final report

October 18, 2021

Traffic Impact Study

Flat Rock Road at Shelbyville Road
Louisville, KY

Prepared for

Louisville Metro Planning Commission
Kentucky Transportation Cabinet

DIANE B. ZIMMERMAN
Traffic Engineering, LLC

12803 High Meadows Pike
Prospect, KY 40059
502.648.1858
dianebzim@att.net

Table of Contents

INTRODUCTION

The development plan for the northwest corner of Flat Rock Road and Shelbyville Road in Louisville, KY shows a grocery store with three outlots. **Figure 1** displays a map of the site. Access to the development will be from two entrances on Shelbyville Road and one on Flat Rock Road. 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 Shelbyville Road with Flat Rock Road, Chestnut Glen Drive, and Johnson Road, Flat Rock Road at Cotswold Green Lane/Kilcott Way and the proposed entrances.

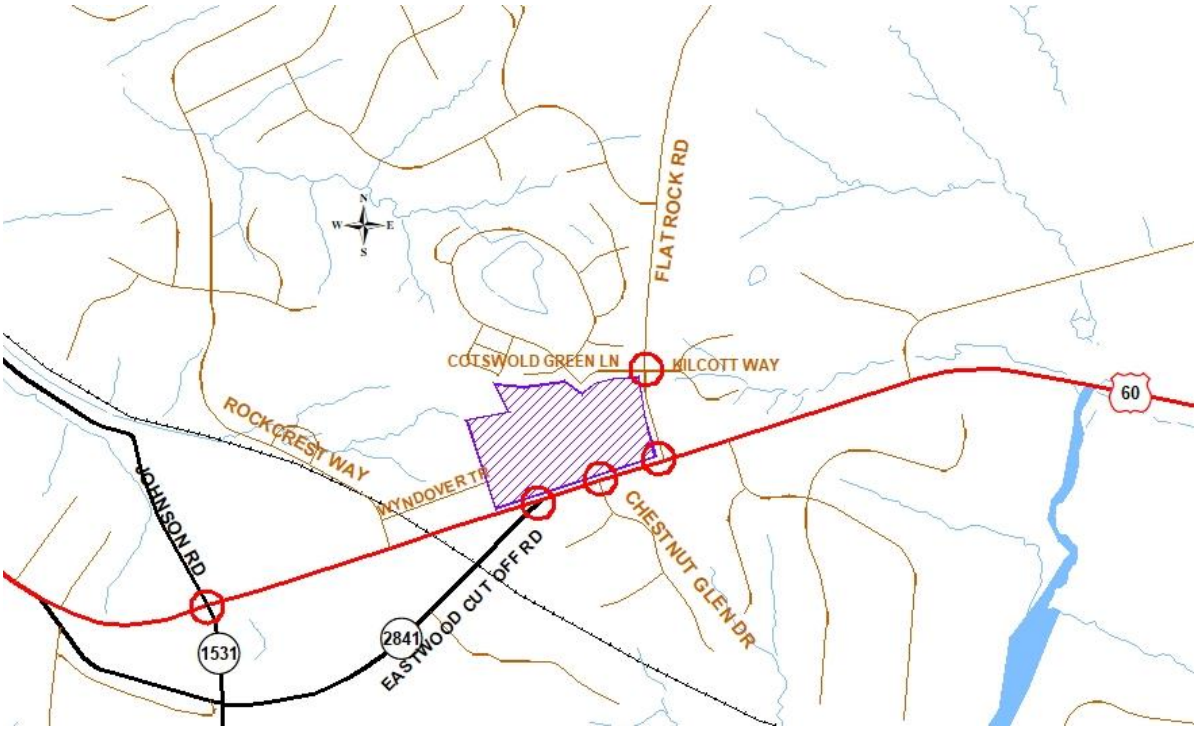


Figure 1. Site Map

EXISTING CONDITIONS

Shelbyville Road (US 60) is maintained by the Kentucky Transportation Cabinet (KYTC) with an estimated 2021 ADT of 16,300 vehicles per day west of Flat Rock Road, as estimated from the turning movement count using a K factor of 11.2. The road has two lanes with elven-foot lanes and one-foot shoulders. The posted speed limit is 45 mph. There are no sidewalks. The intersection with Flat Rock Road is controlled with a traffic signal. There are dedicated left turn lanes at the intersection.

Peak hour traffic counts for the intersections were obtained on Tuesday, April 13, 2021 (see Appendix A). The a.m. peak hour occurred between 7:15 and 8:15 and the p.m. peak hour occurred between 4:30 and 5:30 p.m. **Figure 2** illustrates the existing a.m. and p.m. peak hour traffic volumes.

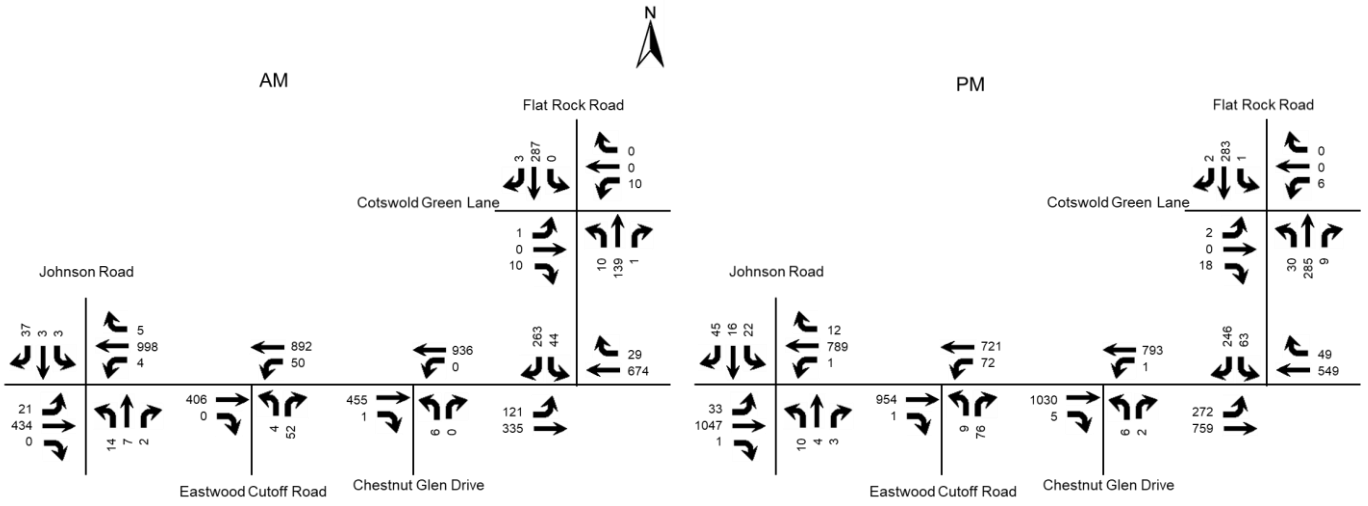


Figure 2. Existing Peak Hour Volumes

FUTURE CONDITIONS

The requested analysis year for this project is 2023. To predict traffic volumes in 2023, two percent annual growth in traffic was added to the 2021 volumes on Shelbyville Road. This growth rate is the determined using the "Aiken Road and Johnson Road Vicinity" study dated June 30, 2021. Additionally, the turning movements to and from Johnson Road were taken from the same study. The trip generation for 204 homes at1312 Flat Rock Road are included at the intersection of Flat Rock Road. **Figure 3** displays the 2023 No Build volumes.

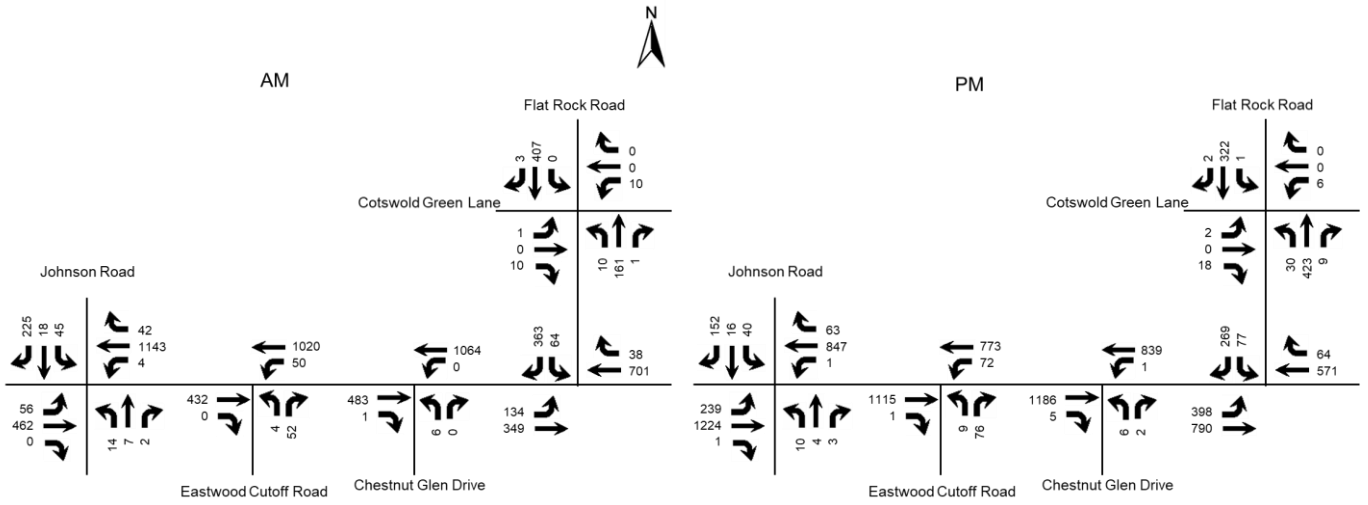


Figure 3. 2023 No Build Peak Hour Volumes

TRIP GENERATION

The Institute of Transportation Engineers Trip Generation Manual, 11th Edition contains trip generation rates for a wide range of developments. The land uses were reviewed and determined to be the best match. The trip generation results are listed in **Table 1**. The primary trips were assigned to the highway network with the percentages shown in **Figure 4**. The pass-by trips are assigned using the existing traffic passing the site. These trips are shown in parenthesis. The western most entrance is a service access so no peak hour trips were assigned to it. **Figure 5** shows the trips generated by this development and distributed throughout the road network for the year 2023 during the peak hours. **Figure 6** displays the individual turning movements for the year 2023 for the peak hours when the development is completed.

Table 1. Peak Hour Trips Generated by Site

	A.M. Peak Hour				P.M. Peak Hour			
Land Use	Trips	In	Out	Pass-by	Trips	In	Out	Pass-by
Supermarket (51,000 sf)	147	87	60	0	452	226	226	108
Fast-Food with Drive-Through (4,000 sq ft)	178	91	87	88	131	68	63	131
Office (4,000 sq ft)	7	6	1	0	9	3	6	0
Strip Center (4,000 sq ft)	16	10	6	0	41	21	20	0
Total	**348**	**194**	**154**	**88**	**633**	**318**	**315**	**181**

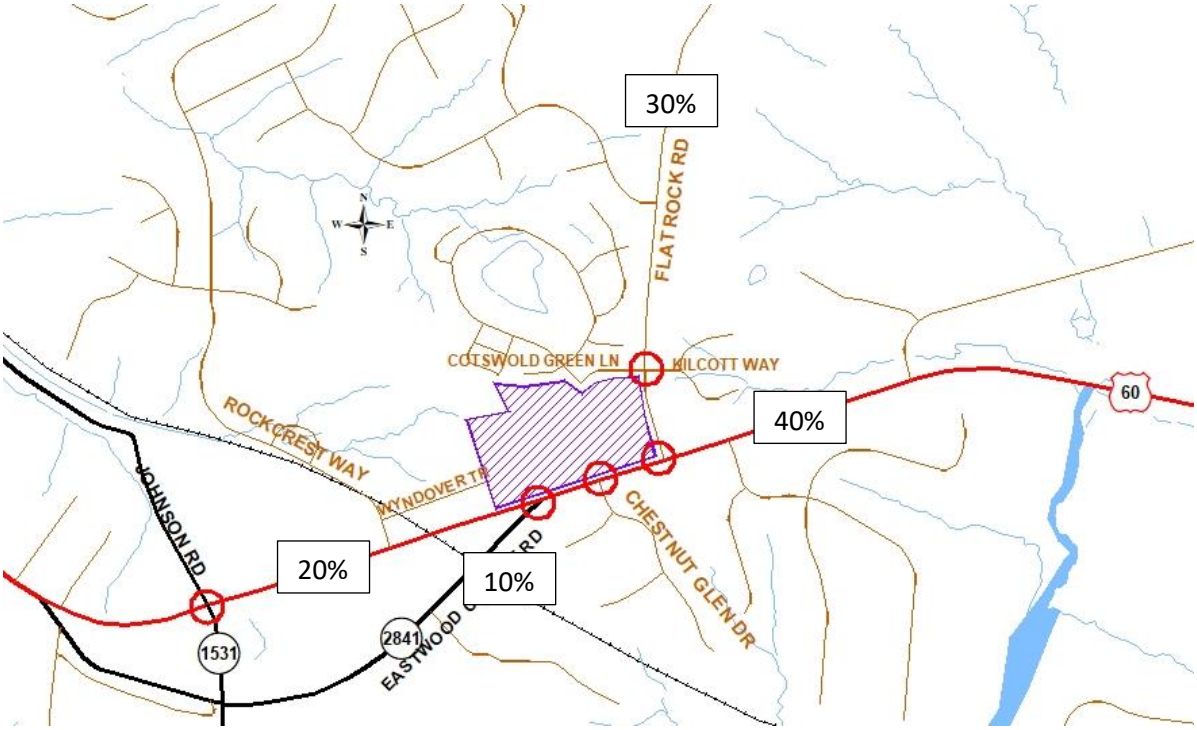


Figure 4. Trip Distribution Percentages

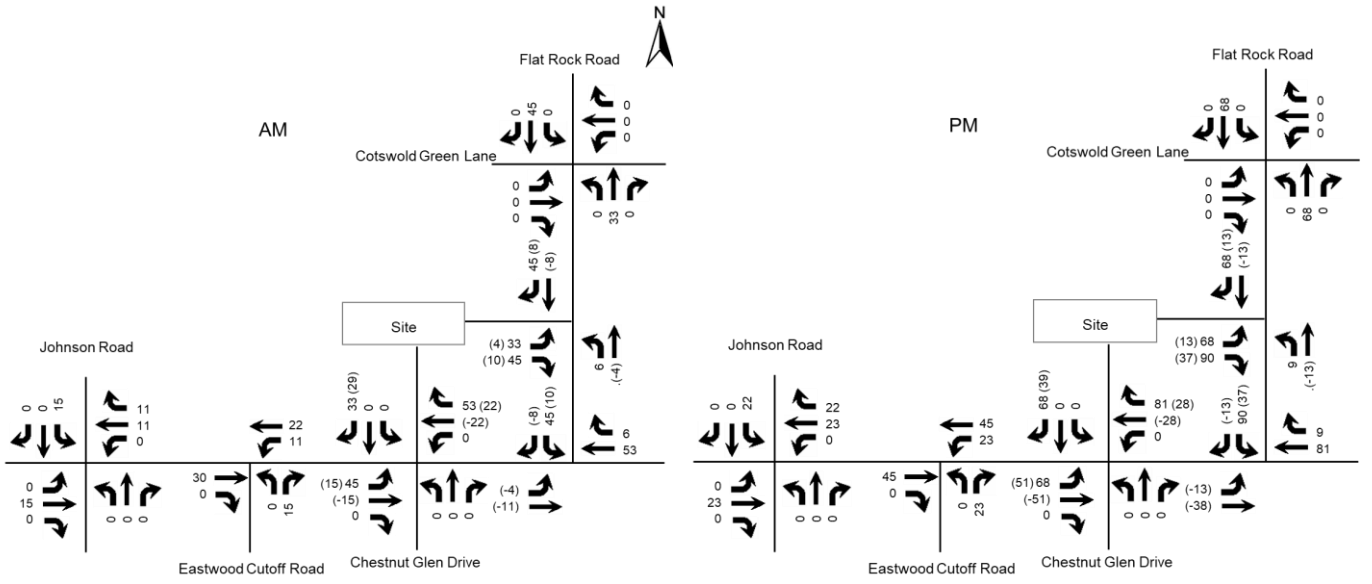


Figure 5. Peak Hour Trips Generated by Site

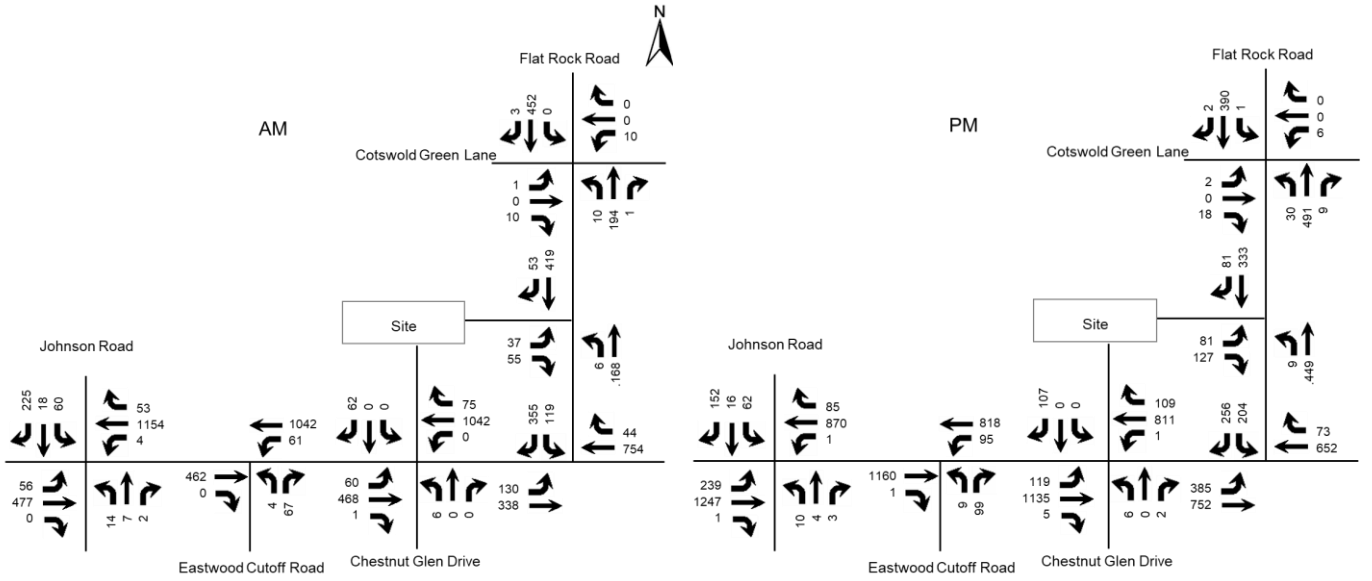


Figure 6. 2023 Peak Hour Build

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, 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

	A.M.			P.M.		
Approach	2021 Existing	2023 No Build	2023 Build	2021 Existing	2023 No Build	2023 Build
Shelbyville Road at Flat Rock Road	**B 19.4**	**C 26.2**	**C 28.6**	**B 16.6**	**C 20.8**	**C 26.4**
Shelbyville Road Eastbound	A 8.2	B 11.8	B 12.3	B 10.5	B 16.0	B 19.9
Shelbyville Road Westbound	B 19.0	C 28.0	C 32.3	B 18.1	C 24.3	C 31.7
Flat Rock Road Southbound	D 37.1	D 39.4	D 38.5	C 34.1	C 31.1	C 34.3
Shelbyville Road at Chestnut Glen Drive						
Shelbyville Road Eastbound			B 11.6			B 11.0
Shelbyville Road Westbound	A 8.3	A 8.4	A 8.3	B 10.5	B 11.3	B 11.1
Chestnut Glen Drive Northbound	C 18.2	C 20.2	E 41.0	C 22.0	D 25.2	F 62.2
Entrance Southbound			C 22.1			C 19.1
Shelbyville Road at Eastwood Cutoff (East)						
Shelbyville Road Westbound	A 8.3	A 8.4	A 8.5	B 10.9	B 11.9	B 12.6
Eastwood Cutoff Road Northbound	B 12.3	B 12.7	B 13.2	C 23.8	D 31.1	E 39.9
Shelbyville Road at Johnson Road						
Shelbyville Road Eastbound	B 10.5	B 11.9	B 12.1	A 9.6	B 12.3	B 12.7
Shelbyville Road Westbound	A 8.2	A 8.3	A 8.3	B 10.5	B 11.5	B 11.6
Eastwood Fisherville Road Northbound	D 27.0	~	~	D 32.0	E 40.4	E 49.2
Johnson Road Southbound	C 20.7	F 257.0	F 314.7	D 30.2	F 304.0	F 541.3
Flat Rock Road at Entrance						
Entrance Westbound			B 12.1			B 13.0
Flat Rock Road Northbound			A 8.4			A 8.2

Approach	A.M.			P.M.		
	2021 Existing	2023 No Build	2023 Build	2021 Existing	2023 No Build	2023 Build
Flat Rock Road at Cotswold Green Lane						
Cotswold Green Lane Eastbound	B 10.1	B 11.0	B 11.4	B 10.6	B 11.0	B 11.7
Killcott Way Westbound	B 11.5	B 12.7	B 13.4	B 13.0	B 14.6	C 16.0
Flat Rock Road Northbound	A 7.9	A 8.2	A 8.3	A 8.0	A 8.1	A 8.3
Flat Rock Road Southbound	A 7.5	A 7.5	A 7.6	A 7.9	A 8.2	A 8.4

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. The traffic impact policy requires using volumes for ten years beyond build-out, or 2033. The 2033 volumes were determined applying a one percent annual growth rate from 2023. Figure 7 illustrates the 2033 No Build volumes. Figure 8 illustrates the 2033 Build Volumes. Using the volumes in Figure 8, a right turn lane will be required at the entrance on Shelbyville Road. The right turn lane will be designed to KYTC standards. The volumes on Flat Rock Road do not meet the turn lane warrants. Table 3 summarizes the delay and Level of Service for 2033. The intersection of Johnson Road has been analyzed with a traffic signal.

