East/West Street	Thixton Lane								
Analysis Year	2027							North/South Street	Pebble Trace								
Time Analyzed	AM Peak No Build							Peak Hour Factor	0.90								
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25								
Project Description	Oak Grove																
Lanes																	
<p style="text-align: center;">Major Street: East-West</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	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	0	0		0	1	0	
Configuration		LT						TR							LR		
Volume (veh/h)		10	83				99	15						35		26	
Percent Heavy Vehicles (%)		0												0		4	
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)		4.10												6.40		6.24	
Base Follow-Up Headway (sec)		2.2												3.5		3.3	
Follow-Up Headway (sec)		2.20												3.50		3.34	
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)		11													68		
Capacity, c (veh/h)		1472													819		
v/c Ratio		0.01													0.08		
95% Queue Length, Q ₉₅ (veh)		0.0													0.3		
Control Delay (s/veh)		7.5													9.8		
Level of Service (LOS)		A													A		
Approach Delay (s/veh)		0.9												9.8			
Approach LOS		A												A			

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	DBZ			Intersection	Thixton at Pebble Trace		
Agency/Co.	Diane B Zimmerman Traffic Engineering			Jurisdiction			
Date Performed	9/19/2021			East/West Street	Thixton Lane		
Analysis Year	2027			North/South Street	Pebble Trace		
Time Analyzed	AM Peak Build			Peak Hour Factor	0.90		
Intersection Orientation	East-West			Analysis Time Period (hrs)	0.25		
Project Description	Oak Grove						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		13	94				133	20						51		35
Percent Heavy Vehicles (%)		0												0		4
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)		4.10												6.40		6.24
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.20												3.50		3.34

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		14														96	
Capacity, c (veh/h)		1420														761	
v/c Ratio		0.01														0.13	
95% Queue Length, Q ₉₅ (veh)		0.0														0.4	
Control Delay (s/veh)		7.6														10.4	
Level of Service (LOS)		A														B	
Approach Delay (s/veh)		1.0												10.4			
Approach LOS														B			

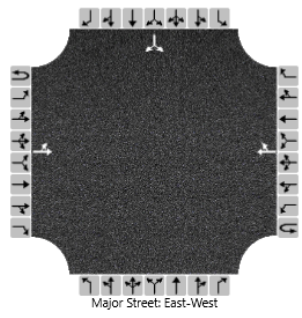
HCS7 Two-Way Stop-Control Report																	
General Information								Site Information									
Analyst	DBZ							Intersection	Thixton at Pebble Trace								
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction									
Date Performed	9/19/2021							East/West Street	Thixton Lane								
Analysis Year	2021							North/South Street	Pebble Trace								
Time Analyzed	PM Peak							Peak Hour Factor	0.92								
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25								
Project Description	Oak Grove																
Lanes																	
<p style="text-align: center;">Major Street: East-West</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	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	0	0		0	1	0	
Configuration	LT								TR				LR				
Volume (veh/h)		22	144				114	34						19		9	
Percent Heavy Vehicles (%)		5												5		11	
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)		4.15												6.45		6.31	
Base Follow-Up Headway (sec)		2.2												3.5		3.3	
Follow-Up Headway (sec)		2.25												3.55		3.40	
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)		24													30		
Capacity, c (veh/h)		1400													695		
v/c Ratio		0.02													0.04		
95% Queue Length, Q ₉₅ (veh)		0.1													0.1		
Control Delay (s/veh)		7.6													10.4		
Level of Service (LOS)		A													B		
Approach Delay (s/veh)		1.1												10.4			
Approach LOS														B			

HCS7 Two-Way Stop-Control Report																	
General Information								Site Information									
Analyst	DBZ							Intersection	Thixton at Pebble Trace								
Agency/Co.	Diane B Zimmerman Traffic Engineering							Jurisdiction									
Date Performed	9/19/2021							East/West Street	Thixton Lane								
Analysis Year	2027							North/South Street	Pebble Trace								
Time Analyzed	PM Peak No Build							Peak Hour Factor	0.92								
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25								
Project Description	Oak Grove																
Lanes																	
<p style="text-align: center;">Major Street East-West</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	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	0	0		0	1	0	
Configuration	LT								TR				LR				
Volume (veh/h)		22	162				128	34						19		9	
Percent Heavy Vehicles (%)		5												5		11	
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)		4.15												6.45		6.31	
Base Follow-Up Headway (sec)		2.2												3.5		3.3	
Follow-Up Headway (sec)		2.25												3.55		3.40	
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)		24														30	
Capacity, c (veh/h)		1382														668	
v/c Ratio		0.02														0.05	
95% Queue Length, Q ₉₅ (veh)		0.1														0.1	
Control Delay (s/veh)		7.7														10.6	
Level of Service (LOS)		A														B	
Approach Delay (s/veh)		1.0												10.6			
Approach LOS														B			

