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

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INTRODUCTION

The site plan for 6503 Billtown Road shows aa 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.

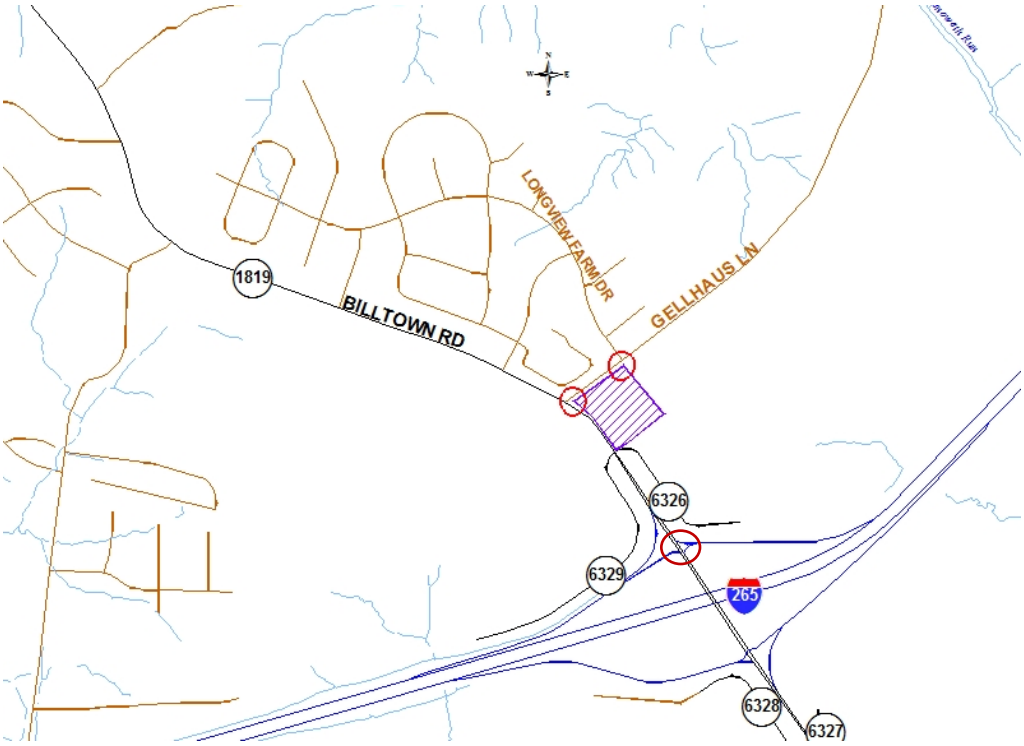


Figure 1. Site Map

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.

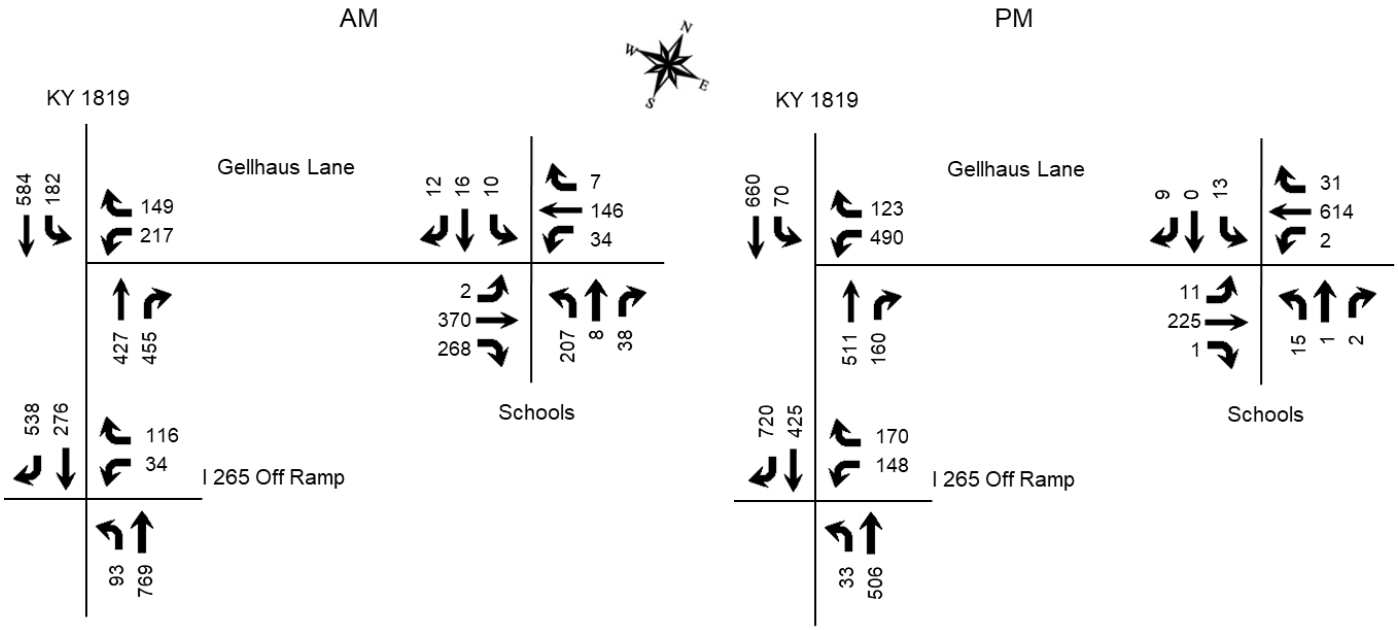


Figure 2. Existing Peak Hour Volumes

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.