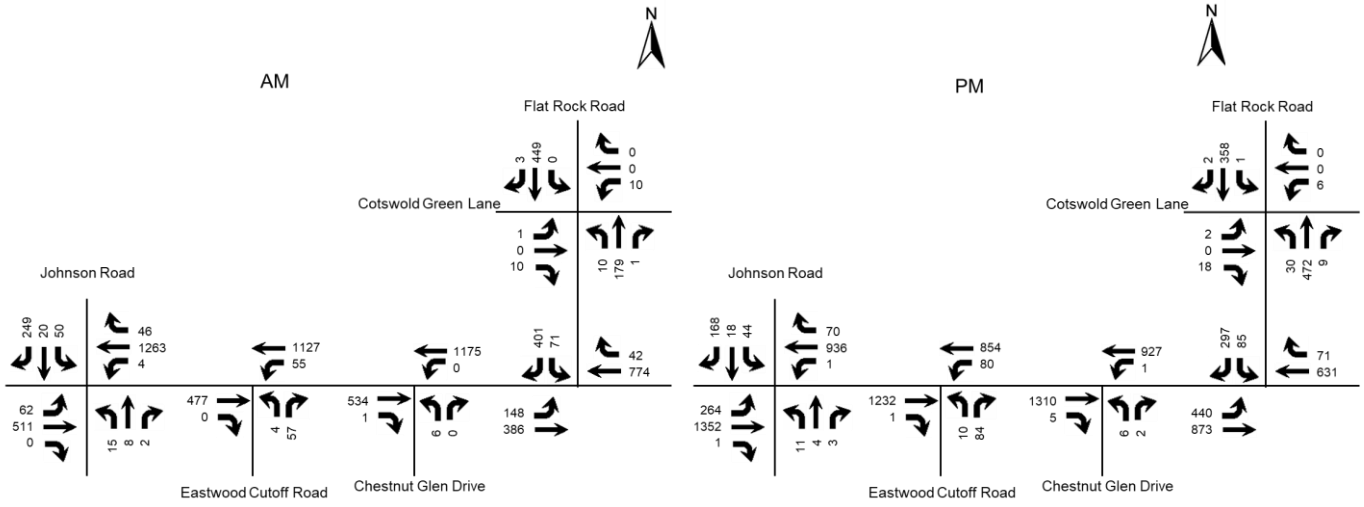


Figure 7. 2033 Peak Hour No Build

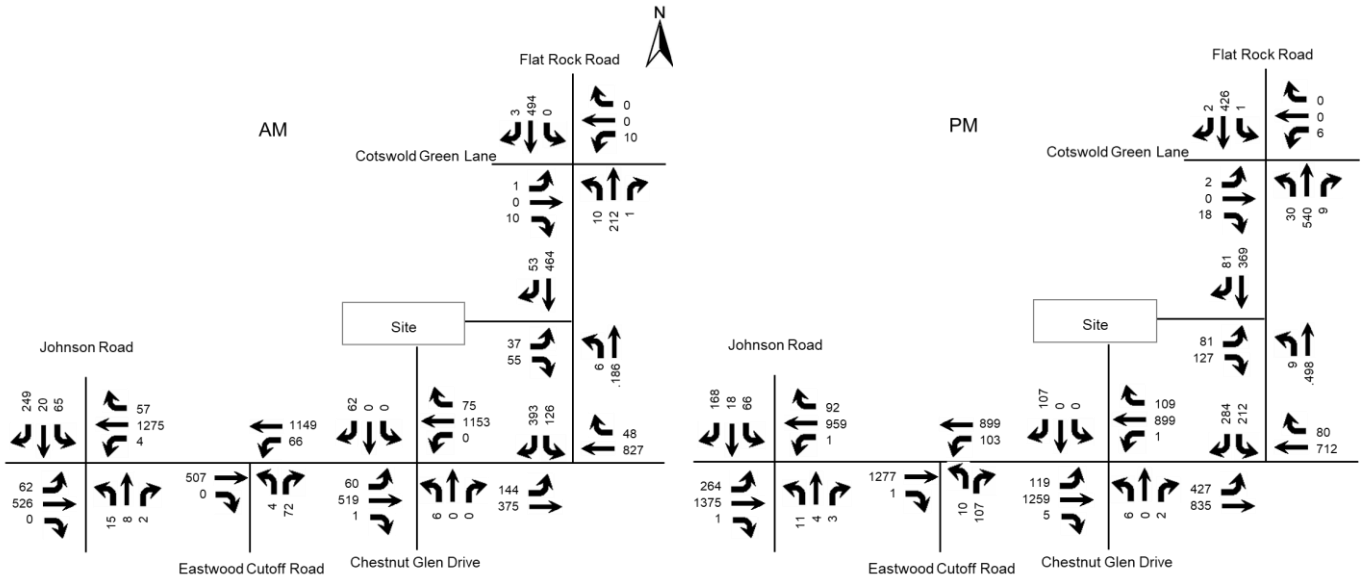


Figure 8. 2033 Peak Hour Build

Table 3. Peak Hour Level of Service

	A.M.			P.M.		
Approach	2021 Existing	2033 No Build	2033 Build	2021 Existing	2033 No Build	2033 Build
Shelbyville Road at Flat Rock Road	**B 19.4**	**C 31.9**	**D 36.4**	**B 16.6**	**C 34.6**	**D 46.2**
Shelbyville Road Eastbound	A 8.2	B 13.3	B 14.0	B 10.5	C 30.5	D 35.2
Shelbyville Road Westbound	B 19.0	D 35.8	D 45.6	B 18.1	D 46.4	F 74.7
Flat Rock Road Southbound	D 37.1	D 46.1	D 43.4	C 34.1	C 26.9	C 31.8
Shelbyville Road at Chestnut Glen Drive						
Shelbyville Road Eastbound			B 12.3			B 11.6
Shelbyville Road Westbound	A 8.3	A 8.5	A 8.5	B 10.5	B 12.1	B 11.8
Chestnut Glen Drive Northbound	C 18.2	C 22.3	F 53.9	C 22.0	D 28.7	F 92.6
Entrance Southbound			D 25.9			C 21.8
Shelbyville Road at Eastwood Cutoff (East)						
Shelbyville Road Westbound	A 8.3	A 8.5	A 8.7	B 10.9	B 13.0	B 13.9
Eastwood Cutoff Road Northbound	B 12.3	B 13.4	B 13.9	C 23.8	E 42.5	F 59.9

	A.M.			P.M.		
Approach	2021 Existing	2033 No Build	2033 Build	2021 Existing	2033 No Build	2033 Build
Shelbyville Road at Johnson Road		**C 29.6**	**C 31.8**		**C 30.0**	**C 34.4**
Shelbyville Road Eastbound	B 10.5	C 21.3	C 21.0	A 9.6	D 39.1	D 46.8
Shelbyville Road Westbound	A 8.2	C 24.9	C 31.1	B 10.5	A 9.8	B 10.7
Eastwood Fisherville Road Northbound	D 27.0	D 43.8	D 41.4	D 32.0	D 43.1	D 43.1
Johnson Road Southbound	C 20.7	E 60.8	D 52.8	D 30.2	D 47.2	D 46.5
Flat Rock Road at Entrance						
Entrance Westbound			B 12.6			B 13.6
Flat Rock Road Northbound			A 8.6			A 8.3
Flat Rock Road at Cotswold Green Lane						
Cotswold Green Lane Eastbound	B 10.1	B 11.3	B 11.8	B 10.6	B 11.5	B 12.1
Killcott Way Westbound	B 11.5	B 13.3	B 14.0	B 13.0	C 15.6	C 17.0
Flat Rock Road Northbound	A 7.9	A 8.3	A 8.5	A 8.0	A 8.2	A 8.4
Flat Rock Road Southbound	A 7.5	A 7.6	A 7.7	A 7.9	A 8.4	A 8.6

Key: Level of Service, Delay in seconds per vehicle

The level of service F condition on the westbound approach of US 60 at Flat Rock Road can be mitigated by adding a right turn lane on the approach. The printout is included in the appendix.

CONCLUSIONS

Based upon the volume of traffic generated by the development and the amount of traffic forecasted for the year 2023 and 2033, there will be an impact to the existing highway network. A right turn lane will be required at the entrance on Shelbyville Road. A right turn lane will be added to the Shelbyville Road, US 60, westbound approach at Flat Rock Road.

APPENDIX

Traffic Counts

Classified Turn Movement Count || All vehicles

Jefferson, KY

Marr Traffic DATA COLLECTION
www.marrtraffic.com

Site 1 of 5
KY-1531 Eastwood Fisherville Rd
KY-1531 Johnson Rd
US-60 Shelbyville Rd (West)
US-60 Shelbyville Rd (East)

Date
Tuesday, April 13, 2021

Lat/Long
38.233605°, -85.453298°

Weather
Cloudy
61°F

0700 - 0900 (Weekday 2h Session) (13-04-2021)
All vehicles

	Northbound					Southbound					Eastbound					Westbound					
	KY-1531 Eastwood Fisherville Rd					KY-1531 Johnson Rd					US-60 Shelbyville Rd (West)					US-60 Shelbyville Rd (East)					
	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Int
TIME	1.1	1.2	1.3	1.4	Total	1.5	1.6	1.7	1.8	Total	1.9	1.10	1.11	1.12	Total	1.13	1.14	1.15	1.16	Total	Total
0700 - 0715	3	0	1	0	4	0	1	11	0	12	0	52	0	0	52	0	243	0	0	243	311
0715 - 0730	5	1	0	0	6	0	0	14	0	14	4	76	0	0	80	1	293	0	0	294	394
0730 - 0745	1	2	0	0	3	2	1	6	0	9	2	106	0	0	108	0	247	1	0	248	368
0745 - 0800	2	2	2	0	6	0	1	11	0	12	6	127	0	0	133	2	241	2	0	245	396
Hourly Total	11	5	3	0	**19**	2	3	42	0	**47**	12	361	0	0	**373**	3	1024	3	0	**1030**	**1469**
0800 - 0815	6	2	0	0	8	1	1	6	0	8	9	125	0	0	134	1	217	2	0	220	370
0815 - 0830	3	3	0	0	6	0	0	8	0	8	3	114	1	0	118	0	202	3	0	205	337
0830 - 0845	6	0	1	0	7	0	1	11	0	12	5	105	0	0	110	1	227	7	0	235	364
0845 - 0900	2	1	0	0	3	1	1	13	0	15	7	140	0	0	147	1	171	3	0	175	340
Hourly Total	17	6	1	0	**24**	2	3	38	0	**43**	24	484	1	0	**509**	3	817	15	0	**835**	**1411**
Grand Total	28	11	4	0	**43**	4	6	80	0	**90**	36	845	1	0	**882**	6	1841	18	0	**1865**	**2880**
Approach %	65.12	25.58	9.30	0.00	-	4.44	6.67	88.89	0.00	-	4.08	95.80	0.11	0.00	-	0.32	98.71	0.97	0.00	-	
Intersection %	0.97	0.38	0.14	0.00	1.49	0.14	0.21	2.78	0.00	3.13	1.25	29.34	0.03	0.00	30.63	0.21	63.92	0.63	0.00	64.76	
PHF	0.58	0.88	0.25	0.00	**0.72**	0.38	0.75	0.66	0.00	**0.77**	0.58	0.85	0.00	0.00	**0.85**	0.50	0.85	0.63	0.00	**0.86**	**0.96**

1600 - 1800 (Weekday 2h Session) (13-04-2021)
All vehicles

	Northbound					Southbound					Eastbound					Westbound					
	KY-1531 Eastwood Fisherville Rd					KY-1531 Johnson Rd					US-60 Shelbyville Rd (West)					US-60 Shelbyville Rd (East)					
	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Int
TIME	1.1	1.2	1.3	1.4	Total	1.5	1.6	1.7	1.8	Total	1.9	1.10	1.11	1.12	Total	1.13	1.14	1.15	1.16	Total	Total
1600 - 1615	1	1	1	0	3	2	1	15	0	18	7	231	0	0	238	0	193	3	0	196	455
1615 - 1630	4	1	1	0	6	2	4	13	0	19	8	237	1	0	246	2	154	3	0	159	430
1630 - 1645	2	0	1	0	3	7	5	7	0	19	5	275	1	0	281	0	204	4	0	208	511
1645 - 1700	2	3	0	0	5	0	2	10	0	12	9	271	0	0	280	0	180	2	0	182	479
Hourly Total	9	5	3	0	**17**	11	12	45	0	**68**	29	1014	2	0	**1045**	2	731	12	0	**745**	**1875**
1700 - 1715	3	1	2	0	6	8	4	12	0	24	8	248	0	0	256	1	203	3	0	207	493
1715 - 1730	3	0	0	0	3	7	5	16	0	28	11	253	0	0	264	0	202	3	0	205	500
1730 - 1745	7	0	2	0	9	6	2	12	0	20	8	243	0	0	251	3	190	2	0	195	475
1745 - 1800	2	0	2	0	4	4	0	8	0	12	13	273	0	0	286	0	202	0	0	202	504
Hourly Total	15	1	6	0	**22**	25	11	48	0	**84**	40	1017	0	0	**1057**	4	797	8	0	**809**	**1972**
Grand Total	24	6	9	0	**39**	36	23	93	0	**152**	69	2031	2	0	**2102**	6	1528	20	0	**1554**	**3847**
Approach %	61.54	15.38	23.08	0.00	-	23.68	15.13	61.18	0.00	-	3.28	96.62	0.10	0.00	-	0.39	98.33	1.29	0.00	-	
Intersection %	0.62	0.16	0.23	0.00	1.01	0.94	0.60	2.42	0.00	3.95	1.79	52.79	0.05	0.00	54.64	0.16	39.72	0.52	0.00	40.40	
PHF	0.83	0.33	0.38	0.00	**0.71**	0.69	0.80	0.70	0.00	**0.74**	0.75	0.95	0.25	0.00	**0.96**	0.25	0.97	0.75	0.00	**0.96**	**0.97**

Classified Turn Movement Count || All vehicles

Marr Traffic DATA COLLECTION
www.marrtraffic.com

Jefferson, KY

Site 2 of 5
Estwood Cut Off Rd

US-60 Shelbyville Rd (West)
US-60 Shelbyville Rd (East)

Date
Tuesday, April 13, 2021

Lat/Long
38.235135°, -85.446968°

Weather
Cloudy
61°F

0700 - 0900 (Weekday 2h Session) (13-04-2021)
All vehicles

	Northbound				Eastbound				Westbound				
	Estwood Cut Off Rd				US-60 Shelbyville Rd (West)				US-60 Shelbyville Rd (East)				
TIME	Left 2.1	Right 2.2	U-Turn 2.3	App Total	Thru 2.4	Right 2.5	U-Turn 2.6	App Total	Left 2.7	Thru 2.8	U-Turn 2.9	App Total	Int Total
0700 - 0715	2	4	0	6	54	0	0	54	16	217	0	233	293
0715 - 0730	1	8	0	9	66	0	0	66	14	258	0	272	347
0730 - 0745	1	12	0	13	100	0	0	100	15	227	0	242	355
0745 - 0800	1	18	0	19	121	0	0	121	11	208	0	219	359
Hourly Total	5	42	0	**47**	341	0	0	**341**	56	910	0	**966**	**1354**
0800 - 0815	1	14	0	15	119	0	0	119	10	199	0	209	343
0815 - 0830	0	12	0	12	99	0	0	99	5	182	0	187	298
0830 - 0845	1	9	0	10	96	0	0	96	10	200	0	210	316
0845 - 0900	2	5	0	7	124	0	0	124	14	144	0	158	289
Hourly Total	4	40	0	**44**	438	0	0	**438**	39	725	0	**764**	**1246**
Grand Total	9	82	0	**91**	779	0	0	**779**	95	1635	0	**1730**	**2600**
Approach %	9.89	90.11	0.00	-	100.00	0.00	0.00	-	5.49	94.51	0.00	-	
Intersection %	0.35	3.15	0.00	3.50	29.96	0.00	0.00	29.96	3.65	62.88	0.00	66.54	
PHF	1.00	0.72	0.00	**0.74**	0.84	0.00	0.00	**0.84**	0.83	0.86	0.00	**0.87**	**0.98**