HCS7 Two-Way Stop-Control Report

General Information				Site Information			
Analyst	DBZ			Intersection	Thixton at Pebble Trace		
Agency/Co.	Diane B Zimmerman Traffic Engineering			Jurisdiction			
Date Performed	9/19/2021			East/West Street	Thixton Lane		
Analysis Year	2027			North/South Street	Pebble Trace		
Time Analyzed	PM Peak Build			Peak Hour Factor	0.92		
Intersection Orientation	East-West			Analysis Time Period (hrs)	0.25		
Project Description	Oak Grove						

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Movement	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Priority																
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		33	200				151	52						29		15
Percent Heavy Vehicles (%)		5												5		11
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)		4.15												6.45		6.31
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.25												3.55		3.40

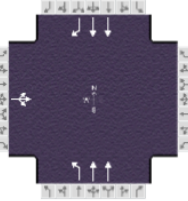
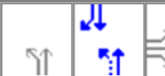

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		36														48	
Capacity, c (veh/h)		1331														597	
v/c Ratio		0.03														0.08	
95% Queue Length, Q ₉₅ (veh)		0.1														0.3	
Control Delay (s/veh)		7.8														11.6	
Level of Service (LOS)		A														B	
Approach Delay (s/veh)		1.3												11.6			
Approach LOS														B			

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information																							
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250																						
Analyst	DBZ	Analysis Date	9/19/2021	Area Type	Other																						
Jurisdiction		Time Period	AM Peak	PHF	0.94																						
Urban Street	Bardstown Road			Analysis Year	2021																						
Intersection	Thixton			File Name	Thixton AM 21.xus																						
Project Description	Oak Grove																										
Demand Information				EB			WB			NB			SB														
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R															
Demand (v), veh/h	97	0	53				231	1587			758	56															
Signal Information																											
Cycle, s	120.0	Reference Phase	2																								
Offset, s	0	Reference Point	End																								
Uncoordinated	No	Simult. Gap E/W	On	Green	8.8	67.6	23.4	0.0	0.0	0.0																	
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	5.0	3.6	0.0	0.0	0.0																	
				Red	3.0	2.0	3.0	0.0	0.0	0.0																	
Timer Results				EBL			EBT			WBL			WBT			NBL			NBT			SBL			SBT		
Assigned Phase							4						5			2						6					
Case Number							12.0						1.0			4.0						7.3					
Phase Duration, s							30.0						15.4			90.0						74.6					
Change Period, (Y+R _c), s							6.6						6.6			7.0						7.0					
Max Allow Headway (MAH), s							3.2						3.0			0.0						0.0					
Queue Clearance Time (g _s), s							25.4						8.7														
Green Extension Time (g _e), s							0.0						0.2			0.0						0.0					
Phase Call Probability							1.00						1.00														
Max Out Probability							1.00						0.18														
Movement Group Results				EB			WB			NB			SB														
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R												
Assigned Movement	7	4	14				5	2					6	16													
Adjusted Flow Rate (v), veh/h	160						246	1688					806	60													
Adjusted Saturation Flow Rate (s), veh/h/ln	1707						1781	1766					1724	1547													
Queue Service Time (g _s), s	10.0						6.7	33.9					16.0	2.1													
Cycle Queue Clearance Time (g _c), s	10.0						6.7	33.9					16.0	2.1													
Green Ratio (g/C)	0.20						0.65	0.69					0.56	0.56													
Capacity (c), veh/h	333						481	2444					1941	871													
Volume-to-Capacity Ratio (X)	0.479						0.510	0.691					0.415	0.068													
Back of Queue (Q), ft/ln (95 th percentile)	192.6						102.7	422.7					257	32.9													
Back of Queue (Q), veh/ln (95 th percentile)	7.6						4.0	16.5					9.8	1.3													
Queue Storage Ratio (RQ) (95 th percentile)	0.00						0.34	0.00					0.00	0.00													
Uniform Delay (d ₁), s/veh	42.9						10.5	10.9					15.0	11.9													
Incremental Delay (d ₂), s/veh	0.4						0.3	1.6					0.7	0.2													
Initial Queue Delay (d ₃), s/veh	0.0						0.0	0.0					0.0	0.0													
Control Delay (d), s/veh	43.3						10.8	12.6					15.6	12.1													
Level of Service (LOS)	D						B	B					B	B													
Approach Delay, s/veh / LOS	43.3			D			0.0			12.3	B		15.4	B													
Intersection Delay, s/veh / LOS				14.9						B																	
Multimodal Results				EB			WB			NB			SB														
Pedestrian LOS Score / LOS	2.33			B			2.32	B		1.35	A		1.67	B													
Bicycle LOS Score / LOS	0.75			A						2.08	B		1.20	A													

