

final report

July 21, 2022

Traffic Impact Study

*Gas/Convenience Store
6503 Billtown Road
Louisville, KY*

Prepared for

Louisville Metro Planning Commission
Kentucky Transportation Cabinet

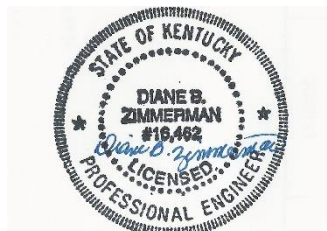


Table of Contents

INTRODUCTION 2

 Figure 1. Site Map..... 2

EXISTING CONDITIONS 2

 Figure 2. Existing Peak Hour Volumes 3

FUTURE CONDITIONS 3

 Figure 3. 2024 No Build Peak Hour Volumes..... 4

TRIP GENERATION 4

 Table 1. Peak Hour Trips Generated by Site 4

 Figure 4. Trip Distribution Percentages 5

 Figure 5. Peak Hour Trips Generated by Site..... 6

 Figure 6. 2024 Build Peak Hour Volumes 7

ANALYSIS 7

 Table 2. Peak Hour Level of Service..... 8

 Figure 7. 2034 No Build Peak Hour Volumes..... 9

 Figure 8. 2034 Build Peak Hour Volumes 9

 Table 3. 2034 Peak Hour Level of Service..... 10

CONCLUSIONS 10

APPENDIX 11

INTRODUCTION

The site plan for 6503 Billtown Road shows a convenience store with 12 fueling positions, a liquor store, and a coffee shop. The site is located on the corner of Billtown Road and Gellhaus Lane in Louisville, KY. **Figure 1** displays a map of the site. Access to the site will be from an entrance on Billtown Road at KY 6326 and a right-in/right-out on Gellhaus Lane. 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 Billtown Road with I 265 westbound ramps, and Gellhaus Lane, and Gellhaus Lane with Longview Farm Drive/Farmer Elementary School.

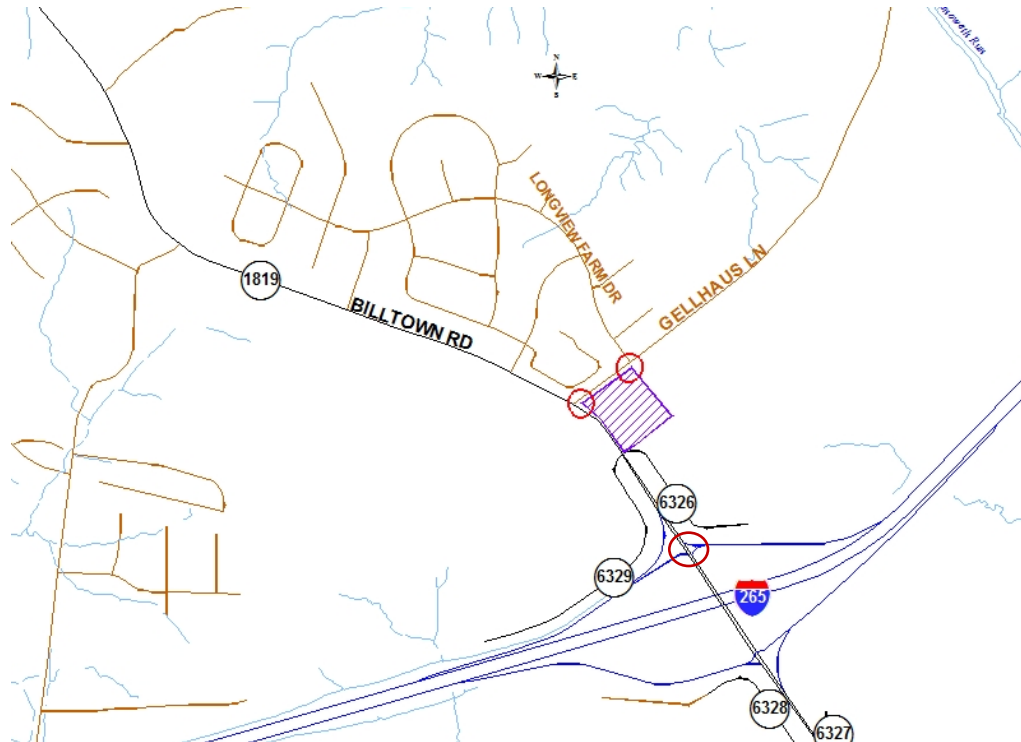


Figure 1. Site Map

EXISTING CONDITIONS

Billtown Road, KY 1819, is maintained by the Kentucky Transportation Cabinet (KYTC) with an estimated 2022 ADT of 10,800 vehicles per day between I 265 and Lovers Lane (KY 1065), as estimated from the Kentucky Transportation Cabinet count at station 325. The road is a two-lane road with nine-foot lanes and a three-foot shoulder. The posted speed limit is 45 mph. There are no sidewalks south of Gellhaus Lane. The intersection with Gellhaus Lane is controlled with a traffic signal. There is a southbound left turn lane and a northbound right turn lane on Billtown Road. The Gellhaus Lane approach has separate right and left turn lanes. At I 265 westbound ramps there is a northbound left turn lane and there are separate lanes on the ramp.

Gellhaus Lane is maintained by Metro Louisville with an estimated 2022 ADT of 3,700 vehicles per day, as estimated from the Kentucky Transportation Cabinet count at station 324. The road is a two-lane road with ten-foot lanes and a one-foot shoulder. The posted speed limit is 35 mph.

There are sidewalks on the north side and along the school property. The intersection with Longview Farm Drive/school entrance is controlled with a stop sign. There is a left turn lane on Gellhaus Lane. The driveway serving both Farmer Elementary and Ramsey Middle School is wide enough to accommodate a separate left turn lane. During arrival and dismissal, the schools provide a crossing guard.

Peak hour traffic counts for the intersections were obtained May 19, 2022. The am peak occurred between 7:00 – 8:00 and the pm peak occurred 4:00 – 5:00 on Billtown Road. **Figure 2** illustrates the 2022 a.m. and p.m. peak hour traffic volumes. The Appendix contains the full count data.

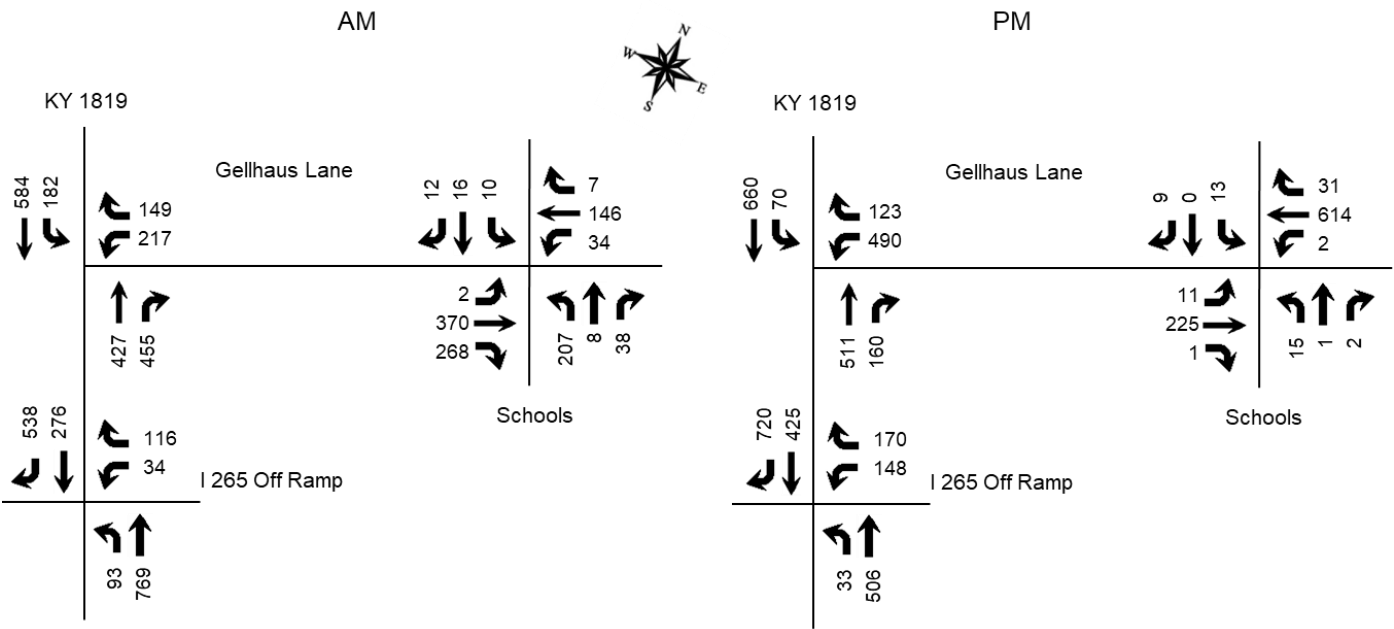


Figure 2. Existing Peak Hour Volumes

FUTURE CONDITIONS

The project completion date is 2024. An annual growth rate of 0.5 percent was applied to the 2022 volumes. This was determined by the historical growth at KYTC stations 325. **Figure 3** displays the 2024 No Build peak hour volumes.

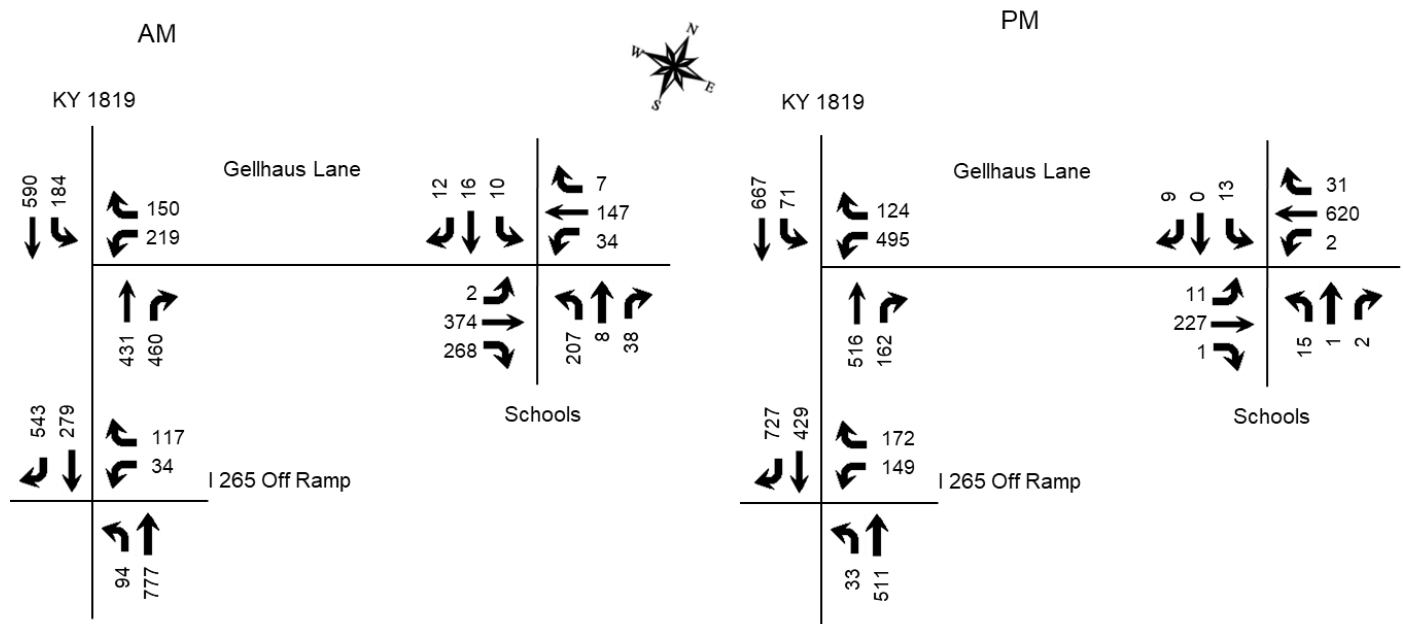


Figure 3. 2024 No Build Peak Hour Volumes

TRIP GENERATION

The Institute of Transportation Engineers [Trip Generation Manual](#), 11th Edition contains trip generation rates for a wide range of developments. The land use “Super Convenience Market/Gas Station” (960) was used for the 12 fueling locations. The trip generation results are listed in **Table 1**. The new trips were assigned to the highway network with the percentages shown in **Figure 4**. The pass-by trips were assigned using the existing traffic patterns. Pass-by trips are shown in parenthesis. **Figure 5** shows the trips generated by this development and distributed throughout the road network during the peak hours. **Figure 6** displays the individual turning movements for the peak hours when the development is completed.

Table 1. Peak Hour Trips Generated by Site

Land Use	A.M. Peak Hour			P.M. Peak Hour		
	Trips	In	Out	Trips	In	Out
Gas Station with Convenience Market (12 fueling locations)	193	97	96	221	111	110
Pass-by Trips	147	74	73	166	83	83
New Trips	46	23	23	55	28	27
Liquor Store (3,000 square feet)	3	2	1	84	42	42
Coffee with Drive-Through (2,200 square feet)	189	96	93	86	43	43