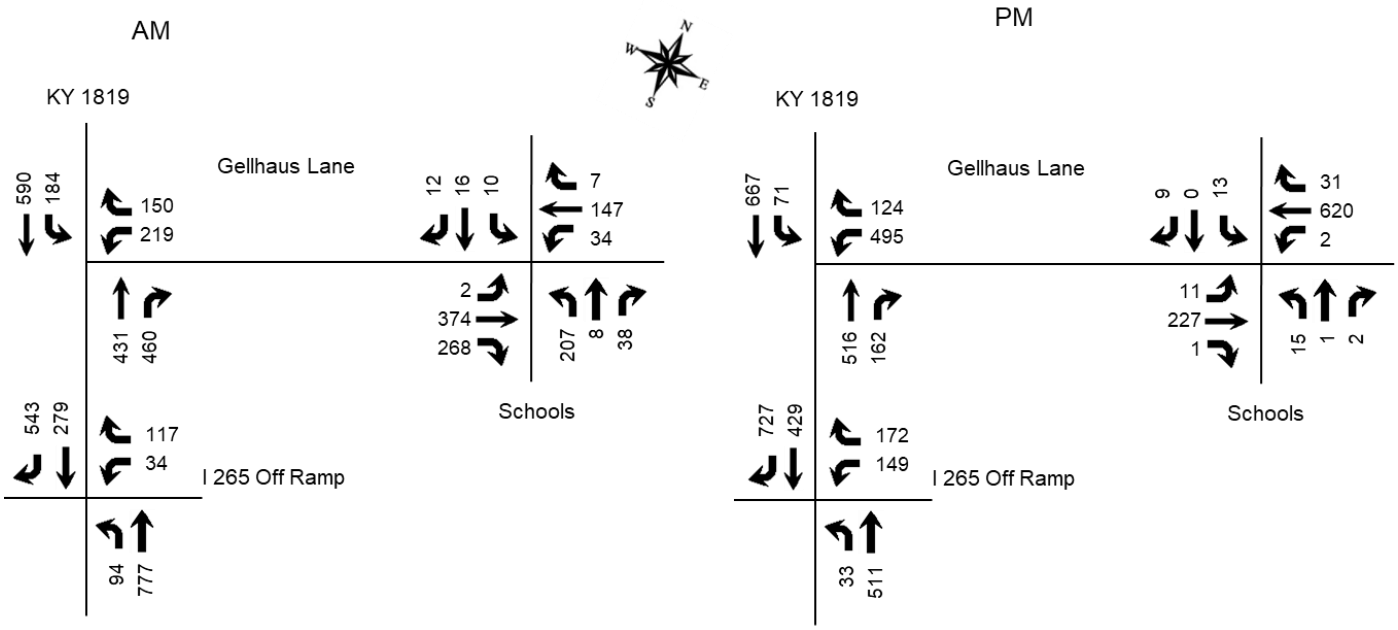


Figure 3. 2024 No Build Peak Hour Volumes

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

	A.M. Peak Hour			P.M. Peak Hour		
Land Use	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