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information																							
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250																						
Analyst	DBZ	Analysis Date	9/19/2021	Area Type	Other																						
Jurisdiction		Time Period	AM Peak	PHF	0.94																						
Urban Street	Bardstown Road	Analysis Year	2027 No Build	Analysis Period	1> 7:00																						
Intersection	Thixton	File Name	Thixton AM 27 NB.xus																								
Project Description	Oak Grove																										
Demand Information				EB			WB			NB			SB														
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R															
Demand (v), veh/h	109	0	60				260	1685				805	63														
Signal Information																											
Cycle, s	120.0	Reference Phase	2																								
Offset, s	0	Reference Point	End	Green	9.8	66.6	23.4	0.0	0.0	0.0	0.0	0.0	0.0														
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	5.0	3.6	0.0	0.0	0.0	0.0	0.0	0.0														
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	2.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0														
Timer Results				EBL			EBT			WBL			WBT			NBL			NBT			SBL			SBT		
Assigned Phase				4						5			2						6								
Case Number				12.0						1.0			4.0						7.3								
Phase Duration, s				30.0						16.4			90.0						73.6								
Change Period, (Y+R _c), s				6.6						6.6			7.0						7.0								
Max Allow Headway (MAH), s				3.2						3.0			0.0						0.0								
Queue Clearance Time (g _s), s				25.4						9.6																	
Green Extension Time (g _e), s				0.0						0.2			0.0						0.0								
Phase Call Probability				1.00						1.00																	
Max Out Probability				1.00						0.49																	
Movement Group Results				EB			WB			NB			SB														
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R															
Assigned Movement	7	4	14				5	2			6	16															
Adjusted Flow Rate (v), veh/h	180						277			1793			856			67											
Adjusted Saturation Flow Rate (s), veh/h/ln	1706						1781			1766			1724			1547											
Queue Service Time (g _s), s	11.4						7.6			38.1			17.7			2.4											
Cycle Queue Clearance Time (g _c), s	11.4						7.6			38.1			17.7			2.4											
Green Ratio (g/C)	0.20						0.65			0.69			0.55			0.55											
Capacity (c), veh/h	333						469			2444			1913			858											
Volume-to-Capacity Ratio (X)	0.540						0.590			0.734			0.448			0.078											
Back of Queue (Q), ft/ln (95 th percentile)	215.3						120.4			468.5			279.6			38.3											
Back of Queue (Q), veh/ln (95 th percentile)	8.5						4.7			18.3			10.7			1.5											
Queue Storage Ratio (RQ) (95 th percentile)	0.00						0.40			0.00			0.00			0.00											
Uniform Delay (d ₁), s/veh	43.5						11.4			11.6			15.8			12.4											
Incremental Delay (d ₂), s/veh	1.0						0.7			2.0			0.8			0.2											
Initial Queue Delay (d ₃), s/veh	0.0						0.0			0.0			0.0			0.0											
Control Delay (d), s/veh	44.4						12.1			13.6			16.6			12.6											
Level of Service (LOS)	D						B			B			B			B											
Approach Delay, s/veh / LOS	44.4	D		0.0			13.4	B		16.3	B																
Intersection Delay, s/veh / LOS	16.0						B																				
Multimodal Results				EB			WB			NB			SB														
Pedestrian LOS Score / LOS	2.33	B		2.32	B		1.35	A		1.67	B																
Bicycle LOS Score / LOS	0.78	A					2.19	B		1.25	A																