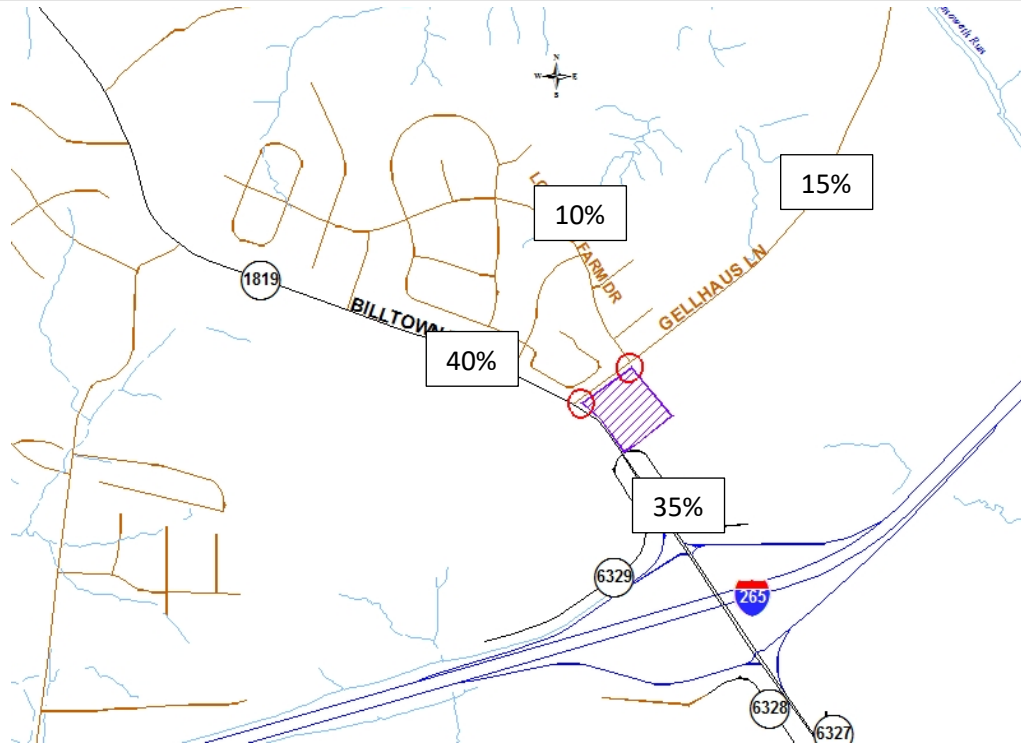


Figure 4. Trip Distribution Percentages

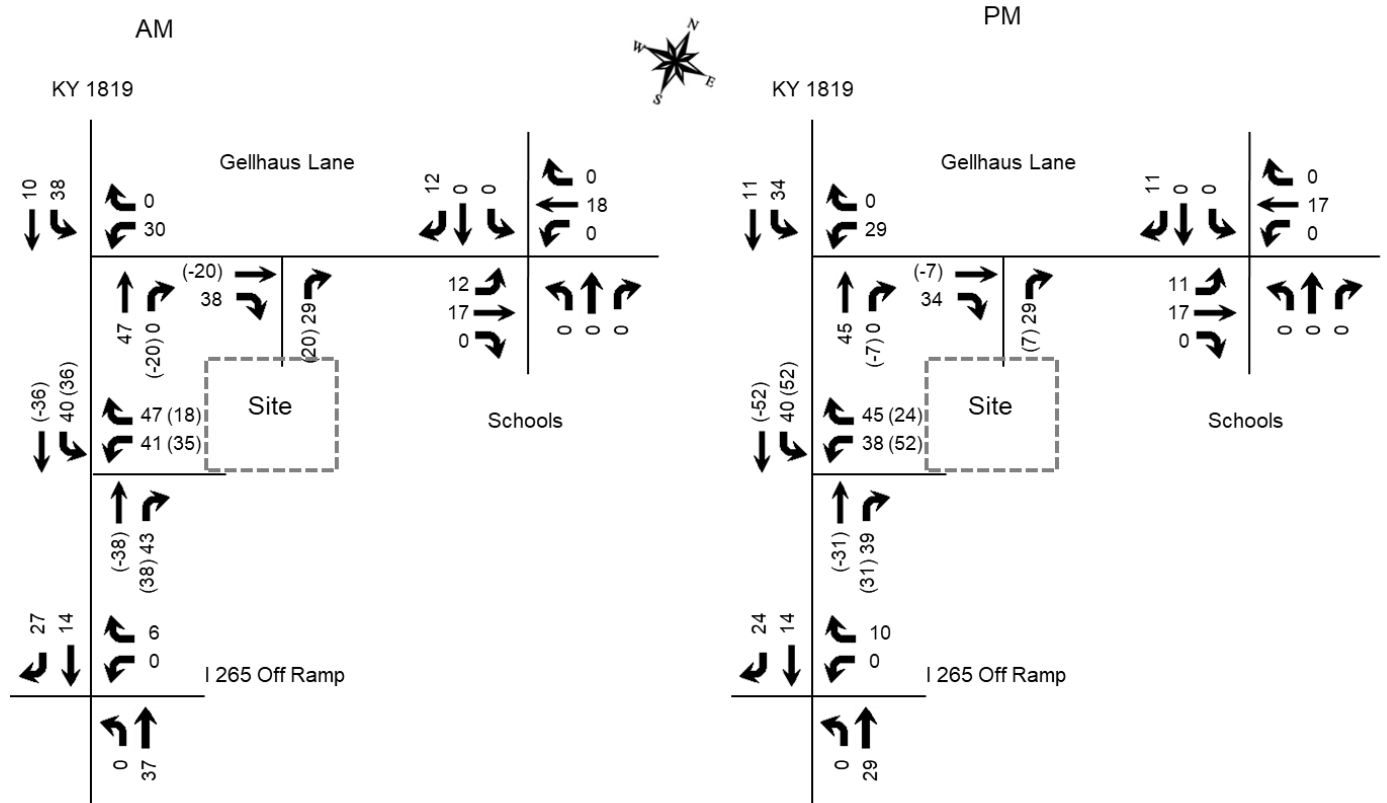


Figure 5. Peak Hour Trips Generated by Site

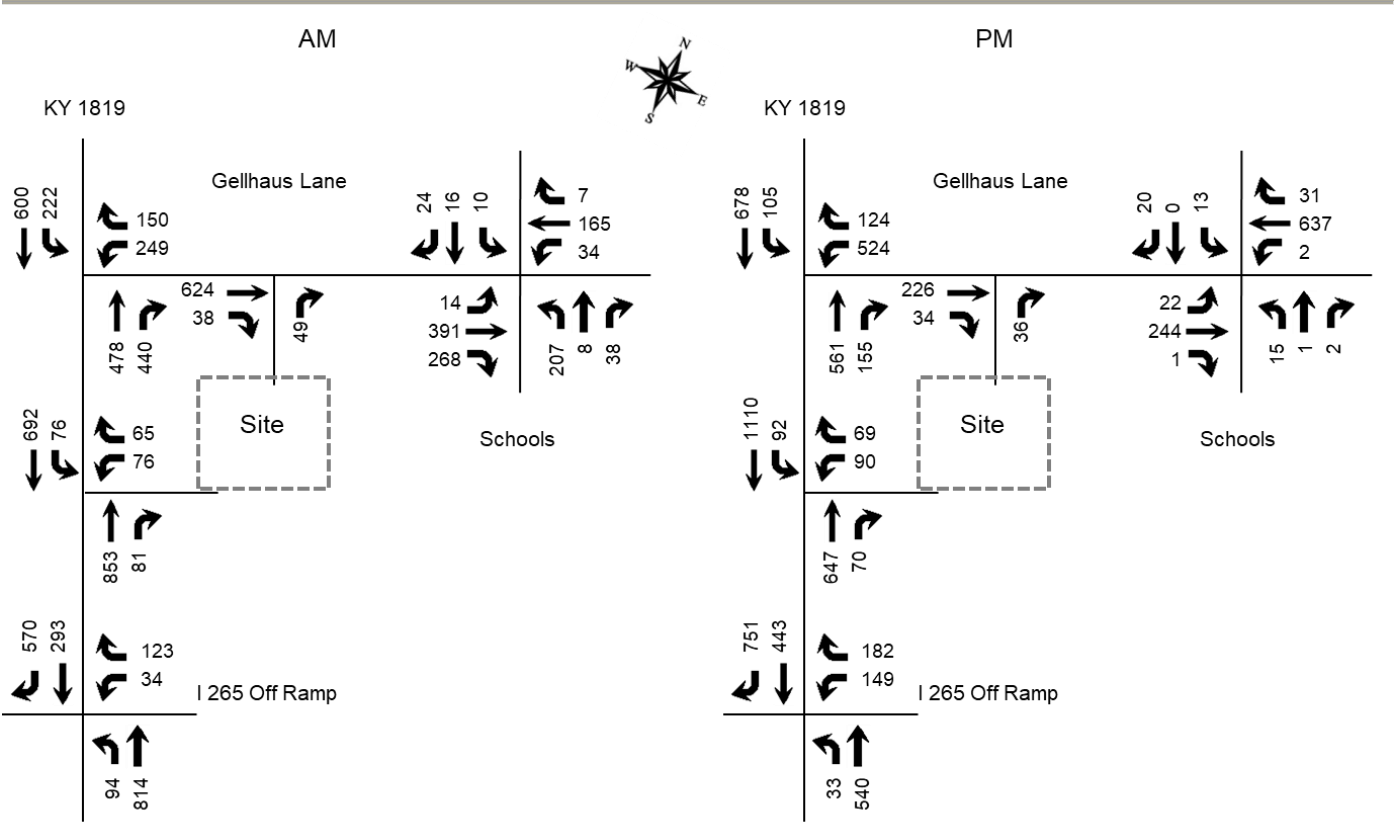


Figure 6. 2024 Build Peak Hour Volumes

ANALYSIS

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

To evaluate the impact of the proposed development, the vehicle delays at the intersections were determined using procedures detailed in the Highway Capacity Manual, 7th edition. Future delays and Level of Service were determined for the intersections using the HCS Streets and Two-Way Stop Controlled (version 2022) software. The delays and Level of Service are summarized in **Table 2**.

Table 2. Peak Hour Level of Service

Approach	A.M.			P.M.		
	2022 Existing	2024 No Build	2024 Build	2022 Existing	2024 No Build	2024 Build
Billtown Road at Gellhaus Lane	B 16.5	B 16.7	B 18.6	C 27.0	D 35.0	D 44.3
Gellhaus Lane Westbound	C 29.8	C 29.8	C 30.4	C 31.7	D 42.3	E 60.6
Billtown Road Northbound	B 16.7	B 16.9	B 19.9	C 28.1	C 32.7	D 41.3
Billtown Road Southbound	B 10.0	B 10.1	B 11.8	C 22.0	C 31.0	C 33.6
Billtown Road at I 265 WB Ramps						
I 265 Ramp Westbound	C 20.8	C 21.1	C 22.7	C 19.6	C 19.9	C 21.0
Billtown Road Northbound	A 8.1	A 8.1	A 8.1	A 8.3	A 8.3	A 8.3
Billtown Road at Entrance						
Entrance Westbound			D 27.6			E 42.1
Billtown Road Southbound			B 10.9			A 9.8
Gellhaus Lane at Longview Farm						
Gellhaus Lane Eastbound	A 7.6	A 7.6	A 7.7	A 9.0	A 9.0	A 9.1
Gellhaus Lane Westbound	A 9.6	A 9.7	A 9.8	A 8.3	A 8.3	A 8.4
School Northbound	E 42.5	E 43.3	E 36.5	C 15.2	C 15.3	C 16.3
Longview Farm Drive Southbound	C 18.6	C 18.7	C 18.2	B 14.7	B 14.8	B 14.9

Key: Level of Service, Delay in seconds per vehicle

The above results include an eastbound right turn lane on Gellhaus Lane at the entrance to the schools.

The entrance was evaluated for turn lanes using the Kentucky Transportation Cabinet [Highway Design Guidance Manual](#) dated July, 2020. The Kentucky Transportation Cabinet policy requires analysis of 2034, or ten years beyond completion. An annual growth rate of 0.5 percent was applied to the 2024 No Build volumes. The 2034 No Build volumes are shown in **Figure 7**. The site volumes were added for the 2034 Build volumes in **Figure 8**. The resulting delays and Level of Service are summarized in **Table 3**. Using the volumes in Figure 8, a southbound left turn lane and a northbound right-turn lane will be required at the entrance on Billtown Road (KY 6326). A right turn lane is not warranted at the entrance on Gellhaus Lane.

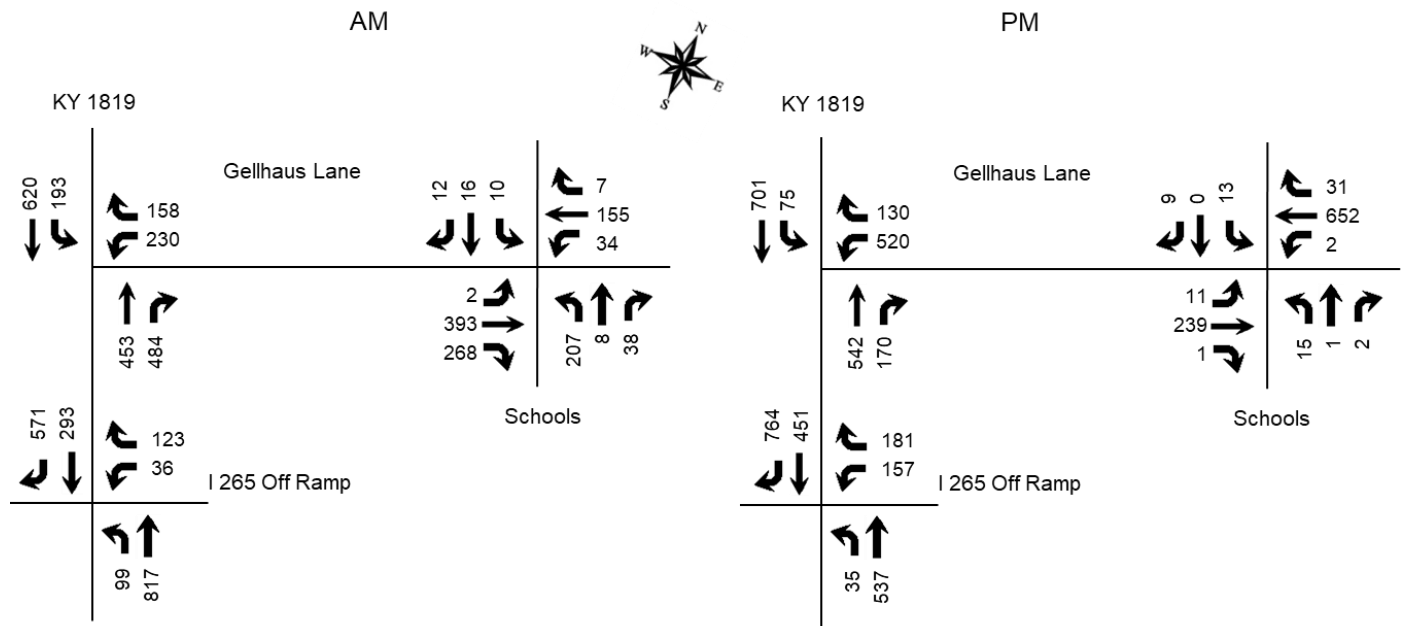


Figure 7. 2034 No Build Peak Hour Volumes

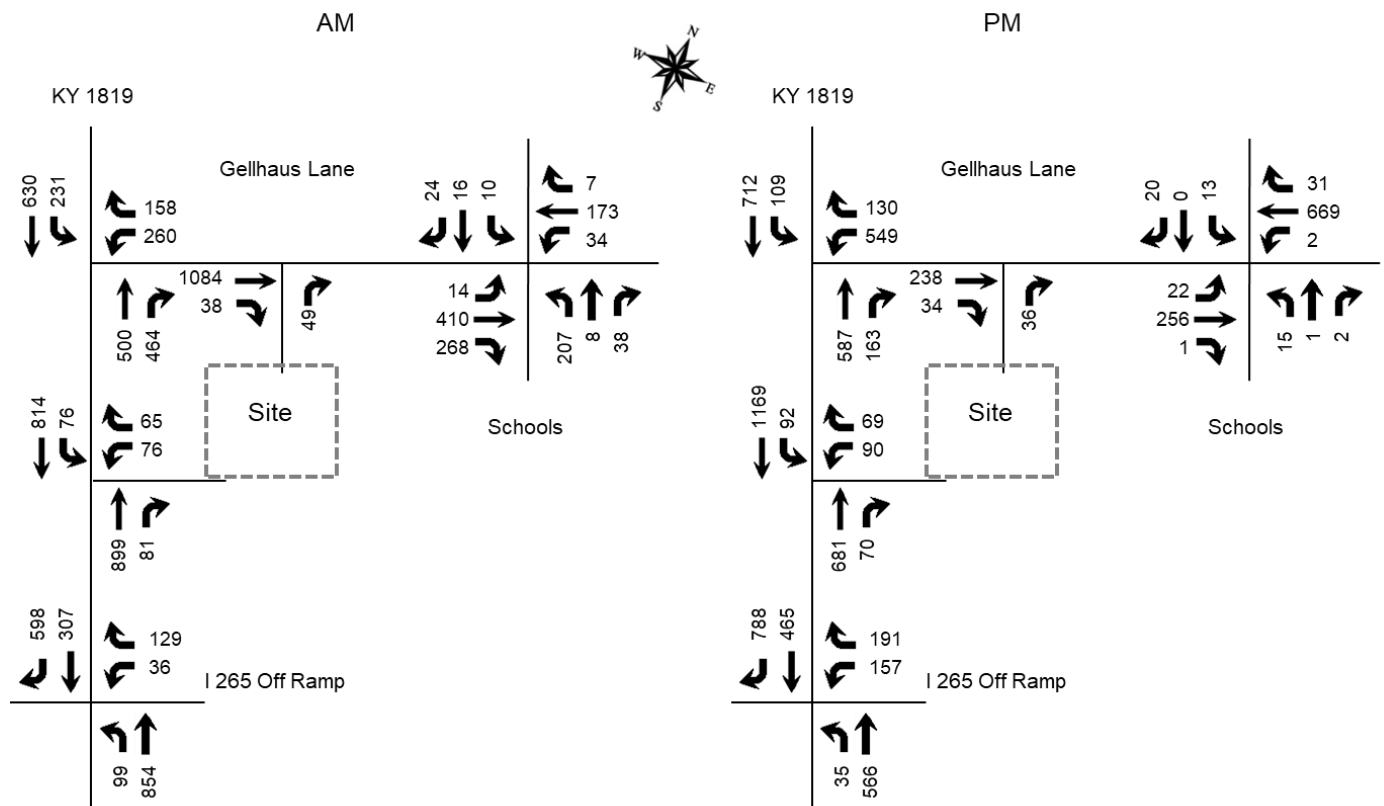


Figure 8. 2034 Build Peak Hour Volumes

Table 3. 2034 Peak Hour Level of Service

Approach	A.M.			P.M.		
	2022 Existing	2034 No Build	2034 Build	2022 Existing	2034 No Build	2034 Build
Billtown Road at Gellhaus Lane	B 16.5	B 17.5	B 19.7	C 27.0	D 41.1	D 47.8
Gellhaus Lane Westbound	C 29.8	C 29.9	C 30.5	C 31.7	D 50.8	E 69.9
Billtown Road Northbound	B 16.7	B 18.1	B 21.5	C 28.1	D 36.7	D 41.8
Billtown Road Southbound	B 10.0	B 10.9	B 12.8	C 22.0	D 36.9	C 35.0
Billtown Road at I 265 WB Ramps						
I 265 Ramp Westbound	C 20.8	C 23.0	C 24.9	C 19.6	C 21.9	C 23.2
Billtown Road Northbound	A 8.1	A 8.1	A 8.2	A 8.3	A 8.4	A 8.4
Billtown Road at Entrance						
Entrance Westbound			D 32.3			E 48.4
Billtown Road Southbound			B 11.2			A 9.9
Gellhaus Lane at Longview Farm						
Gellhaus Lane Eastbound	A 7.6	A 7.6	A 7.7	A 9.0	A 9.1	A 9.2
Gellhaus Lane Westbound	A 9.6	A 9.8	A 9.9	A 8.3	A 8.3	A 8.4
School Northbound	E 42.5	E 47.9	E 40.2	C 15.2	C 15.8	C 16.9
Longview Farm Drive Southbound	C 18.6	C 19.5	C 18.9	B 14.7	C 15.3	C 15.4

Key: Level of Service, Delay in seconds per vehicle

CONCLUSIONS

Based upon the volume of traffic generated by the development and the amount of traffic forecasted for the year 2034, there will be an impact to the existing highway network but the intersections will operate an acceptable level of service. A left and right-turn lane will be required at the entrance on Billtown Road, as well as a right turn lane into the school facility on Gellhaus Lane.