1600 - 1800 (Weekday 2h Session) (13-04-2021)
All vehicles

	Northbound				Eastbound				Westbound				
	Estwood Cut Off Rd				US-60 Shelbyville Rd (West)				US-60 Shelbyville Rd (East)				
TIME	Left 2.1	Right 2.2	U-Turn 2.3	App Total	Thru 2.4	Right 2.5	U-Turn 2.6	App Total	Left 2.7	Thru 2.8	U-Turn 2.9	App Total	Int Total
1600 - 1615	1	27	0	28	212	2	0	214	8	174	0	182	424
1615 - 1630	0	19	0	19	217	0	0	217	23	144	0	167	403
1630 - 1645	2	17	0	19	245	0	0	245	21	191	0	212	476
1645 - 1700	0	20	0	20	251	0	0	251	21	167	0	188	459
Hourly Total	3	83	0	**86**	925	2	0	**927**	73	676	0	**749**	**1762**
1700 - 1715	4	18	0	22	230	1	0	231	14	183	0	197	450
1715 - 1730	3	21	0	24	228	0	0	228	16	180	0	196	448
1730 - 1745	1	21	0	22	223	0	0	223	13	183	0	196	441
1745 - 1800	0	16	0	16	249	0	0	249	14	172	0	186	451
Hourly Total	8	76	0	**84**	930	1	0	**931**	57	718	0	**775**	**1790**
Grand Total	11	159	0	**170**	1855	3	0	**1858**	130	1394	0	**1524**	**3552**
Approach %	6.47	93.53	0.00	-	99.84	0.16	0.00	-	8.53	91.47	0.00	-	
Intersection %	0.31	4.48	0.00	4.79	52.22	0.08	0.00	52.31	3.66	39.25	0.00	42.91	
PHF	0.56	0.90	0.00	**0.89**	0.95	0.25	0.00	**0.95**	0.86	0.94	0.00	**0.94**	**0.96**

Classified Turn Movement Count || All vehicles

Marr Traffic DATA COLLECTION
www.marrtraffic.com

Jefferson, KY

Site 3 of 5
Chestnout Gilen Dr

US-60 Shelbyville Rd (West)
US-60 Shelbyville Rd (East)

Date
Tuesday, April 13, 2021

Lat/Long
38.235512°, -85.445514°

Weather
Cloudy
61°F

0700 - 0900 (Weekday 2h Session) (13-04-2021)
All vehicles

	Northbound				Eastbound				Westbound				
	Chestnout Gilen Dr				US-60 Shelbyville Rd (West)				US-60 Shelbyville Rd (East)				
TIME	Left 3.1	Right 3.2	U-Turn 3.3	App Total	Thru 3.4	Right 3.5	U-Turn 3.6	App Total	Left 3.7	Thru 3.8	U-Turn 3.9	App Total	Int Total
0700 - 0715	3	0	0	3	59	0	0	59	0	231	0	231	293
0715 - 0730	4	0	0	4	74	0	0	74	0	269	0	269	347
0730 - 0745	0	0	0	0	110	1	0	111	0	241	0	241	352
0745 - 0800	2	0	0	2	137	0	0	137	0	218	0	218	357
Hourly Total	9	0	0	**9**	380	1	0	**381**	0	959	0	**959**	**1349**
0800 - 0815	0	0	0	0	134	0	0	134	0	208	0	208	342
0815 - 0830	2	0	0	2	110	1	0	111	0	184	0	184	297
0830 - 0845	2	0	0	2	104	2	0	106	0	206	0	206	314
0845 - 0900	0	0	0	0	128	1	0	129	0	160	0	160	289
Hourly Total	4	0	0	**4**	476	4	0	**480**	0	758	0	**758**	**1242**
Grand Total	13	0	0	**13**	856	5	0	**861**	0	1717	0	**1717**	**2591**
Approach %	100.00	0.00	0.00	-	99.42	0.58	0.00	-	0.00	100.00	0.00	-	
Intersection %	0.50	0.00	0.00	0.50	33.04	0.19	0.00	33.23	0.00	66.27	0.00	66.27	
PHF	0.38	0.00	0.00	**0.38**	0.83	0.25	0.00	**0.83**	0.00	0.87	0.00	**0.87**	**0.98**

1600 - 1800 (Weekday 2h Session) (13-04-2021)
All vehicles

	Northbound				Eastbound				Westbound				
	Chestnout Gilen Dr				US-60 Shelbyville Rd (West)				US-60 Shelbyville Rd (East)				
TIME	Left 3.1	Right 3.2	U-Turn 3.3	App Total	Thru 3.4	Right 3.5	U-Turn 3.6	App Total	Left 3.7	Thru 3.8	U-Turn 3.9	App Total	Int Total
1600 - 1615	3	1	0	4	236	2	0	238	0	179	0	179	421
1615 - 1630	2	2	0	4	230	5	0	235	0	165	0	165	404
1630 - 1645	1	1	0	2	260	3	0	263	1	211	0	212	477
1645 - 1700	3	0	0	3	272	0	0	272	0	187	0	187	462
Hourly Total	9	4	0	**13**	998	10	0	**1008**	1	742	0	**743**	**1764**
1700 - 1715	0	1	0	1	244	1	0	245	0	197	0	197	443
1715 - 1730	2	0	0	2	254	1	0	255	0	198	0	198	455
1730 - 1745	1	0	0	1	237	3	0	240	0	184	0	184	425
1745 - 1800	0	1	0	1	264	2	0	266	1	191	0	192	459
Hourly Total	3	2	0	**5**	999	7	0	**1006**	1	770	0	**771**	**1782**
Grand Total	12	6	0	**18**	1997	17	0	**2014**	2	1512	0	**1514**	**3546**
Approach %	66.67	33.33	0.00	-	99.16	0.84	0.00	-	0.13	99.87	0.00	-	
Intersection %	0.34	0.17	0.00	0.51	56.32	0.48	0.00	56.80	0.06	42.64	0.00	42.70	
PHF	0.50	0.50	0.00	**0.67**	0.95	0.42	0.00	**0.95**	0.25	0.94	0.00	**0.94**	**0.96**

Classified Turn Movement Count || All vehicles

Marr Traffic DATA COLLECTION
www.marrtraffic.com

Jefferson, KY

Site 4 of 5

Flat Rock Rd
US-60 Shelbyville Rd (West)
US-60 Shelbyville Rd (East)

Date
Tuesday, April 13, 2021

Lat/Long
38.235876°, -85.444255°

Weather
Cloudy
61°F

0700 - 0900 (Weekday 2h Session) (13-04-2021)

All vehicles

	Southbound				Eastbound				Westbound				
	Flat Rock Rd				US-60 Shelbyville Rd (West)				US-60 Shelbyville Rd (East)				
TIME	Left 4.1	Right 4.2	U-Turn 4.3	App Total	Left 4.4	Thru 4.5	U-Turn 4.6	App Total	Thru 4.7	Right 4.8	U-Turn 4.9	App Total	Int Total
0700 - 0715	6	72	0	78	10	50	0	60	160	2	0	162	300
0715 - 0730	12	71	0	83	13	61	0	74	201	5	0	206	363
0730 - 0745	8	75	0	83	21	87	0	108	168	12	0	180	371
0745 - 0800	16	59	0	75	35	102	0	137	161	7	0	168	380
Hourly Total	42	277	0	**319**	79	300	0	**379**	690	26	0	**716**	**1414**
0800 - 0815	8	58	0	66	52	85	0	137	144	5	0	149	352
0815 - 0830	10	53	0	63	35	67	0	102	129	4	0	133	298
0830 - 0845	9	61	0	70	28	85	0	113	148	4	0	152	335
0845 - 0900	3	46	0	49	25	100	0	125	111	7	0	118	292
Hourly Total	30	218	0	**248**	140	337	0	**477**	532	20	0	**552**	**1277**
Grand Total	72	495	0	**567**	219	637	0	**856**	1222	46	0	**1268**	**2691**
Approach %	12.70	87.30	0.00	-	25.58	74.42	0.00	-	96.37	3.63	0.00	-	
Intersection %	2.68	18.39	0.00	21.07	8.14	23.67	0.00	31.81	45.41	1.71	0.00	47.12	
PHF	0.69	0.88	0.00	**0.92**	0.58	0.82	0.00	**0.83**	0.84	0.60	0.00	**0.85**	**0.96**

1600 - 1800 (Weekday 2h Session) (13-04-2021)

All vehicles

	Southbound				Eastbound				Westbound				
	Flat Rock Rd				US-60 Shelbyville Rd (West)				US-60 Shelbyville Rd (East)				
TIME	Left 4.1	Right 4.2	U-Turn 4.3	App Total	Left 4.4	Thru 4.5	U-Turn 4.6	App Total	Thru 4.7	Right 4.8	U-Turn 4.9	App Total	Int Total
1600 - 1615	13	54	0	67	64	171	0	235	122	8	0	130	432
1615 - 1630	12	50	0	62	72	162	0	234	116	14	0	130	426
1630 - 1645	14	62	0	76	68	194	0	262	153	12	0	165	503
1645 - 1700	20	56	0	76	70	201	0	271	130	16	0	146	493
Hourly Total	59	222	0	**281**	274	728	0	**1002**	521	50	0	**571**	**1854**
1700 - 1715	13	67	0	80	64	173	0	237	129	10	0	139	456
1715 - 1730	16	61	0	77	70	191	0	261	137	11	0	148	486
1730 - 1745	9	57	0	66	64	178	0	242	132	14	0	146	454
1745 - 1800	10	67	0	77	76	185	0	261	121	11	0	132	470
Hourly Total	48	252	0	**300**	274	727	0	**1001**	519	46	0	**565**	**1866**
Grand Total	107	474	0	**581**	548	1455	0	**2003**	1040	96	0	**1136**	**3720**
Approach %	18.42	81.58	0.00	-	27.36	72.64	0.00	-	91.55	8.45	0.00	-	
Intersection %	2.88	12.74	0.00	15.62	14.73	39.11	0.00	53.84	27.96	2.58	0.00	30.54	
PHF	0.79	0.92	0.00	**0.97**	0.97	0.94	0.00	**0.95**	0.90	0.77	0.00	**0.91**	**0.96**

Classified Turn Movement Count || All vehicles

Marr Traffic DATA COLLECTION
www.marrtraffic.com

Jefferson, KY

Site 5 of 5
Flat Rock Rd (South)
Flat Rock Rd (North)
Cottswold Green
Kilcott Way

Date
Tuesday, April 13, 2021

Weather
Cloudy
61°F

Lat/Long
38.237228°, -85.444627°

0700 - 0900 (Weekday 2h Session) (13-04-2021)
All vehicles

	Northbound					Southbound					Eastbound					Westbound					
	Flat Rock Rd (South)					Flat Rock Rd (North)					Cottswold Green					Kilcott Way					
	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Int
TIME	5.1	5.2	5.3	5.4	Total	5.5	5.6	5.7	5.8	Total	5.9	5.10	5.11	5.12	Total	5.13	5.14	5.15	5.16	Total	Total
0700 - 0715	0	12	0	0	12	0	75	1	0	76	0	0	2	0	2	1	0	0	0	1	91
0715 - 0730	1	17	0	0	18	0	79	0	0	79	1	0	2	0	3	1	0	0	0	1	101
0730 - 0745	1	32	0	0	33	0	76	1	0	77	0	0	4	0	4	7	0	0	0	7	121
0745 - 0800	2	40	0	0	42	0	68	2	0	70	0	0	3	0	3	1	0	0	0	1	116
Hourly Total	4	101	0	0	**105**	0	298	4	0	**302**	1	0	11	0	**12**	10	0	0	0	**10**	**429**
0800 - 0815	6	50	1	0	57	0	64	0	0	64	0	0	1	0	1	1	0	0	0	1	123
0815 - 0830	1	35	3	0	39	0	57	1	0	58	0	0	6	0	6	0	0	0	0	0	103
0830 - 0845	0	32	0	0	32	0	60	1	0	61	0	0	9	0	9	1	0	0	0	1	103
0845 - 0900	2	30	0	0	32	0	42	0	0	42	0	0	7	0	7	0	0	0	0	0	81
Hourly Total	9	147	4	0	**160**	0	223	2	0	**225**	0	0	23	0	**23**	2	0	0	0	**2**	**410**
Grand Total	13	248	4	0	**265**	0	521	6	0	**527**	1	0	34	0	**35**	12	0	0	0	**12**	**839**
Approach %	4.91	93.58	1.51	0.00	-	0.00	98.86	1.14	0.00	-	2.86	0.00	97.14	0.00	-	100.00	0.00	0.00	0.00	-	
Intersection %	1.55	29.56	0.48	0.00	31.59	0.00	62.10	0.72	0.00	62.81	0.12	0.00	4.05	0.00	4.17	1.43	0.00	0.00	0.00	1.43	
PHF	0.42	0.79	0.33	0.00	**0.75**	0.00	0.87	0.50	0.00	**0.87**	0.00	0.00	0.58	0.00	**0.58**	0.32	0.00	0.00	0.00	**0.32**	**0.94**

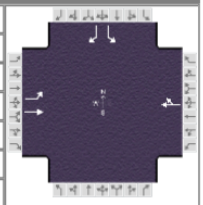
1600 - 1800 (Weekday 2h Session) (13-04-2021)
All vehicles

	Northbound					Southbound					Eastbound					Westbound					
	Flat Rock Rd (South)					Flat Rock Rd (North)					Cottswold Green					Kilcott Way					
	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Int
TIME	5.1	5.2	5.3	5.4	Total	5.5	5.6	5.7	5.8	Total	5.9	5.10	5.11	5.12	Total	5.13	5.14	5.15	5.16	Total	Total
1600 - 1615	5	65	1	0	71	0	58	0	0	58	0	0	7	0	7	2	0	0	0	2	138
1615 - 1630	3	82	1	0	86	0	56	0	0	56	0	0	3	0	3	1	0	0	0	1	146
1630 - 1645	8	71	0	0	79	0	72	0	0	72	1	0	7	0	8	0	0	0	0	0	159
1645 - 1700	9	75	2	0	86	0	72	1	0	73	0	0	1	0	1	2	0	0	0	2	162
Hourly Total	25	293	4	0	**322**	0	258	1	0	**259**	1	0	18	0	**19**	5	0	0	0	**5**	**605**
1700 - 1715	5	69	3	0	77	1	68	1	0	70	2	0	5	0	7	2	0	0	0	2	156
1715 - 1730	8	70	4	0	82	0	71	1	0	72	0	0	5	0	5	2	0	0	0	2	161
1730 - 1745	1	72	2	0	75	0	57	1	0	58	2	0	6	0	8	2	0	0	0	2	143
1745 - 1800	3	84	1	0	88	1	75	1	0	77	1	0	6	0	7	1	0	0	0	1	173
Hourly Total	17	295	10	0	**322**	2	271	4	0	**277**	5	0	22	0	**27**	7	0	0	0	**7**	**633**
Grand Total	42	588	14	0	**644**	2	529	5	0	**536**	6	0	40	0	**46**	12	0	0	0	**12**	**1238**
Approach %	6.52	91.30	2.17	0.00	-	0.37	98.69	0.93	0.00	-	13.04	0.00	86.96	0.00	-	100.00	0.00	0.00	0.00	-	
Intersection %	3.39	47.50	1.13	0.00	52.02	0.16	42.73	0.40	0.00	43.30	0.48	0.00	3.23	0.00	3.72	0.97	0.00	0.00	0.00	0.97	
PHF	0.83	0.95	0.56	0.00	**0.94**	0.25	0.98	0.75	0.00	**0.98**	0.38	0.00	0.64	0.00	**0.66**	0.75	0.00	0.00	0.00	**0.75**	**0.98**

HCS Reports

HCS7 Signalized Intersection Results Summary

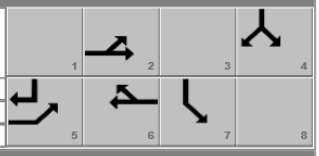
General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 15, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.96
Urban Street	US 60	Analysis Year	2021	Analysis Period	1> 7:15
Intersection	Flat Rock Road	File Name	AM 21.xus		
Project Description	Grocery				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	121	335			674	29				44		263

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	5.8	57.0	18.2	0.0	0.0	0.0	
Yellow	4.0	5.0	4.0	0.0	0.0	0.0	
Red	2.0	2.0	2.0	0.0	0.0	0.0	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	11.8	75.8		64.0				24.2
Change Period, (*Y+R c*), s	6.0	7.0		7.0				6.0
Max Allow Headway (*MAH*), s	2.9	0.0		0.0				3.1
Queue Clearance Time (*g s*), s	4.8							17.9
Green Extension Time (*g e*), s	0.1	0.0		0.0				0.4
Phase Call Probability	0.97							1.00
Max Out Probability	0.00							0.10

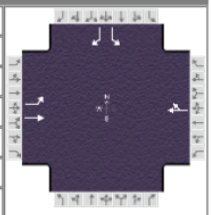
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	126	349			732					46		274
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1697	1781			1857					1682		1585
Queue Service Time (*g s*), s	2.8	7.6			28.0					2.3		15.9
Cycle Queue Clearance Time (*g c*), s	2.8	7.6			28.0					2.3		15.9
Green Ratio (*g/C*)	0.65	0.69			0.57					0.18		0.24
Capacity (*c*), veh/h	370	1225			1057					307		381
Volume-to-Capacity Ratio (*X*)	0.341	0.285			0.692					0.149		0.719
Back of Queue (*Q*), ft/ln (90 th percentile)	38.4	106.5			378.7					42.8		230.2
Back of Queue (*Q*), veh/ln (90 th percentile)	1.4	4.0			14.9					1.6		9.1
Queue Storage Ratio (*RQ*) (90 th percentile)	0.31	0.00			0.00					0.11		0.58
Uniform Delay (*d 1*), s/veh	12.2	6.1			15.3					34.4		34.9
Incremental Delay (*d 2*), s/veh	0.2	0.6			3.7					0.1		2.7
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0					0.0		0.0
Control Delay (*d*), s/veh	12.4	6.6			19.0					34.5		37.6
Level of Service (LOS)	B	A			B					C		D
Approach Delay, s/veh / LOS	8.2		A	19.0		B	0.0			37.1		D
Intersection Delay, s/veh / LOS	19.4						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.66	A	1.89	B	1.73	B	1.96	B
Bicycle LOS Score / LOS	1.27	A	1.70	B				F

 HCS™ Streets Version 7.9.5 Generated: 10/15/2021 12:07:42 PM

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 15, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.96
Urban Street	US 60	Analysis Year	2023 No Build	Analysis Period	1> 7:15
Intersection	Flat Rock Road	File Name	AM 23 No Build.xus		
Project Description	Grocery				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	134	349			701	38				64		363

Signal Information					EB			WB			NB			SB		
Cycle, s	100.0	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	5.9	51.1	24.0	0.0	0.0	0.0						
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.0	5.0	4.0	0.0	0.0	0.0						
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	11.9	70.0		58.1				30.0
Change Period, (*Y+R c*), s	6.0	7.0		7.0				6.0
Max Allow Headway (*MAH*), s	2.9	0.0		0.0				3.1
Queue Clearance Time (*g s*), s	5.7							24.0
Green Extension Time (*g e*), s	0.1	0.0		0.0				0.0
Phase Call Probability	0.98							1.00
Max Out Probability	0.00							1.00