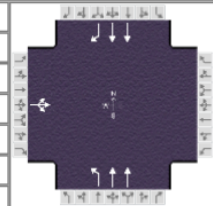
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information						Signal Information																	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250																						
Analyst	DBZ	Analysis Date	9/19/2021	Area Type	Other																						
Jurisdiction		Time Period	AM Peak	PHF	0.94																						
Urban Street	Bardstown Road	Analysis Year	2027 Build	Analysis Period	1> 7:00																						
Intersection	Thixton	File Name	Thixton AM 27 B.xus																								
Project Description	Oak Grove																										
Demand Information				EB			WB			NB			SB														
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R															
Demand (v), veh/h	156	0	85				279	1685			805	68															
Signal Information																											
Cycle, s	120.0	Reference Phase	2																								
Offset, s	0	Reference Point	End	Green	9.9	70.0	19.9	0.0	0.0	0.0																	
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	5.0	3.6	0.0	0.0	0.0																	
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	2.0	3.0	0.0	0.0	0.0																	
Timer Results				EBL			EBT			WBL			WBT			NBL			NBT			SBL			SBT		
Assigned Phase				4						5			2						6								
Case Number				12.0						1.0			4.0						7.3								
Phase Duration, s				26.5						16.5			93.5						77.0								
Change Period, (Y+R _c), s				6.6						6.6			7.0						7.0								
Max Allow Headway (MAH), s				3.2						3.0			0.0						0.0								
Queue Clearance Time (g _s), s				19.7						9.6																	
Green Extension Time (g _e), s				0.2						0.3			0.0						0.0								
Phase Call Probability				1.00						1.00																	
Max Out Probability				0.66						0.02																	
Movement Group Results				EB			WB			NB			SB														
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R															
Assigned Movement	7	4	14				5	2			6	16															
Adjusted Flow Rate (v), veh/h	256						297 1793			856 72																	
Adjusted Saturation Flow Rate (s), veh/h/ln	1707						1781 1766			1724 1547																	
Queue Service Time (g _s), s	17.7						7.6 34.5			16.5 2.5																	
Cycle Queue Clearance Time (g _c), s	17.7						7.6 34.5			16.5 2.5																	
Green Ratio (g/C)	0.17						0.68 0.72			0.58 0.58																	
Capacity (c), veh/h	283						495 2547			2011 902																	
Volume-to-Capacity Ratio (X)	0.907						0.600 0.704			0.426 0.080																	
Back of Queue (Q), ft/ln (95 th percentile)	362.2						112.8 408.7			260.4 38																	
Back of Queue (Q), veh/ln (95 th percentile)	14.3						4.4 16.0			9.9 1.5																	
Queue Storage Ratio (RQ) (95 th percentile)	0.00						0.38 0.00			0.00 0.00																	
Uniform Delay (d ₁), s/veh	49.1						9.9 9.5			13.9 10.9																	
Incremental Delay (d ₂), s/veh	23.0						0.4 1.7			0.7 0.2																	
Initial Queue Delay (d ₃), s/veh	0.0						0.0 0.0			0.0 0.0																	
Control Delay (d), s/veh	72.2						10.3 11.1			14.5 11.1																	
Level of Service (LOS)	E						B B			B B																	
Approach Delay, s/veh / LOS	72.2	E	0.0				11.0	B	14.3	B																	
Intersection Delay, s/veh / LOS	16.7						B																				
Multimodal Results				EB			WB			NB			SB														
Pedestrian LOS Score / LOS	2.33	B	2.32	B	1.34	A	1.67	B																			
Bicycle LOS Score / LOS	0.91	A			2.21	B	1.25	A																			

Oak Grove Subdivision
Traffic Impact Study

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250		
Analyst	DBZ	Analysis Date	9/19/2021	Area Type	Other		
Jurisdiction		Time Period	PM Peak	PHF	0.98		
Urban Street	Bardstown Road	Analysis Year	2021	Analysis Period	1> 4:45		
Intersection	Thixton	File Name	Thixton PM 21.xus				
Project Description	Oak Grove						



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h	106	0	211				97	1035			1841	137

Signal Information				Signal Timing (s)										
Cycle, s	140.0	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	No	Simult. Gap E/W	On	Green	5.9	80.5	33.4	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.6	5.0	3.6	0.0	0.0	0.0				
				Red	3.0	2.0	3.0	0.0	0.0	0.0				