APPENDIX

Traffic Counts

Classified Turn Movement Count || All vehicles



www.marrtraffic.com

Louisville, KY

Site 2 of 3

Gellhaus Ln
Billtown Rd (West)
Billtown Rd (East)

Date

Thursday, May 19, 2022

Lat/Long

38.150503°, -85.549365°

Weather

Fair
73°F

0700 - 0900 (Weekday 2h Session) (05-19-2022)

All vehicles

Southbound					Eastbound					Westbound				
Gellhaus Ln					Billtown Rd (West)					Billtown Rd (East)				
Left	Right	U-Turn	App		Left	Thru	U-Turn	App		Thru	Right	U-Turn	App	Int
2.1	2.2	2.3	Total		2.4	2.5	2.6	Total		2.7	2.8	2.9	Total	Total
42	26	0	68		39	149	0	188		107	87	0	194	450
74	49	0	123		65	154	0	219		85	130	0	215	557
63	53	0	116		59	163	0	222		103	116	0	219	557
38	21	0	59		19	118	0	137		132	122	0	254	450
217	149	0	366		182	584	0	766		427	455	0	882	2014
38	13	0	51		16	121	0	137		111	78	0	189	377
31	4	0	35		33	107	0	140		108	78	0	186	361
54	25	0	79		36	111	0	147		108	70	0	178	404
74	67	0	141		63	115	0	178		84	79	0	163	482
197	109	0	306		148	454	0	602		411	305	0	716	1624
414	258	0	672		330	1038	0	1368		838	760	0	1598	3638
61.61	38.39	0.00	-		24.12	75.88	0.00	-		52.44	47.56	0.00	-	
11.38	7.09	0.00	18.47		9.07	28.53	0.00	37.60		23.03	20.89	0.00	43.93	
0.73	0.70	0.00	0.74		0.70	0.90	0.00	0.86		0.81	0.88	0.00	0.87	0.90

1600 - 1800 (Weekday 2h Session) (05-19-2022)

All vehicles

Southbound					Eastbound					Westbound				
Gellhaus Ln					Billtown Rd (West)					Billtown Rd (East)				
Left	Right	U-Turn	App		Left	Thru	U-Turn	App		Thru	Right	U-Turn	App	Int
2.1	2.2	2.3	Total		2.4	2.5	2.6	Total		2.7	2.8	2.9	Total	Total
133	55	0	188		21	157	0	178		147	41	0	188	554
97	21	0	118		15	170	0	185		133	30	0	163	466
103	33	0	136		20	159	0	179		113	46	0	159	474
157	14	0	171		14	174	0	188		118	43	0	161	520
490	123	0	613		70	660	0	730		511	160	0	671	2014
133	27	0	160		19	142	0	161		122	40	0	162	483
149	26	0	175		14	139	0	153		130	38	0	168	496
91	23	0	114		16	164	0	180		133	37	0	170	464
110	22	0	132		9	117	0	126		110	23	0	133	391
483	98	0	581		58	562	0	620		495	138	0	633	1834
973	221	0	1194		128	1222	0	1350		1006	298	0	1304	3848
81.49	18.51	0.00	-		9.48	90.52	0.00	-		77.15	22.85	0.00	-	
25.29	5.74	0.00	31.03		3.33	31.76	0.00	35.08		26.14	7.74	0.00	33.89	
0.78	0.56	0.00	0.82		0.83	0.95	0.00	0.97		0.87	0.87	0.00	0.89	0.91

Classified Turn Movement Count || All vehicles

Louisville, KY

Site 1 of 3

Billtown Rd (South)
Billtown Rd (North)
KY-841 Gene Snyder Fwy W/Bound On-Ramp
KY-841 Gene Snyder Fwy W/Bound Off-Ramp

Date

Thursday, May 19, 2022

Lat/Long

38.147793°, -85.546767°

Weather

Fair
73°F

0700 - 0900 (Weekday 2h Session) (05-19-2022)

All vehicles

TIME	Northbound				Southbound				Eastbound				Westbound			
	Billtown Rd (South)				Billtown Rd (North)				KY-841 Gene Snyder Fwy W/Bound On-Ramp				KY-841 Gene Snyder Fwy W/Bound Off-Ramp			
	Left 1.1	Thru 1.2	U-Turn 1.3	App Total	Thru 1.4	Right 1.5	U-Turn 1.6	App Total	Left 1.7	Thru 1.8	Right 1.9	App Total	Int Total			
0700 - 0715	17	168	0	185	79	116	0	195	1	0	23	24	404			
0715 - 0730	27	192	0	219	84	141	0	225	11	0	33	44	488			
0730 - 0745	27	188	0	215	64	169	0	233	10	0	32	42	490			
0745 - 0800	22	221	0	243	49	112	0	161	12	0	28	40	444			
Hourly Total	93	769	0	862	276	538	0	814	34	0	116	150	1826			
0800 - 0815	20	164	0	184	49	102	0	151	11	1	33	45	380			
0815 - 0830	13	158	0	171	43	99	0	142	6	0	33	39	352			
0830 - 0845	11	135	0	146	53	115	0	168	7	1	38	46	360			
0845 - 0900	9	136	0	145	60	120	0	180	11	0	34	45	370			
Hourly Total	53	593	0	646	205	436	0	641	35	2	138	175	1462			
Grand Total	146	1362	0	1508	481	974	0	1455	69	2	254	325	3288			
Approach %	9.68	90.32	0.00	-	33.06	66.94	0.00	-	21.23	0.62	78.15	-	-			
Intersection %	4.44	41.42	0.00	45.86	14.63	29.62	0.00	44.25	2.10	0.06	7.73	9.88	-			
PHF	0.86	0.87	0.00	0.89	0.82	0.80	0.00	0.87	0.71	0.00	0.88	0.85	0.93			

1600 - 1800 (Weekday 2h Session) (05-19-2022)

All vehicles

TIME	Northbound				Southbound				Eastbound				Westbound			
	Billtown Rd (South)				Billtown Rd (North)				KY-841 Gene Snyder Fwy W/Bound On-Ramp				KY-841 Gene Snyder Fwy W/Bound Off-Ramp			
	Left 1.1	Thru 1.2	U-Turn 1.3	App Total	Thru 1.4	Right 1.5	U-Turn 1.6	App Total	Left 1.7	Thru 1.8	Right 1.9	App Total	Int Total			
1600 - 1615	9	148	0	157	130	148	0	278	40	0	46	86	521			
1615 - 1630	12	109	0	121	95	183	0	278	41	0	51	92	491			
1630 - 1645	7	115	0	122	103	165	0	268	34	0	44	78	468			
1645 - 1700	5	134	0	139	97	224	0	321	33	0	29	62	522			
Hourly Total	33	506	0	539	425	720	0	1145	148	0	170	318	2002			
1700 - 1715	12	117	0	129	107	177	0	284	32	0	45	77	490			
1715 - 1730	11	116	0	127	112	181	0	293	35	0	49	84	504			
1730 - 1745	9	119	0	128	99	165	0	264	36	0	46	82	474			
1745 - 1800	10	88	0	98	89	131	0	220	37	1	40	78	396			
Hourly Total	42	440	0	482	407	654	0	1061	140	1	180	321	1864			
Grand Total	75	946	0	1021	832	1374	0	2206	288	1	350	639	3866			
Approach %	7.35	92.65	0.00	-	37.72	62.28	0.00	-	45.07	0.16	54.77	-	-			
Intersection %	1.94	24.47	0.00	26.41	21.52	35.54	0.00	57.06	7.45	0.03	9.05	16.53	-			
PHF	0.69	0.85	0.00	0.86	0.82	0.80	0.00	0.89	0.90	0.00	0.83	0.86	0.96			

Classified Turn Movement Count || All vehicles

Louisville, KY

Site 3 of 3

Driveway
Longview Farm Dr
Gellhaus Ln (West)
Gellhaus Ln (East)

Date

Thursday, May 19, 2022

Weather

Fair
73°F

Lat/Long

38.151340°, -85.548006°

0700 - 0900 (Weekday 2h Session) (05-19-2022)

All vehicles

TIME	Northbound					Southbound					Eastbound					Westbound					Int Total
	Driveway					Longview Farm Dr					Gellhaus Ln (West)					Gellhaus Ln (East)					
	Left 3.1	Thru 3.2	Right 3.3	U-Turn 3.4	App Total	Left 3.5	Thru 3.6	Right 3.7	U-Turn 3.8	App Total	Left 3.9	Thru 3.10	Right 3.11	U-Turn 3.12	App Total	Left 3.13	Thru 3.14	Right 3.15	U-Turn 3.16	App Total	
0700 - 0715	33	1	6	0	40	4	3	4	0	11	0	68	56	0	124	6	32	3	0	41	216
0715 - 0730	76	4	14	0	94	3	8	4	0	15	0	88	107	0	195	14	42	0	0	56	360
0730 - 0745	82	3	17	0	102	2	5	2	0	9	0	96	83	0	179	12	28	0	0	40	330
0745 - 0800	16	0	1	0	17	1	0	2	0	3	2	118	22	0	142	2	44	4	0	50	212
Hourly Total	207	8	38	0	253	10	16	12	0	38	2	370	268	0	640	34	146	7	0	187	1118
0800 - 0815	5	1	2	0	8	6	2	1	0	9	1	73	20	0	94	2	40	1	0	43	154
0815 - 0830	3	0	0	0	3	4	1	3	0	8	4	66	44	0	114	5	30	1	0	36	161
0830 - 0845	42	0	7	0	49	6	6	3	0	15	0	41	63	0	104	10	40	2	0	52	220
0845 - 0900	104	7	18	0	129	7	11	3	0	21	0	57	80	0	137	18	34	2	0	54	341
Hourly Total	154	8	27	0	189	23	20	10	0	53	5	237	207	0	449	35	144	6	0	185	876
Grand Total	361	16	65	0	442	33	36	22	0	91	7	607	475	0	1089	69	290	13	0	372	1994
Approach %	81.67	3.62	14.71	0.00	-	36.26	39.56	24.18	0.00	-	0.64	55.74	43.62	0.00	-	18.55	77.96	3.49	0.00	-	-
Intersection %	18.10	0.80	3.26	0.00	22.17	1.65	1.81	1.10	0.00	4.56	0.35	30.44	23.82	0.00	54.61	3.46	14.54	0.65	0.00	18.66	-
PHF	0.63	0.50	0.56	0.00	0.62	0.63	0.50	0.75	0.00	0.63	0.25	0.78	0.63	0.00	0.82	0.61	0.83	0.44	0.00	0.83	0.78

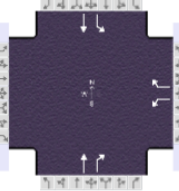
1600 - 1800 (Weekday 2h Session) (05-19-2022)

All vehicles

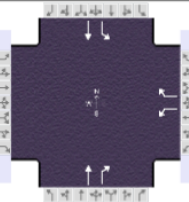
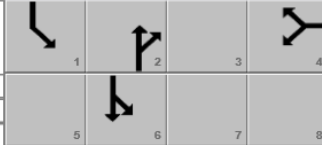
TIME	Northbound					Southbound					Eastbound					Westbound					Int Total
	Driveway					Longview Farm Dr					Gellhaus Ln (West)					Gellhaus Ln (East)					
	Left 3.1	Thru 3.2	Right 3.3	U-Turn 3.4	App Total	Left 3.5	Thru 3.6	Right 3.7	U-Turn 3.8	App Total	Left 3.9	Thru 3.10	Right 3.11	U-Turn 3.12	App Total	Left 3.13	Thru 3.14	Right 3.15	U-Turn 3.16	App Total	
1600 - 1615	70	2	13	0	85	2	1	2	0	5	3	47	14	0	63	1	113	2	0	116	269
1615 - 1630	11	0	5	0	16	1	0	2	0	3	0	41	2	0	43	0	111	10	0	121	183
1630 - 1645	7	1	0	0	8	5	0	4	0	9	5	61	0	0	66	0	131	7	0	138	221
1645 - 1700	3	0	1	0	4	2	0	3	0	5	1	57	0	1	59	0	149	7	0	156	224
Hourly Total	91	3	19	0	113	10	1	11	0	22	8	206	16	1	231	1	504	26	0	531	897
1700 - 1715	2	0	1	0	3	4	0	2	0	6	3	57	0	0	60	1	165	9	0	175	244
1715 - 1730	3	0	0	0	3	2	0	0	0	2	1	50	1	0	52	1	169	8	0	178	235
1730 - 1745	3	1	2	0	6	3	0	0	0	3	1	51	1	0	53	0	116	10	0	126	188
1745 - 1800	1	0	0	0	1	2	1	4	0	7	1	30	0	0	31	0	121	5	0	126	165
Hourly Total	9	1	3	0	13	11	1	6	0	18	6	188	2	0	196	2	571	32	0	605	832
Grand Total	100	4	22	0	126	21	2	17	0	40	14	394	18	1	427	3	1075	58	0	1136	1729
Approach %	79.37	3.17	17.46	0.00	-	52.50	5.00	42.50	0.00	-	3.28	92.27	4.22	0.23	-	0.26	94.63	5.11	0.00	-	-
Intersection %	5.78	0.23	1.27	0.00	7.29	1.21	0.12	0.98	0.00	2.31	0.81	22.79	1.04	0.06	24.70	0.17	62.17	3.35	0.00	65.70	-
PHF	0.54	0.25	0.50	0.00	0.56	0.65	0.00	0.56	0.00	0.61	0.50	0.92	0.25	0.25	0.90	0.50	0.91	0.86	0.00	0.91	0.95

HCS Reports

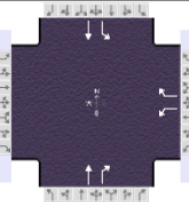
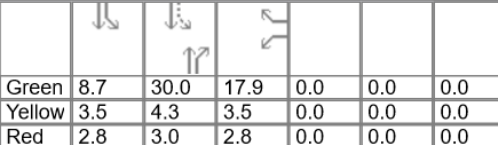
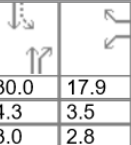
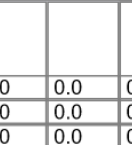
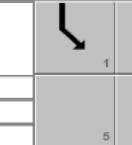
HCS Signalized Intersection Results Summary

