

final report

August 2, 2023

## Traffic Impact Study

Wawa  
Outer Loop at Vaghn Mill Road  
Louisville, KY

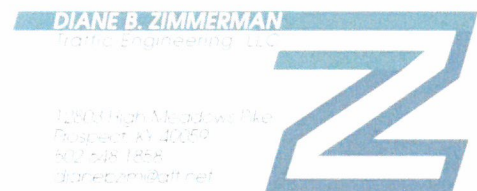
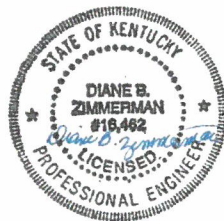
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Prepared for

Louisville Metro Planning Commission  
Kentucky Transportation Cabinet



23-ZONE-0058

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## INTRODUCTION

The site plan for Wawa shows a convenience store with 16 fueling positions on the southeast corner of Outer Loop (KY 1065) and Vaghn Mill Road in Louisville, KY. The site plan is in the appendix. **Figure 1** displays a map of the site. Access to the site will be from a full access driveway on Vaghn Mill Road and a right-in right-out access on Outer Loop. 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 Outer Loop and Vaghn Mill Road and Apple Valley Drive, and Vaghn Mill Road with Fegenbush Lane, and the proposed entrances.

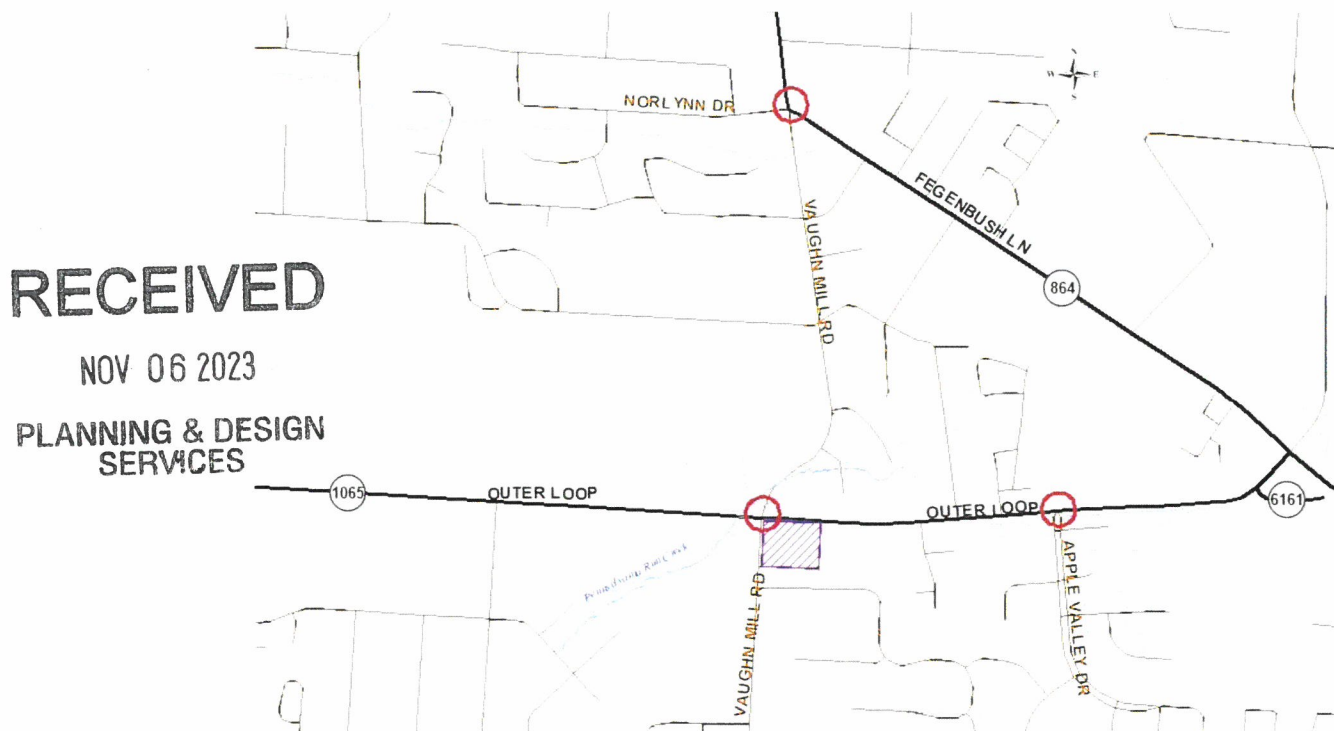


Figure 1. Site Map

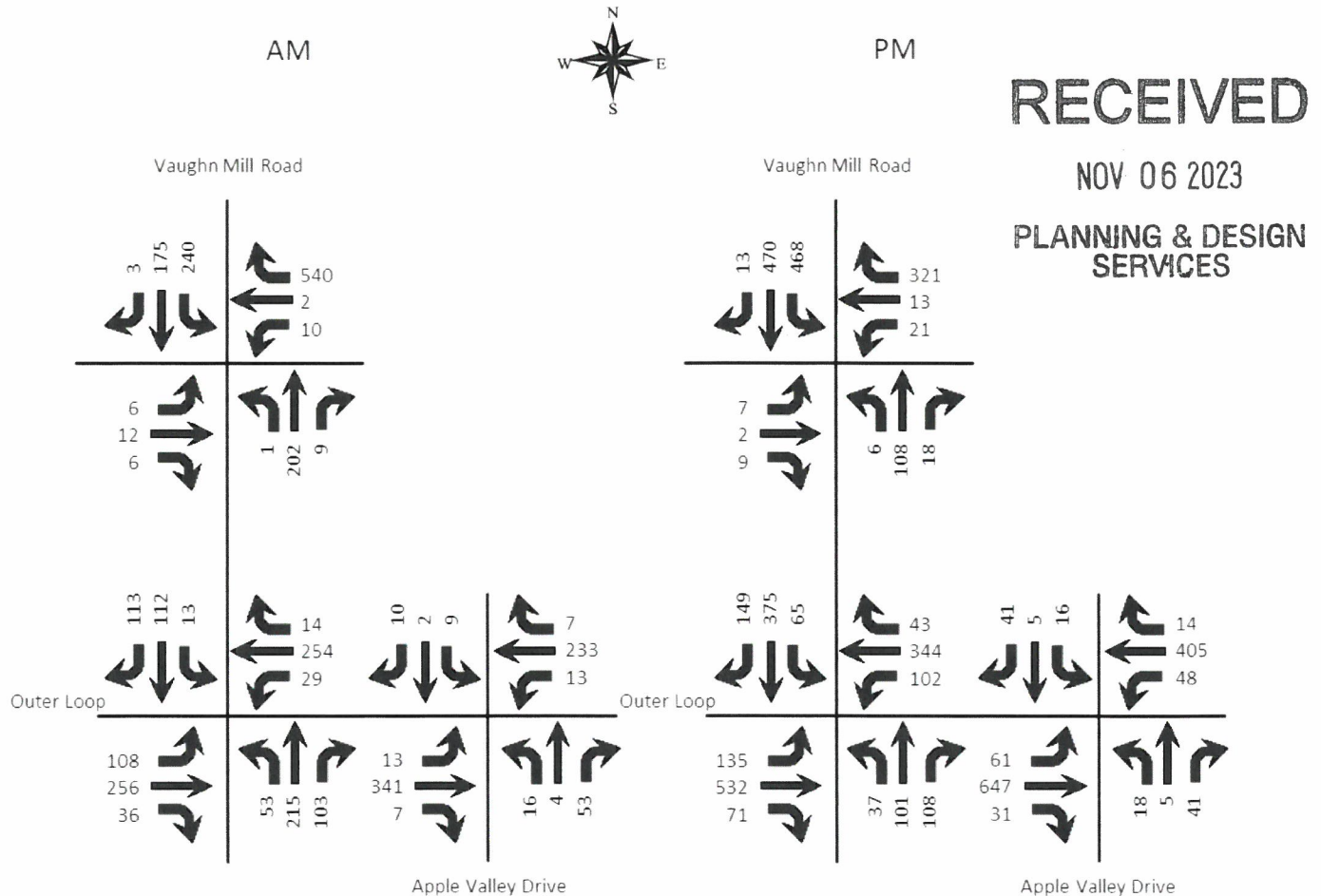
## EXISTING CONDITIONS

Outer Loop, KY 1065, is a state-maintained road with an estimated 2023 Average Daily Traffic (ADT) of 10,700 vehicles per day west of Vaghn Mill Road, as estimated from the turning movement count by applying the K factor of 11.2 from Kentucky Transportation Cabinet (KYTC) 2020 count at station 300. The road has two twelve-foot lanes, a one-foot shoulder through the study