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4			5	2		6
Case Number		12.0			1.0	4.0		7.3
Phase Duration, s		40.0			12.5	100.0		87.5
Change Period, (Y+R _c), s		6.6			6.6	7.0		7.0
Max Allow Headway (MAH), s		3.3			3.0	0.0		0.0
Queue Clearance Time (g _s), s		35.4			5.0			
Green Extension Time (g _e), s		0.0			0.1	0.0		0.0
Phase Call Probability		1.00			0.98			
Max Out Probability		1.00			0.00			

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	7	4	14				5	2		6	16	
Adjusted Flow Rate (v), veh/h		323					99	1056		1879	140	
Adjusted Saturation Flow Rate (s), veh/h/ln		1620					1795	1781		1795	1572	
Queue Service Time (g _s), s		26.6					3.0	19.8		65.3	5.8	
Cycle Queue Clearance Time (g _c), s		26.6					3.0	19.8		65.3	5.8	
Green Ratio (g/C)		0.24					0.63	0.66		0.58	0.58	
Capacity (c), veh/h		386					153	2366		2065	904	
Volume-to-Capacity Ratio (X)		0.837					0.646	0.446		0.910	0.155	
Back of Queue (Q), ft/ln (95 th percentile)		463.5					89.3	293.1		901.9	94	
Back of Queue (Q), veh/ln (95 th percentile)		18.0					3.5	11.5		35.8	3.7	
Queue Storage Ratio (RQ) (95 th percentile)		0.00					0.30	0.00		0.00	0.00	
Uniform Delay (d ₁), s/veh		50.7					32.3	11.2		26.5	13.9	
Incremental Delay (d ₂), s/veh		14.1					1.7	0.6		7.4	0.4	
Initial Queue Delay (d ₃), s/veh		0.0					0.0	0.0		0.0	0.0	
Control Delay (d), s/veh		64.8					34.0	11.8		33.9	14.2	
Level of Service (LOS)		E					C	B		C	B	
Approach Delay, s/veh / LOS	64.8	E		0.0			13.7	B		32.6	C	
Intersection Delay, s/veh / LOS	29.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.33	B	2.33	B	1.36	A	1.67	B
Bicycle LOS Score / LOS	1.02	A			1.44	A	2.15	B

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information						Diagram																	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250																						
Analyst	DBZ	Analysis Date	9/19/2021	Area Type	Other																						
Jurisdiction		Time Period	PM Peak	PHF	0.98																						
Urban Street	Bardstown Road	Analysis Year	2027 No Build	Analysis Period	1> 4:45																						
Intersection	Thixton	File Name	Thixton PM 27 NB.xus																								
Project Description	Oak Grove																										
Demand Information				EB			WB			NB			SB														
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R															
Demand (v), veh/h	119	0	238				109	1099			1954	154															
Signal Information																											
Cycle, s	170.0	Reference Phase	2	Green	6.2	103.2	40.4	0.0	0.0	0.0																	
Offset, s	0	Reference Point	End	Yellow	3.6	5.0	3.6	0.0	0.0	0.0																	
Uncoordinated	No	Simult. Gap E/W	On	Red	3.0	2.0	3.0	0.0	0.0	0.0																	
Force Mode	Fixed	Simult. Gap N/S	On																								
Timer Results				EBL			EBT			WBL			WBT			NBL			NBT			SBL			SBT		
Assigned Phase				4						5			2						6								
Case Number				12.0						1.0			4.0						7.3								
Phase Duration, s				47.0						12.8			123.0						110.2								
Change Period, (Y+R _c), s				6.6						6.6			7.0						7.0								
Max Allow Headway (MAH), s				3.3						3.0			0.0						0.0								
Queue Clearance Time (g _s), s				39.6						6.0																	
Green Extension Time (g _e), s				0.8						0.2			0.0						0.0								
Phase Call Probability				1.00						0.99																	
Max Out Probability				0.00						0.00																	
Movement Group Results				EB			WB			NB			SB														
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R															
Assigned Movement	7	4	14				5	2			6	16															
Adjusted Flow Rate (v), veh/h	364						111 1121			1994 157																	
Adjusted Saturation Flow Rate (s), veh/h/ln	1619						1795 1781			1795 1572																	
Queue Service Time (g _s), s	37.6						4.0 24.8			83.5 7.4																	
Cycle Queue Clearance Time (g _c), s	37.6						4.0 24.8			83.5 7.4																	
Green Ratio (g/C)	0.24						0.66 0.68			0.61 0.61																	
Capacity (c), veh/h	385						133 2430			2178 954																	
Volume-to-Capacity Ratio (X)	0.946						0.836 0.462			0.915 0.165																	
Back of Queue (Q), ft/ln (95 th percentile)	582.9						136.9 367.1			1139 123.6																	
Back of Queue (Q), veh/ln (95 th percentile)	22.6						5.4 14.5			45.2 4.8																	
Queue Storage Ratio (RQ) (95 th percentile)	0.00						0.46 0.00			0.00 0.00																	
Uniform Delay (d ₁), s/veh	63.7						41.9 12.5			29.6 14.6																	
Incremental Delay (d ₂), s/veh	5.4						5.2 0.6			7.5 0.4																	
Initial Queue Delay (d ₃), s/veh	0.0						0.0 0.0			0.0 0.0																	
Control Delay (d), s/veh	69.1						47.1 13.2			37.0 15.0																	
Level of Service (LOS)	E						D B			D B																	
Approach Delay, s/veh / LOS	69.1	E	0.0				16.2	B	35.4	D																	
Intersection Delay, s/veh / LOS	32.4						C																				
Multimodal Results				EB			WB			NB			SB														
Pedestrian LOS Score / LOS	2.34	B	2.34	B	1.37	A	1.68	B																			
Bicycle LOS Score / LOS	1.09	A			1.50	B	2.26	B																			