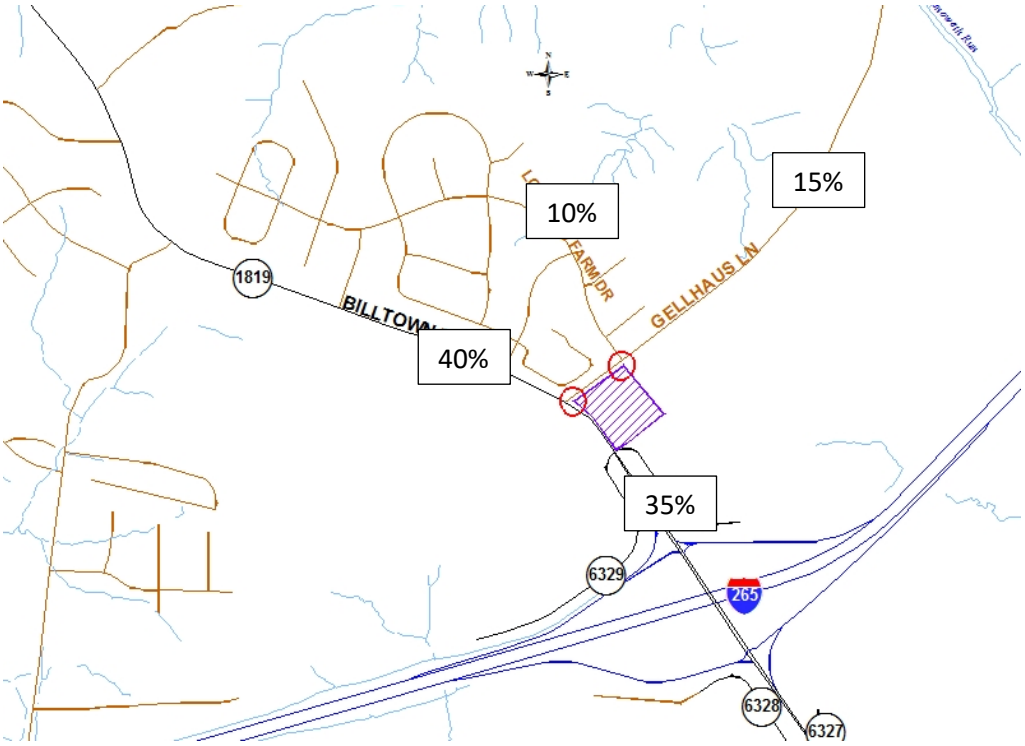


Figure 4. Trip Distribution Percentages

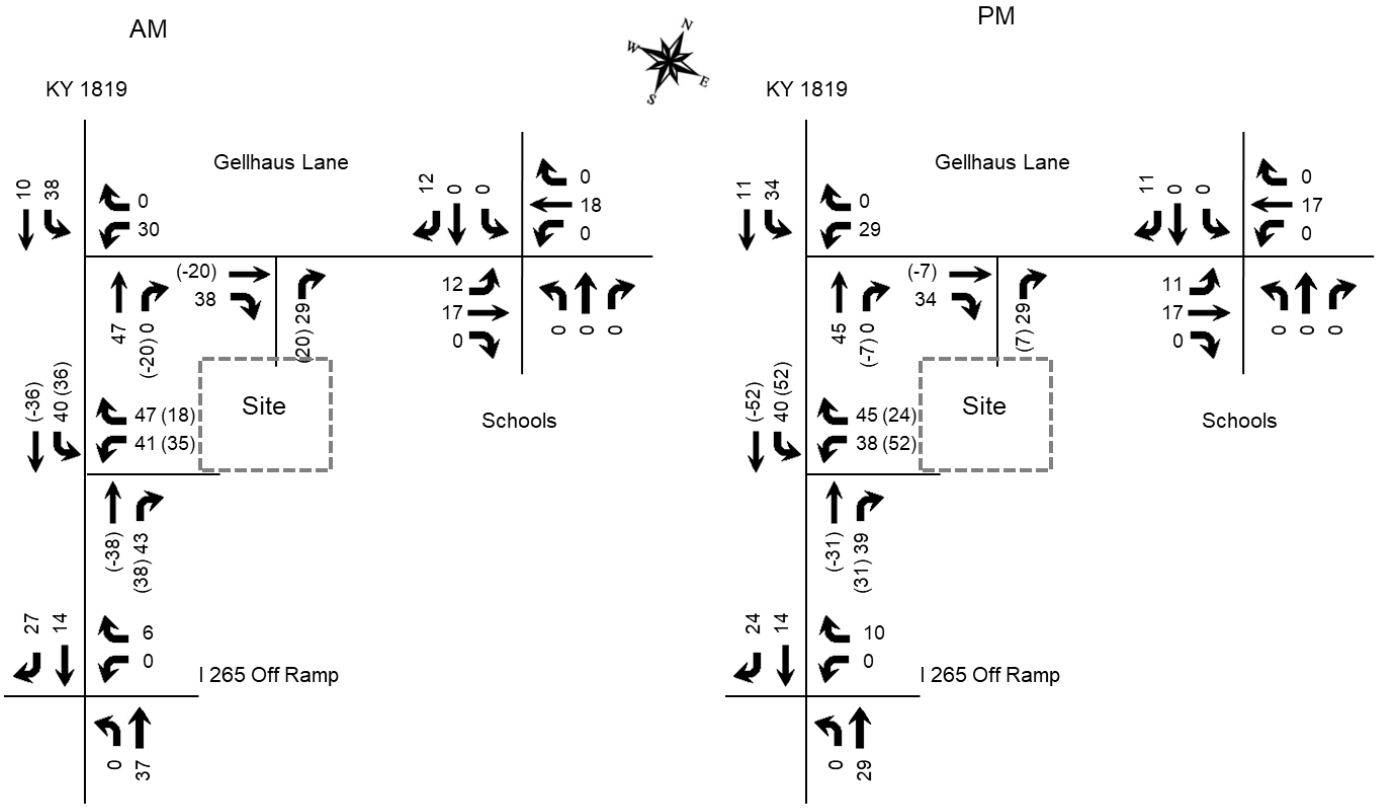


Figure 5. Peak Hour Trips Generated by Site

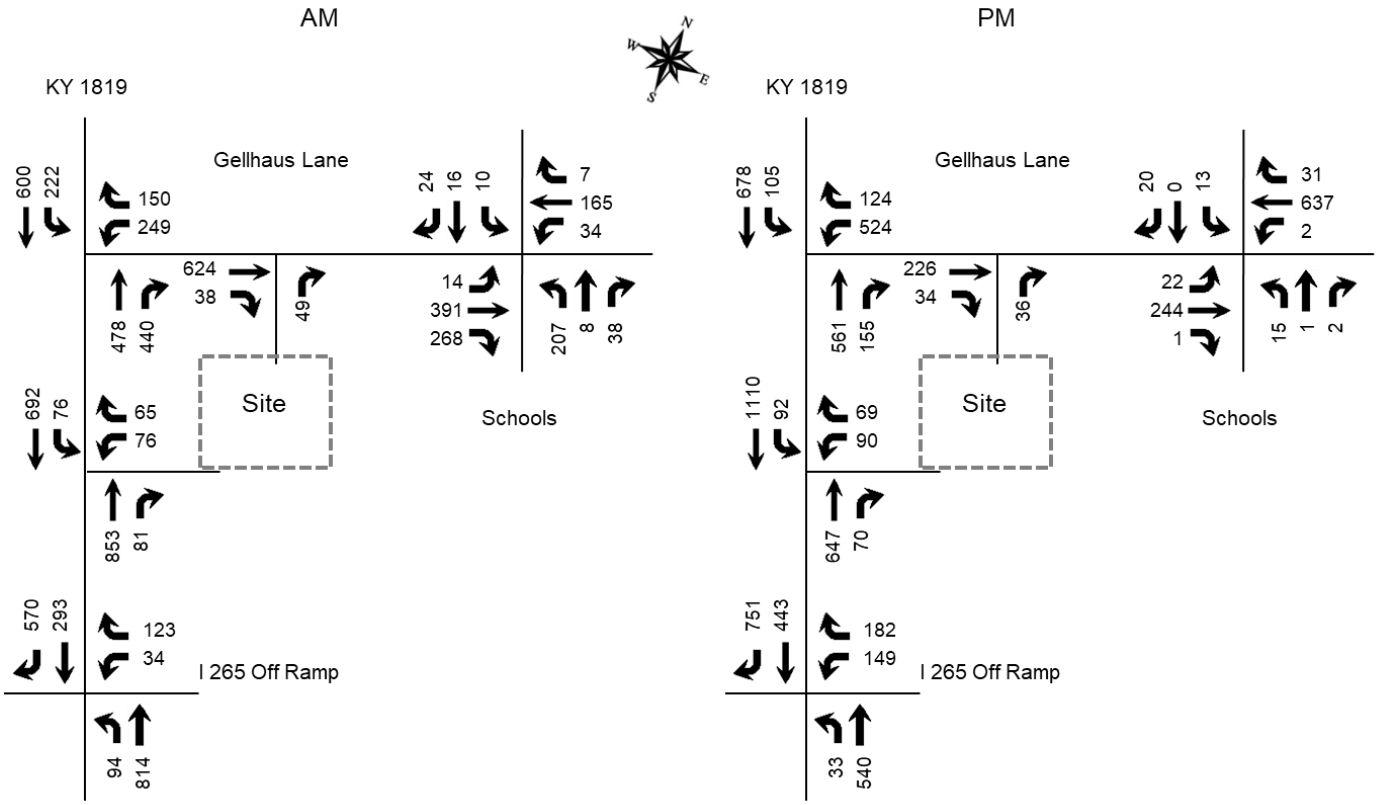


Figure 6. 2024 Build Peak Hour Volumes

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

	A.M.			P.M.		
Approach	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.