area. The speed limit is 45 mph. There is a sidewalk along the north side, west of the intersection with Vaghn Mill Road. The intersection with Vaghn Mill Road is controlled with a traffic signal. At the intersection there are dedicated left turn lanes on each approach and a southbound right turn lane. The intersection with Apple Valley Drive is controlled with a traffic signal. There are dedicated left turn lanes on all approaches with the eastbound and westbound approaches have a dedicated right turn lane.

Vaghn Mill Road is maintained by Louisville Metro with an estimated 2023 Average Daily Traffic (ADT) of 5,900 vehicles per day south of Outer Loop, as estimated from the turning movement count by applying the K factor of 13.4 from

Kentucky Transportation Cabinet (KYTC) 2018 count at station 293. The road has two nine-foot lanes, a one-foot shoulder through the study area. The speed limit is 35 mph. There is a sidewalk along the east side.

Peak hour traffic counts for the intersections were obtained on Tuesday, April 25, 2023. For the intersection of Outer Loop and Vaghn Mill Road the a.m. peak hour occurred between 7:15 and 8:15, and the p.m. peak hour occurred between 4:45 and 5:45. **Figure 2** illustrates the 2023 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 2023 volumes. This was determined by the historical growth at KYTC count stations in the vicinity. **Figure 3** displays the 2024 No Build peak hour volumes.