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information				Diagram							
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250										
Analyst	DBZ	Analysis Date	9/19/2021	Area Type	Other										
Jurisdiction		Time Period	PM Peak	PHF	0.98										
Urban Street	Bardstown Road	Analysis Year	2027 Build	Analysis Period	1> 4:45										
Intersection	Thixton	File Name	Thixton PM 27 B.xus												
Project Description	Oak Grove														
Demand Information				EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R			
Demand (v), veh/h	135	0	269				143	1099				1954	201		
Signal Information															
Cycle, s	170.0	Reference Phase	2	Green	11.8	92.5	45.5	0.0	0.0	0.0					
Offset, s	0	Reference Point	End	Yellow	3.6	5.0	3.6	0.0	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Red	3.0	2.0	3.0	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On												
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase					4			5	2		6				
Case Number					12.0			1.0	4.0		7.3				
Phase Duration, s					52.1			18.4	117.9		99.5				
Change Period, (Y+R _c), s					6.6			6.6	7.0		7.0				
Max Allow Headway (MAH), s					3.3			3.0	0.0		0.0				
Queue Clearance Time (g _s), s					44.5			11.6							
Green Extension Time (g _e), s					0.9			0.2	0.0		0.0				
Phase Call Probability					1.00			1.00							
Max Out Probability					0.00			0.00							
Movement Group Results				EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R			
Assigned Movement	7	4	14				5	2			6	16			
Adjusted Flow Rate (v), veh/h	412						146	1121	1994			205			
Adjusted Saturation Flow Rate (s), veh/h/ln	1620						1795	1781	1795			1572			
Queue Service Time (g _s), s	42.5						9.6	27.1	92.5			11.6			
Cycle Queue Clearance Time (g _c), s	42.5						9.6	27.1	92.5			11.6			
Green Ratio (g/C)	0.27						0.63	0.65	0.54			0.54			
Capacity (c), veh/h	433						167	2324	1953			856			
Volume-to-Capacity Ratio (X)	0.952						0.872	0.483	1.021			0.240			
Back of Queue (Q), ft/ln (95 th percentile)	645.9						267.5	404.1	1438.6			198.7			
Back of Queue (Q), veh/ln (95 th percentile)	25.0						10.6	15.9	57.1			7.8			
Queue Storage Ratio (RQ) (95 th percentile)	0.00						0.89	0.00	0.00			0.00			
Uniform Delay (d ₁), s/veh	61.2						58.2	15.0	38.8			20.3			
Incremental Delay (d ₂), s/veh	5.4						5.4	0.7	25.8			0.7			
Initial Queue Delay (d ₃), s/veh	0.0						0.0	0.0	0.0			0.0			
Control Delay (d), s/veh	66.6						63.5	15.7	64.6			21.0			
Level of Service (LOS)	E						E	B	F			C			
Approach Delay, s/veh / LOS	66.6	E	0.0				21.2	C	60.5	E					
Intersection Delay, s/veh / LOS	48.3						D								
Multimodal Results				EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.34	B	2.34	B	1.37	A	1.69	B							
Bicycle LOS Score / LOS	1.17	A			1.53	B	2.30	B							