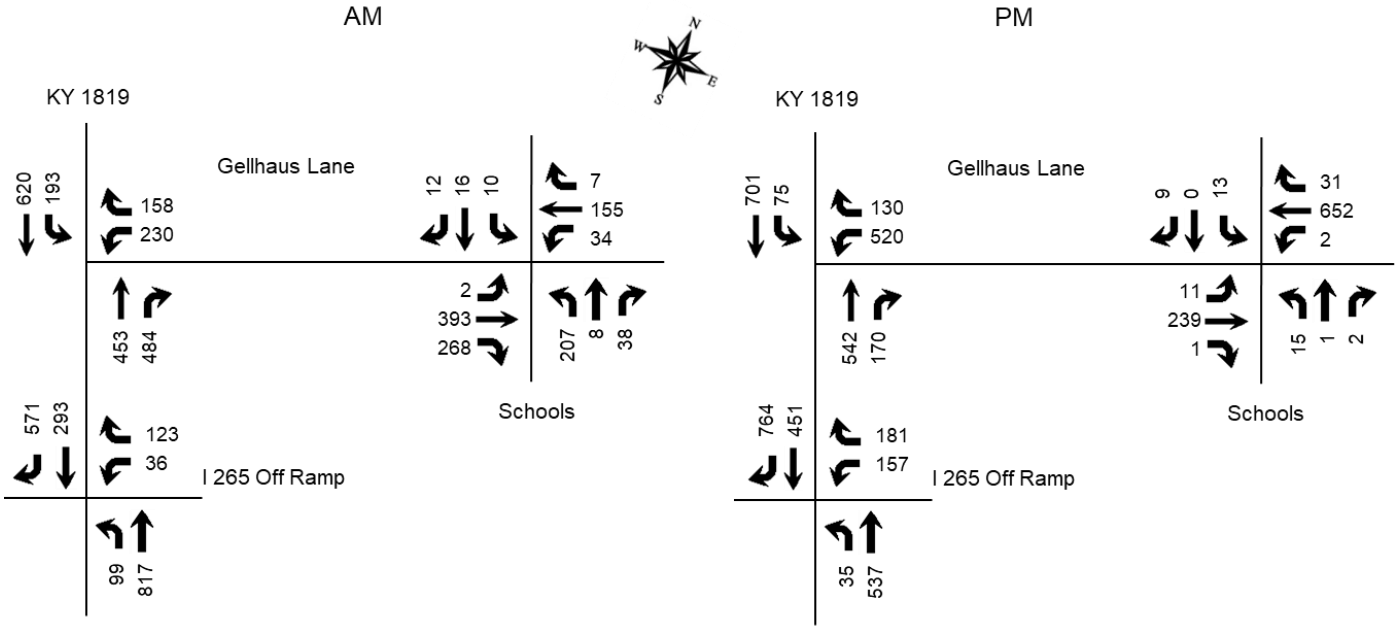


Figure 7. 2034 No Build Peak Hour Volumes

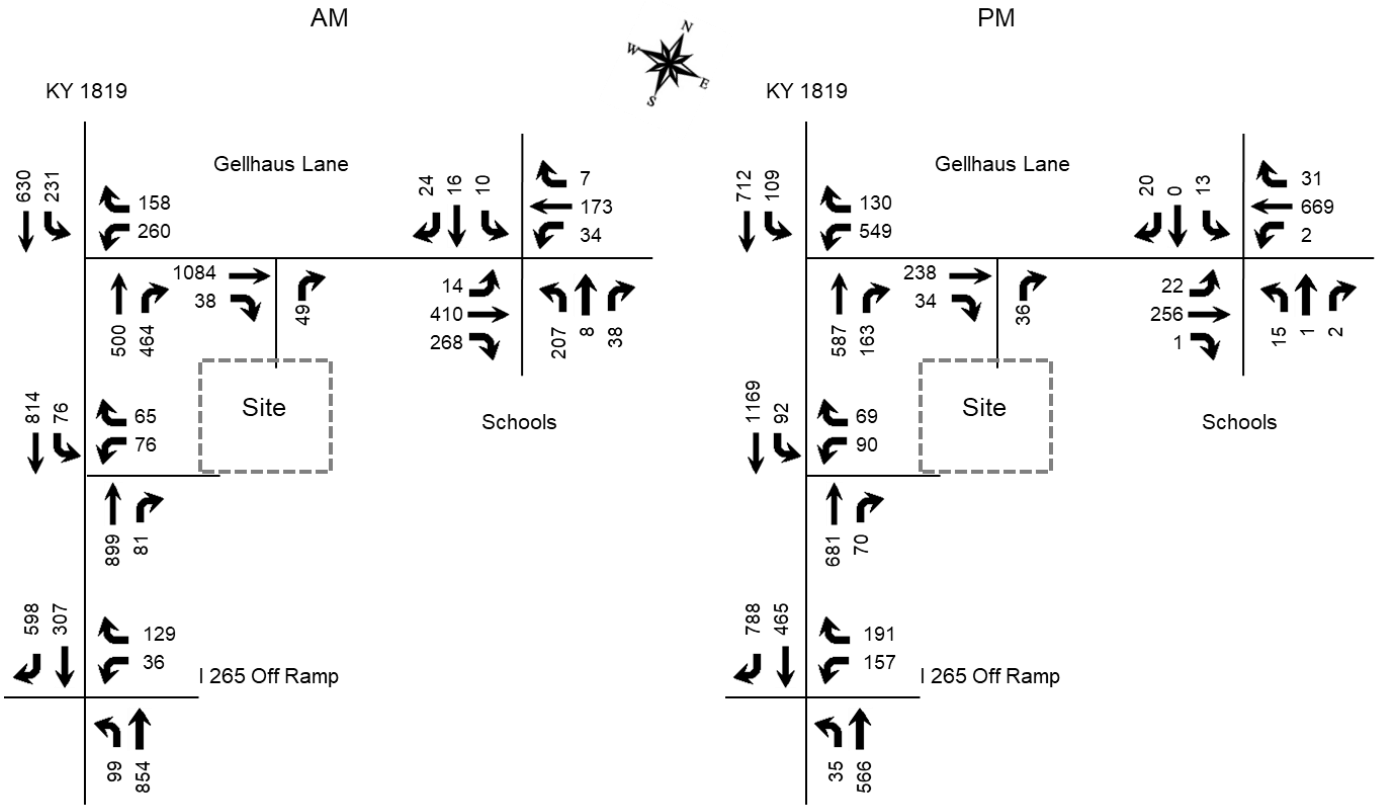


Figure 8. 2034 Build Peak Hour Volumes

Table 3. 2034 Peak Hour Level of Service

	A.M.			P.M.		
Approach	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

Marr Traffic DATA COLLECTION
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)				
TIME	Left 2.1	Right 2.2	U-Turn 2.3	App Total	Left 2.4	Thru 2.5	U-Turn 2.6	App Total	Thru 2.7	Right 2.8	U-Turn 2.9	App Total	Int Total
0700 - 0715	42	26	0	68	39	149	0	188	107	87	0	194	450
0715 - 0730	74	49	0	123	65	154	0	219	85	130	0	215	557
0730 - 0745	63	53	0	116	59	163	0	222	103	116	0	219	557
0745 - 0800	38	21	0	59	19	118	0	137	132	122	0	254	450
Hourly Total	217	149	0	**366**	182	584	0	**766**	427	455	0	**882**	**2014**
0800 - 0815	38	13	0	51	16	121	0	137	111	78	0	189	377
0815 - 0830	31	4	0	35	33	107	0	140	108	78	0	186	361
0830 - 0845	54	25	0	79	36	111	0	147	108	70	0	178	404
0845 - 0900	74	67	0	141	63	115	0	178	84	79	0	163	482
Hourly Total	197	109	0	**306**	148	454	0	**602**	411	305	0	**716**	**1624**
Grand Total	414	258	0	**672**	330	1038	0	**1368**	838	760	0	**1598**	**3638**
Approach %	61.61	38.39	0.00	-	24.12	75.88	0.00	-	52.44	47.56	0.00	-	
Intersection %	11.38	7.09	0.00	18.47	9.07	28.53	0.00	37.60	23.03	20.89	0.00	43.93	
PHF	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)				
TIME	Left 2.1	Right 2.2	U-Turn 2.3	App Total	Left 2.4	Thru 2.5	U-Turn 2.6	App Total	Thru 2.7	Right 2.8	U-Turn 2.9	App Total	Int Total
1600 - 1615	133	55	0	188	21	157	0	178	147	41	0	188	554
1615 - 1630	97	21	0	118	15	170	0	185	133	30	0	163	466
1630 - 1645	103	33	0	136	20	159	0	179	113	46	0	159	474
1645 - 1700	157	14	0	171	14	174	0	188	118	43	0	161	520
Hourly Total	490	123	0	**613**	70	660	0	**730**	511	160	0	**671**	**2014**
1700 - 1715	133	27	0	160	19	142	0	161	122	40	0	162	483
1715 - 1730	149	26	0	175	14	139	0	153	130	38	0	168	496
1730 - 1745	91	23	0	114	16	164	0	180	133	37	0	170	464
1745 - 1800	110	22	0	132	9	117	0	126	110	23	0	133	391
Hourly Total	483	98	0	**581**	58	562	0	**620**	495	138	0	**633**	**1834**
Grand Total	973	221	0	**1194**	128	1222	0	**1350**	1006	298	0	**1304**	**3848**
Approach %	81.49	18.51	0.00	-	9.48	90.52	0.00	-	77.15	22.85	0.00	-	
Intersection %	25.29	5.74	0.00	31.03	3.33	31.76	0.00	35.08	26.14	7.74	0.00	33.89	