General Information										Intersection Information									
Agency		Diane B. Zimmerman Traffic Engineering								Duration, h		0.250							
Analyst		DBZ		Analysis Date		Jul 25, 2022		Area Type		Other									
Jurisdiction				Time Period		AM Peak		PHF		0.90									
Urban Street		Billtown Road		Analysis Year		2022		Analysis Period		1> 7:00									
Intersection		Gellhaus Lane		File Name		Billtown AM 22.xus													
Project Description		Billtown Road																	
																			
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h							217		149		427	455	182	584					
Signal Information																			
Cycle, s	72.4	Reference Phase	2	Green	7.0	30.0	15.6	0.0	0.0	0.0									
Offset, s	0	Reference Point	End	Yellow	3.5	4.3	3.5	0.0	0.0	0.0									
Uncoordinated	Yes	Simult. Gap E/W	On	Red	2.8	3.0	2.8	0.0	0.0	0.0									
Force Mode	Fixed	Simult. Gap N/S	On																
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase										4				2		1		6	
Case Number										9.0				7.3		1.0		4.0	
Phase Duration, s										21.9				37.3		13.3		50.6	
Change Period, (Y+R c), s										6.3				7.3		6.3		7.3	
Max Allow Headway (MAH), s										6.7				4.0		4.0		4.0	
Queue Clearance Time (g s), s										11.1				16.4		6.4		17.3	
Green Extension Time (g e), s										4.5				6.3		0.6		6.3	
Phase Call Probability										1.00				1.00		0.98		1.00	
Max Out Probability										0.00				0.00		0.00		0.00	
Movement Group Results				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement							7		14		2	12	1	6					
Adjusted Flow Rate (v), veh/h							241		166		474	283	202	649					
Adjusted Saturation Flow Rate (s), veh/h/ln							1753		1522		1870	1598	1725	1885					
Queue Service Time (g s), s							9.1		6.9		14.4	9.2	4.4	15.3					
Cycle Queue Clearance Time (g c), s							9.1		6.9		14.4	9.2	4.4	15.3					
Green Ratio (g/C)							0.21		0.21		0.41	0.41	0.54	0.60					
Capacity (c), veh/h							377		327		775	662	456	1126					
Volume-to-Capacity Ratio (X)							0.640		0.506		0.612	0.428	0.443	0.576					
Back of Queue (Q), ft/ln (95 th percentile)																			
Back of Queue (Q), veh/ln (95 th percentile)							7.3		4.8		9.2	5.2	2.5	8.2					
Queue Storage Ratio (RQ) (95 th percentile)							0.69		0.46		0.23	0.88	0.22	0.46					
Uniform Delay (d 1), s/veh							25.9		25.1		16.7	15.1	11.2	9.0					
Incremental Delay (d 2), s/veh							4.9		3.3		0.8	0.4	0.7	0.5					
Initial Queue Delay (d 3), s/veh							0.0		0.0		0.0	0.0	0.0	0.0					
Control Delay (d), s/veh							30.8		28.4		17.4	15.6	11.9	9.4					
Level of Service (LOS)							C		C		B	B	B	A					
Approach Delay, s/veh / LOS				0.0				29.8		C		16.7		B		10.0		B	
Intersection Delay, s/veh / LOS				16.5						B									
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				2.23		B		1.94		B		1.90		B		0.67		A	
Bicycle LOS Score / LOS								F		1.74		B		1.89		B			

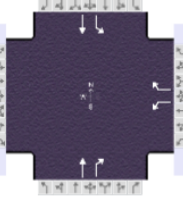
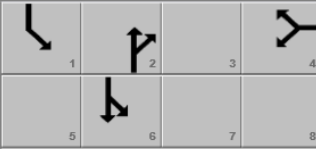
HCS Signalized Intersection Results Summary

General Information						Intersection Information													
Agency		Diane B. Zimmerman Traffic Engineering				Duration, h		0.250											
Analyst		DBZ		Analysis Date		Jul 25, 2022		Area Type		Other									
Jurisdiction				Time Period		AM Peak		PHF		0.90									
Urban Street		Billtown Road		Analysis Year		2024 No Build		Analysis Period		1> 7:00									
Intersection		Gellhaus Lane		File Name		Billtown AM 24 NB.xus													
Project Description		Billtown Road																	
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h							219		150		431	460	184	590					
Signal Information																			
Cycle, s	72.7	Reference Phase	2																
Offset, s	0	Reference Point	End																
Uncoordinated	Yes	Simult. Gap E/W	On																
Force Mode	Fixed	Simult. Gap N/S	On																
				Green	7.1	30.0	15.7	0.0	0.0	0.0									
				Yellow	3.5	4.3	3.5	0.0	0.0	0.0									
				Red	2.8	3.0	2.8	0.0	0.0	0.0									
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase										4				2		1		6	
Case Number										9.0				7.3		1.0		4.0	
Phase Duration, s										22.0				37.3		13.4		50.7	
Change Period, (Y+R c), s										6.3				7.3		6.3		7.3	
Max Allow Headway (MAH), s										6.7				4.0		4.0		4.0	
Queue Clearance Time (g s), s										11.2				16.7		6.5		17.6	
Green Extension Time (g e), s										4.5				6.4		0.6		6.4	
Phase Call Probability										1.00				1.00		0.98		1.00	
Max Out Probability										0.00				0.00		0.00		0.00	
Movement Group Results				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement							7		14		2	12	1	6					
Adjusted Flow Rate (v), veh/h							243		167		479	289	204	656					
Adjusted Saturation Flow Rate (s), veh/h/ln							1753		1522		1870	1598	1725	1885					
Queue Service Time (g s), s							9.2		7.0		14.7	9.4	4.5	15.6					
Cycle Queue Clearance Time (g c), s							9.2		7.0		14.7	9.4	4.5	15.6					
Green Ratio (g/C)							0.22		0.22		0.41	0.41	0.54	0.60					
Capacity (c), veh/h							379		329		772	659	453	1125					
Volume-to-Capacity Ratio (X)							0.642		0.506		0.620	0.438	0.452	0.583					
Back of Queue (Q), ft/ln (95 th percentile)																			
Back of Queue (Q), veh/ln (95 th percentile)							7.4		0.5		9.4	5.4	2.6	8.4					
Queue Storage Ratio (RQ) (95 th percentile)							0.69		0.05		0.24	0.91	0.22	0.47					
Uniform Delay (d 1), s/veh							25.9		25.1		16.8	15.3	11.3	9.1					
Incremental Delay (d 2), s/veh							4.9		3.3		0.8	0.5	0.7	0.5					
Initial Queue Delay (d 3), s/veh							0.0		0.0		0.0	0.0	0.0	0.0					
Control Delay (d), s/veh							30.8		28.4		17.7	15.8	12.0	9.6					
Level of Service (LOS)							C		C		B	B	B	A					
Approach Delay, s/veh / LOS				0.0				29.8		C		16.9		B		10.1		B	
Intersection Delay, s/veh / LOS				16.7						B									
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				2.23		B		1.94		B		1.90		B		0.67		A	
Bicycle LOS Score / LOS								F		1.75		B		1.91		B			

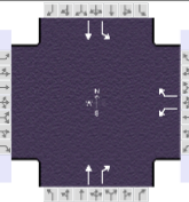
HCS Signalized Intersection Results Summary

General Information						Intersection Information													
Agency		CDM Smith				Duration, h		0.250											
Analyst		DBZ		Analysis Date		Jul 25, 2022		Area Type		Other									
Jurisdiction				Time Period		AM Peak		PHF		0.90									
Urban Street		Billtown Road		Analysis Year		2024 Build		Analysis Period		1> 7:00									
Intersection		Gellhaus Lane		File Name		Billtown AM 24 B.xus													
Project Description		Billtown Road																	
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h							249		150		478	440	222	600					
Signal Information																			
Cycle, s	76.6	Reference Phase	2																
Offset, s	0	Reference Point	End																
Uncoordinated	Yes	Simult. Gap E/W	On																
Force Mode	Fixed	Simult. Gap N/S	On																
				Green	8.7	30.0	17.9	0.0	0.0	0.0									
				Yellow	3.5	4.3	3.5	0.0	0.0	0.0									
				Red	2.8	3.0	2.8	0.0	0.0	0.0									
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase										4				2		1		6	
Case Number										9.0				7.3		1.0		4.0	
Phase Duration, s										24.2				37.3		15.0		52.3	
Change Period, (Y+R c), s										6.3				7.3		6.3		7.3	
Max Allow Headway (MAH), s										6.7				4.0		4.0		4.0	
Queue Clearance Time (g s), s										13.0				20.5		8.0		19.3	
Green Extension Time (g e), s										4.9				6.7		0.8		6.7	
Phase Call Probability										1.00				1.00		0.99		1.00	
Max Out Probability										0.00				0.00		0.00		0.00	
Movement Group Results				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement							7		14		2	12	1	6					
Adjusted Flow Rate (v), veh/h							277		167		531	267	247	667					
Adjusted Saturation Flow Rate (s), veh/h/ln							1753		1522		1870	1598	1725	1885					
Queue Service Time (g s), s							11.0		7.2		18.5	9.3	6.0	17.3					
Cycle Queue Clearance Time (g c), s							11.0		7.2		18.5	9.3	6.0	17.3					
Green Ratio (g/C)							0.23		0.23		0.39	0.39	0.53	0.59					
Capacity (c), veh/h							411		357		733	626	417	1109					
Volume-to-Capacity Ratio (X)							0.674		0.467		0.725	0.426	0.591	0.601					
Back of Queue (Q), ft/ln (95 th percentile)																			
Back of Queue (Q), veh/ln (95 th percentile)							8.6		4.9		11.7	5.5	3.6	9.4					
Queue Storage Ratio (RQ) (95 th percentile)							0.80		0.47		0.30	0.93	0.31	0.52					
Uniform Delay (d 1), s/veh							26.7		25.2		19.8	17.0	13.7	10.1					
Incremental Delay (d 2), s/veh							5.2		2.6		1.4	0.5	1.3	0.5					
Initial Queue Delay (d 3), s/veh							0.0		0.0		0.0	0.0	0.0	0.0					
Control Delay (d), s/veh							31.9		27.8		21.2	17.5	15.0	10.6					
Level of Service (LOS)							C		C		C	B	B	B					
Approach Delay, s/veh / LOS				0.0				30.4		C		19.9		B		11.8		B	
Intersection Delay, s/veh / LOS				18.6						B									
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				2.23		B		1.94		B		1.90		B		0.67		A	
Bicycle LOS Score / LOS								F		1.80		B		1.99		B			

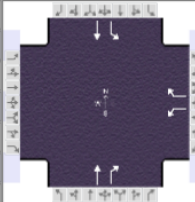
HCS Signalized Intersection Results Summary

General Information					Intersection Information															
Agency		Diane B. Zimmerman Traffic Engineering					Duration, h		0.250											
Analyst		DBZ		Analysis Date		Jul 25, 2022		Area Type							Other					
Jurisdiction				Time Period		AM Peak		PHF							0.90					
Urban Street		Billtown Road		Analysis Year		2034 No Build		Analysis Period							1> 7:00					
Intersection		Gellhaus Lane		File Name		Billtown AM 34 NB.xus														
Project Description		Billtown Road																		
Demand Information					EB			WB			NB			SB						
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h								230		158		453	484	193	620					
Signal Information																				
Cycle, s	74.0	Reference Phase	2																	
Offset, s	0	Reference Point	End																	
Uncoordinated	Yes	Simult. Gap E/W	On																	
Force Mode	Fixed	Simult. Gap N/S	On																	
					Green	7.5	30.0	16.6	0.0	0.0	0.0									
					Yellow	3.5	4.3	3.5	0.0	0.0	0.0									
					Red	2.8	3.0	2.8	0.0	0.0	0.0									
Timer Results					EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase											4				2		1		6	
Case Number											9.0				7.3		1.0		4.0	
Phase Duration, s											22.9				37.3		13.8		51.1	
Change Period, (Y+R c), s											6.3				7.3		6.3		7.3	
Max Allow Headway (MAH), s											6.7				4.0		4.0		4.0	
Queue Clearance Time (g s), s											11.8				18.2		6.9		19.4	
Green Extension Time (g e), s											4.8				7.1		0.7		7.1	
Phase Call Probability											1.00				1.00		0.99		1.00	
Max Out Probability											0.00				0.00		0.00		0.00	
Movement Group Results					EB			WB			NB			SB						
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement								7		14		2	12	1	6					
Adjusted Flow Rate (v), veh/h								256		176		503	316	214	689					
Adjusted Saturation Flow Rate (s), veh/h/ln								1753		1522		1870	1598	1725	1885					
Queue Service Time (g s), s								9.8		7.5		16.2	10.8	4.9	17.4					
Cycle Queue Clearance Time (g c), s								9.8		7.5		16.2	10.8	4.9	17.4					
Green Ratio (g/C)								0.22		0.22		0.41	0.41	0.53	0.59					
Capacity (c), veh/h								393		342		758	648	433	1116					
Volume-to-Capacity Ratio (X)								0.650		0.514		0.664	0.487	0.495	0.617					
Back of Queue (Q), ft/ln (95 th percentile)																				
Back of Queue (Q), veh/ln (95 th percentile)								7.8		5.1		10.3	6.3	2.8	9.2					
Queue Storage Ratio (RQ) (95 th percentile)								0.73		0.49		0.26	1.06	0.25	0.52					
Uniform Delay (d 1), s/veh								26.1		25.2		17.9	16.3	12.2	9.7					
Incremental Delay (d 2), s/veh								4.9		3.3		1.0	0.6	0.9	0.6					
Initial Queue Delay (d s), s/veh								0.0		0.0		0.0	0.0	0.0	0.0					
Control Delay (d), s/veh								31.0		28.4		18.9	16.9	13.1	10.3					
Level of Service (LOS)								C		C		B	B	B	B					
Approach Delay, s/veh / LOS					0.0			29.9		C	18.1		B		10.9		B			
Intersection Delay, s/veh / LOS					17.5					B										
Multimodal Results					EB			WB			NB			SB						
Pedestrian LOS Score / LOS					2.23		B	1.94		B	1.90		B	0.67		A				
Bicycle LOS Score / LOS										F	1.84		B	1.98		B				

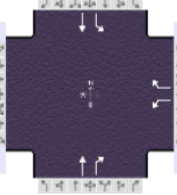
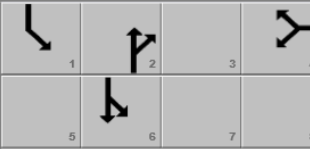
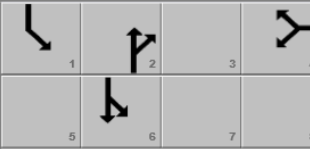
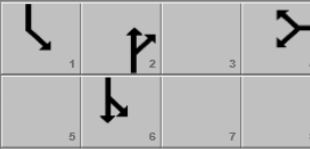
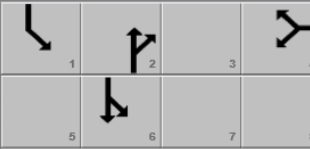
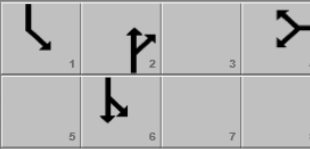
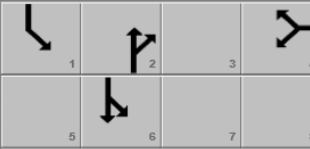
HCS Signalized Intersection Results Summary

General Information					Intersection Information														
Agency	Diane B. Zimmerman Traffic Engineering					Duration, h	0.250												
Analyst	DBZ	Analysis Date	Jul 25, 2022		Area Type	Other													
Jurisdiction		Time Period	AM Peak		PHF	0.90													
Urban Street	Billtown Road	Analysis Year	2034 Build		Analysis Period	1> 7:00													
Intersection	Gellhaus Lane	File Name	Billtown AM 34 B.xus																
Project Description	Billtown Road																		
																			