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information						Diagram					
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250										
Analyst	DBZ	Analysis Date	9/19/2021	Area Type	Other										
Jurisdiction		Time Period	AM Peak	PHF	0.94										
Urban Street	Bardstown Road	Analysis Year	2027 Build	Analysis Period	1> 7:00										
Intersection	Thixton	File Name	Thixton AM 27 B Right.xus												
Project Description	Oak Grove Right turn Thixton														
Demand Information				EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R			
Demand (v), veh/h	156		85				279	1685			805	68			
Signal Information															
Cycle, s	120.0	Reference Phase	2	Green	8.7	77.9	13.2	0.0	0.0	0.0	0.0	0.0			
Offset, s	0	Reference Point	End	Yellow	3.6	5.0	3.6	0.0	0.0	0.0	0.0	0.0			
Uncoordinated	No	Simult. Gap E/W	On	Red	3.0	2.0	3.0	0.0	0.0	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On												
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase					4			5	2		6				
Case Number					9.0			1.0	4.0		7.3				
Phase Duration, s					19.8			15.3	100.2		84.9				
Change Period, (Y+R _c), s					6.6			6.6	7.0		7.0				
Max Allow Headway (MAH), s					3.2			3.0	0.0		0.0				
Queue Clearance Time (g _s), s					12.8			8.3							
Green Extension Time (g _e), s					0.4			0.4	0.0		0.0				
Phase Call Probability					1.00			1.00							
Max Out Probability					0.00			0.00							
Movement Group Results				EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R			
Assigned Movement	7		14				5	2		6		16			
Adjusted Flow Rate (v), veh/h	166		90				297	1793		856		72			
Adjusted Saturation Flow Rate (s), veh/h/ln	1810		1610				1781	1766		1724		1547			
Queue Service Time (g _s), s	10.8		5.8				6.3	27.6		13.9		2.1			
Cycle Queue Clearance Time (g _c), s	10.8		5.8				6.3	27.6		13.9		2.1			
Green Ratio (g/C)	0.11		0.18				0.74	0.78		0.65		0.65			
Capacity (c), veh/h	198		293				533	2745		2239		1005			
Volume-to-Capacity Ratio (X)	0.837		0.308				0.557	0.653		0.382		0.072			
Back of Queue (Q), ft/ln (95 th percentile)	218.4		104.8				81.8	294.1		214.5		29.8			
Back of Queue (Q), veh/ln (95 th percentile)	8.7		4.2				3.2	11.5		8.2		1.1			
Queue Storage Ratio (RQ) (95 th percentile)	0.00		0.00				0.27	0.00		0.00		0.00			
Uniform Delay (d ₁), s/veh	52.4		42.5				6.9	6.1		9.8		7.7			
Incremental Delay (d ₂), s/veh	3.6		0.2				0.3	1.2		0.5		0.1			
Initial Queue Delay (d ₃), s/veh	0.0		0.0				0.0	0.0		0.0		0.0			
Control Delay (d), s/veh	55.9		42.7				7.2	7.3		10.3		7.9			
Level of Service (LOS)	E		D				A	A		B		A			
Approach Delay, s/veh / LOS	51.3		D		0.0		7.3	A		10.1		B			
Intersection Delay, s/veh / LOS	11.5						B								
Multimodal Results				EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.33		B	2.32		B	0.64		A	1.88		B			
Bicycle LOS Score / LOS			F				2.21		B	1.25		A			