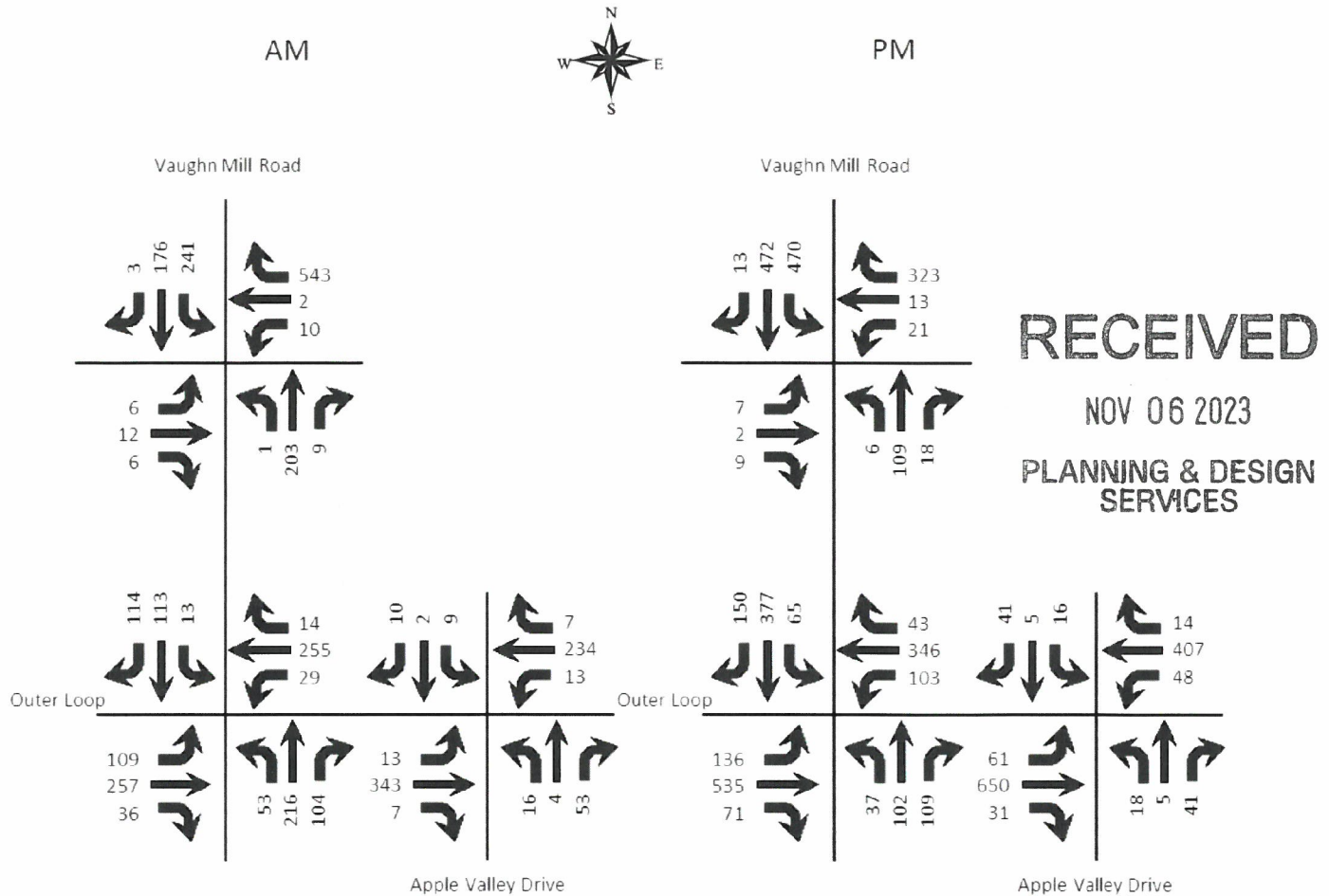


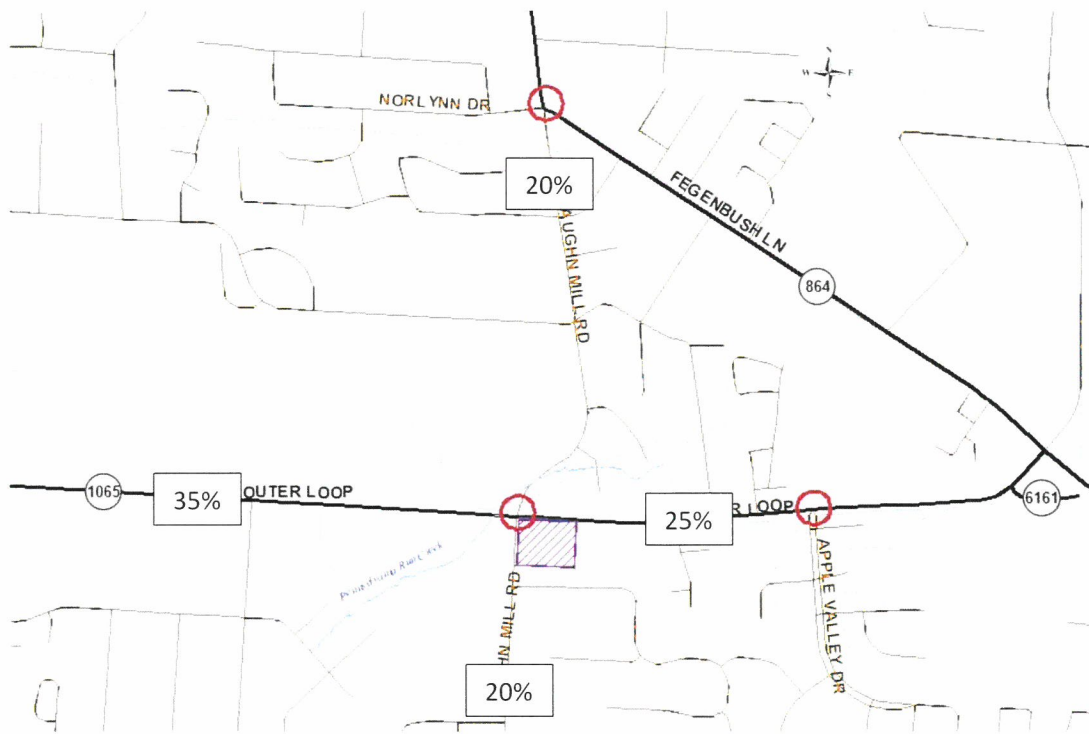
Figure 3. 2024 No Build Peak Hour Volumes