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h							260		158		500	464	231	630					
Signal Information																			
Cycle, s	78.1	Reference Phase	2								1	2		3	4				
Offset, s	0	Reference Point	End																
Uncoordinated	Yes	Simult. Gap E/W	On	Green	9.3	30.0	18.9	0.0	0.0	0.0									
				Yellow	3.5	4.3	3.5	0.0	0.0	0.0									
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.8	3.0	2.8	0.0	0.0	0.0									
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase										4				2		1		6	
Case Number										9.0				7.3		1.0		4.0	
Phase Duration, s										25.2				37.3		15.6		52.9	
Change Period, (Y+R c), s										6.3				7.3		6.3		7.3	
Max Allow Headway (MAH), s										6.7				4.0		4.0		4.0	
Queue Clearance Time (g s), s										13.7				22.4		8.4		21.2	
Green Extension Time (g e), s										5.2				7.4		0.8		7.4	
Phase Call Probability										1.00				1.00		1.00		1.00	
Max Out Probability										0.01				0.01		0.00		0.00	
Movement Group Results				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement							7		14		2	12	1	6					
Adjusted Flow Rate (v), veh/h							289		176		556	293	257	700					
Adjusted Saturation Flow Rate (s), veh/h/ln							1753		1522		1870	1598	1725	1885					
Queue Service Time (g s), s							11.7		7.7		20.4	10.8	6.4	19.2					
Cycle Queue Clearance Time (g c), s							11.7		7.7		20.4	10.8	6.4	19.2					
Green Ratio (g/C)							0.24		0.24		0.38	0.38	0.53	0.58					
Capacity (c), veh/h							425		369		719	614	399	1100					
Volume-to-Capacity Ratio (X)							0.679		0.475		0.773	0.478	0.643	0.636					
Back of Queue (Q), ft/ln (95 th percentile)																			
Back of Queue (Q), veh/ln (95 th percentile)							9.0		5.2		12.8	6.5	4.0	10.4					
Queue Storage Ratio (RQ) (95 th percentile)							0.84		0.50		0.32	1.10	0.35	0.58					
Uniform Delay (d 1), s/veh							26.9		25.4		21.1	18.2	14.8	10.8					
Incremental Delay (d 2), s/veh							5.2		2.6		1.8	0.6	1.7	0.6					
Initial Queue Delay (d 3), s/veh							0.0		0.0		0.0	0.0	0.0	0.0					
Control Delay (d), s/veh							32.1		28.0		22.9	18.7	16.6	11.4					
Level of Service (LOS)							C		C		C	B	B	B					
Approach Delay, s/veh / LOS				0.0			30.5			21.5			12.8			B			
Intersection Delay, s/veh / LOS				19.7						B									
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				2.23			B			1.91			0.68			A			
Bicycle LOS Score / LOS							F			1.89			2.07			B			

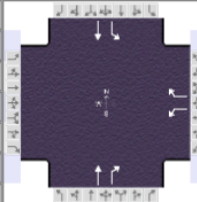
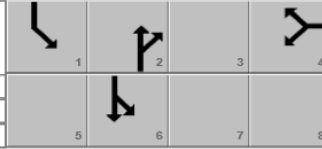
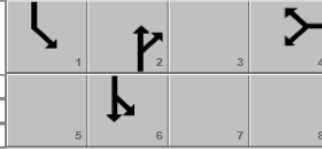
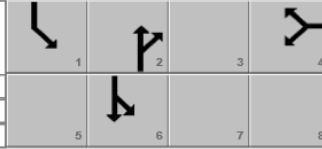
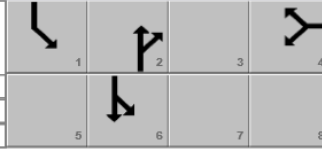
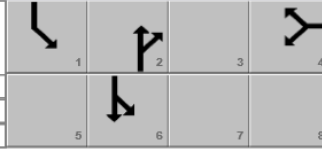
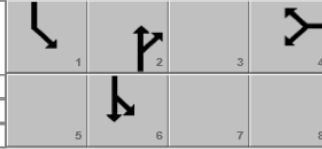
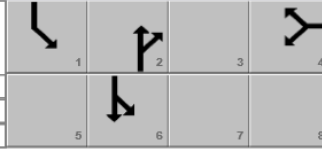
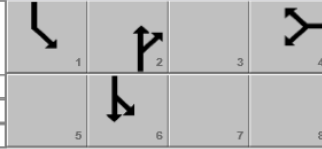
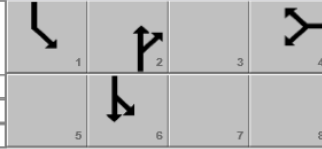
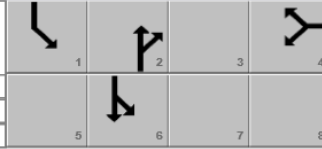
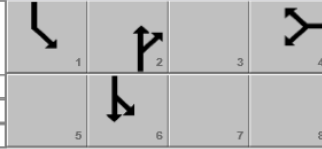
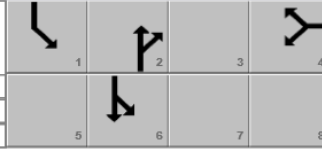
HCS Signalized Intersection Results Summary

General Information								Intersection Information											
Agency		Diane B. Zimmerman Traffic Engineering						Duration, h		0.250									
Analyst		DBZ		Analysis Date		Jul 25, 2022		Area Type		Other									
Jurisdiction				Time Period		PM Peak		PHF		0.91									
Urban Street		Billtown Road		Analysis Year		2022		Analysis Period		1> 4:00									
Intersection		Gellhaus Lane		File Name		Billtown PM 22.xus													
Project Description		Billtown Road																	
																			
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h							490		123		511	160	70	660					
Signal Information																			
Cycle, s	94.9	Reference Phase	2								1	2	3	4					
Offset, s	0	Reference Point	End	Green	5.2	34.6	35.1	0.0	0.0	0.0									
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.5	4.3	3.5	0.0	0.0	0.0									
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.8	3.0	2.8	0.0	0.0	0.0		5	6	7	8				
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase										4				2		1		6	
Case Number										9.0				7.3		1.0		4.0	
Phase Duration, s										41.4				41.9		11.5		53.5	
Change Period, (Y+R c), s										6.3				7.3		6.3		7.3	
Max Allow Headway (MAH), s										6.7				4.0		4.0		4.0	
Queue Clearance Time (g s), s										28.0				27.9		5.0		32.9	
Green Extension Time (g e), s										7.0				6.6		0.2		6.6	
Phase Call Probability										1.00				1.00		0.87		1.00	
Max Out Probability										0.19				0.01		0.00		0.01	
Movement Group Results				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement							7		14		2	12	1	6					
Adjusted Flow Rate (v), veh/h							538		135		562	154	77	725					
Adjusted Saturation Flow Rate (s), veh/h/ln							1781		1572		1870	1535	1428	1870					
Queue Service Time (g s), s							26.0		5.6		25.9	6.7	3.0	30.9					
Cycle Queue Clearance Time (g c), s							26.0		5.6		25.9	6.7	3.0	30.9					
Green Ratio (g/C)							0.37		0.37		0.37	0.37	0.44	0.49					
Capacity (c), veh/h							659		582		684	561	218	911					
Volume-to-Capacity Ratio (X)							0.817		0.232		0.821	0.274	0.353	0.797					
Back of Queue (Q), ft/ln (95 th percentile)																			
Back of Queue (Q), veh/ln (95 th percentile)							17.4		3.8		16.5	4.1	1.7	18.0					
Queue Storage Ratio (RQ) (95 th percentile)							1.61		0.35		0.42	0.72	0.18	0.92					
Uniform Delay (d 1), s/veh							27.0		20.6		27.4	21.3	20.3	20.5					
Incremental Delay (d 2), s/veh							7.3		0.6		2.5	0.3	1.0	1.6					
Initial Queue Delay (d 3), s/veh							0.0		0.0		0.0	0.0	0.0	0.0					
Control Delay (d), s/veh							34.4		21.2		29.9	21.5	21.2	22.1					
Level of Service (LOS)							C		C		C	C	C	C					
Approach Delay, s/veh / LOS				0.0		31.7		C		28.1		C		22.0		C			
Intersection Delay, s/veh / LOS				27.0						C									
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				1.98		B		1.95		B		1.92		B		0.70		A	
Bicycle LOS Score / LOS								F		1.67		B		1.81		B			

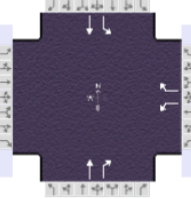
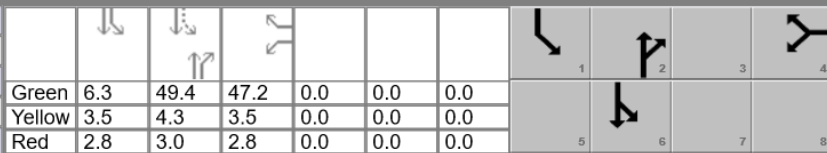
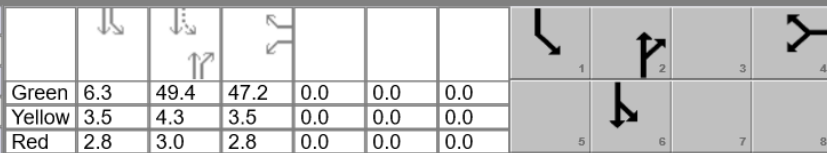
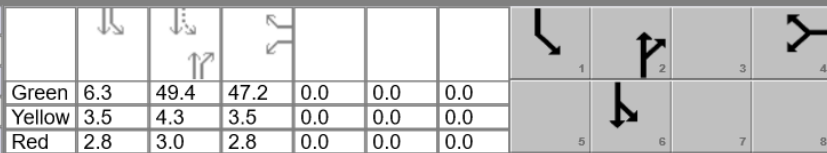
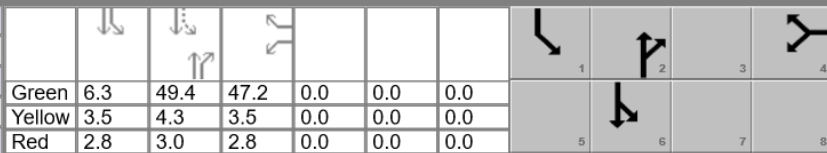
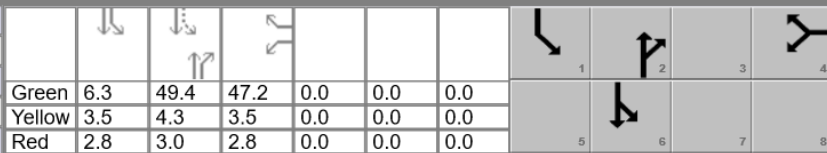
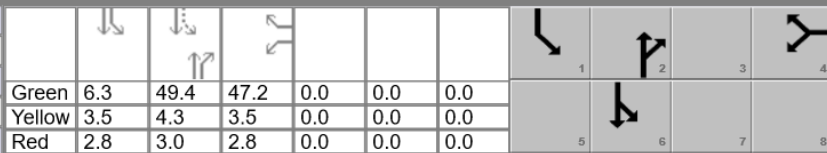
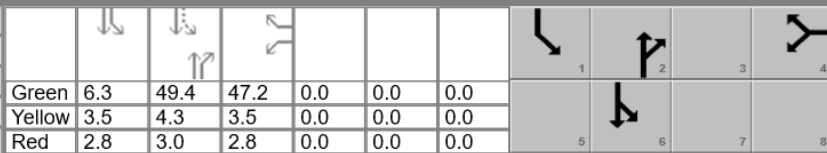
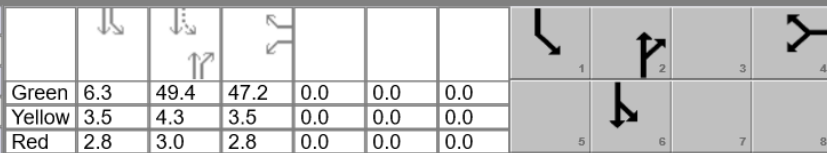
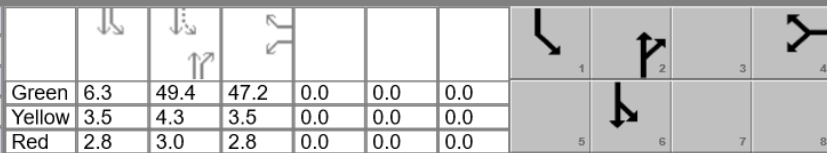
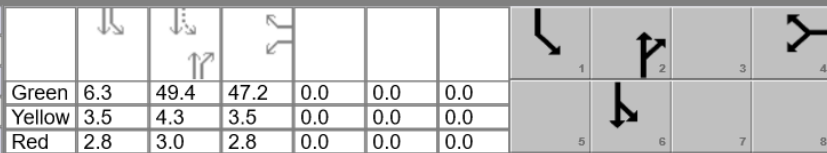
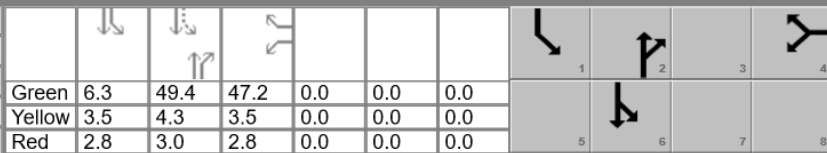
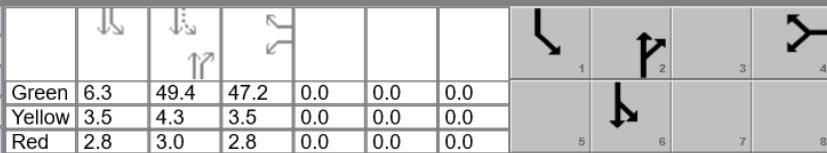
HCS Signalized Intersection Results Summary

General Information					Intersection Information																							
Agency		Diane B. Zimmerman Traffic Engineering					Duration, h		0.250																			
Analyst		DBZ		Analysis Date		Jul 25, 2022		Area Type						CBD														
Jurisdiction				Time Period		PM Peak		PHF						0.91														
Urban Street		Billtown Road		Analysis Year		2024 No Build		Analysis Period						1> 4:00														
Intersection		Gellhaus Lane		File Name		Billtown PM 24 NB.xus																						
Project Description		Billtown Road																										
Demand Information					EB			WB			NB			SB														
Approach Movement					L			T			R			L			T			R								
Demand (v), veh/h								495			124			516			162			71			667					
Signal Information																												
Cycle, s		112.0		Reference Phase													2											
Offset, s		0		Reference Point													End											
Uncoordinated		Yes		Simult. Gap E/W													On											
Force Mode		Fixed		Simult. Gap N/S													On											
					Green	5.6	43.6	42.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0												
					Yellow	3.5	4.3	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0												
					Red	2.8	3.0	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0												
Timer Results					EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT									
Assigned Phase											4				2		1		6									
Case Number											9.0				7.3		1.0		4.0									
Phase Duration, s											49.1				50.9		11.9		62.8									
Change Period, (Y+R c), s											6.3				7.3		6.3		7.3									
Max Allow Headway (MAH), s											6.7				4.0		4.0		4.0									
Queue Clearance Time (g s), s											37.6				36.8		5.9		45.6									
Green Extension Time (g e), s											5.2				6.7		0.2		6.5									
Phase Call Probability											1.00				1.00		0.91		1.00									
Max Out Probability											0.54				0.02		0.00		0.05									
Movement Group Results					EB			WB			NB			SB														
Approach Movement					L			T			R			L			T			R								
Assigned Movement														2			12			1			6					
Adjusted Flow Rate (v), veh/h								544			136			567			156			78			733					
Adjusted Saturation Flow Rate (s), veh/h/ln								1603			1415			1683			1381			1286			1683					
Queue Service Time (g s), s								35.6			7.4			34.8			8.7			3.9			43.6					
Cycle Queue Clearance Time (g c), s								35.6			7.4			34.8			8.7			3.9			43.6					
Green Ratio (g/C)								0.38			0.38			0.39			0.39			0.46			0.50					
Capacity (c), veh/h								614			542			656			538			177			835					
Volume-to-Capacity Ratio (X)								0.886			0.252			0.864			0.290			0.441			0.878					
Back of Queue (Q), ft/ln (95 th percentile)																												
Back of Queue (Q), veh/ln (95 th percentile)								22.2			4.5			20.0			5.0			2.1			24.0					
Queue Storage Ratio (RQ) (95 th percentile)								2.05			0.42			0.51			0.87			0.22			1.22					
Uniform Delay (d 1), s/veh								32.4			23.7			31.5			23.6			24.5			25.2					
Incremental Delay (d 2), s/veh								14.4			0.7			3.7			0.3			1.7			6.3					
Initial Queue Delay (d 3), s/veh								0.0			0.0			0.0			0.0			0.0			0.0					
Control Delay (d), s/veh								46.8			24.3			35.2			23.9			26.2			31.6					
Level of Service (LOS)								D			C						D			C			C			C		
Approach Delay, s/veh / LOS					0.0			42.3			D			32.7			C			31.0			C					
Intersection Delay, s/veh / LOS								35.0									D											
Multimodal Results					EB			WB			NB			SB														
Pedestrian LOS Score / LOS					1.99			B			1.96			B			1.92			B			0.71			A		
Bicycle LOS Score / LOS											F			1.68			B			1.83			B					