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information				Diagram							
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250										
Analyst	DBZ	Analysis Date	9/19/2021	Area Type	Other										
Jurisdiction		Time Period	PM Peak	PHF	0.98										
Urban Street	Bardstown Road	Analysis Year	2027 Build	Analysis Period	1> 4:45										
Intersection	Thixton	File Name	Thixton PM 27 B Right.xus												
Project Description	Oak Grove Right														
Demand Information				EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R			
Demand (v), veh/h	135		269				143	1099			1954	201			
Signal Information															
Cycle, s	170.0	Reference Phase	2	Green	6.9	112.7	30.2	0.0	0.0	0.0					
Offset, s	0	Reference Point	End	Yellow	3.6	5.0	3.6	0.0	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Red	3.0	2.0	3.0	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On												
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase					4			5	2		6				
Case Number					9.0			1.0	4.0		7.3				
Phase Duration, s					36.8			13.5	133.2		119.7				
Change Period, (Y+R _c), s					6.6			6.6	7.0		7.0				
Max Allow Headway (MAH), s					3.3			3.0	0.0		0.0				
Queue Clearance Time (g _s), s					29.3			6.7							
Green Extension Time (g _e), s					0.9			0.2	0.0		0.0				
Phase Call Probability					1.00			1.00							
Max Out Probability					0.00			0.00							
Movement Group Results				EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R			
Assigned Movement	7		14				5	2			6	16			
Adjusted Flow Rate (v), veh/h	138			274			146 1121			1994 205					
Adjusted Saturation Flow Rate (s), veh/h/ln	1810			1610			1795 1781			1795 1572					
Queue Service Time (g _s), s	11.5			27.3			4.7 20.1			71.6 8.6					
Cycle Queue Clearance Time (g _c), s	11.5			27.3			4.7 20.1			71.6 8.6					
Green Ratio (g/C)	0.18			0.22			0.72 0.74			0.66 0.66					
Capacity (c), veh/h	321			352			168 2644			2379 1042					
Volume-to-Capacity Ratio (X)	0.429			0.781			0.867 0.424			0.838 0.197					
Back of Queue (Q), ft/ln (95 th percentile)	228.9			421.1			195.4 289.2			938.3 137.7					
Back of Queue (Q), veh/ln (95 th percentile)	9.2			16.8			7.8 11.4			37.2 5.4					
Queue Storage Ratio (RQ) (95 th percentile)	0.00			0.00			0.65 0.00			0.00 0.00					
Uniform Delay (d ₁), s/veh	62.3			62.6			40.2 8.2			21.7 11.1					
Incremental Delay (d ₂), s/veh	0.3			1.4			5.2 0.5			3.7 0.4					
Initial Queue Delay (d ₃), s/veh	0.0			0.0			0.0 0.0			0.0 0.0					
Control Delay (d), s/veh	62.6			64.0			45.3 8.7			25.5 11.5					
Level of Service (LOS)	E			E			D A			C B					
Approach Delay, s/veh / LOS	63.6			E 0.0			12.9 B			24.2 C					
Intersection Delay, s/veh / LOS				24.7						C					
Multimodal Results				EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.34			B			2.34 B			0.67 A			1.89 B		
Bicycle LOS Score / LOS				F						1.53 B			2.30 B		

Entrance PM Peak Hour Southbound Approach

Left Turn Lane Warrants

Input Fields

Left Turn Volume (vph)	25	Speed Limit (mph)	35
Advancing Volume (vph)	57	No. of through lanes	1
Opposing Volume (vph)	79	Percent Heavy Vehicles (decimal percent)	0.01



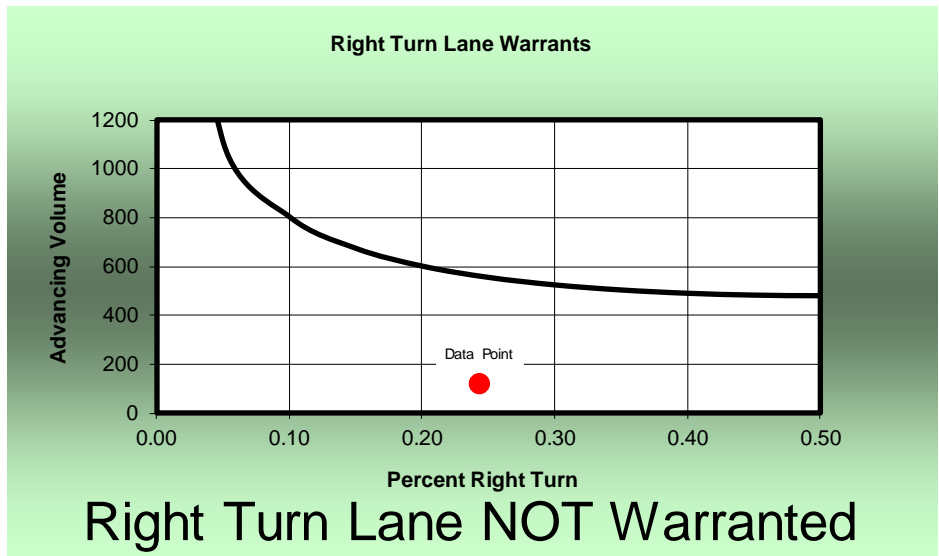
Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

Entrance AM Peak Hour Northbound Approach

Right Turn Lane Warrants

Input Fields

Right Turn Volume (vph)	29	Speed Limit (mph)	35
Advancing Volume (vph)	119		



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.