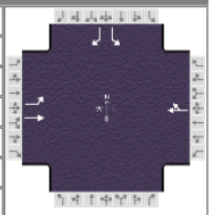
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	140	364			770					67		378
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1697	1781			1853					1682		1585
Queue Service Time (*g s*), s	3.7	9.5			34.7					3.1		22.0
Cycle Queue Clearance Time (*g c*), s	3.7	9.5			34.7					3.1		22.0
Green Ratio (*g/C*)	0.59	0.63			0.51					0.24		0.30
Capacity (*c*), veh/h	281	1123			948					403		473
Volume-to-Capacity Ratio (*X*)	0.497	0.324			0.812					0.165		0.799
Back of Queue (*Q*), ft/ln (90 th percentile)	55.4	141.9			495.1					57.6		320.7
Back of Queue (*Q*), veh/ln (90 th percentile)	2.1	5.3			19.5					2.2		12.6
Queue Storage Ratio (*RQ*) (90 th percentile)	0.44	0.00			0.00					0.14		0.80
Uniform Delay (*d 1*), s/veh	17.7	8.6			20.4					30.1		32.3
Incremental Delay (*d 2*), s/veh	0.5	0.8			7.5					0.1		8.7
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0					0.0		0.0
Control Delay (*d*), s/veh	18.2	9.4			28.0					30.2		41.0
Level of Service (LOS)	B	A			C					C		D
Approach Delay, s/veh / LOS	11.8		B	28.0		C	0.0			39.4		D
Intersection Delay, s/veh / LOS	26.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.68	A	1.90	B	1.73	B	1.96	B
Bicycle LOS Score / LOS	1.32	A	1.76	B				F

 HCS™ Streets Version 7.9.5 Generated: 10/15/2021 12:07:42 PM

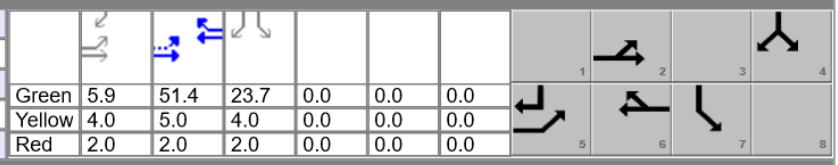
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 15, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.96
Urban Street	US 60	Analysis Year	2023 Build	Analysis Period	1> 7:15
Intersection	Flat Rock Road	File Name	AM 23 Build.xus		
Project Description	Grocery				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	130	338			754	44				119		358

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	5.9	51.4	23.7	0.0	0.0	0.0		
Yellow	4.0	5.0	4.0	0.0	0.0	0.0		
Red	2.0	2.0	2.0	0.0	0.0	0.0		

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	11.9	70.3		58.4				29.7
Change Period, (*Y+R* $_c$), s	6.0	7.0		7.0				6.0
Max Allow Headway (*MAH*), s	2.9	0.0		0.0				3.1
Queue Clearance Time (g_s), s	5.5							23.7
Green Extension Time (g_e), s	0.1	0.0		0.0				0.1
Phase Call Probability	0.98							1.00
Max Out Probability	0.00							1.00

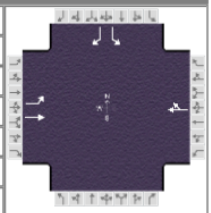
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	135	352			831					124		373
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1697	1781			1852					1682		1585
Queue Service Time (g_s), s	3.5	9.0			39.6					6.1		21.7
Cycle Queue Clearance Time (g_c), s	3.5	9.0			39.6					6.1		21.7
Green Ratio (*g/C*)	0.59	0.63			0.51					0.24		0.30
Capacity (*c*), veh/h	246	1127			952					399		469
Volume-to-Capacity Ratio (*X*)	0.550	0.312			0.873					0.311		0.795
Back of Queue (*Q*), ft/ln (90 th percentile)	64.5	136.8			571.7					111.8		316
Back of Queue (*Q*), veh/ln (90 th percentile)	2.4	5.1			22.5					4.2		12.4
Queue Storage Ratio (*RQ*) (90 th percentile)	0.52	0.00			0.00					0.28		0.79
Uniform Delay (d_1), s/veh	20.0	8.4			21.4					31.4		32.4
Incremental Delay (d_2), s/veh	0.7	0.7			10.9					0.2		8.3
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0					0.0		0.0
Control Delay (*d*), s/veh	20.7	9.1			32.3					31.6		40.8
Level of Service (LOS)	C	A			C					C		D
Approach Delay, s/veh / LOS	12.3		B	32.3		C	0.0			38.5		D
Intersection Delay, s/veh / LOS	28.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.68	A	1.90	B	1.73	B	1.96	B
Bicycle LOS Score / LOS	1.29	A	1.86	B				F

 HCS™ Streets Version 7.9.5 Generated: 10/15/2021 12:07:42 PM

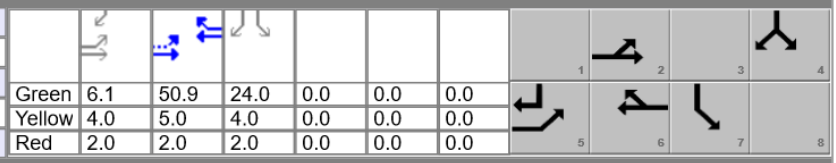
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 15, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.96
Urban Street	US 60	Analysis Year	2033 No Build	Analysis Period	1> 7:15
Intersection	Flat Rock Road	File Name	AM 33 No Build.xus		
Project Description	Grocery				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	148	386			774	42				71		401

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	6.1	50.9	24.0	0.0	0.0	0.0		
Yellow	4.0	5.0	4.0	0.0	0.0	0.0		
Red	2.0	2.0	2.0	0.0	0.0	0.0		

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	12.1	70.0		57.9				30.0
Change Period, (*Y+R c*), s	6.0	7.0		7.0				6.0
Max Allow Headway (*MAH*), s	2.9	0.0		0.0				3.1
Queue Clearance Time (*g s*), s	6.1							26.0
Green Extension Time (*g e*), s	0.1	0.0		0.0				0.0
Phase Call Probability	0.99							1.00
Max Out Probability	0.00							1.00

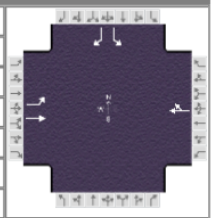
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	154	402			850					74		418
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1697	1781			1853					1682		1585
Queue Service Time (*g s*), s	4.1	10.8			41.6					3.5		24.0
Cycle Queue Clearance Time (*g c*), s	4.1	10.8			41.6					3.5		24.0
Green Ratio (*g/C*)	0.59	0.63			0.51					0.24		0.30
Capacity (*c*), veh/h	233	1122			942					404		478
Volume-to-Capacity Ratio (*X*)	0.661	0.358			0.902					0.183		0.874
Back of Queue (*Q*), ft/ln (90 th percentile)	82.5	157.4			615					64.3		381.8
Back of Queue (*Q*), veh/ln (90 th percentile)	3.1	5.9			24.2					2.4		15.0
Queue Storage Ratio (*RQ*) (90 th percentile)	0.66	0.00			0.00					0.16		0.95
Uniform Delay (*d 1*), s/veh	21.5	8.8			22.3					30.2		33.1
Incremental Delay (*d 2*), s/veh	1.2	0.9			13.5					0.1		15.7
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0					0.0		0.0
Control Delay (*d*), s/veh	22.7	9.7			35.8					30.3		48.9
Level of Service (LOS)	C	A			D					C		D
Approach Delay, s/veh / LOS	13.3	B		35.8	D		0.0			46.1	D	
Intersection Delay, s/veh / LOS	31.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.68	A	1.90	B	1.73	B	1.96	B
Bicycle LOS Score / LOS	1.41	A	1.89	B				F

 HCS™ Streets Version 7.9.5 Generated: 10/15/2021 12:07:42 PM

HCS7 Signalized Intersection Results Summary

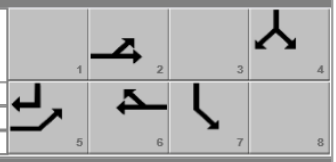
General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 15, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.96
Urban Street	US 60	Analysis Year	2033 Build	Analysis Period	1> 7:15
Intersection	Flat Rock Road	File Name	AM 33 Build.xus		
Project Description	Grocery				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	144	375			827	48				126		393

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	6.0	51.0	24.0	0.0	0.0	0.0	
Yellow	4.0	5.0	4.0	0.0	0.0	0.0	
Red	2.0	2.0	2.0	0.0	0.0	0.0	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	12.0	70.0		58.0				30.0
Change Period, (*Y+R c*), s	6.0	7.0		7.0				6.0
Max Allow Headway (*MAH*), s	2.9	0.0		0.0				3.1
Queue Clearance Time (*g s*), s	6.0							26.0
Green Extension Time (*g e*), s	0.1	0.0		0.0				0.0
Phase Call Probability	0.98							1.00
Max Out Probability	0.00							1.00

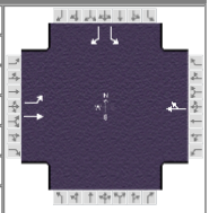
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	150	391			911					131		409
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1697	1781			1852					1682		1585
Queue Service Time (*g s*), s	4.0	10.4			47.5					6.4		24.0
Cycle Queue Clearance Time (*g c*), s	4.0	10.4			47.5					6.4		24.0
Green Ratio (*g/C*)	0.59	0.63			0.51					0.24		0.30
Capacity (*c*), veh/h	194	1122			944					404		476
Volume-to-Capacity Ratio (*X*)	0.772	0.348			0.965					0.325		0.861
Back of Queue (*Q*), ft/ln (90 th percentile)	83.4	153.3			741.8					118.4		368.7
Back of Queue (*Q*), veh/ln (90 th percentile)	3.1	5.8			29.2					4.4		14.5
Queue Storage Ratio (*RQ*) (90 th percentile)	0.67	0.00			0.00					0.30		0.92
Uniform Delay (*d 1*), s/veh	23.0	8.8			23.6					31.3		33.0
Incremental Delay (*d 2*), s/veh	2.5	0.9			22.0					0.2		14.2
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0					0.0		0.0
Control Delay (*d*), s/veh	25.5	9.6			45.6					31.5		47.2
Level of Service (LOS)	C	A			D					C		D
Approach Delay, s/veh / LOS	14.0	B		45.6	D		0.0			43.4	D	
Intersection Delay, s/veh / LOS	36.4						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.68	A	1.90	B	1.73	B	1.96	B
Bicycle LOS Score / LOS	1.38	A	1.99	B				F

 HCS™ Streets Version 7.9.5 Generated: 10/15/2021 12:07:42 PM

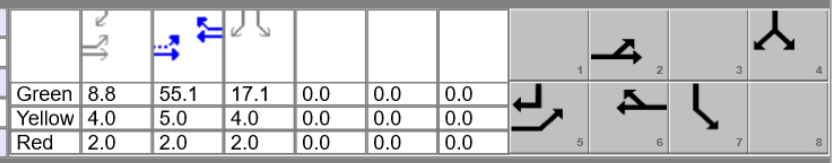
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 15, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.96
Urban Street	US 60	Analysis Year	2021	Analysis Period	1> 4:30
Intersection	Flat Rock Road	File Name	PM 21.xus		
Project Description	Grocery				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	272	759			549	49				63		246

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	8.8	55.1	17.1	0.0	0.0	0.0		
Yellow	4.0	5.0	4.0	0.0	0.0	0.0		
Red	2.0	2.0	2.0	0.0	0.0	0.0		

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	14.8	76.9		62.1				23.1
Change Period, (*Y+R c*), s	6.0	7.0		7.0				6.0
Max Allow Headway (*MAH*), s	2.9	0.0		0.0				3.1
Queue Clearance Time (*g s*), s	8.4							16.7
Green Extension Time (*g e*), s	0.4	0.0		0.0				0.4
Phase Call Probability	1.00							1.00
Max Out Probability	0.00							0.04

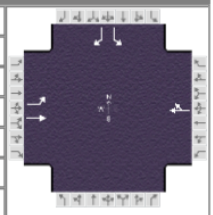
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	283	791			623					66		256
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1795	1870			1829					1697		1547
Queue Service Time (*g s*), s	6.4	22.0			23.2					3.3		14.7
Cycle Queue Clearance Time (*g c*), s	6.4	22.0			23.2					3.3		14.7
Green Ratio (*g/C*)	0.66	0.70			0.55					0.17		0.26
Capacity (*c*), veh/h	487	1307			1008					290		400
Volume-to-Capacity Ratio (*X*)	0.581	0.605			0.618					0.226		0.640
Back of Queue (*Q*), ft/ln (90 th percentile)	85.3	256			322.2					62.6		210.2
Back of Queue (*Q*), veh/ln (90 th percentile)	3.4	10.1			12.6					2.4		8.1
Queue Storage Ratio (*RQ*) (90 th percentile)	0.68	0.00			0.00					0.16		0.53
Uniform Delay (*d 1*), s/veh	11.8	7.8			15.3					35.7		32.9
Incremental Delay (*d 2*), s/veh	0.4	2.1			2.8					0.1		0.7
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0					0.0		0.0
Control Delay (*d*), s/veh	12.2	9.9			18.1					35.9		33.7
Level of Service (LOS)	B	A			B					D		C
Approach Delay, s/veh / LOS	10.5	B		18.1	B		0.0			34.1	C	
Intersection Delay, s/veh / LOS	16.6						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.66	A	1.89	B	1.73	B	1.96	B
Bicycle LOS Score / LOS	2.26	B	1.52	B				F

 HCS™ Streets Version 7.9.5 Generated: 10/15/2021 12:45:08 PM

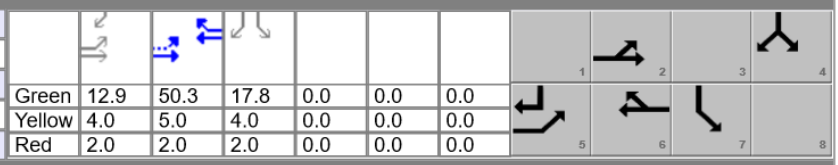
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 15, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.96
Urban Street	US 60	Analysis Year	2023 No Build	Analysis Period	1> 4:30
Intersection	Flat Rock Road	File Name	PM 23 NB.xus		
Project Description	Grocery				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	398	790			571	64				77		269

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	12.9	50.3	17.8	0.0	0.0	0.0						
Yellow	4.0	5.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	18.9	76.2		57.3				23.8
Change Period, (*Y+R c*), s	6.0	7.0		7.0				6.0
Max Allow Headway (*MAH*), s	2.9	0.0		0.0				3.1
Queue Clearance Time (*g s*), s	12.4							17.3
Green Extension Time (*g e*), s	0.5	0.0		0.0				0.4
Phase Call Probability	1.00							1.00
Max Out Probability	0.03							0.07

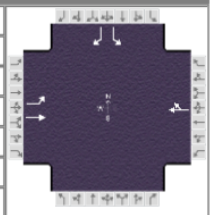
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	415	823			661					80		280
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1795	1870			1822					1697		1547
Queue Service Time (*g s*), s	10.4	24.2			28.3					4.1		15.3
Cycle Queue Clearance Time (*g c*), s	10.4	24.2			28.3					4.1		15.3
Green Ratio (*g/C*)	0.65	0.69			0.50					0.18		0.31
Capacity (*c*), veh/h	476	1295			917					301		475
Volume-to-Capacity Ratio (*X*)	0.871	0.635			0.721					0.266		0.590
Back of Queue (*Q*), ft/ln (90 th percentile)	202.5	280.6			403.2					76.5		213.5
Back of Queue (*Q*), veh/ln (90 th percentile)	8.0	11.0			15.8					2.9		8.2
Queue Storage Ratio (*RQ*) (90 th percentile)	1.62	0.00			0.00					0.19		0.53
Uniform Delay (*d 1*), s/veh	17.0	8.4			19.4					35.5		29.3
Incremental Delay (*d 2*), s/veh	9.2	2.4			4.9					0.2		0.4
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0					0.0		0.0
Control Delay (*d*), s/veh	26.2	10.8			24.3					35.7		29.8
Level of Service (LOS)	C	B			C					D		C
Approach Delay, s/veh / LOS	16.0	B		24.3	C		0.0			31.1	C	
Intersection Delay, s/veh / LOS	20.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.66	A	1.90	B	1.73	B	1.96	B
Bicycle LOS Score / LOS	2.53	C	1.58	B				F

 HCS™ Streets Version 7.9.5 Generated: 10/15/2021 12:45:08 PM

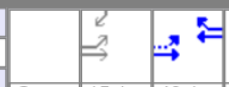
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 15, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.96
Urban Street	US 60	Analysis Year	2023 Build	Analysis Period	1> 4:30
Intersection	Flat Rock Road	File Name	PM 23 B.xus		
Project Description	Grocery				

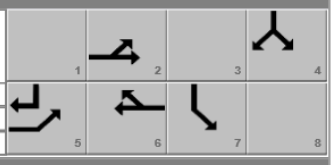


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	385	752			652	73				204		256

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	15.1	49.1	16.8	0.0	0.0	0.0						
Yellow	4.0	5.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	21.1	77.2		56.1				22.8
Change Period, (*Y+R c*), s	6.0	7.0		7.0				6.0
Max Allow Headway (*MAH*), s	2.9	0.0		0.0				3.1
Queue Clearance Time (*g s*), s	14.6							16.2
Green Extension Time (*g e*), s	0.4	0.0		0.0				0.6
Phase Call Probability	1.00							1.00
Max Out Probability	0.06							0.05

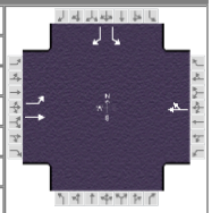
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	401	783			755					213		267
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1795	1870			1823					1697		1547
Queue Service Time (*g s*), s	12.6	21.5			36.0					11.9		14.2
Cycle Queue Clearance Time (*g c*), s	12.6	21.5			36.0					11.9		14.2
Green Ratio (*g/C*)	0.66	0.70			0.49					0.17		0.32
Capacity (*c*), veh/h	436	1313			895					285		493
Volume-to-Capacity Ratio (*X*)	0.920	0.597			0.844					0.745		0.540
Back of Queue (*Q*), ft/ln (90 th percentile)	237.1	247.9			524.2					202.7		199.3
Back of Queue (*Q*), veh/ln (90 th percentile)	9.4	9.8			20.5					7.6		7.7
Queue Storage Ratio (*RQ*) (90 th percentile)	1.90	0.00			0.00					0.51		0.50
Uniform Delay (*d 1*), s/veh	23.4	7.6			22.1					39.6		28.0
Incremental Delay (*d 2*), s/veh	16.7	2.0			9.6					2.2		0.3
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0					0.0		0.0
Control Delay (*d*), s/veh	40.0	9.6			31.7					41.8		28.4
Level of Service (LOS)	D	A			C					D		C
Approach Delay, s/veh / LOS	19.9	B		31.7	C		0.0			34.3	C	
Intersection Delay, s/veh / LOS	26.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.66	A	1.90	B	1.73	B	1.96	B
Bicycle LOS Score / LOS	2.44	B	1.73	B				F

 HCS™ Streets Version 7.9.5 Generated: 10/15/2021 12:45:08 PM

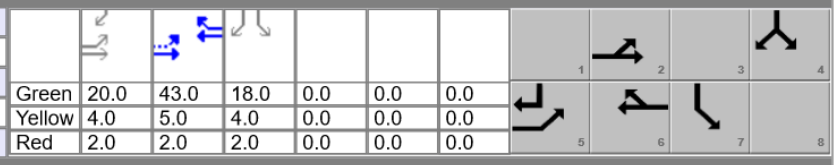
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 15, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.96
Urban Street	US 60	Analysis Year	2033 No Build	Analysis Period	1> 4:30
Intersection	Flat Rock Road	File Name	PM 33 NB.xus		
Project Description	Grocery				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	440	873			631	71				85		297

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	20.0	43.0	18.0	0.0	0.0	0.0		
Yellow	4.0	5.0	4.0	0.0	0.0	0.0		
Red	2.0	2.0	2.0	0.0	0.0	0.0		