PHF	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

Marr Traffic DATA COLLECTION

Louisville, KY

www.marrtraffic.com

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

Weather
Fair
73°F

Lat/Long
38.147793°, -85.546767°

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

All vehicles

	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	Thru	U-Turn	App	Thru	Right	U-Turn	App					Left	Thru	Right	App	Int
TIME	1.1	1.2	1.3	Total	1.4	1.5	1.6	Total					1.7	1.8	1.9	Total	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

	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	Thru	U-Turn	App	Thru	Right	U-Turn	App					Left	Thru	Right	App	Int
TIME	1.1	1.2	1.3	Total	1.4	1.5	1.6	Total					1.7	1.8	1.9	Total	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

Marr Traffic DATA COLLECTION

Louisville, KY

www.marrtraffic.com

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

	Northbound					Southbound					Eastbound					Westbound					
	Driveway					Longview Farm Dr					Gellhaus Ln (West)					Gellhaus Ln (East)					
	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Int
TIME	3.1	3.2	3.3	3.4	Total	3.5	3.6	3.7	3.8	Total	3.9	3.10	3.11	3.12	Total	3.13	3.14	3.15	3.16	Total	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)

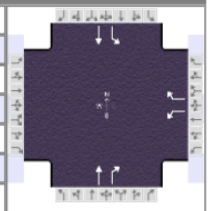
All vehicles

	Northbound					Southbound					Eastbound					Westbound					
	Driveway					Longview Farm Dr					Gellhaus Ln (West)					Gellhaus Ln (East)					
	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Left	Thru	Right	U-Turn	App	Int
TIME	3.1	3.2	3.3	3.4	Total	3.5	3.6	3.7	3.8	Total	3.9	3.10	3.11	3.12	Total	3.13	3.14	3.15	3.16	Total	Total
1600 - 1615	70	2	13	0	85	2	1	2	0	5	2	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

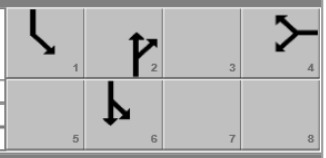
General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jul 25, 2022	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Urban Street	Billtown Road	Analysis Year	2022	Analysis Period	1> 7:00
Intersection	Gellhaus 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
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	30.0	15.6	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				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

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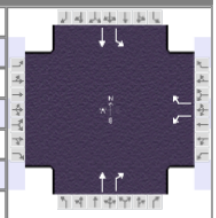
HCS Signalized Intersection Results Summary