HCS Signalized Intersection Results Summary

General Information							Intersection Information												
Agency		Diane B. Zimmerman Traffic Engineering					Duration, h		0.250										
Analyst		DBZ		Analysis Date		Jul 25, 2022		Area Type		CBD									
Jurisdiction				Time Period		PM Peak		PHF		0.91									
Urban Street		Billtown Road		Analysis Year		2024 Build		Analysis Period		1> 4:00									
Intersection		Gellhaus Lane		File Name		Billtown PM 24 B.xus													
Project Description		Billtown Road																	
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h							524		124		561	155	105	678					
Signal Information																			
Cycle, s	132.0	Reference Phase	2																
Offset, s	0	Reference Point	End																
Uncoordinated	Yes	Simult. Gap E/W	On																
Force Mode	Fixed	Simult. Gap N/S	On																
				Green	8.8	54.0	49.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
				Yellow	3.5	4.3	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
				Red	2.8	3.0	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase										4				2		1		6	
Case Number										9.0				7.3		1.0		4.0	
Phase Duration, s										55.7				61.3		15.1		76.4	
Change Period, (Y+R c), s										6.3				7.3		6.3		7.3	
Max Allow Headway (MAH), s										6.7				4.0		4.0		4.0	
Queue Clearance Time (g s), s										48.4				47.1		8.6		52.0	
Green Extension Time (g e), s										1.0				6.8		0.3		6.5	
Phase Call Probability										1.00				1.00		0.99		1.00	
Max Out Probability										1.00				0.07		0.00		0.12	
Movement Group Results				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement							7		14		2	12	1	6					
Adjusted Flow Rate (v), veh/h							576		136		616	148	115	745					
Adjusted Saturation Flow Rate (s), veh/h/ln							1603		1415		1683	1381	1286	1683					
Queue Service Time (g s), s							46.4		8.8		45.1	9.4	6.6	50.0					
Cycle Queue Clearance Time (g c), s							46.4		8.8		45.1	9.4	6.6	50.0					
Green Ratio (g/C)							0.37		0.37		0.41	0.41	0.49	0.52					
Capacity (c), veh/h							599		529		688	565	179	881					
Volume-to-Capacity Ratio (X)							0.961		0.258		0.896	0.263	0.643	0.846					
Back of Queue (Q), ft/ln (95 th percentile)																			
Back of Queue (Q), veh/ln (95 th percentile)							30.2		5.6		26.5	5.5	3.8	27.6					
Queue Storage Ratio (RQ) (95 th percentile)							2.79		0.52		0.67	0.96	0.38	1.40					
Uniform Delay (d 1), s/veh							40.4		28.7		36.4	25.9	29.2	26.9					
Incremental Delay (d 2), s/veh							27.6		0.7		8.5	0.2	3.8	6.7					
Initial Queue Delay (d 3), s/veh							0.0		0.0		0.0	0.0	0.0	0.0					
Control Delay (d), s/veh							68.0		29.4		44.9	26.1	33.0	33.6					
Level of Service (LOS)							E		C		D	C	C	C					
Approach Delay, s/veh / LOS				0.0		60.6		E		41.3		D		33.6		C			
Intersection Delay, s/veh / LOS				44.3					D										
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				1.99		B		1.97		B		1.92		B		0.71		A	
Bicycle LOS Score / LOS								F		1.75		B		1.91		B			

HCS Signalized Intersection Results Summary

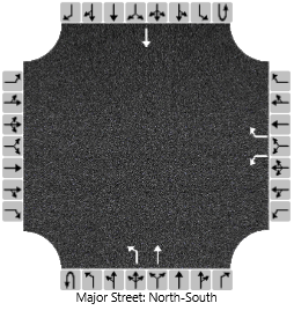
General Information					Intersection Information															
Agency	Diane B. Zimmerman Traffic Engineering					Duration, h	0.250													
Analyst	DBZ	Analysis Date	Jul 25, 2022		Area Type	CBD														
Jurisdiction		Time Period	PM Peak		PHF	0.91														
Urban Street	Billtown Road	Analysis Year	2034 No Build		Analysis Period	1> 4:00														
Intersection	Gellhaus Lane	File Name	Billtown PM 34 NB.xus																	
Project Description	Billtown Road																			
Demand Information					EB			WB			NB			SB						
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h								520		130		542	170	75	701					
Signal Information																				
Cycle, s	122.7	Reference Phase	2																	
Offset, s	0	Reference Point	End																	
Uncoordinated	Yes	Simult. Gap E/W	On																	
Force Mode	Fixed	Simult. Gap N/S	On																	
				Green	6.3	49.4	47.2	0.0	0.0	0.0										
				Yellow	3.5	4.3	3.5	0.0	0.0	0.0										
				Red	2.8	3.0	2.8	0.0	0.0	0.0										
Timer Results					EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase											4				2		1		6	
Case Number											9.0				7.3		1.0		4.0	
Phase Duration, s											53.5				56.7		12.6		69.3	
Change Period, (Y+R c), s											6.3				7.3		6.3		7.3	
Max Allow Headway (MAH), s											6.7				4.0		4.0		4.0	
Queue Clearance Time (g s), s											43.9				42.2		6.5		53.3	
Green Extension Time (g e), s											3.2				7.1		0.2		6.5	
Phase Call Probability											1.00				1.00		0.94		1.00	
Max Out Probability											1.00				0.05		0.00		0.15	
Movement Group Results					EB			WB			NB			SB						
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement								7		14		2	12	1	6					
Adjusted Flow Rate (v), veh/h								571		143		596	165	82	770					
Adjusted Saturation Flow Rate (s), veh/h/ln								1603		1415		1683	1381	1286	1683					
Queue Service Time (g s), s								41.9		8.5		40.2	9.9	4.5	51.3					
Cycle Queue Clearance Time (g c), s								41.9		8.5		40.2	9.9	4.5	51.3					
Green Ratio (g/C)								0.38		0.38		0.40	0.40	0.47	0.51					
Capacity (c), veh/h								616		544		678	556	169	850					
Volume-to-Capacity Ratio (X)								0.928		0.263		0.879	0.296	0.487	0.906					
Back of Queue (Q), ft/ln (95 th percentile)																				
Back of Queue (Q), veh/ln (95 th percentile)								26.7		5.3		23.3	5.8	2.5	28.9					
Queue Storage Ratio (RQ) (95 th percentile)								2.46		0.49		0.59	1.01	0.25	1.47					
Uniform Delay (d 1), s/veh								36.2		25.9		33.9	24.9	26.9	27.7					
Incremental Delay (d 2), s/veh								20.7		0.7		5.9	0.3	2.2	10.0					
Initial Queue Delay (d 3), s/veh								0.0		0.0		0.0	0.0	0.0	0.0					
Control Delay (d), s/veh								56.9		26.6		39.8	25.2	29.0	37.8					
Level of Service (LOS)								E		C		D	C	C	D					
Approach Delay, s/veh / LOS					0.0				50.8		D		36.7		D		36.9		D	
Intersection Delay, s/veh / LOS										41.1					D					
Multimodal Results					EB			WB			NB			SB						
Pedestrian LOS Score / LOS					1.99		B		1.96		B		1.92		B		0.71		A	
Bicycle LOS Score / LOS									F		1.74		B		1.89		B			

HCS Signalized Intersection Results Summary

General Information					Intersection Information														
Agency		Diane B. Zimmerman Traffic Engineering					Duration, h		0.250										
Analyst		DBZ	Analysis Date	Jul 25, 2022		Area Type		CBD											
Jurisdiction			Time Period	PM Peak		PHF		0.91											
Urban Street		Billtown Road		Analysis Year	2034 Build		Analysis Period		1> 4:00										
Intersection		Gellhaus Lane		File Name	Billtown PM 34 B.xus														
Project Description		Billtown Road																	
Demand Information					EB			WB			NB			SB					
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R			
Demand (v), veh/h								549		130		587	163	109	712				
Signal Information						1	2	3	4	5	6	7	8						
Cycle, s		136.7	Reference Phase											2					
Offset, s		0	Reference Point											End					
Uncoordinated		Yes	Simult. Gap E/W											On					
Force Mode		Fixed	Simult. Gap N/S											On					
Timer Results					EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT							
Assigned Phase								4		2	1	6							
Case Number								9.0		7.3	1.0	4.0							
Phase Duration, s								56.3		64.9	15.5	80.4							
Change Period, (Y+R c), s								6.3		7.3	6.3	7.3							
Max Allow Headway (MAH), s								6.7		4.0	4.0	4.0							
Queue Clearance Time (g s), s								53.4		50.5	9.0	56.4							
Green Extension Time (g e), s								0.0		7.1	0.3	6.5							
Phase Call Probability								1.00		1.00	0.99	1.00							
Max Out Probability								1.00		0.13	0.00	0.23							
Movement Group Results					EB			WB			NB			SB					
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R			
Assigned Movement								7		14		2	12	1	6				
Adjusted Flow Rate (v), veh/h								603		143		645	157	120	782				
Adjusted Saturation Flow Rate (s), veh/h/ln								1603		1415		1683	1381	1286	1683				
Queue Service Time (g s), s								51.4		9.7		48.5	10.2	7.0	54.4				
Cycle Queue Clearance Time (g c), s								51.4		9.7		48.5	10.2	7.0	54.4				
Green Ratio (g/C)								0.37		0.37		0.43	0.43	0.50	0.54				
Capacity (c), veh/h								604		517		722	582	177	913				
Volume-to-Capacity Ratio (X)								0.999		0.276		0.894	0.270	0.677	0.857				
Back of Queue (Q), ft/ln (95 th percentile)																			
Back of Queue (Q), veh/ln (95 th percentile)								34.4		6.2		28.2	5.9	4.0	30.0				
Queue Storage Ratio (RQ) (95 th percentile)								3.18		0.58		0.72	1.04	0.41	1.52				
Uniform Delay (d 1), s/veh								42.6		30.6		36.6	25.8	30.2	27.2				
Incremental Delay (d 2), s/veh								36.4		0.8		9.0	0.2	4.5	7.8				
Initial Queue Delay (d 3), s/veh								0.0		0.0		0.0	0.0	0.0	0.0				
Control Delay (d), s/veh								79.0		31.4		45.6	26.1	34.6	35.0				
Level of Service (LOS)								E		C		D	C	C	D				
Approach Delay, s/veh / LOS					0.0			69.9		E		41.8		D	35.0		C		
Intersection Delay, s/veh / LOS					47.8					D									
Multimodal Results					EB			WB			NB			SB					
Pedestrian LOS Score / LOS					2.00		B	1.97		B	1.92		B	0.71		A			
Bicycle LOS Score / LOS									F		1.81		B	1.98		B			

HCS Two-Way Stop-Control Report																
General Information									Site Information							
Analyst	Diane Zimmerman				Intersection				Billtown at I 265 WB							
Agency/Co.	Diane B. Zimmerman Traffic Engineering				Jurisdiction											
Date Performed	7/21/2022				East/West Street				I 265 Westbound							
Analysis Year	2022				North/South Street				Billtown Road							
Time Analyzed	AM Peak				Peak Hour Factor				0.93							
Intersection Orientation	North-South				Analysis Time Period (hrs)				0.25							
Project Description	Billtown Road															
Lanes																
Major Street: North-South																
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	10	1	2	3	4	4	5	6
Number of Lanes		0	0	0		1	0	1	0	1	1	0	0	0	1	0
Configuration						L		R		L	T				T	
Volume (veh/h)						34		116		93	769				276	
Percent Heavy Vehicles (%)						0		1		1						
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)						7.10		6.21		4.11						
Base Follow-Up Headway (sec)						3.5		3.3		2.2						
Follow-Up Headway (sec)						3.50		3.31		2.21						
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						37		125		100						
Capacity, c (veh/h)						212		373		1270						
v/c Ratio						0.17		0.33		0.08						
95% Queue Length, Q ₉₅ (veh)						0.6		1.4		0.3						
Control Delay (s/veh)						25.5		19.4		8.1						
Level of Service (LOS)						D		C		A						
Approach Delay (s/veh)					20.8				0.9							
Approach LOS					C				A							

HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	Diane Zimmerman							Intersection	Billtown at I 265 WB							
Agency/Co.	Diane B. Zimmerman Traffic Engineering							Jurisdiction								
Date Performed	7/21/2022							East/West Street	I 265 Westbound							
Analysis Year	2024							North/South Street	Billtown Road							
Time Analyzed	AM Peak No Build							Peak Hour Factor	0.93							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Billtown Road															
Lanes																
Major Street: North-South																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	1	1	0	0	0	1	0
Configuration						L		R		L	T				T	
Volume (veh/h)						34		117		94	777				279	
Percent Heavy Vehicles (%)						0		1		1						
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)						7.10		6.21		4.11						
Base Follow-Up Headway (sec)						3.5		3.3		2.2						
Follow-Up Headway (sec)						3.50		3.31		2.21						
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						37		126		101						
Capacity, c (veh/h)						209		369		1267						
v/c Ratio						0.18		0.34		0.08						
95% Queue Length, Q ₉₅ (veh)						0.6		1.5		0.3						
Control Delay (s/veh)						25.9		19.7		8.1						
Level of Service (LOS)						D		C		A						
Approach Delay (s/veh)					21.1				0.9							
Approach LOS					C				A							

HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	Diane Zimmerman							Intersection	Billtown at I 265 WB							
Agency/Co.	Diane B. Zimmerman Traffic Engineering							Jurisdiction								
Date Performed	7/21/2022							East/West Street	I 265 Westbound							
Analysis Year	2024							North/South Street	Billtown Road							
Time Analyzed	AM Peak Build							Peak Hour Factor	0.93							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Billtown Road															
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	10U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	1	1	0	0	0	1	0
Configuration						L		R		L	T				T	
Volume (veh/h)						34		123		94	814				293	
Percent Heavy Vehicles (%)						0		1		1						
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)						7.10		6.21		4.11						
Base Follow-Up Headway (sec)						3.5		3.3		2.2						
Follow-Up Headway (sec)						3.50		3.31		2.21						
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						37		132		101						
Capacity, c (veh/h)						198		350		1251						
v/c Ratio						0.18		0.38		0.08						
95% Queue Length, Q ₉₅ (veh)						0.7		1.7		0.3						
Control Delay (s/veh)						27.3		21.4		8.1						
Level of Service (LOS)						D		C		A						
Approach Delay (s/veh)					22.7				0.8							
Approach LOS					C				A							