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	26.0	76.0		50.0				24.0
Change Period, (*Y+R c*), s	6.0	7.0		7.0				6.0
Max Allow Headway (*MAH*), s	2.9	0.0		0.0				3.1
Queue Clearance Time (*g s*), s	21.3							17.5
Green Extension Time (*g e*), s	0.0	0.0		0.0				0.5
Phase Call Probability	1.00							1.00
Max Out Probability	1.00							0.10

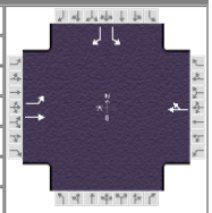
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	458	909			731					89		309
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1795	1870			1822					1697		1547
Queue Service Time (*g s*), s	19.3	29.3			38.2					4.5		15.5
Cycle Queue Clearance Time (*g c*), s	19.3	29.3			38.2					4.5		15.5
Green Ratio (*g/C*)	0.65	0.69			0.43					0.18		0.38
Capacity (*c*), veh/h	466	1291			784					305		587
Volume-to-Capacity Ratio (*X*)	0.982	0.705			0.932					0.290		0.527
Back of Queue (*Q*), ft/ln (90 th percentile)	501.7	335.3			619					84.9		209.8
Back of Queue (*Q*), veh/ln (90 th percentile)	19.9	13.2			24.2					3.2		8.1
Queue Storage Ratio (*RQ*) (90 th percentile)	4.01	0.00			0.00					0.21		0.52
Uniform Delay (*d 1*), s/veh	29.0	9.4			27.1					35.5		24.1
Incremental Delay (*d 2*), s/veh	36.8	3.2			19.3					0.2		0.3
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0					0.0		0.0
Control Delay (*d*), s/veh	65.9	12.6			46.4					35.7		24.3
Level of Service (LOS)	E	B			D					D		C
Approach Delay, s/veh / LOS	30.5	C		46.4	D		0.0			26.9	C	
Intersection Delay, s/veh / LOS	34.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.66	A	1.91	B	1.73	B	1.96	B
Bicycle LOS Score / LOS	2.74	C	1.69	B				F

 HCS™ Streets Version 7.9.5 Generated: 10/15/2021 12:45:08 PM

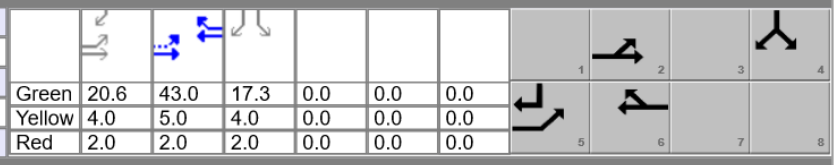
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 15, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.96
Urban Street	US 60	Analysis Year	2033 Build	Analysis Period	1> 4:30
Intersection	Flat Rock Road	File Name	PM 33 B.xus		
Project Description	Grocery				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	427	835			712	80				212		284

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	20.6	43.0	17.3	0.0	0.0	0.0						
Yellow	4.0	5.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	26.6	76.7		50.0				23.3
Change Period, (*Y+R c*), s	6.0	7.0		7.0				6.0
Max Allow Headway (*MAH*), s	2.9	0.0		0.0				3.1
Queue Clearance Time (*g s*), s	23.6							16.7
Green Extension Time (*g e*), s	0.0	0.0		0.0				0.7
Phase Call Probability	1.00							1.00
Max Out Probability	1.00							0.08

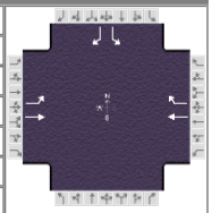
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	496	970			825					221		296
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1795	1870			1822					1697		1547
Queue Service Time (*g s*), s	21.6	35.9			44.0					12.4		14.7
Cycle Queue Clearance Time (*g c*), s	21.6	35.9			44.0					12.4		14.7
Green Ratio (*g/C*)	0.68	0.70			0.44					0.17		0.38
Capacity (*c*), veh/h	460	1303			784					294		587
Volume-to-Capacity Ratio (*X*)	1.078	0.745			1.052					0.750		0.504
Back of Queue (*Q*), ft/ln (90 th percentile)	502.4	352.8			886.4					210.7		200.3
Back of Queue (*Q*), veh/ln (90 th percentile)	19.9	13.9			34.6					7.9		7.7
Queue Storage Ratio (*RQ*) (90 th percentile)	4.02	0.00			0.00					0.53		0.50
Uniform Delay (*d 1*), s/veh	37.7	12.1			28.0					39.3		23.8
Incremental Delay (*d 2*), s/veh	41.6	0.6			46.6					2.8		0.2
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0					0.0		0.0
Control Delay (*d*), s/veh	79.3	12.7			74.7					42.1		24.0
Level of Service (LOS)	F	B			F					D		C
Approach Delay, s/veh / LOS	35.2	D		74.7	E		0.0			31.8	C	
Intersection Delay, s/veh / LOS	46.2						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.66	A	1.91	B	1.73	B	1.96	B
Bicycle LOS Score / LOS	2.66	C	1.85	B				F

 HCS™ Streets Version 7.9.5 Generated: 10/17/2021 11:32:00 PM

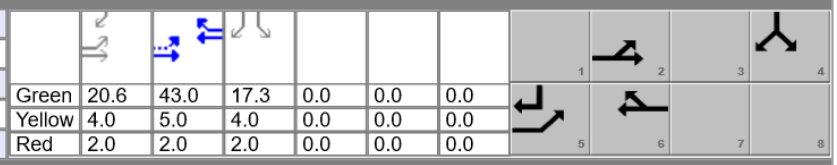
HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 15, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.96
Urban Street	US 60	Analysis Year	2033 Build	Analysis Period	1> 4:30
Intersection	Flat Rock Road	File Name	PM 33 B IMP.xus		
Project Description	Grocery Improved				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	427	835			712	80				212		284

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	20.6	43.0	17.3	0.0	0.0	0.0						
Yellow	4.0	5.0	4.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2		6				4
Case Number	1.0	4.0		7.3				9.0
Phase Duration, s	26.6	76.7		50.0				23.3
Change Period, (*Y+R c*), s	6.0	7.0		7.0				6.0
Max Allow Headway (*MAH*), s	2.9	0.0		0.0				3.1
Queue Clearance Time (*g s*), s	22.7							16.7
Green Extension Time (*g e*), s	0.0	0.0		0.0				0.7
Phase Call Probability	1.00							1.00
Max Out Probability	1.00							0.08

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate (*v*), veh/h	496	970			742	83				221		296
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1795	1870			1856	1610				1697		1547
Queue Service Time (*g s*), s	20.7	35.9			37.3	3.1				12.4		14.7
Cycle Queue Clearance Time (*g c*), s	20.7	35.9			37.3	3.1				12.4		14.7
Green Ratio (*g/C*)	0.68	0.70			0.44	0.44				0.17		0.38
Capacity (*c*), veh/h	509	1303			817	693				294		587
Volume-to-Capacity Ratio (*X*)	0.973	0.745			0.908	0.120				0.750		0.504
Back of Queue (*Q*), ft/ln (90 th percentile)	395.1	352.8			594	49.8				210.7		200.3
Back of Queue (*Q*), veh/ln (90 th percentile)	15.7	13.9			23.2	2.0				7.9		7.7
Queue Storage Ratio (*RQ*) (90 th percentile)	3.16	0.00			0.00	0.00				0.53		0.50
Uniform Delay (*d 1*), s/veh	33.3	12.1			26.5	17.1				39.3		23.8
Incremental Delay (*d 2*), s/veh	9.6	0.6			15.7	0.4				2.8		0.2
Initial Queue Delay (*d 3*), s/veh	0.0	0.0			0.0	0.0				0.0		0.0
Control Delay (*d*), s/veh	42.9	12.7			42.2	17.5				42.1		24.0
Level of Service (LOS)	D	B			D	B				D		C
Approach Delay, s/veh / LOS	22.9	C		39.7	D		0.0			31.8	C	
Intersection Delay, s/veh / LOS	29.5						C					

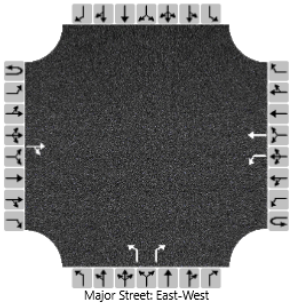
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.66	A	1.91	B	1.96	B	1.96	B
Bicycle LOS Score / LOS	2.66	C	1.85	B				F

 HCS™ Streets Version 7.9.5 Generated: 10/17/2021 11:32:00 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Chestnut G
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2021	North/South Street	Chestnut Glen
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.98
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		1	0	1		0	0	0
Configuration				TR		L	T			L		R				
Volume (veh/h)			455	1		0	936			6		0				
Percent Heavy Vehicles (%)						3				0		0				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.40		6.20				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.50		3.30				

Delay, Queue Length, and Level of Service

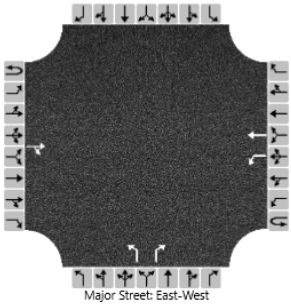
Flow Rate, v (veh/h)						0				6		0				
Capacity, c (veh/h)						1091				279		602				
v/c Ratio						0.00				0.02		0.00				
95% Queue Length, Q_{95} (veh)						0.0				0.1		0.0				
Control Delay (s/veh)						8.3				18.2		11.0				
Level of Service (LOS)						A				C		B				
Approach Delay (s/veh)					0.0				18.2							
Approach LOS									C							

HCS™ TWSC Version 7.9.5
Chestnut AM 21.xtw
Generated: 10/15/2021 2:55:59 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Chestnut G
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2023	North/South Street	Chestnut Glen
Time Analyzed	AM Peak Hour No Build	Peak Hour Factor	0.98
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		1	0	1		0	0	0
Configuration				TR		L	T			L		R				
Volume (veh/h)			483	1		0	1064			6		0				
Percent Heavy Vehicles (%)						3				0		0				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.40		6.20				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.50		3.30				

Delay, Queue Length, and Level of Service

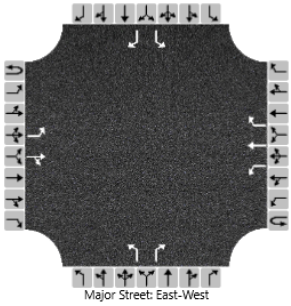
Flow Rate, v (veh/h)						0				6		0				
Capacity, c (veh/h)						1065				243		580				
v/c Ratio						0.00				0.03		0.00				
95% Queue Length, Q_{95} (veh)						0.0				0.1		0.0				
Control Delay (s/veh)						8.4				20.2		11.2				
Level of Service (LOS)						A				C		B				
Approach Delay (s/veh)					0.0				20.2							
Approach LOS									C							

HCS™ TWSC Version 7.9.5
Chestnut AM 23 NB.xtw
Generated: 10/15/2021 2:58:01 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Chestnut G
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2023	North/South Street	Chestnut Glen
Time Analyzed	AM Peak Hour Build	Peak Hour Factor	0.98
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	1		1	0	1		1	0	1
Configuration		L		TR		L	T	R		L		R		L		R
Volume (veh/h)		60	468	1		0	1042	75		6		0		0		62
Percent Heavy Vehicles (%)		3				3				0		0		3		0
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized						No				No				No		
Median Type | Storage		Left Only								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1		6.2		7.1		6.2
Critical Headway (sec)		4.13				4.13				7.10		6.20		7.13		6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5		3.3		3.5		3.3
Follow-Up Headway (sec)		2.23				2.23				3.50		3.30		3.53		3.30

Delay, Queue Length, and Level of Service

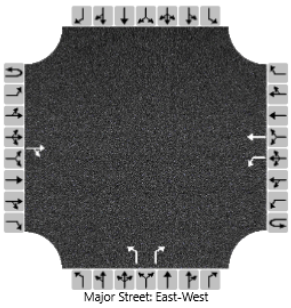
Flow Rate, v (veh/h)		61				0				6		0		0		63
Capacity, c (veh/h)		609				1079				106		591		182		274
v/c Ratio		0.10				0.00				0.06		0.00		0.00		0.23
95% Queue Length, Q_{95} (veh)		0.3				0.0				0.2		0.0		0.0		0.9
Control Delay (s/veh)		11.6				8.3				41.0		11.1		24.8		22.1
Level of Service (LOS)		B				A				E		B		C		C
Approach Delay (s/veh)		1.3				0.0				41.0				22.1		
Approach LOS										E				C		

HCS™ TWSC Version 7.9.5
Chestnut AM 23 B.xtw
Generated: 10/15/2021 3:03:43 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Chestnut G
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2033	North/South Street	Chestnut Glen
Time Analyzed	AM Peak Hour No Build	Peak Hour Factor	0.98
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		1	0	1		0	0	0
Configuration				TR		L	T			L		R				
Volume (veh/h)			534	1		0	1175			6		0				
Percent Heavy Vehicles (%)						3				0		0				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.40		6.20				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.50		3.30				

Delay, Queue Length, and Level of Service

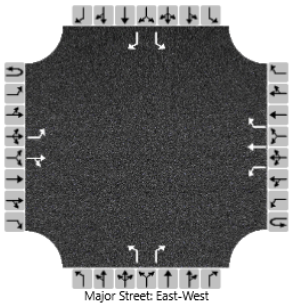
Flow Rate, v (veh/h)						0				6		0				
Capacity, c (veh/h)						1018				214		542				
v/c Ratio						0.00				0.03		0.00				
95% Queue Length, Q_{95} (veh)						0.0				0.1		0.0				
Control Delay (s/veh)						8.5				22.3		11.6				
Level of Service (LOS)						A				C		B				
Approach Delay (s/veh)					0.0				22.3							
Approach LOS									C							

HCS™ TWSC Version 7.9.5
Chestnut AM 33 NB.xtw
Generated: 10/15/2021 2:59:44 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Chestnut G
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2033	North/South Street	Chestnut Glen
Time Analyzed	AM Peak Hour Build	Peak Hour Factor	0.98
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	1		1	0	1		1	0	1
Configuration		L		TR		L	T	R		L		R		L		R
Volume (veh/h)		60	519	1		0	1153	75		6		0		0		62
Percent Heavy Vehicles (%)		3				3				0		0		3		0
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized						No				No				No		
Median Type | Storage		Left Only								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1		6.2		7.1		6.2
Critical Headway (sec)		4.13				4.13				7.10		6.20		7.13		6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5		3.3		3.5		3.3
Follow-Up Headway (sec)		2.23				2.23				3.50		3.30		3.53		3.30

Delay, Queue Length, and Level of Service

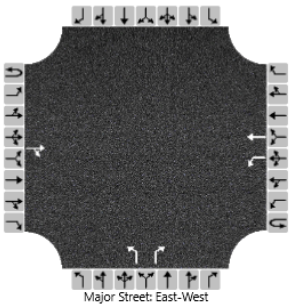
Flow Rate, v (veh/h)		61				0				6		0		0		63
Capacity, c (veh/h)		552				1032				80		553		157		235
v/c Ratio		0.11				0.00				0.08		0.00		0.00		0.27
95% Queue Length, Q_{95} (veh)		0.4				0.0				0.2		0.0		0.0		1.1
Control Delay (s/veh)		12.3				8.5				53.9		11.5		28.0		25.9
Level of Service (LOS)		B				A				F		B		D		D
Approach Delay (s/veh)		1.3				0.0				53.9				25.9		
Approach LOS										F				D		

HCS™ TWSC Version 7.9.5
Chestnut AM 33 B.xtw
Generated: 10/15/2021 3:17:42 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Chestnut G
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2021	North/South Street	Chestnut Glen
Time Analyzed	PM Peak Hour	Peak Hour Factor	0.96
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		1	0	1		0	0	0
Configuration				TR		L	T			L		R				
Volume (veh/h)			1030	5		1	793			6		2				
Percent Heavy Vehicles (%)						0				0		0				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.10				6.40		6.20				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.20				3.50		3.30				

Delay, Queue Length, and Level of Service

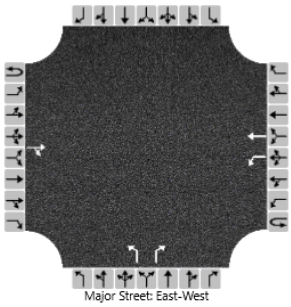
Flow Rate, v (veh/h)						1				6		2				
Capacity, c (veh/h)						654				205		269				
v/c Ratio						0.00				0.03		0.01				
95% Queue Length, Q_{95} (veh)						0.0				0.1		0.0				
Control Delay (s/veh)						10.5				23.1		18.5				
Level of Service (LOS)						B				C		C				
Approach Delay (s/veh)					0.0				22.0							
Approach LOS									C							

HCS™ TWSC Version 7.9.5
Chestnut PM 21.xtw
Generated: 10/15/2021 3:21:16 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Chestnut G
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2023	North/South Street	Chestnut Glen
Time Analyzed	PM Peak Hour No Build	Peak Hour Factor	0.96
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		1	0	1		0	0	0
Configuration				TR		L	T			L		R				
Volume (veh/h)			1186	5		1	839			6		2				
Percent Heavy Vehicles (%)						0				0		0				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.10				6.40		6.20				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.20				3.50		3.30				

Delay, Queue Length, and Level of Service

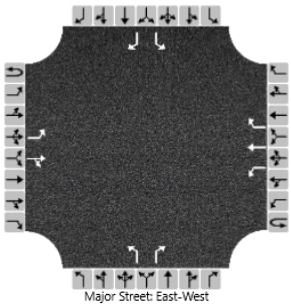
Flow Rate, v (veh/h)						1				6		2				
Capacity, c (veh/h)						568				175		216				
v/c Ratio						0.00				0.04		0.01				
95% Queue Length, Q_{95} (veh)						0.0				0.1		0.0				
Control Delay (s/veh)						11.3				26.3		21.8				
Level of Service (LOS)						B				D		C				
Approach Delay (s/veh)					0.0				25.2							
Approach LOS									D							

HCS™ TWSC Version 7.9.5
Chestnut PM 23 NB.xtw
Generated: 10/15/2021 3:22:40 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Chestnut G
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2023	North/South Street	Chestnut Glen
Time Analyzed	PM Peak Hour Build	Peak Hour Factor	0.96
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	1		1	0	1		1	0	1
Configuration		L		TR		L	T	R		L		R		L		R
Volume (veh/h)		119	1135	5		1	811	109		6		2		0		107
Percent Heavy Vehicles (%)		0				0				0		0		3		0
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized						No				No				No		
Median Type | Storage		Left Only								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1		6.2		7.1		6.2
Critical Headway (sec)		4.10				4.10				7.10		6.20		7.13		6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5		3.3		3.5		3.3
Follow-Up Headway (sec)		2.20				2.20				3.50		3.30		3.53		3.30

Delay, Queue Length, and Level of Service

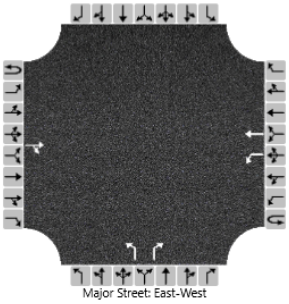
Flow Rate, v (veh/h)		124				1				6		2		0		111
Capacity, c (veh/h)		726				595				57		232		98		366
v/c Ratio		0.17				0.00				0.11		0.01		0.00		0.30
95% Queue Length, Q_{95} (veh)		0.6				0.0				0.4		0.0		0.0		1.3
Control Delay (s/veh)		11.0				11.1				76.0		20.6		41.9		19.1
Level of Service (LOS)		B				B				F		C		E		C
Approach Delay (s/veh)		1.0				0.0				62.2				19.1		
Approach LOS										F				C		