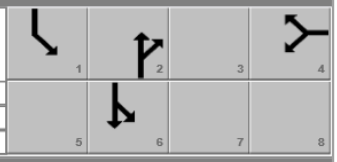
General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jul 25, 2022	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Urban Street	Billtown Road	Analysis Year	2024 No Build	Analysis Period	1> 7:00
Intersection	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

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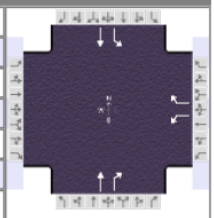
HCS Signalized Intersection Results Summary

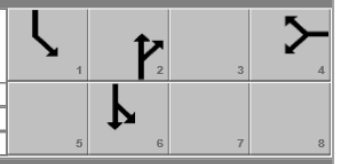
General Information				Intersection Information	
Agency	CDM Smith			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jul 25, 2022	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Urban Street	Billtown Road	Analysis Year	2024 Build	Analysis Period	1> 7:00
Intersection	Gellhaus Lane	File Name	Billtown 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

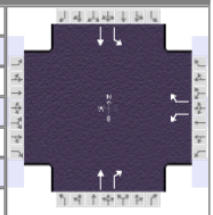
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				7		14		2	12	1	6	
Adjusted Flow Rate (*v*), veh/h				277		167		531	267	247	667	
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1753		1522		1870	1598	1725	1885	
Queue Service Time (*g s*), s				11.0		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™ Streets Version 2022 Generated: 7/25/2022 1:29:27 PM

HCS Signalized Intersection Results Summary

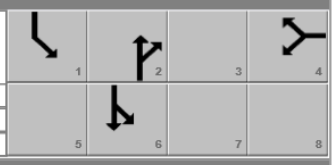
General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jul 25, 2022	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Urban Street	Billtown Road	Analysis Year	2034 No Build	Analysis Period	1> 7:00
Intersection	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

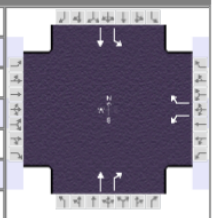
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				7		14		2	12	1	6	
Adjusted Flow Rate (*v*), veh/h				256		176		503	316	214	689	
Adjusted Saturation Flow Rate (*s*), veh/h/ln				1753		1522		1870	1598	1725	1885	
Queue Service Time (*g s*), s				9.8		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 3*), 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™ Streets Version 2022 Generated: 7/25/2022 1:07:22 PM

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					EB			WB			NB			SB		
Cycle, s	78.1	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	9.3	30.0		18.9	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					

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		C	21.5		C	12.8		B
Intersection Delay, s/veh / LOS	19.7						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.23	B	1.94	B	1.91	B	0.68	A
Bicycle LOS Score / LOS				F	1.89	B	2.07	B

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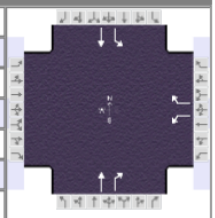
HCS Signalized Intersection Results Summary

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
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

							1	2	3	4
Green	5.2	34.6	35.1	0.0	0.0	0.0	5	6	7	8
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				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

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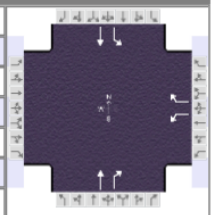
HCS Signalized Intersection Results Summary

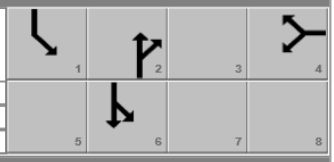
General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jul 25, 2022	Area Type	CBD
Jurisdiction		Time Period	PM Peak	PHF	0.91
Urban Street	Billtown Road	Analysis Year	2024 No Build	Analysis Period	1> 4:00
Intersection	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	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	
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				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	L	T	R	L	T	R
Assigned Movement				7		14		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

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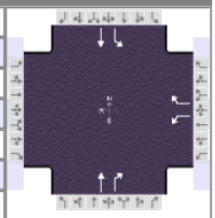
HCS Signalized Intersection Results Summary

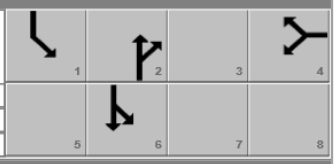
General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jul 25, 2022	Area Type	CBD
Jurisdiction		Time Period	PM Peak	PHF	0.91
Urban Street	Billtown Road	Analysis Year	2024 Build	Analysis Period	1> 4:00
Intersection	Gellhaus 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	
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				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

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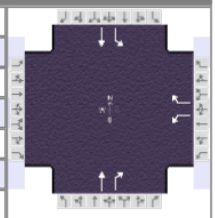
HCS Signalized Intersection Results Summary

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					EB			WB			NB			SB		
Cycle, s	122.7	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	6.3	49.4		47.2	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					

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

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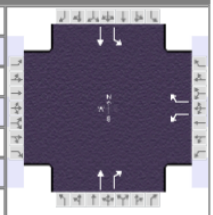
HCS Signalized Intersection Results Summary

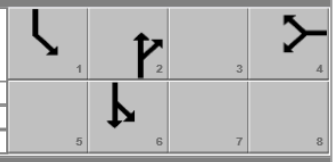
General Information				Intersection Information	
Agency	Diane B. Zimmerman Traffic Engineering			Duration, h	0.250
Analyst	DBZ	Analysis Date	Jul 25, 2022	Area Type	CBD
Jurisdiction		Time Period	PM Peak	PHF	0.91
Urban Street	Billtown Road	Analysis Year	2034 Build	Analysis Period	1> 4:00
Intersection	Gellhaus 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			
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

Green	9.2	57.6	50.0	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				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

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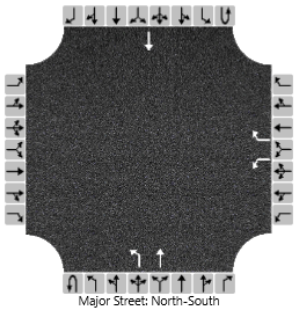
HCS Two-Way Stop-Control Report

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



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		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						