HCS Two-Way Stop-Control Report																	
General Information									Site Information								
Analyst	Diane Zimmerman								Intersection	Billtown at I 265 WB							
Agency/Co.	Diane B. Zimmerman Traffic Engineering								Jurisdiction								
Date Performed	7/21/2022								East/West Street	I 265 Westbound							
Analysis Year	2034								North/South Street	Billtown Road							
Time Analyzed	AM Peak No Build								Peak Hour Factor	0.93							
Intersection Orientation	North-South								Analysis Time Period (hrs)	0.25							
Project Description	Billtown Road																
Lanes																	
Major Street: North-South																	
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	10	1	2	3	4	4	5	6	
Number of Lanes		0	0	0		1	0	1	0	1	1	0	0	0	1	0	
Configuration						L		R		L	T				T		
Volume (veh/h)						36		123		99	817				293		
Percent Heavy Vehicles (%)						0		1		1							
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)						7.10		6.21		4.11							
Base Follow-Up Headway (sec)						3.5		3.3		2.2							
Follow-Up Headway (sec)						3.50		3.31		2.21							
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)						39		132		106							
Capacity, c (veh/h)						193		348		1251							
v/c Ratio						0.20		0.38		0.09							
95% Queue Length, Q ₉₅ (veh)						0.7		1.7		0.3							
Control Delay (s/veh)						28.2		21.5		8.1							
Level of Service (LOS)						D		C		A							
Approach Delay (s/veh)					23.0				0.9								
Approach LOS					C				A								

HCS Two-Way Stop-Control Report																	
General Information									Site Information								
Analyst	Diane Zimmerman								Intersection	Billtown at I 265 WB							
Agency/Co.	Diane B. Zimmerman Traffic Engineering								Jurisdiction								
Date Performed	7/21/2022								East/West Street	I 265 Westbound							
Analysis Year	2034								North/South Street	Billtown Road							
Time Analyzed	AM Peak Build								Peak Hour Factor	0.93							
Intersection Orientation	North-South								Analysis Time Period (hrs)	0.25							
Project Description	Billtown Road																
Lanes																	
Major Street: North-South																	
Vehicle Volumes and Adjustments																	
Approach	Eastbound				Westbound				Northbound				Southbound				
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Priority		10	11	12		7	8	9	10U	1	2	3	4U	4	5	6	
Number of Lanes		0	0	0		1	0	1	0	1	1	0	0	0	1	0	
Configuration						L		R		L	T				T		
Volume (veh/h)						36		129		99	854				307		
Percent Heavy Vehicles (%)						0		1		1							
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)						7.10		6.21		4.11							
Base Follow-Up Headway (sec)						3.5		3.3		2.2							
Follow-Up Headway (sec)						3.50		3.31		2.21							
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)						39		139		106							
Capacity, c (veh/h)						183		330		1235							
v/c Ratio						0.21		0.42		0.09							
95% Queue Length, Q ₉₅ (veh)						0.8		2.0		0.3							
Control Delay (s/veh)						29.9		23.5		8.2							
Level of Service (LOS)						D		C		A							
Approach Delay (s/veh)					24.9				0.9								
Approach LOS					C				A								

HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	Diane Zimmerman							Intersection	Billtown at I 265 WB							
Agency/Co.	Diane B. Zimmerman Traffic Engineering							Jurisdiction								
Date Performed	7/21/2022							East/West Street	I 265 Westbound							
Analysis Year	2022							North/South Street	Billtown Road							
Time Analyzed	PM Peak							Peak Hour Factor	0.96							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Billtown Road															
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	10	1	2	3	4	4	5	6
Number of Lanes		0	0	0		1	0	1	0	1	1	0	0	0	1	0
Configuration						L		R		L	T				T	
Volume (veh/h)						148		170		33	506				425	
Percent Heavy Vehicles (%)						1		2		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)						7.1		6.2		4.1						
Critical Headway (sec)						7.11		6.22		4.10						
Base Follow-Up Headway (sec)						3.5		3.3		2.2						
Follow-Up Headway (sec)						3.51		3.32		2.20						
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						154		177		34						
Capacity, c (veh/h)						327		551		1128						
v/c Ratio						0.47		0.32		0.03						
95% Queue Length, Q ₉₅ (veh)						2.4		1.4		0.1						
Control Delay (s/veh)						25.4		14.6		8.3						
Level of Service (LOS)						D		B		A						
Approach Delay (s/veh)					19.6				0.5							
Approach LOS					C				A							

HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	Diane Zimmerman							Intersection	Billtown at I 265 WB							
Agency/Co.	Diane B. Zimmerman Traffic Engineering							Jurisdiction								
Date Performed	7/21/2022							East/West Street	I 265 Westbound							
Analysis Year	2024							North/South Street	Billtown Road							
Time Analyzed	PM Peak No Build							Peak Hour Factor	0.96							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Billtown Road															
Lanes																
Major Street: North-South																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	1	1	0	0	0	1	0
Configuration						L		R		L	T				T	
Volume (veh/h)						149		172		33	511				429	
Percent Heavy Vehicles (%)						1		2		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)						7.1		6.2		4.1						
Critical Headway (sec)						7.11		6.22		4.10						
Base Follow-Up Headway (sec)						3.5		3.3		2.2						
Follow-Up Headway (sec)						3.51		3.32		2.20						
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						155		179		34						
Capacity, c (veh/h)						324		547		1124						
v/c Ratio						0.48		0.33		0.03						
95% Queue Length, Q ₉₅ (veh)						2.5		1.4		0.1						
Control Delay (s/veh)						25.9		14.7		8.3						
Level of Service (LOS)						D		B		A						
Approach Delay (s/veh)					19.9				0.5							
Approach LOS					C				A							

HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	Diane Zimmerman							Intersection	Billtown at I 265 WB							
Agency/Co.	Diane B. Zimmerman Traffic Engineering							Jurisdiction								
Date Performed	7/21/2022							East/West Street	I 265 Westbound							
Analysis Year	2024							North/South Street	Billtown Road							
Time Analyzed	PM Peak Build							Peak Hour Factor	0.96							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Billtown Road															
Lanes																
Major Street: North-South																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	1	1	0	0	0	1	0
Configuration						L		R		L	T				T	
Volume (veh/h)						149		182		33	540				443	
Percent Heavy Vehicles (%)						1		2		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)						7.1		6.2		4.1						
Critical Headway (sec)						7.11		6.22		4.10						
Base Follow-Up Headway (sec)						3.5		3.3		2.2						
Follow-Up Headway (sec)						3.51		3.32		2.20						
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						155		190		34						
Capacity, c (veh/h)						311		526		1110						
v/c Ratio						0.50		0.36		0.03						
95% Queue Length, Q ₉₅ (veh)						2.6		1.6		0.1						
Control Delay (s/veh)						27.5		15.6		8.3						
Level of Service (LOS)						D		C		A						
Approach Delay (s/veh)					21.0				0.5							
Approach LOS					C				A							

HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	Diane Zimmerman							Intersection	Billtown at I 265 WB							
Agency/Co.	Diane B. Zimmerman Traffic Engineering							Jurisdiction								
Date Performed	7/21/2022							East/West Street	I 265 Westbound							
Analysis Year	2034							North/South Street	Billtown Road							
Time Analyzed	PM Peak No Build							Peak Hour Factor	0.96							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Billtown Road															
Lanes																
Major Street: North-South																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	10U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	1	1	0	0	0	1	0
Configuration						L		R		L	T				T	
Volume (veh/h)						157		181		35	537				451	
Percent Heavy Vehicles (%)						1		2		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)						7.1		6.2		4.1						
Critical Headway (sec)						7.11		6.22		4.10						
Base Follow-Up Headway (sec)						3.5		3.3		2.2						
Follow-Up Headway (sec)						3.51		3.32		2.20						
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						164		189		36						
Capacity, c (veh/h)						308		528		1102						
v/c Ratio						0.53		0.36		0.03						
95% Queue Length, Q ₉₅ (veh)						2.9		1.6		0.1						
Control Delay (s/veh)						29.2		15.5		8.4						
Level of Service (LOS)						D		C		A						
Approach Delay (s/veh)					21.9				0.5							
Approach LOS					C				A							

HCS Two-Way Stop-Control Report																	
General Information									Site Information								
Analyst	Diane Zimmerman								Intersection	Billtown at I 265 WB							
Agency/Co.	Diane B. Zimmerman Traffic Engineering								Jurisdiction								
Date Performed	7/21/2022								East/West Street	I 265 Westbound							
Analysis Year	2034								North/South Street	Billtown Road							
Time Analyzed	PM Peak Build								Peak Hour Factor	0.96							
Intersection Orientation	North-South								Analysis Time Period (hrs)	0.25							
Project Description	Billtown Road																
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	10	1	2	3	4	4	5	6	
Number of Lanes		0	0	0		1	0	1	0	1	1	0	0	0	1	0	
Configuration						L		R		L	T				T		
Volume (veh/h)						157		191		35	566				465		
Percent Heavy Vehicles (%)						1		2		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)						7.1		6.2		4.1							
Critical Headway (sec)						7.11		6.22		4.10							
Base Follow-Up Headway (sec)						3.5		3.3		2.2							
Follow-Up Headway (sec)						3.51		3.32		2.20							
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)						164		199		36							
Capacity, c (veh/h)						295		508		1089							
v/c Ratio						0.55		0.39		0.03							
95% Queue Length, Q ₉₅ (veh)						3.1		1.8		0.1							
Control Delay (s/veh)						31.3		16.6		8.4							
Level of Service (LOS)						D		C		A							
Approach Delay (s/veh)					23.2				0.5								
Approach LOS					C				A								

Copyright © 2022 University of Florida. All Rights Reserved. HCS™ TWSC Version 2022 I 265 PM 34 B.xtw Generated: 7/21/2022 5:09:48 PM

HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	Diane Zimmerman							Intersection	Billtown Road Entrance							
Agency/Co.	Diane B. Zimmerman Traffic Engineering							Jurisdiction								
Date Performed	7/21/2022							East/West Street	Entrance							
Analysis Year	2024							North/South Street	Billtown Road							
Time Analyzed	AM Peak Build							Peak Hour Factor	0.92							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Billtown Road															
Lanes																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	0	1	1	0	1	1	0
Configuration						L		R			T	R		L	T	
Volume (veh/h)						76		65			853	81		76	692	
Percent Heavy Vehicles (%)						0		0						0		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized					No				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)						6.40		6.20						4.10		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.50		3.30						2.20		
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						83		71						83		
Capacity, c (veh/h)						200		328						691		
v/c Ratio						0.41		0.22						0.12		
95% Queue Length, Q ₉₅ (veh)						1.9		0.8						0.4		
Control Delay (s/veh)						35.0		19.0						10.9		
Level of Service (LOS)						E		C						B		
Approach Delay (s/veh)					27.6								1.1			
Approach LOS					D								A			

HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	Diane Zimmerman							Intersection	Billtown Road Entrance							
Agency/Co.	Diane B. Zimmerman Traffic Engineering							Jurisdiction								
Date Performed	7/21/2022							East/West Street	Entrance							
Analysis Year	2034							North/South Street	Billtown Road							
Time Analyzed	AM Peak Build							Peak Hour Factor	0.92							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Billtown Road															
Lanes																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	0	1	1	0	1	1	0
Configuration						L		R			T	R		L	T	
Volume (veh/h)						76		65			899	81		76	814	
Percent Heavy Vehicles (%)						0		0						0		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized					No				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)						6.40		6.20						4.10		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.50		3.30						2.20		
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						83		71						83		
Capacity, c (veh/h)						175		307						662		
v/c Ratio						0.47		0.23						0.12		
95% Queue Length, Q ₉₅ (veh)						2.2		0.9						0.4		
Control Delay (s/veh)						42.6		20.2						11.2		
Level of Service (LOS)						E		C						B		
Approach Delay (s/veh)					32.3								1.0			
Approach LOS					D								A			

HCS Two-Way Stop-Control Report

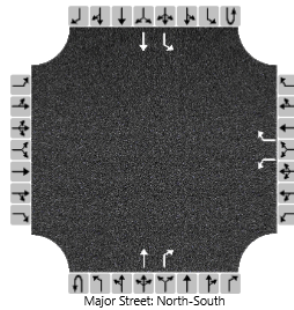
General Information

Analyst	Diane Zimmerman
Agency/Co.	Diane B. Zimmerman Traffic Engineering
Date Performed	7/21/2022
Analysis Year	2024
Time Analyzed	PM Peak Build
Intersection Orientation	North-South
Project Description	Billtown Road

Site Information

Intersection	Billtown Road Entrance
Jurisdiction	
East/West Street	Entrance
North/South Street	Billtown Road
Peak Hour Factor	0.93
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	0	1	1	0	1	1	0
Configuration						L		R			T	R		L	T	
Volume (veh/h)						90		69			647	70		92	1110	
Percent Heavy Vehicles (%)						0		0						0		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized						No				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)						6.40		6.20						4.10		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.50		3.30						2.20		

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						97		74						99		
Capacity, c (veh/h)						152		445						853		
v/c Ratio						0.64		0.17						0.12		
95% Queue Length, Q ₉₅ (veh)						3.5		0.6						0.4		
Control Delay (s/veh)						63.1		14.7						9.8		
Level of Service (LOS)						F		B						A		
Approach Delay (s/veh)						42.1								0.7		
Approach LOS						E								A		

HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	Diane Zimmerman							Intersection	Billtown Road Entrance							
Agency/Co.	Diane B. Zimmerman Traffic Engineering							Jurisdiction								
Date Performed	7/21/2022							East/West Street	Entrance							
Analysis Year	2034							North/South Street	Billtown Road							
Time Analyzed	PM Peak Build							Peak Hour Factor	0.93							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Billtown Road															
Lanes																
Major Street: North-South																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	0	1	1	0	1	1	0
Configuration						L		R			T	R		L	T	
Volume (veh/h)						90		69			681	70		92	1169	
Percent Heavy Vehicles (%)						0		0						0		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized					No				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)						6.40		6.20						4.10		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.50		3.30						2.20		
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)						97		74						99		
Capacity, c (veh/h)						141		424						826		
v/c Ratio						0.69		0.17						0.12		
95% Queue Length, Q ₉₅ (veh)						3.9		0.6						0.4		
Control Delay (s/veh)						73.8		15.3						9.9		
Level of Service (LOS)						F		C						A		
Approach Delay (s/veh)					48.4								0.7			
Approach LOS					E								A			

HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	Diane Zimmerman							Intersection	Gellhaus at School							
Agency/Co.	Diane B. Zimmerman Traffic Engineering							Jurisdiction								
Date Performed	7/21/2022							East/West Street	Gellhaus Lane							
Analysis Year	2022							North/South Street	School/Longview Farm							
Time Analyzed	AM Peak							Peak Hour Factor	0.78							
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25							
Project Description	Billtown Road															
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		1	1	0		0	1	0
Configuration		L		TR		L		TR		L		TR			LTR	
Volume (veh/h)		2	370	268		34	146	7		207	8	38		10	16	12
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	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)		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	6.50	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				3.50	4.00	3.30		3.50	4.00	3.30
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)		3				44				265		59			49	
Capacity, c (veh/h)		1389				819				330		412			313	
v/c Ratio		0.00				0.05				0.80		0.14			0.16	
95% Queue Length, Q ₉₅ (veh)		0.0				0.2				6.7		0.5			0.5	
Control Delay (s/veh)		7.6				9.6				48.5		15.2			18.6	
Level of Service (LOS)		A				A				E		C			C	
Approach Delay (s/veh)	0.0				1.8				42.5				18.6			
Approach LOS	A				A				E				C			

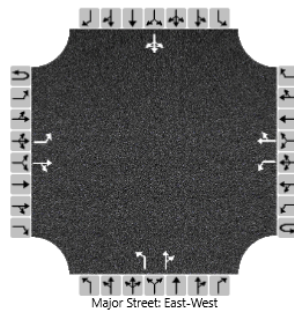
HCS Two-Way Stop-Control Report																	
General Information									Site Information								
Analyst	Diane Zimmerman								Intersection	Gellhaus at School							
Agency/Co.	Diane B. Zimmerman Traffic Engineering								Jurisdiction								
Date Performed	7/21/2022								East/West Street	Gellhaus Lane							
Analysis Year	2024								North/South Street	School/Longview Farm							
Time Analyzed	AM Peak No Build								Peak Hour Factor	0.78							
Intersection Orientation	East-West								Analysis Time Period (hrs)	0.25							
Project Description	Billtown Road																
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		1	1	0		0	1	0	
Configuration		L		TR		L		TR		L		TR			LTR		
Volume (veh/h)		2	374	268		34	147	7		207	8	38		10	16	12	
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	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)		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	6.50	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				3.50	4.00	3.30		3.50	4.00	3.30	
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)		3				44				265		59			49		
Capacity, c (veh/h)		1387				816				328		409			311		
v/c Ratio		0.00				0.05				0.81		0.14			0.16		
95% Queue Length, Q ₉₅ (veh)		0.0				0.2				6.8		0.5			0.5		
Control Delay (s/veh)		7.6				9.7				49.5		15.3			18.7		
Level of Service (LOS)		A				A				E		C			C		
Approach Delay (s/veh)	0.0				1.7				43.3				18.7				
Approach LOS	A				A				E				C				