HCS™ TWSC Version 7.9.5
Chestnut PM 23 B.xtw
Generated: 10/15/2021 3:26:26 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Chestnut G
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2033	North/South Street	Chestnut Glen
Time Analyzed	PM Peak Hour No Build	Peak Hour Factor	0.96
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		1	0	1		0	0	0
Configuration				TR		L	T			L		R				
Volume (veh/h)			1310	5		1	927			6		2				
Percent Heavy Vehicles (%)						0				0		0				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.10				6.40		6.20				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.20				3.50		3.30				

Delay, Queue Length, and Level of Service

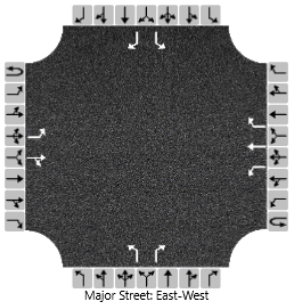
Flow Rate, v (veh/h)						1				6		2				
Capacity, c (veh/h)						508				150		182				
v/c Ratio						0.00				0.04		0.01				
95% Queue Length, Q_{95} (veh)						0.0				0.1		0.0				
Control Delay (s/veh)						12.1				30.0		25.0				
Level of Service (LOS)						B				D		D				
Approach Delay (s/veh)					0.0				28.7							
Approach LOS									D							

HCS™ TWSC Version 7.9.5
Chestnut PM 33 NB.xtw
Generated: 10/15/2021 3:24:07 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Chestnut G
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2033	North/South Street	Chestnut Glen
Time Analyzed	PM Peak Hour Build	Peak Hour Factor	0.96
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	1		1	0	1		1	0	1
Configuration		L		TR		L	T	R		L		R		L		R
Volume (veh/h)		119	1259	5		1	899	109		6		2		0		107
Percent Heavy Vehicles (%)		0				0				0		0		3		0
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized						No				No				No		
Median Type | Storage		Left Only								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1		6.2		7.1		6.2
Critical Headway (sec)		4.10				4.10				7.10		6.20		7.13		6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5		3.3		3.5		3.3
Follow-Up Headway (sec)		2.20				2.20				3.50		3.30		3.53		3.30

Delay, Queue Length, and Level of Service

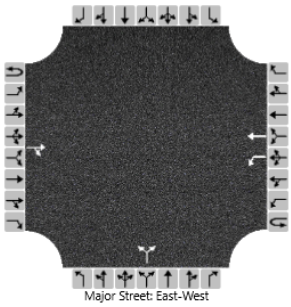
Flow Rate, v (veh/h)		124				1				6		2		0		111
Capacity, c (veh/h)		671				532				39		195		81		324
v/c Ratio		0.18				0.00				0.16		0.01		0.00		0.34
95% Queue Length, Q_{95} (veh)		0.7				0.0				0.5		0.0		0.0		1.5
Control Delay (s/veh)		11.6				11.8				115.6		23.6		49.6		21.8
Level of Service (LOS)		B				B				F		C		E		C
Approach Delay (s/veh)		1.0				0.0				92.6				21.8		
Approach LOS										F				C		

HCS™ TWSC Version 7.9.5
Chestnut PM 33 B.xtw
Generated: 10/15/2021 4:09:56 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Eastwood
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2021	North/South Street	Eastwood
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.98
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume (veh/h)			406	1		50	892			4		52				
Percent Heavy Vehicles (%)						2				25		12				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.12				6.65		6.32				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.22				3.73		3.41				

Delay, Queue Length, and Level of Service

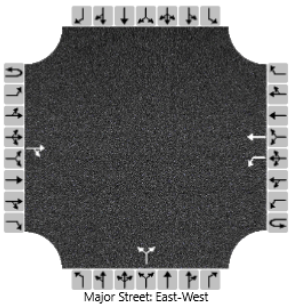
Flow Rate, v (veh/h)						51					57					
Capacity, c (veh/h)						1144					552					
v/c Ratio						0.04					0.10					
95% Queue Length, Q_{95} (veh)						0.1					0.3					
Control Delay (s/veh)						8.3					12.3					
Level of Service (LOS)						A					B					
Approach Delay (s/veh)					0.4				12.3							
Approach LOS									B							

HCS™ TWSC Version 7.9.5
Eastwood AM 21.xtw
Generated: 10/15/2021 4:23:45 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Eastwood
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2023	North/South Street	Eastwood
Time Analyzed	AM Peak Hour No Build	Peak Hour Factor	0.98
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume (veh/h)			432	1		50	1020			4		52				
Percent Heavy Vehicles (%)						2				25		12				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.12				6.65		6.32				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.22				3.73		3.41				

Delay, Queue Length, and Level of Service

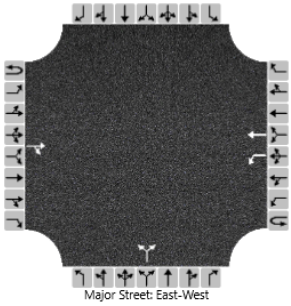
Flow Rate, v (veh/h)						51					57					
Capacity, c (veh/h)						1118					523					
v/c Ratio						0.05					0.11					
95% Queue Length, Q_{95} (veh)						0.1					0.4					
Control Delay (s/veh)						8.4					12.7					
Level of Service (LOS)						A					B					
Approach Delay (s/veh)					0.4				12.7							
Approach LOS									B							

HCS™ TWSC Version 7.9.5
Eastwood AM 23 NB.xtw
Generated: 10/15/2021 4:25:57 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Eastwood
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2023	North/South Street	Eastwood
Time Analyzed	AM Peak Hour Build	Peak Hour Factor	0.98
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume (veh/h)			462	0		61	1042			4		67				
Percent Heavy Vehicles (%)						2				25		12				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.12				6.65		6.32				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.22				3.73		3.41				

Delay, Queue Length, and Level of Service

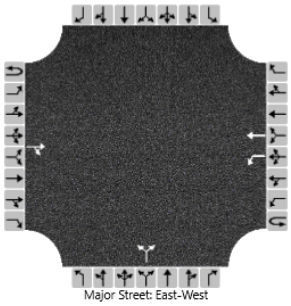
Flow Rate, v (veh/h)						62					72					
Capacity, c (veh/h)						1090					514					
v/c Ratio						0.06					0.14					
95% Queue Length, Q_{95} (veh)						0.2					0.5					
Control Delay (s/veh)						8.5					13.2					
Level of Service (LOS)						A					B					
Approach Delay (s/veh)					0.5				13.2							
Approach LOS									B							

HCS™ TWSC Version 7.9.5
Eastwood AM 23 B.xtw
Generated: 10/15/2021 4:28:27 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Eastwood
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2033	North/South Street	Eastwood
Time Analyzed	AM Peak Hour No Build	Peak Hour Factor	0.98
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume (veh/h)			477	0		55	1127			4		57				
Percent Heavy Vehicles (%)						2				25		12				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.12				6.65		6.32				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.22				3.73		3.41				

Delay, Queue Length, and Level of Service

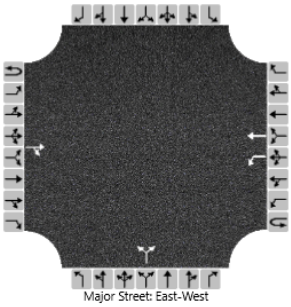
Flow Rate, v (veh/h)						56					62					
Capacity, c (veh/h)						1076					490					
v/c Ratio						0.05					0.13					
95% Queue Length, Q_{95} (veh)						0.2					0.4					
Control Delay (s/veh)						8.5					13.4					
Level of Service (LOS)						A					B					
Approach Delay (s/veh)					0.4				13.4							
Approach LOS									B							

HCS™ TWSC Version 7.9.5
Eastwood AM 33 NB.xtw
Generated: 10/15/2021 4:29:57 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Eastwood
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2033	North/South Street	Eastwood
Time Analyzed	AM Peak Hour Build	Peak Hour Factor	0.98
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume (veh/h)			507	0		66	1149			4		72				
Percent Heavy Vehicles (%)						2				25		12				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.12				6.65		6.32				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.22				3.73		3.41				

Delay, Queue Length, and Level of Service

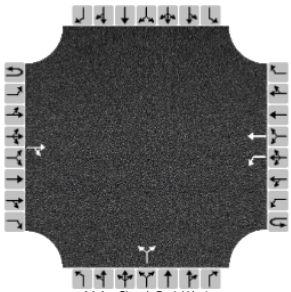
Flow Rate, v (veh/h)						67					78					
Capacity, c (veh/h)						1049					481					
v/c Ratio						0.06					0.16					
95% Queue Length, Q_{95} (veh)						0.2					0.6					
Control Delay (s/veh)						8.7					13.9					
Level of Service (LOS)						A					B					
Approach Delay (s/veh)					0.5				13.9							
Approach LOS									B							

HCS™ TWSC Version 7.9.5
Eastwood AM 33 B.xtw
Generated: 10/15/2021 4:31:48 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Eastwood C
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2021	North/South Street	Eastwood Cutoff Road
Time Analyzed	PM Peak Hour	Peak Hour Factor	0.96
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume (veh/h)			954	1		72	721			9		76				
Percent Heavy Vehicles (%)						4				11		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.14				6.51		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.24				3.60		3.33				

Delay, Queue Length, and Level of Service

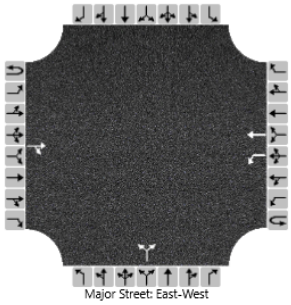
Flow Rate, v (veh/h)						75					89					
Capacity, c (veh/h)						688					279					
v/c Ratio						0.11					0.32					
95% Queue Length, Q_{95} (veh)						0.4					1.3					
Control Delay (s/veh)						10.9					23.8					
Level of Service (LOS)						B					C					
Approach Delay (s/veh)					1.0				23.8							
Approach LOS									C							

HCS™ TWSC Version 7.9.5
Eastwood PM 21.xtw
Generated: 10/15/2021 4:34:01 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Eastwood C
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2023	North/South Street	Eastwood Cutoff Road
Time Analyzed	PM Peak Hour No Build	Peak Hour Factor	0.96
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume (veh/h)			1115	1		72	773			9		76				
Percent Heavy Vehicles (%)						4				11		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.14				6.51		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.24				3.60		3.33				

Delay, Queue Length, and Level of Service

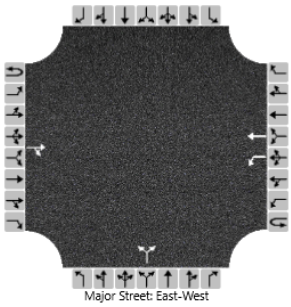
Flow Rate, v (veh/h)						75					89					
Capacity, c (veh/h)						594					224					
v/c Ratio						0.13					0.39					
95% Queue Length, Q_{95} (veh)						0.4					1.8					
Control Delay (s/veh)						11.9					31.1					
Level of Service (LOS)						B					D					
Approach Delay (s/veh)					1.0				31.1							
Approach LOS									D							

HCS™ TWSC Version 7.9.5
Eastwood PM 23 NB.xtw
Generated: 10/15/2021 4:35:21 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Eastwood C
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2023	North/South Street	Eastwood Cutoff Road
Time Analyzed	PM Peak Hour Build	Peak Hour Factor	0.96
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume (veh/h)			1160	1		95	818			9		99				
Percent Heavy Vehicles (%)						4				11		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.14				6.51		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.24				3.60		3.33				

Delay, Queue Length, and Level of Service

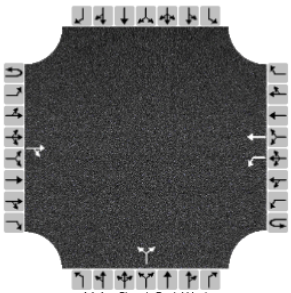
Flow Rate, v (veh/h)						99					113					
Capacity, c (veh/h)						570					211					
v/c Ratio						0.17					0.53					
95% Queue Length, Q_{95} (veh)						0.6					2.8					
Control Delay (s/veh)						12.6					39.9					
Level of Service (LOS)						B					E					
Approach Delay (s/veh)					1.3				39.9							
Approach LOS									E							

HCS™ TWSC Version 7.9.5
Eastwood PM 23 B.xtw
Generated: 10/15/2021 4:36:29 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Eastwood C
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2033	North/South Street	Eastwood Cutoff Road
Time Analyzed	PM Peak Hour No Build	Peak Hour Factor	0.96
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume (veh/h)			1232	1		80	854			10		84				
Percent Heavy Vehicles (%)						4				11		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.14				6.51		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.24				3.60		3.33				

Delay, Queue Length, and Level of Service

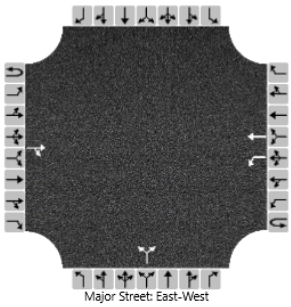
Flow Rate, v (veh/h)						83					98					
Capacity, c (veh/h)						534					190					
v/c Ratio						0.16					0.52					
95% Queue Length, Q_{95} (veh)						0.5					2.6					
Control Delay (s/veh)						13.0					42.5					
Level of Service (LOS)						B					E					
Approach Delay (s/veh)					1.1				42.5							
Approach LOS									E							

HCS™ TWSC Version 7.9.5
Eastwood PM 33 NB.xtw
Generated: 10/15/2021 4:37:59 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Eastwood C
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2033	North/South Street	Eastwood Cutoff Road
Time Analyzed	PM Peak Hour Build	Peak Hour Factor	0.96
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0
Configuration				TR		L	T				LR					
Volume (veh/h)			1277	1		103	899			10		107				
Percent Heavy Vehicles (%)						4				11		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.14				6.51		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.24				3.60		3.33				

Delay, Queue Length, and Level of Service

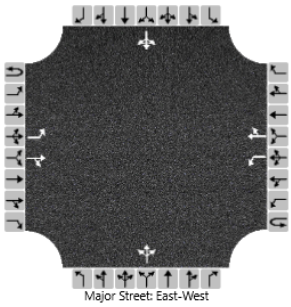
Flow Rate, v (veh/h)						107					122					
Capacity, c (veh/h)						512					179					
v/c Ratio						0.21					0.68					
95% Queue Length, Q_{95} (veh)						0.8					4.1					
Control Delay (s/veh)						13.9					59.9					
Level of Service (LOS)						B					F					
Approach Delay (s/veh)					1.4				59.9							
Approach LOS									F							

HCS™ TWSC Version 7.9.5
Eastwood PM 33 B.xtw
Generated: 10/15/2021 4:39:35 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Johnson
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2021	North/South Street	Johnson Road
Time Analyzed	AM Peak	Peak Hour Factor	0.97
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		0	1	0
Configuration		L		TR		L		TR			LTR				LTR	
Volume (veh/h)		21	434	0		4	998	5		14	7	2		3	3	37
Percent Heavy Vehicles (%)		0				0				7	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage		Left + Thru								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.10				4.10				7.17	6.50	6.20		7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.56	4.00	3.30		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

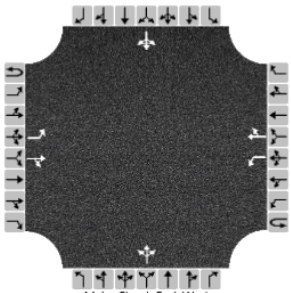
Flow Rate, v (veh/h)		22				4					24				44	
Capacity, c (veh/h)		680				1124					187				273	
v/c Ratio		0.03				0.00					0.13				0.16	
95% Queue Length, Q_{95} (veh)		0.1				0.0					0.4				0.6	
Control Delay (s/veh)		10.5				8.2					27.0				20.7	
Level of Service (LOS)		B				A					D				C	
Approach Delay (s/veh)		0.5				0.0					27.0				20.7	
Approach LOS											D				C	

HCS™ TWSC Version 7.9.5
Johnson AM 21.xtw
Generated: 10/17/2021 8:44:50 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Johnson
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2023	North/South Street	Johnson Road
Time Analyzed	AM Peak No Build	Peak Hour Factor	0.97
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		0	1	0
Configuration		L		TR		L		TR			LTR				LTR	
Volume (veh/h)		56	462	0		4	1143	42		14	7	2		45	18	225
Percent Heavy Vehicles (%)		0				0				7	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage		Left + Thru								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.10				4.10				7.17	6.50	6.20		7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.56	4.00	3.30		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

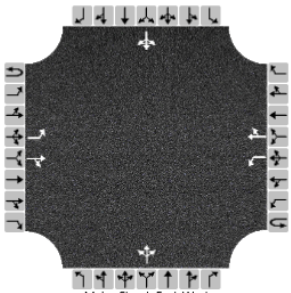
Flow Rate, v (veh/h)		58				4					24				297	
Capacity, c (veh/h)		578				1096									209	
v/c Ratio		0.10				0.00									1.42	
95% Queue Length, Q_{95} (veh)		0.3				0.0									17.4	
Control Delay (s/veh)		11.9				8.3									257.0	
Level of Service (LOS)		B				A									F	
Approach Delay (s/veh)		1.3				0.0								257.0		
Approach LOS														F		

HCS™ TWSC Version 7.9.5
Johnson AM 23 NB.xtw
Generated: 10/17/2021 8:46:16 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Johnson
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2023	North/South Street	Johnson Road
Time Analyzed	AM Peak Build	Peak Hour Factor	0.97
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		0	1	0
Configuration		L		TR		L		TR			LTR				LTR	
Volume (veh/h)		56	477	0		4	1154	53		14	7	2		60	18	225
Percent Heavy Vehicles (%)		0				0				7	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage		Left + Thru								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.10				4.10				7.17	6.50	6.20		7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.56	4.00	3.30		3.50	4.00	3.30

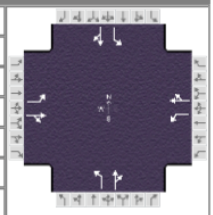
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		58				4					24				312	
Capacity, c (veh/h)		566				1082									201	
v/c Ratio		0.10				0.00									1.55	
95% Queue Length, Q_{95} (veh)		0.3				0.0									19.8	
Control Delay (s/veh)		12.1				8.3									314.7	
Level of Service (LOS)		B				A									F	
Approach Delay (s/veh)		1.3				0.0								314.7		
Approach LOS														F		

HCS™ TWSC Version 7.9.5
Johnson AM 23 B.xtw
Generated: 10/17/2021 11:10:04 PM

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 15, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.97
Urban Street	US 60	Analysis Year	2033 No Build	Analysis Period	1> 7:15
Intersection	Johnson Road	File Name	AM 33 No Build.xus		
Project Description	Grocery				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	62	511	1	4	1263	46	15	8	2	50	20	249

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	68.0	20.0	0.0	0.0	0.0	0.0	1	2	3	4		
Yellow	4.0	4.0	0.0	0.0	0.0	0.0						
Red	2.0	2.0	0.0	0.0	0.0	0.0	5	6	7	8		