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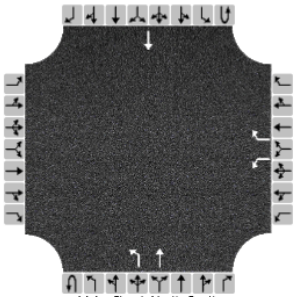
HCS Two-Way Stop-Control Report

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



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						

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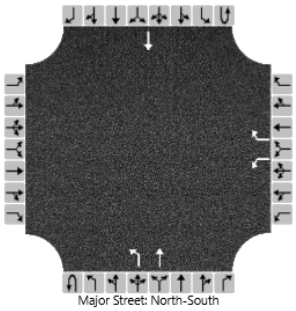
HCS Two-Way Stop-Control Report

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	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		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						

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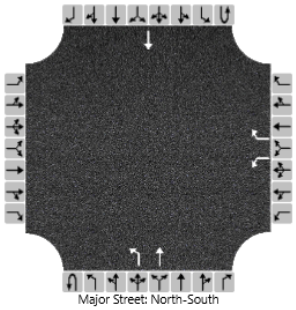
HCS Two-Way Stop-Control Report

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



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)						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						

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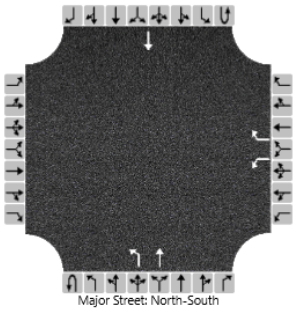
HCS Two-Way Stop-Control Report

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



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)						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						

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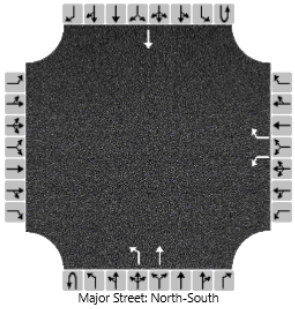
HCS Two-Way Stop-Control Report

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	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)						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						

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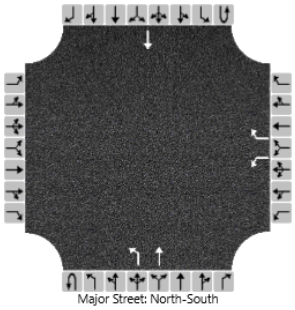
HCS Two-Way Stop-Control Report

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



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						

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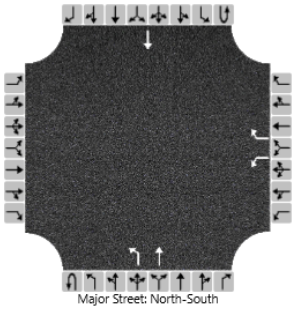
HCS Two-Way Stop-Control Report

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



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						

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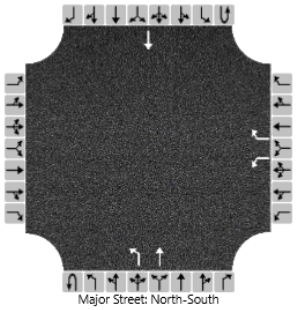
HCS Two-Way Stop-Control Report

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



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)						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						

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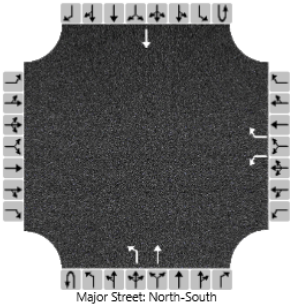
HCS Two-Way Stop-Control Report

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	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)						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						

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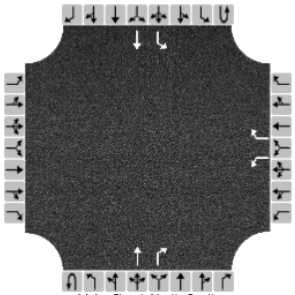
HCS Two-Way Stop-Control Report

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		

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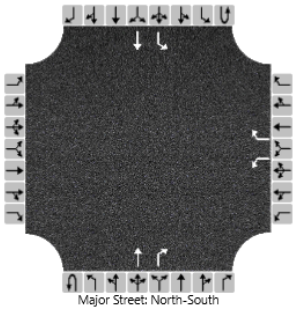
HCS Two-Way Stop-Control Report

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		

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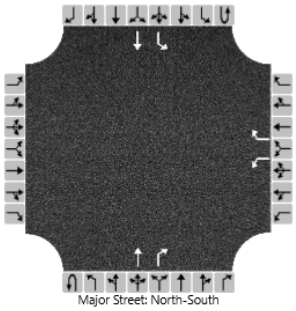
HCS Two-Way Stop-Control Report

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	PM 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	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		

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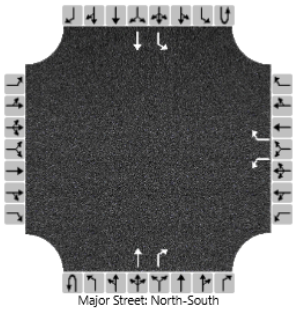
HCS Two-Way Stop-Control Report

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



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		

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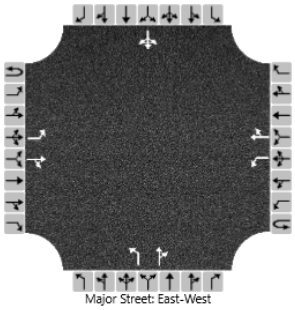
HCS Two-Way Stop-Control Report

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			

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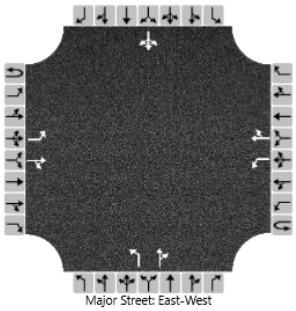
HCS Two-Way Stop-Control Report

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		

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School AM 24 NB.xtw

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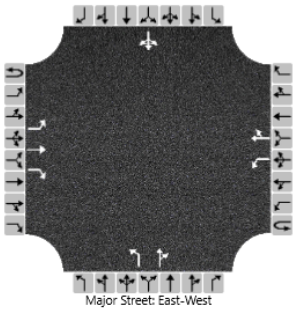
HCS Two-Way Stop-Control Report