HCS Two-Way Stop-Control Report																	
General Information									Site Information								
Analyst	Diane Zimmerman								Intersection	Gellhaus at School							
Agency/Co.	Diane B. Zimmerman Traffic Engineering								Jurisdiction								
Date Performed	7/21/2022								East/West Street	Gellhaus Lane							
Analysis Year	2024								North/South Street	School/Longview Farm							
Time Analyzed	AM Peak Build								Peak Hour Factor	0.78							
Intersection Orientation	East-West								Analysis Time Period (hrs)	0.25							
Project Description	Billtown Road																
Lanes																	
Major Street: East-West																	
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	1	0	1	1	0		1	1	0		0	1	0	
Configuration		L	T	R		L		TR		L		TR			LTR		
Volume (veh/h)		14	391	268		34	165	7		207	8	38		10	16	24	
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	0	
Proportion Time Blocked																	
Percent Grade (%)									0				0				
Right Turn Channelized	No																
Median Type Storage					Left Only								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	6.50	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				3.50	4.00	3.30		3.50	4.00	3.30	
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)		18				44				265		59			64		
Capacity, c (veh/h)		1361				800				349		486			336		
v/c Ratio		0.01				0.05				0.76		0.12			0.19		
95% Queue Length, Q ₉₅ (veh)		0.0				0.2				6.0		0.4			0.7		
Control Delay (s/veh)		7.7				9.8				41.6		13.4			18.2		
Level of Service (LOS)		A				A				E		B			C		
Approach Delay (s/veh)	0.2				1.6				36.5				18.2				
Approach LOS	A				A				E				C				

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Diane Zimmerman	Intersection	Gellhaus at School
Agency/Co.	Diane B. Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	7/21/2022	East/West Street	Gellhaus Lane
Analysis Year	2034	North/South Street	School/Longview Farm
Time Analyzed	AM Peak No Build	Peak Hour Factor	0.78
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Billtown Road		

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		1	1	0		0	1	0
Configuration		L		TR		L		TR		L		TR			LTR	
Volume (veh/h)		2	393	268		34	155	7		207	8	38		10	16	12
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	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)		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	6.50	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				3.50	4.00	3.30		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		3				44				265		59			49	
Capacity, c (veh/h)		1375				799				316		394			298	
v/c Ratio		0.00				0.05				0.84		0.15			0.16	
95% Queue Length, Q ₉₅ (veh)		0.0				0.2				7.3		0.5			0.6	
Control Delay (s/veh)		7.6				9.8				55.1		15.7			19.5	
Level of Service (LOS)		A				A				F		C			C	
Approach Delay (s/veh)	0.0				1.7				47.9				19.5			
Approach LOS	A				A				E				C			

HCS Two-Way Stop-Control Report																	
General Information									Site Information								
Analyst	Diane Zimmerman								Intersection	Gellhaus at School							
Agency/Co.	Diane B. Zimmerman Traffic Engineering								Jurisdiction								
Date Performed	7/21/2022								East/West Street	Gellhaus Lane							
Analysis Year	2034								North/South Street	School/Longview Farm							
Time Analyzed	AM Peak Build								Peak Hour Factor	0.78							
Intersection Orientation	East-West								Analysis Time Period (hrs)	0.25							
Project Description	Billtown Road																
Lanes																	
Major Street: East-West																	
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	1	0	1	1	0		1	1	0		0	1	0	
Configuration		L	T	R		L		TR		L		TR			LTR		
Volume (veh/h)		14	410	268		34	173	7		207	8	38		10	16	24	
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	0	
Proportion Time Blocked																	
Percent Grade (%)									0				0				
Right Turn Channelized	No																
Median Type Storage					Left Only								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	6.50	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				3.50	4.00	3.30		3.50	4.00	3.30	
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)		18				44				265		59			64		
Capacity, c (veh/h)		1349				784				336		469			322		
v/c Ratio		0.01				0.06				0.79		0.13			0.20		
95% Queue Length, Q ₉₅ (veh)		0.0				0.2				6.5		0.4			0.7		
Control Delay (s/veh)		7.7				9.9				46.0		13.8			18.9		
Level of Service (LOS)		A				A				E		B			C		
Approach Delay (s/veh)	0.2				1.6				40.2				18.9				
Approach LOS	A				A				E				C				

HCS Two-Way Stop-Control Report																	
General Information									Site Information								
Analyst	Diane Zimmerman								Intersection	Gellhaus at School							
Agency/Co.	Diane B. Zimmerman Traffic Engineering								Jurisdiction								
Date Performed	7/21/2022								East/West Street	Gellhaus Lane							
Analysis Year	2022								North/South Street	School/Longview Farm							
Time Analyzed	PM Peak Build								Peak Hour Factor	0.95							
Intersection Orientation	East-West								Analysis Time Period (hrs)	0.25							
Project Description	Billtown Road																
Lanes																	
Major Street: East-West																	
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		1	1	0		0	1	0	
Configuration		L		TR		L		TR		L		TR			LTR		
Volume (veh/h)		11	225	1		2	614	31		15	1	2		13	0	9	
Percent Heavy Vehicles (%)		0				50				0	0	0		0	0	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)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2	
Critical Headway (sec)		4.10				4.60				7.10	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				2.65				3.50	4.00	3.30		3.50	4.00	3.30	
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)		12				2				16		3			23		
Capacity, c (veh/h)		923				1093				352		475			394		
v/c Ratio		0.01				0.00				0.04		0.01			0.06		
95% Queue Length, Q ₉₅ (veh)		0.0				0.0				0.1		0.0			0.2		
Control Delay (s/veh)		9.0				8.3				15.7		12.6			14.7		
Level of Service (LOS)		A				A				C		B			B		
Approach Delay (s/veh)	0.4				0.0				15.2				14.7				
Approach LOS	A				A				C				B				

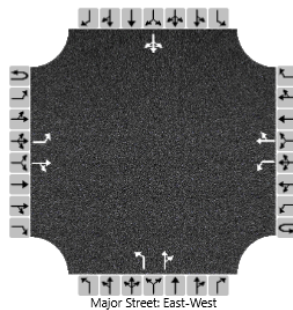
HCS Two-Way Stop-Control Report																	
General Information									Site Information								
Analyst	Diane Zimmerman								Intersection	Gellhaus at School							
Agency/Co.	Diane B. Zimmerman Traffic Engineering								Jurisdiction								
Date Performed	7/21/2022								East/West Street	Gellhaus Lane							
Analysis Year	2024								North/South Street	School/Longview Farm							
Time Analyzed	PM Peak No Build								Peak Hour Factor	0.95							
Intersection Orientation	East-West								Analysis Time Period (hrs)	0.25							
Project Description	Billtown Road																
Lanes																	
Major Street: East-West																	
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		1	1	0		0	1	0	
Configuration		L		TR		L		TR		L		TR			LTR		
Volume (veh/h)		11	227	1		2	620	31		15	1	2		13	0	9	
Percent Heavy Vehicles (%)		0				50				0	0	0		0	0	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)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2	
Critical Headway (sec)		4.10				4.60				7.10	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				2.65				3.50	4.00	3.30		3.50	4.00	3.30	
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)		12				2				16		3			23		
Capacity, c (veh/h)		918				1091				349		471			390		
v/c Ratio		0.01				0.00				0.05		0.01			0.06		
95% Queue Length, Q ₉₅ (veh)		0.0				0.0				0.1		0.0			0.2		
Control Delay (s/veh)		9.0				8.3				15.8		12.7			14.8		
Level of Service (LOS)		A				A				C		B			B		
Approach Delay (s/veh)	0.4				0.0				15.3				14.8				
Approach LOS	A				A				C				B				

HCS Two-Way Stop-Control Report																	
General Information									Site Information								
Analyst	Diane Zimmerman								Intersection	Gellhaus at School							
Agency/Co.	Diane B. Zimmerman Traffic Engineering								Jurisdiction								
Date Performed	7/21/2022								East/West Street	Gellhaus Lane							
Analysis Year	2024								North/South Street	School/Longview Farm							
Time Analyzed	PM Peak Build								Peak Hour Factor	0.95							
Intersection Orientation	East-West								Analysis Time Period (hrs)	0.25							
Project Description	Billtown Road																
Lanes																	
Major Street: East-West																	
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	1	0	1	1	0			1	1	0		0	1	0
Configuration		L	T	R		L		TR			L		TR			LTR	
Volume (veh/h)		22	244	1		2	637	31			15	1	2		13	0	20
Percent Heavy Vehicles (%)		0				50					0	0	0		0	0	0
Proportion Time Blocked																	
Percent Grade (%)									0				0				
Right Turn Channelized	No																
Median Type Storage					Left Only								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				4.60				7.10	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				2.65				3.50	4.00	3.30		3.50	4.00	3.30	
Delay, Queue Length, and Level of Service																	
Flow Rate, v (veh/h)		23				2				16		3			35		
Capacity, c (veh/h)		904				1073				319		441			397		
v/c Ratio		0.03				0.00				0.05		0.01			0.09		
95% Queue Length, Q ₉₅ (veh)		0.1				0.0				0.2		0.0			0.3		
Control Delay (s/veh)		9.1				8.4				16.9		13.2			14.9		
Level of Service (LOS)		A				A				C		B			B		
Approach Delay (s/veh)	0.7				0.0				16.3				14.9				
Approach LOS	A				A				C				B				

HCS Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Diane Zimmerman	Intersection	Gellhaus at School
Agency/Co.	Diane B. Zimmerman Traffic Engineering	Jurisdiction	
Date Performed	7/21/2022	East/West Street	Gellhaus Lane
Analysis Year	2034	North/South Street	School/Longview Farm
Time Analyzed	PM Peak No Build	Peak Hour Factor	0.95
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Billtown Road		

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		1	1	0		0	1	0
Configuration		L		TR		L		TR		L		TR			LTR	
Volume (veh/h)		11	239	1		2	652	31		15	1	2		13	0	9
Percent Heavy Vehicles (%)		0				50				0	0	0		0	0	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)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.10				4.60				7.10	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				2.65				3.50	4.00	3.30		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		12				2				16		3			23	
Capacity, c (veh/h)		892				1078				333		450			373	
v/c Ratio		0.01				0.00				0.05		0.01			0.06	
95% Queue Length, Q ₉₅ (veh)		0.0				0.0				0.1		0.0			0.2	
Control Delay (s/veh)		9.1				8.3				16.4		13.0			15.3	
Level of Service (LOS)		A				A				C		B			C	
Approach Delay (s/veh)	0.4				0.0				15.8				15.3			
Approach LOS	A				A				C				C			

HCS Two-Way Stop-Control Report

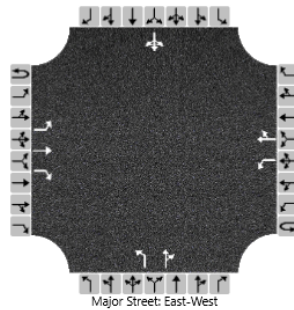
General Information

Analyst	Diane Zimmerman
Agency/Co.	Diane B. Zimmerman Traffic Engineering
Date Performed	7/21/2022
Analysis Year	2034
Time Analyzed	PM Peak Build
Intersection Orientation	East-West
Project Description	Billtown Road

Site Information

Intersection	Gellhaus at School
Jurisdiction	
East/West Street	Gellhaus Lane
North/South Street	School/Longview Farm
Peak Hour Factor	0.95
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	1	0	1	1	0		1	1	0		0	1	0
Configuration		L	T	R		L		TR		L		TR			LTR	
Volume (veh/h)		22	256	1		2	669	31		15	1	2		13	0	20
Percent Heavy Vehicles (%)		0				50				0	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized		No														
Median Type Storage																

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				4.60				7.10	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				2.65				3.50	4.00	3.30		3.50	4.00	3.30

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		23				2				16		3			35	
Capacity, c (veh/h)		878				1060				304		421			379	
v/c Ratio		0.03				0.00				0.05		0.01			0.09	
95% Queue Length, Q ₉₅ (veh)		0.1				0.0				0.2		0.0			0.3	
Control Delay (s/veh)		9.2				8.4				17.5		13.6			15.4	
Level of Service (LOS)		A				A				C		B			C	
Approach Delay (s/veh)		0.7				0.0				16.9				15.4		
Approach LOS		A				A				C				C		

Left Turn Lane Warrants

Input Fields

Left Turn Volume (vph)	92	Speed Limit (mph)	45
Advancing Volume (vph)	906	No. of through lanes	1
Opposing Volume (vph)	980	Percent Heavy Vehicles (decimal percent)	0.01



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

Right Turn Lane Warrants

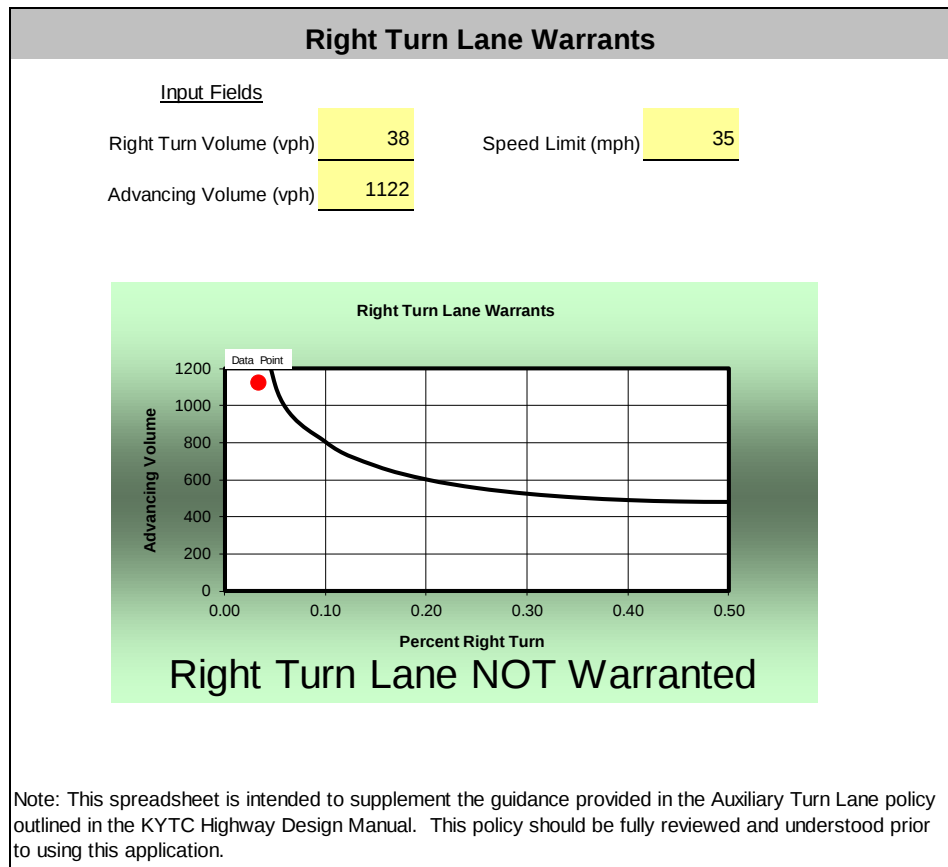
Input Fields

Right Turn Volume (vph)	81	Speed Limit (mph)	45
Advancing Volume (vph)	980		



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

Gellhaus Lane



Billtown Road without Coffee Shop
Right turns = $81 - (96 \cdot .35) = 47$