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		6.0		6.0		6.0		6.0
Phase Duration, s		74.0		74.0		26.0		26.0
Change Period, ($Y+R_c$), s		6.0		6.0		6.0		6.0
Max Allow Headway (*MAH*), s		0.0		0.0		4.3		4.3
Queue Clearance Time (g_s), s						22.0		22.0
Green Extension Time (g_e), s		0.0		0.0		0.0		0.0
Phase Call Probability						1.00		1.00
Max Out Probability						1.00		1.00

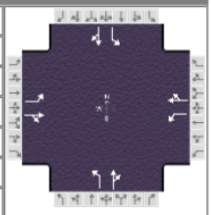
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	64	528		4	1220		15	10		52	277	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	465	1781		889	1859		1058	1834		1427	1629	
Queue Service Time (g_s), s	0.0	13.5		0.3	61.0		0.0	0.5		0.0	16.4	
Cycle Queue Clearance Time (g_c), s	68.0	13.5		13.7	61.0		20.0	0.5		20.0	16.4	
Green Ratio (*g/C*)	0.68	0.68		0.68	0.68		0.20	0.20		0.20	0.20	
Capacity (*c*), veh/h	72	1211		557	1264		72	367		72	326	
Volume-to-Capacity Ratio (*X*)	0.887	0.436		0.007	0.965		0.215	0.028		0.716	0.851	
Back of Queue (*Q*), ft/ln (90 th percentile)	133.8	188.5		2.1	661.8		19.5	9		82.8	293.5	
Back of Queue (*Q*), veh/ln (90 th percentile)	5.4	7.1		0.1	26.1		0.7	0.4		3.3	11.7	
Queue Storage Ratio (*RQ*) (90 th percentile)	0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh	50.0	7.3		13.4	14.4		50.0	32.2		50.0	38.6	
Incremental Delay (d_2), s/veh	77.7	1.1		0.0	10.5		1.5	0.0		28.5	18.9	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	127.7	8.4		13.4	24.9		51.5	32.2		78.5	57.5	
Level of Service (LOS)	F	A		B	C		D	C		E	E	
Approach Delay, s/veh / LOS	21.3	C		24.9	C		43.8	D		60.8	E	
Intersection Delay, s/veh / LOS	29.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.86	B	1.86	B	1.94	B	1.94	B
Bicycle LOS Score / LOS	1.46	A	2.72	C	0.53	A	1.03	A

 HCS™ Streets Version 7.9.5 Generated: 10/17/2021 11:14:00 PM

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 15, 2021	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.97
Urban Street	US 60	Analysis Year	2033 Build	Analysis Period	1> 7:15
Intersection	Johnson Road	File Name	AM 33 Build.xus		
Project Description	Grocery				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	62	526	1	4	1275	57	15	8	2	65	20	249

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

								1	2	3	4	
Green	68.1	19.9	0.0	0.0	0.0	0.0						
Yellow	4.0	4.0	0.0	0.0	0.0	0.0		5	6	7	8	
Red	2.0	2.0	0.0	0.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		6.0		6.0		6.0		6.0
Phase Duration, s		74.1		74.1		25.9		25.9
Change Period, (*Y+R c*), s		6.0		6.0		6.0		6.0
Max Allow Headway (*MAH*), s		0.0		0.0		3.3		3.3
Queue Clearance Time (*g s*), s						19.8		18.4
Green Extension Time (*g e*), s		0.0		0.0		0.0		0.2
Phase Call Probability						1.00		1.00
Max Out Probability						1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	64	543		4	1267		15	10		67	277	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	444	1781		877	1856		1058	1834		1427	1629	
Queue Service Time (*g s*), s	0.0	14.0		0.2	68.1		1.4	0.5		4.0	16.4	
Cycle Queue Clearance Time (*g c*), s	68.1	14.0		14.2	68.1		17.8	0.5		4.4	16.4	
Green Ratio (*g/C*)	0.68	0.68		0.68	0.68		0.20	0.20		0.20	0.20	
Capacity (*c*), veh/h	72	1213		546	1264		109	365		350	324	
Volume-to-Capacity Ratio (*X*)	0.885	0.448		0.007	1.002		0.142	0.028		0.192	0.856	
Back of Queue (*Q*), ft/ln (90 th percentile)	133.6	193.3		1.7	770.5		18	9		61.4	292.9	
Back of Queue (*Q*), veh/ln (90 th percentile)	5.3	7.3		0.1	30.3		0.7	0.4		2.5	11.7	
Queue Storage Ratio (*RQ*) (90 th percentile)	0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Uniform Delay (*d 1*), s/veh	50.0	7.3		11.1	16.1		47.3	32.3		34.0	38.7	
Incremental Delay (*d 2*), s/veh	77.1	1.2		0.0	15.0		0.2	0.0		0.1	18.6	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	127.1	8.5		11.2	31.1		47.5	32.3		34.1	57.3	
Level of Service (LOS)	F	A		B	F		D	C		C	E	
Approach Delay, s/veh / LOS	21.0	C		31.1	C		41.4	D		52.8	D	
Intersection Delay, s/veh / LOS	31.8						C					

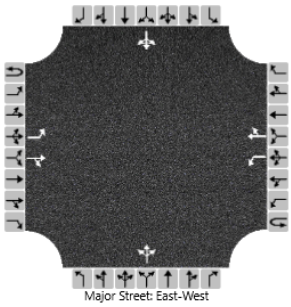
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.86	B	1.86	B	1.94	B	1.94	B
Bicycle LOS Score / LOS	1.49	A	2.76	C	0.53	A	1.06	A

 HCS™ Streets Version 7.9.5 Generated: 10/17/2021 11:26:29 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Johnson
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2021	North/South Street	Johnson Road
Time Analyzed	PM Peak	Peak Hour Factor	0.97
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		0	1	0
Configuration		L		TR		L		TR			LTR				LTR	
Volume (veh/h)		33	1047	1		1	789	12		10	4	3		22	16	45
Percent Heavy Vehicles (%)		0				0				0	0	0		0	6	2
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage		Left + Thru								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.10				4.10				7.10	6.50	6.20		7.10	6.56	6.22
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30		3.50	4.05	3.32

Delay, Queue Length, and Level of Service

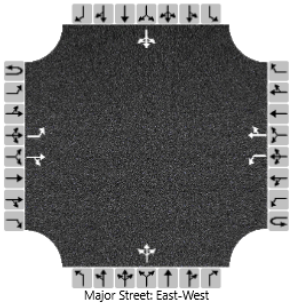
Flow Rate, v (veh/h)		34				1					18				86	
Capacity, c (veh/h)		814				653					151				226	
v/c Ratio		0.04				0.00					0.12				0.38	
95% Queue Length, Q_{95} (veh)		0.1				0.0					0.4				1.7	
Control Delay (s/veh)		9.6				10.5					32.0				30.2	
Level of Service (LOS)		A				B					D				D	
Approach Delay (s/veh)		0.3				0.0					32.0				30.2	
Approach LOS											D				D	

HCS™ TWSC Version 7.9.5
Johnson PM 21.xtw
Generated: 10/17/2021 8:47:10 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Johnson
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2023	North/South Street	Johnson Road
Time Analyzed	PM Peak No Build	Peak Hour Factor	0.97
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		0	1	0
Configuration		L		TR		L		TR			LTR				LTR	
Volume (veh/h)		239	1224	1		1	847	63		10	4	3		40	16	152
Percent Heavy Vehicles (%)		0				0				0	0	0		0	6	2
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Left + Thru								1							

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.10				4.10				7.10	6.50	6.20		7.10	6.56	6.22
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30		3.50	4.05	3.32

Delay, Queue Length, and Level of Service

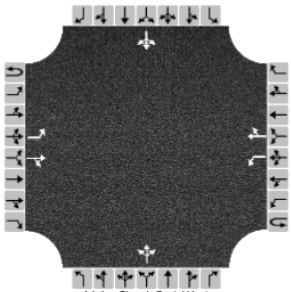
Flow Rate, v (veh/h)		246				1					18				214	
Capacity, c (veh/h)		739				557					119				145	
v/c Ratio		0.33				0.00					0.15				1.48	
95% Queue Length, Q_{95} (veh)		1.5				0.0					0.5				14.3	
Control Delay (s/veh)		12.3				11.5					40.4				304.0	
Level of Service (LOS)		B				B					E				F	
Approach Delay (s/veh)	2.0				0.0				40.4				304.0			
Approach LOS									E				F			

HCS™ TWSC Version 7.9.5
Johnson PM 23 NB.xtw
Generated: 10/17/2021 8:50:14 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Shelbyville at Johnson
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/15/2021	East/West Street	Shelbyville Road
Analysis Year	2023	North/South Street	Johnson Road
Time Analyzed	PM Peak Build	Peak Hour Factor	0.97
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		0	1	0
Configuration		L		TR		L		TR			LTR				LTR	
Volume (veh/h)		239	1247	1		1	870	85		10	4	3		62	16	152
Percent Heavy Vehicles (%)		0				0				0	0	0		0	6	2
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage		Left + Thru								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.10				4.10				7.10	6.50	6.20		7.10	6.56	6.22
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30		3.50	4.05	3.32

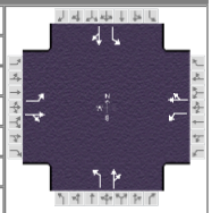
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		246				1					18				237	
Capacity, c (veh/h)		710				546					99				118	
v/c Ratio		0.35				0.00					0.18				2.00	
95% Queue Length, Q_{95} (veh)		1.6				0.0					0.6				19.4	
Control Delay (s/veh)		12.7				11.6					49.2				541.3	
Level of Service (LOS)		B				B					E				F	
Approach Delay (s/veh)		2.0				0.0					49.2				541.3	
Approach LOS											E				F	

HCS™ TWSC Version 7.9.5
Johnson PM 23 B.xtw
Generated: 10/17/2021 11:12:32 PM

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 15, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.97
Urban Street	US 60	Analysis Year	2033 No Build	Analysis Period	1> 4:30
Intersection	Johnson Road	File Name	PM 33 NB.xus		
Project Description	Grocery				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	264	1352	1	1	936	70	11	4	3	44	18	168

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	73.1	14.9	0.0	0.0	0.0	0.0						
Yellow	4.0	4.0	0.0	0.0	0.0	0.0						
Red	2.0	2.0	0.0	0.0	0.0	0.0						

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		6.0		6.0		6.0		6.0
Phase Duration, s		79.1		79.1		20.9		20.9
Change Period, (*Y+R* $_c$), s		6.0		6.0		6.0		6.0
Max Allow Headway (*MAH*), s		0.0		0.0		3.3		3.3
Queue Clearance Time (g_s), s						14.6		13.7
Green Extension Time (g_e), s		0.0		0.0		0.3		0.3
Phase Call Probability						1.00		1.00
Max Out Probability						0.17		0.08

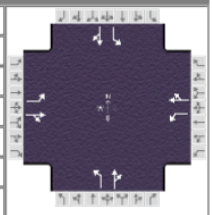
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	272	1395		1	966		11	7		45	192	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	591	1885		393	1818		1210	1764		1431	1583	
Queue Service Time (g_s), s	43.0	73.7		0.0	31.0		0.9	0.3		2.8	11.7	
Cycle Queue Clearance Time (g_c), s	74.1	73.7		73.1	31.0		12.6	0.3		3.1	11.7	
Green Ratio (*g/C*)	0.74	0.74		0.73	0.73		0.15	0.15		0.15	0.15	
Capacity (*c*), veh/h	326	1397		72	1329		111	263		280	236	
Volume-to-Capacity Ratio (*X*)	0.834	0.999		0.013	0.727		0.102	0.027		0.162	0.813	
Back of Queue (*Q*), ft/ln (90 th percentile)	294.6	896.2		1.2	306.4		12.5	6.8		43.8	203.6	
Back of Queue (*Q*), veh/ln (90 th percentile)	11.8	35.6		0.0	11.9		0.5	0.3		1.8	7.9	
Queue Storage Ratio (*RQ*) (90 th percentile)	0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Uniform Delay (d_1), s/veh	29.9	12.9		55.5	8.0		47.3	36.4		37.7	41.2	
Incremental Delay (d_2), s/veh	21.5	23.7		0.2	1.8		0.1	0.0		0.1	8.3	
Initial Queue Delay (d_3), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	51.4	36.6		55.7	9.8		47.4	36.4		37.8	49.5	
Level of Service (LOS)	D	D		E	A		D	D		D	D	
Approach Delay, s/veh / LOS	39.1	D		9.8	A		43.1	D		47.2	D	
Intersection Delay, s/veh / LOS	30.0						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.85	B	1.85	B	1.94	B	1.94	B
Bicycle LOS Score / LOS	3.24	C	2.20	B	0.52	A	0.88	A

 HCS™ Streets Version 7.9.5 Generated: 10/17/2021 11:32:00 PM

HCS7 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Oct 15, 2021	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.97
Urban Street	US 60	Analysis Year	2033 Build	Analysis Period	1> 4:30
Intersection	Johnson Road	File Name	PM 33 B.xus		
Project Description	Grocery				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	264	1375	1	1	959	92	11	4	3	66	18	168

Signal Information					EB		WB		NB		SB	
Cycle, s	100.0	Reference Phase	2									
Offset, s	0	Reference Point	End	Green	73.1	14.9	0.0	0.0	0.0	0.0		
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.0	4.0	0.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	0.0	0.0	0.0		

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		6.0		6.0		6.0		6.0
Phase Duration, s		79.1		79.1		20.9		20.9
Change Period, (*Y+R c*), s		6.0		6.0		6.0		6.0
Max Allow Headway (*MAH*), s		0.0		0.0		3.3		3.3
Queue Clearance Time (*g s*), s						14.6		13.7
Green Extension Time (*g e*), s		0.0		0.0		0.3		0.3
Phase Call Probability						1.00		1.00
Max Out Probability						0.18		0.09

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	272	1419		1	1017		11	7		68	192	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	563	1885		384	1812		1210	1764		1431	1583	
Queue Service Time (*g s*), s	38.1	74.1		0.0	35.8		0.9	0.3		4.3	11.7	
Cycle Queue Clearance Time (*g c*), s	74.1	74.1		73.1	35.8		12.6	0.3		4.6	11.7	
Green Ratio (*g/C*)	0.74	0.74		0.73	0.73		0.15	0.15		0.15	0.15	
Capacity (*c*), veh/h	287	1396		72	1324		111	263		281	236	
Volume-to-Capacity Ratio (*X*)	0.949	1.016		0.013	0.768		0.102	0.027		0.242	0.811	
Back of Queue (*Q*), ft/ln (90 th percentile)	347.7	965		1.2	346.5		12.5	6.7		66.9	203.3	
Back of Queue (*Q*), veh/ln (90 th percentile)	13.9	38.3		0.0	13.4		0.5	0.3		2.7	7.9	
Queue Storage Ratio (*RQ*) (90 th percentile)	0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Uniform Delay (*d 1*), s/veh	34.9	13.0		55.6	9.1		47.3	36.3		38.3	41.2	
Incremental Delay (*d 2*), s/veh	41.5	28.1		0.1	1.6		0.1	0.0		0.2	8.2	
Initial Queue Delay (*d 3*), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay (*d*), s/veh	76.4	41.1		55.8	10.7		47.4	36.4		38.5	49.4	
Level of Service (LOS)	E	F		E	B		D	D		D	D	
Approach Delay, s/veh / LOS	46.8	D		10.7	B		43.1	D		46.5	D	
Intersection Delay, s/veh / LOS	34.4						C					

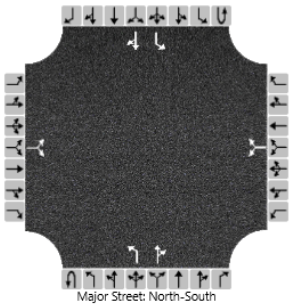
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.85	B	1.85	B	1.94	B	1.94	B
Bicycle LOS Score / LOS	3.28	C	2.28	B	0.52	A	0.92	A

 HCS™ Streets Version 7.9.5 Generated: 10/17/2021 11:32:00 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Cotswold G at Flat Rock
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/17/2021	East/West Street	Cotswold Green Ln
Analysis Year	2021	North/South Street	Flat Rock Road
Time Analyzed	AM Peak	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

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	1	0		0	1	0	0	1	1	0	0	1	1	0
Configuration			LR				LR			L		TR		L		TR
Volume (veh/h)		1		10		10		0		10	139	1		0	287	3
Percent Heavy Vehicles (%)		0		0		0		0		1				0		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Left Only								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2		7.1		6.2		4.1				4.1		
Critical Headway (sec)		7.10		6.20		7.10		6.20		4.11				4.10		
Base Follow-Up Headway (sec)		3.5		3.3		3.5		3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50		3.30		3.50		3.30		2.21				2.20		

Delay, Queue Length, and Level of Service

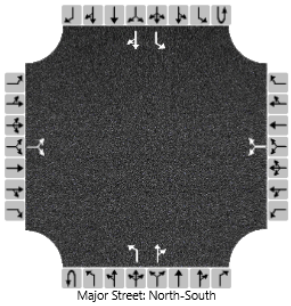
Flow Rate, v (veh/h)			12				11			11				0		
Capacity, c (veh/h)			722				561			1261				1447		
v/c Ratio			0.02				0.02			0.01				0.00		
95% Queue Length, Q_{95} (veh)			0.0				0.1			0.0				0.0		
Control Delay (s/veh)			10.1				11.5			7.9				7.5		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)		10.1				11.5				0.5				0.0		
Approach LOS		B				B										

HCS™ TWSC Version 7.9.5
Cotswold AM 21.xtw
Generated: 10/17/2021 10:38:28 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Cotswold G at Flat Rock
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/17/2021	East/West Street	Cotswold Green Ln
Analysis Year	2023	North/South Street	Flat Rock Road
Time Analyzed	AM Peak No Build	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

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	1	0		0	1	0	0	1	1	0	0	1	1	0
Configuration			LR				LR			L		TR		L		TR
Volume (veh/h)		1		10		10		0		10	161	1		0	407	3
Percent Heavy Vehicles (%)		0		0		0		0		1				0		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Left Only								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2		7.1		6.2		4.1				4.1		
Critical Headway (sec)		7.10		6.20		7.10		6.20		4.11				4.10		
Base Follow-Up Headway (sec)		3.5		3.3		3.5		3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50		3.30		3.50		3.30		2.21				2.20		

Delay, Queue Length, and Level of Service

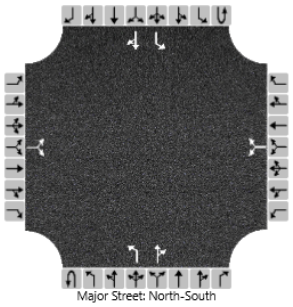
Flow Rate, v (veh/h)			12				11			11				0		
Capacity, c (veh/h)			614				476			1133				1419		
v/c Ratio			0.02				0.02			0.01				0.00		
95% Queue Length, Q_{95} (veh)			0.1				0.1			0.0				0.0		
Control Delay (s/veh)			11.0				12.7			8.2				7.5		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)		11.0				12.7				0.5				0.0		
Approach LOS		B				B										

HCS™ TWSC Version 7.9.5
Cotswold AM 23 NB.xtw
Generated: 10/17/2021 10:41:48 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Cotswold G at Flat Rock
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/17/2021	East/West Street	Cotswold Green Ln
Analysis Year	2023	North/South Street	Flat Rock Road
Time Analyzed	AM Peak Build	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