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



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		

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School AM 24 B.xtw
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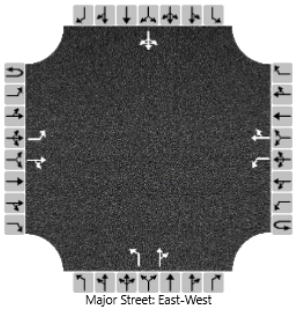
HCS Two-Way Stop-Control Report

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			

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School AM 34 NB.xtw

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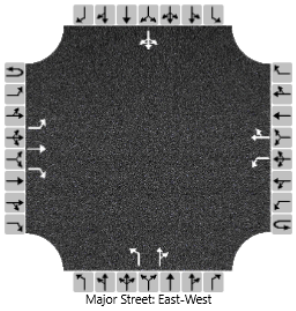
HCS Two-Way Stop-Control Report

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



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		

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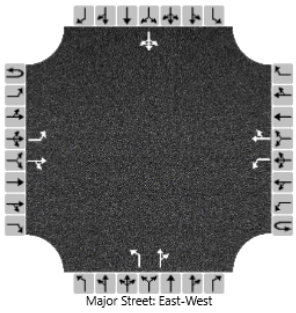
HCS Two-Way Stop-Control Report

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



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		

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School PM 22.xtw

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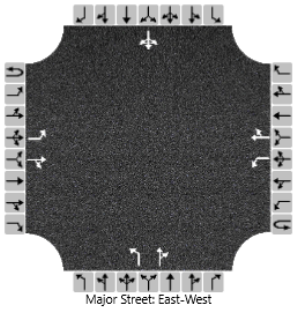
HCS Two-Way Stop-Control Report

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



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			

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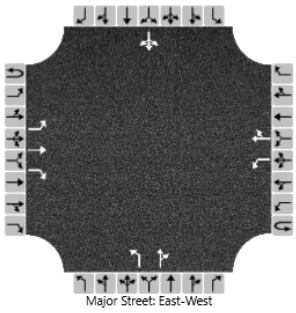
HCS Two-Way Stop-Control Report

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



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		

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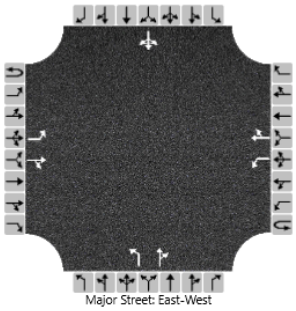
HCS Two-Way Stop-Control Report

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			

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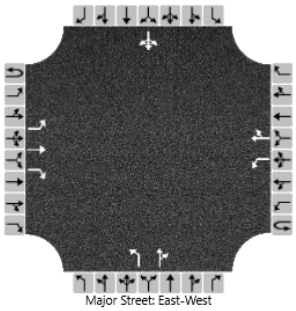
HCS Two-Way Stop-Control Report

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 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	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		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)		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		

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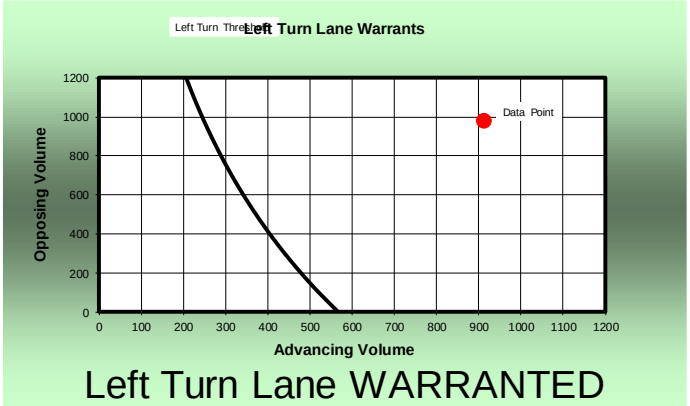
Left Turn Lane Warrants

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



Left Turn Lane WARRANTED

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		

Right Turn Lane WARRANTED

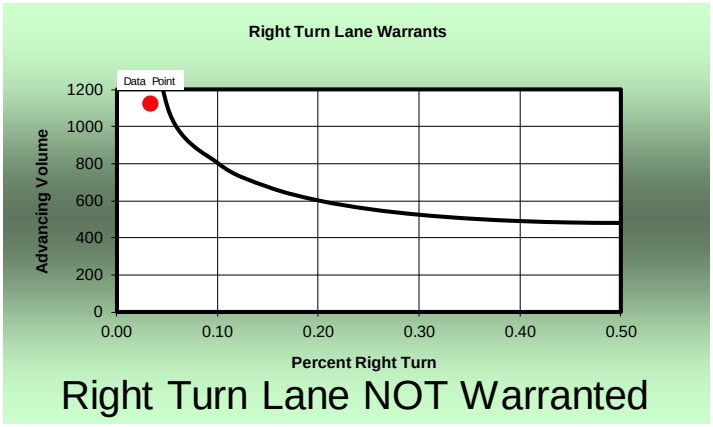
Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

Gellhaus Lane

Right Turn Lane Warrants

Input Fields

Right Turn Volume (vph)	38	Speed Limit (mph)	35
Advancing Volume (vph)	1122		



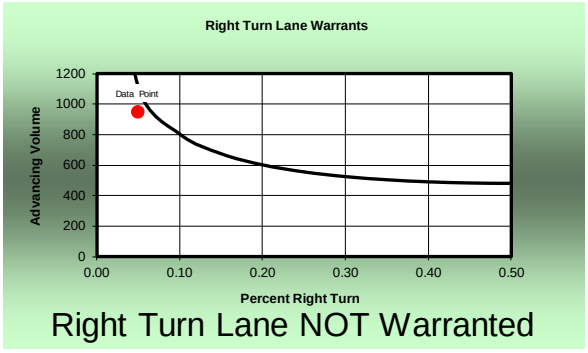
Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

Billtown Road without Coffee Shop
Right turns =81 – (96*.35) = 47

Right Turn Lane Warrants

Input Fields

Right Turn Volume (vph)	47	Speed Limit (mph)	45
Advancing Volume (vph)	946		



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.