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	1	0		0	1	0	0	1	1	0	0	1	1	0
Configuration			LR				LR			L		TR		L		TR
Volume (veh/h)		1		10		10		0		10	194	1		0	452	3
Percent Heavy Vehicles (%)		0		0		0		0		1				0		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Left Only								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2		7.1		6.2		4.1				4.1		
Critical Headway (sec)		7.10		6.20		7.10		6.20		4.11				4.10		
Base Follow-Up Headway (sec)		3.5		3.3		3.5		3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50		3.30		3.50		3.30		2.21				2.20		

Delay, Queue Length, and Level of Service

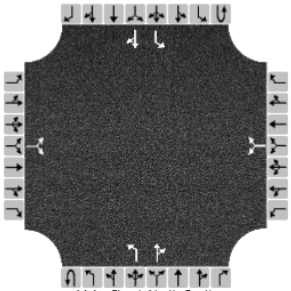
Flow Rate, v (veh/h)			12				11			11				0		
Capacity, c (veh/h)			576				440			1089				1378		
v/c Ratio			0.02				0.02			0.01				0.00		
95% Queue Length, Q_{95} (veh)			0.1				0.1			0.0				0.0		
Control Delay (s/veh)			11.4				13.4			8.3				7.6		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)		11.4				13.4				0.4				0.0		
Approach LOS		B				B										

HCS™ TWSC Version 7.9.5
Cotswold AM 23 B.xtw
Generated: 10/17/2021 10:43:04 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Cotswold G at Flat Rock
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/17/2021	East/West Street	Cotswold Green Ln
Analysis Year	2033	North/South Street	Flat Rock Road
Time Analyzed	AM Peak No Build	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

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	1	0		0	1	0	0	1	1	0	0	1	1	0
Configuration			LR				LR			L		TR		L		TR
Volume (veh/h)		1		10		10		0		10	179	1		0	449	3
Percent Heavy Vehicles (%)		0		0		0		0		1				0		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2		7.1		6.2		4.1				4.1		
Critical Headway (sec)		7.10		6.20		7.10		6.20		4.11				4.10		
Base Follow-Up Headway (sec)		3.5		3.3		3.5		3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50		3.30		3.50		3.30		2.21				2.20		

Delay, Queue Length, and Level of Service

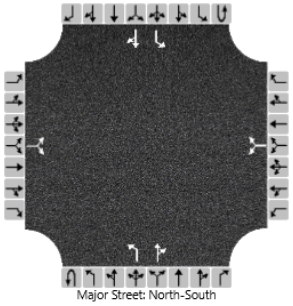
Flow Rate, v (veh/h)			12				11			11				0		
Capacity, c (veh/h)			579				446			1092				1397		
v/c Ratio			0.02				0.02			0.01				0.00		
95% Queue Length, Q_{95} (veh)			0.1				0.1			0.0				0.0		
Control Delay (s/veh)			11.3				13.3			8.3				7.6		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)	11.3				13.3				0.4				0.0			
Approach LOS	B				B											

HCS™ TWSC Version 7.9.5
Cotswold AM 33 NB.xtw
Generated: 10/17/2021 10:46:01 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Cotswold G at Flat Rock
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/17/2021	East/West Street	Cotswold Green Ln
Analysis Year	2033	North/South Street	Flat Rock Road
Time Analyzed	AM Peak Build	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

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	1	0		0	1	0	0	1	1	0	0	1	1	0
Configuration			LR				LR			L		TR		L		TR
Volume (veh/h)		1		10		10		0		10	212	1		0	494	3
Percent Heavy Vehicles (%)		0		0		0		0		1				0		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Left Only								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2		7.1		6.2		4.1				4.1		
Critical Headway (sec)		7.10		6.20		7.10		6.20		4.11				4.10		
Base Follow-Up Headway (sec)		3.5		3.3		3.5		3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50		3.30		3.50		3.30		2.21				2.20		

Delay, Queue Length, and Level of Service

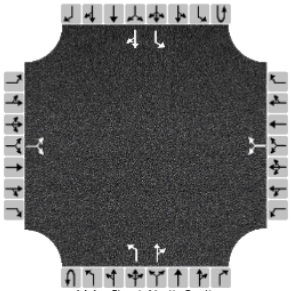
Flow Rate, v (veh/h)			12				11			11				0		
Capacity, c (veh/h)			544				413			1048				1356		
v/c Ratio			0.02				0.03			0.01				0.00		
95% Queue Length, Q_{95} (veh)			0.1				0.1			0.0				0.0		
Control Delay (s/veh)			11.8				14.0			8.5				7.7		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)		11.8				14.0				0.4				0.0		
Approach LOS		B				B										

HCS™ TWSC Version 7.9.5
Cotswold AM 33 B.xtw
Generated: 10/17/2021 10:47:40 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Cotswold G at Flat Rock
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/17/2021	East/West Street	Cotswold Green Ln
Analysis Year	2021	North/South Street	Flat Rock Road
Time Analyzed	PM Peak	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

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	1	0		0	1	0	0	1	1	0	0	1	1	0
Configuration			LR				LR			L		TR		L		TR
Volume (veh/h)		2		18		6		0		30	285	9		1	283	2
Percent Heavy Vehicles (%)		0		22		0		0		7				0		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2		7.1		6.2		4.1				4.1		
Critical Headway (sec)		7.10		6.42		7.10		6.20		4.17				4.10		
Base Follow-Up Headway (sec)		3.5		3.3		3.5		3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50		3.50		3.50		3.30		2.26				2.20		

Delay, Queue Length, and Level of Service

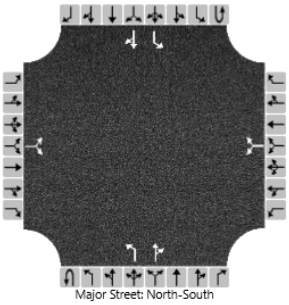
Flow Rate, v (veh/h)			21				6			32				1		
Capacity, c (veh/h)			665				455			1233				1262		
v/c Ratio			0.03				0.01			0.03				0.00		
95% Queue Length, Q_{95} (veh)			0.1				0.0			0.1				0.0		
Control Delay (s/veh)			10.6				13.0			8.0				7.9		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)	10.6				13.0				0.7				0.0			
Approach LOS	B				B											

HCS™ TWSC Version 7.9.5
Cotswold PM 21.xtw
Generated: 10/17/2021 10:51:41 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Cotswold G at Flat Rock
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/17/2021	East/West Street	Cotswold Green Ln
Analysis Year	2023	North/South Street	Flat Rock Road
Time Analyzed	PM Peak No Build	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

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	1	0		0	1	0	0	1	1	0	0	1	1	0
Configuration			LR				LR			L		TR		L		TR
Volume (veh/h)		2		18		6		0		30	423	9		1	322	2
Percent Heavy Vehicles (%)		0		22		0		0		7				0		
Proportion Time Blocked																
Percent Grade (%)	0				0											
Right Turn Channelized																
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2		7.1		6.2		4.1				4.1		
Critical Headway (sec)		7.10		6.42		7.10		6.20		4.17				4.10		
Base Follow-Up Headway (sec)		3.5		3.3		3.5		3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50		3.50		3.50		3.30		2.26				2.20		

Delay, Queue Length, and Level of Service

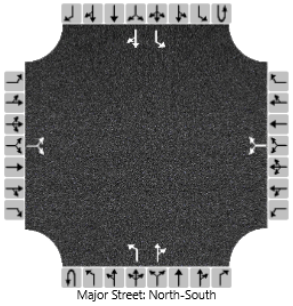
Flow Rate, v (veh/h)			21				6			32				1		
Capacity, c (veh/h)			617				380			1191				1117		
v/c Ratio			0.03				0.02			0.03				0.00		
95% Queue Length, Q_{95} (veh)			0.1				0.1			0.1				0.0		
Control Delay (s/veh)			11.0				14.6			8.1				8.2		
Level of Service (LOS)			B				B			A				A		
Approach Delay (s/veh)	11.0				14.6				0.5				0.0			
Approach LOS	B				B											

HCS™ TWSC Version 7.9.5
Cotswold PM 23 NB.xtw
Generated: 10/17/2021 10:52:48 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Cotswold G at Flat Rock
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/17/2021	East/West Street	Cotswold Green Ln
Analysis Year	2023	North/South Street	Flat Rock Road
Time Analyzed	PM Peak Build	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

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	1	0		0	1	0	0	1	1	0	0	1	1	0
Configuration			LR				LR			L		TR		L		TR
Volume (veh/h)		2		18		6		0		30	491	9		1	390	2
Percent Heavy Vehicles (%)		0		22		0		0		7				0		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Left Only								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2		7.1		6.2		4.1				4.1		
Critical Headway (sec)		7.10		6.42		7.10		6.20		4.17				4.10		
Base Follow-Up Headway (sec)		3.5		3.3		3.5		3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50		3.50		3.50		3.30		2.26				2.20		

Delay, Queue Length, and Level of Service

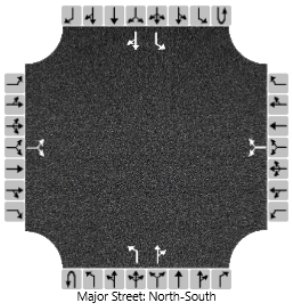
Flow Rate, v (veh/h)			21				6			32				1		
Capacity, c (veh/h)			558				333			1120				1051		
v/c Ratio			0.04				0.02			0.03				0.00		
95% Queue Length, Q_{95} (veh)			0.1				0.1			0.1				0.0		
Control Delay (s/veh)			11.7				16.0			8.3				8.4		
Level of Service (LOS)			B				C			A				A		
Approach Delay (s/veh)		11.7				16.0				0.5				0.0		
Approach LOS		B				C										

HCS™ TWSC Version 7.9.5
Cotswold PM 23 B.xtw
Generated: 10/17/2021 10:53:43 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Cotswold G at Flat Rock
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/17/2021	East/West Street	Cotswold Green Ln
Analysis Year	2033	North/South Street	Flat Rock Road
Time Analyzed	PM Peak No Build	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

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	1	0		0	1	0	0	1	1	0	0	1	1	0
Configuration			LR				LR			L		TR		L		TR
Volume (veh/h)		2		18		6		0		30	472	9		1	368	2
Percent Heavy Vehicles (%)		0		22		0		0		7				0		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Left Only								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2		7.1		6.2		4.1				4.1		
Critical Headway (sec)		7.10		6.42		7.10		6.20		4.17				4.10		
Base Follow-Up Headway (sec)		3.5		3.3		3.5		3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50		3.50		3.50		3.30		2.26				2.20		

Delay, Queue Length, and Level of Service

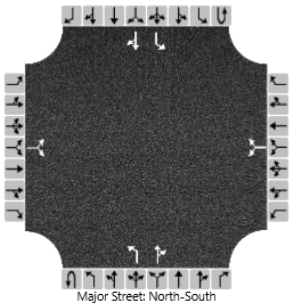
Flow Rate, v (veh/h)			21				6			32				1		
Capacity, c (veh/h)			577				346			1142				1069		
v/c Ratio			0.04				0.02			0.03				0.00		
95% Queue Length, Q_{95} (veh)			0.1				0.1			0.1				0.0		
Control Delay (s/veh)			11.5				15.6			8.2				8.4		
Level of Service (LOS)			B				C			A				A		
Approach Delay (s/veh)		11.5				15.6				0.5				0.0		
Approach LOS		B				C										

HCS™ TWSC Version 7.9.5
Cotswold PM 33 NB.xtw
Generated: 10/17/2021 10:54:49 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Cotswold G at Flat Rock
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/17/2021	East/West Street	Cotswold Green Ln
Analysis Year	2033	North/South Street	Flat Rock Road
Time Analyzed	PM Peak Build	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

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	1	0		0	1	0	0	1	1	0	0	1	1	0
Configuration			LR				LR			L		TR		L		TR
Volume (veh/h)		2		18		6		0		30	540	9		1	426	2
Percent Heavy Vehicles (%)		0		22		0		0		7				0		
Proportion Time Blocked																
Percent Grade (%)		0				0										
Right Turn Channelized																
Median Type | Storage		Left Only								1						

Critical and Follow-up Headways

Base Critical Headway (sec)		7.1		6.2		7.1		6.2		4.1				4.1		
Critical Headway (sec)		7.10		6.42		7.10		6.20		4.17				4.10		
Base Follow-Up Headway (sec)		3.5		3.3		3.5		3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50		3.50		3.50		3.30		2.26				2.20		

Delay, Queue Length, and Level of Service

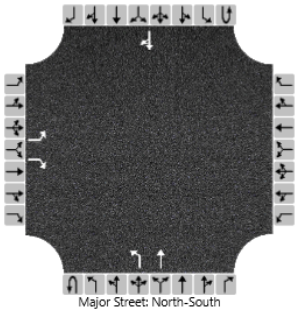
Flow Rate, v (veh/h)			21				6			32				1		
Capacity, c (veh/h)			528				306			1084				1006		
v/c Ratio			0.04				0.02			0.03				0.00		
95% Queue Length, Q_{95} (veh)			0.1				0.1			0.1				0.0		
Control Delay (s/veh)			12.1				17.0			8.4				8.6		
Level of Service (LOS)			B				C			A				A		
Approach Delay (s/veh)		12.1				17.0				0.4				0.0		
Approach LOS		B				C										

HCS™ TWSC Version 7.9.5
Cotswold PM 33 B.xtw
Generated: 10/17/2021 10:55:55 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Entrance on Flat Rock
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/17/2021	East/West Street	Entrnace
Analysis Year	2033	North/South Street	Flat Rock Rd
Time Analyzed	AM Peak	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

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		1	0	1		0	0	0	0	1	1	0	0	0	1	0
Configuration		L		R						L	T					TR
Volume (veh/h)		37		55						6	186				464	53
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		No														
Median Type | Storage		Left Only								1						

Critical and Follow-up Headways

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

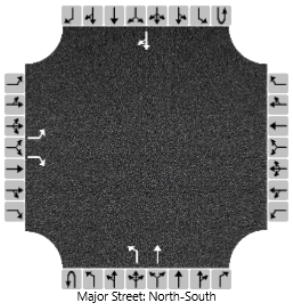
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		39		58						6						
Capacity, c (veh/h)		483		557						1020						
v/c Ratio		0.08		0.10						0.01						
95% Queue Length, Q_{95} (veh)		0.3		0.3						0.0						
Control Delay (s/veh)		13.1		12.2						8.6						
Level of Service (LOS)		B		B						A						
Approach Delay (s/veh)		12.6								0.3						
Approach LOS		B														

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Entrance on Flat Rock
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/17/2021	East/West Street	Entrnace
Analysis Year	2023	North/South Street	Flat Rock Rd
Time Analyzed	AM Peak	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

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		1	0	1		0	0	0	0	1	1	0	0	0	1	0
Configuration		L		R						L	T					TR
Volume (veh/h)		37		55						6	168				419	53
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)	0															
Right Turn Channelized	No															
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

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

Delay, Queue Length, and Level of Service

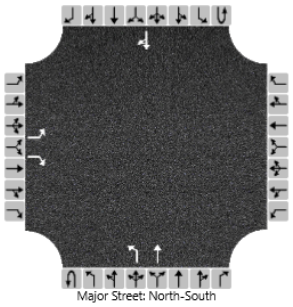
Flow Rate, v (veh/h)		39		58						6						
Capacity, c (veh/h)		512		592						1062						
v/c Ratio		0.08		0.10						0.01						
95% Queue Length, Q_{95} (veh)		0.2		0.3						0.0						
Control Delay (s/veh)		12.6		11.7						8.4						
Level of Service (LOS)		B		B						A						
Approach Delay (s/veh)	12.1								0.3							
Approach LOS	B															

HCS™ TWSC Version 7.9.5
Ent AM 23.xtw
Generated: 10/17/2021 10:58:45 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Entrance on Flat Rock
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/17/2021	East/West Street	Entrnace
Analysis Year	2033	North/South Street	Flat Rock Rd
Time Analyzed	AM Peak	Peak Hour Factor	0.95
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

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		1	0	1		0	0	0	0	1	1	0	0	0	1	0
Configuration		L		R						L	T					TR
Volume (veh/h)		37		55						6	186				464	53
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)	0															
Right Turn Channelized	No															
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

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

Delay, Queue Length, and Level of Service

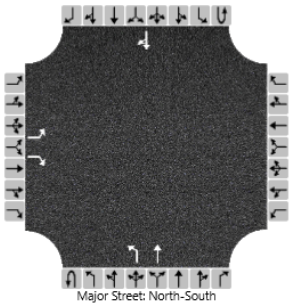
Flow Rate, v (veh/h)		39		58						6						
Capacity, c (veh/h)		483		557						1020						
v/c Ratio		0.08		0.10						0.01						
95% Queue Length, Q_{95} (veh)		0.3		0.3						0.0						
Control Delay (s/veh)		13.1		12.2						8.6						
Level of Service (LOS)		B		B						A						
Approach Delay (s/veh)	12.6								0.3							
Approach LOS	B															

HCS™ TWSC Version 7.9.5
Ent AM 33.xtw
Generated: 10/17/2021 11:00:17 PM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Entrance on Flat Rock
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/17/2021	East/West Street	Entrnace
Analysis Year	2023	North/South Street	Flat Rock Rd
Time Analyzed	PM Peak	Peak Hour Factor	0.98
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

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		1	0	1		0	0	0	0	1	1	0	0	0	1	0
Configuration		L		R						L	T					TR
Volume (veh/h)		81		127						9	449				333	81
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		No														
Median Type | Storage		Left Only								1						

Critical and Follow-up Headways

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

Delay, Queue Length, and Level of Service

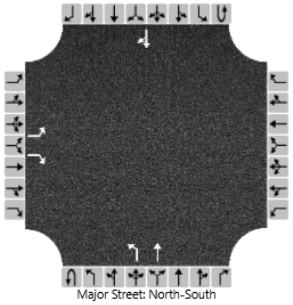
Flow Rate, v (veh/h)		83		130						9						
Capacity, c (veh/h)		444		664						1131						
v/c Ratio		0.19		0.20						0.01						
95% Queue Length, Q_{95} (veh)		0.7		0.7						0.0						
Control Delay (s/veh)		15.0		11.7						8.2						
Level of Service (LOS)		B		B						A						
Approach Delay (s/veh)		13.0								0.2						
Approach LOS		B														

HCS™ TWSC Version 7.9.5
Ent PM 23.xtw
Generated: 10/18/2021 10:10:20 AM

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	DBZ	Intersection	Entrance on Flat Rock
Agency/Co.	Diane B Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	10/17/2021	East/West Street	Entrnace
Analysis Year	2033	North/South Street	Flat Rock Rd
Time Analyzed	PM Peak	Peak Hour Factor	0.98
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Grocery Flat Rock		

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		1	0	1		0	0	0	0	1	1	0	0	0	1	0
Configuration		L		R						L	T					TR
Volume (veh/h)		81		127						9	498				369	81
Percent Heavy Vehicles (%)		3		3						3						
Proportion Time Blocked																
Percent Grade (%)	0															
Right Turn Channelized	No															
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

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

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		83		130						9						
Capacity, c (veh/h)		414		633						1097						
v/c Ratio		0.20		0.20						0.01						
95% Queue Length, Q_{95} (veh)		0.7		0.8						0.0						
Control Delay (s/veh)		15.9		12.1						8.3						
Level of Service (LOS)		C		B						A						
Approach Delay (s/veh)	13.6								0.1							
Approach LOS	B															

HCS™ TWSC Version 7.9.5
Ent PM 33.xtw
Generated: 10/17/2021 11:04:09 PM