## TRIP GENERATION

The Institute of Transportation Engineers Trip Generation Manual, 11<sup>th</sup> Edition contains trip generation rates for a wide range of developments. The land use “Convenience Market/Gas Station” (945) was used for the 16 pumps and a store greater than 5,500 square feet. The trip generation results are listed in **Table 1**. The new trips were assigned to the highway network with the percentages shown in **Figure 4**. The pass-by trips were assigned using the existing traffic patterns. Pass-by trips are shown in parenthesis. **Figure 5** shows the trips generated by this development and distributed throughout the road network during the peak hours. **Figure 6** displays the individual turning movements for the peak hours when the development is completed.

**Table 1. Peak Hour Trips Generated by Site**

Land Use	A.M. Peak Hour			P.M. Peak Hour		
	Trips	In	Out	Trips	In	Out
Gas Station with Convenience Market (16 fueling locations)	506	253	253	430	215	215
Pass-by Trips	384	192	192	322	161	161
New Trips	122	61	61	108	54	54



**Figure 4. Trip Distribution Percentages (New Trips)**

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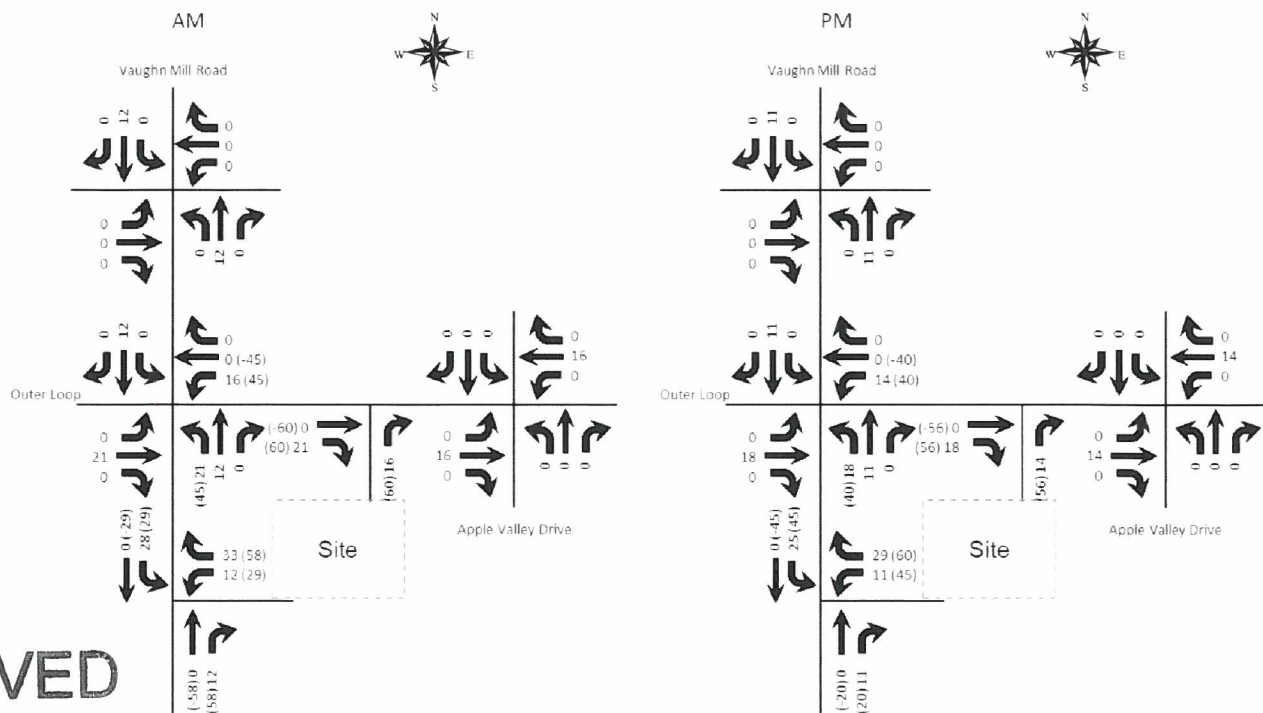


Figure 5. Peak Hour Trips Generated by Site

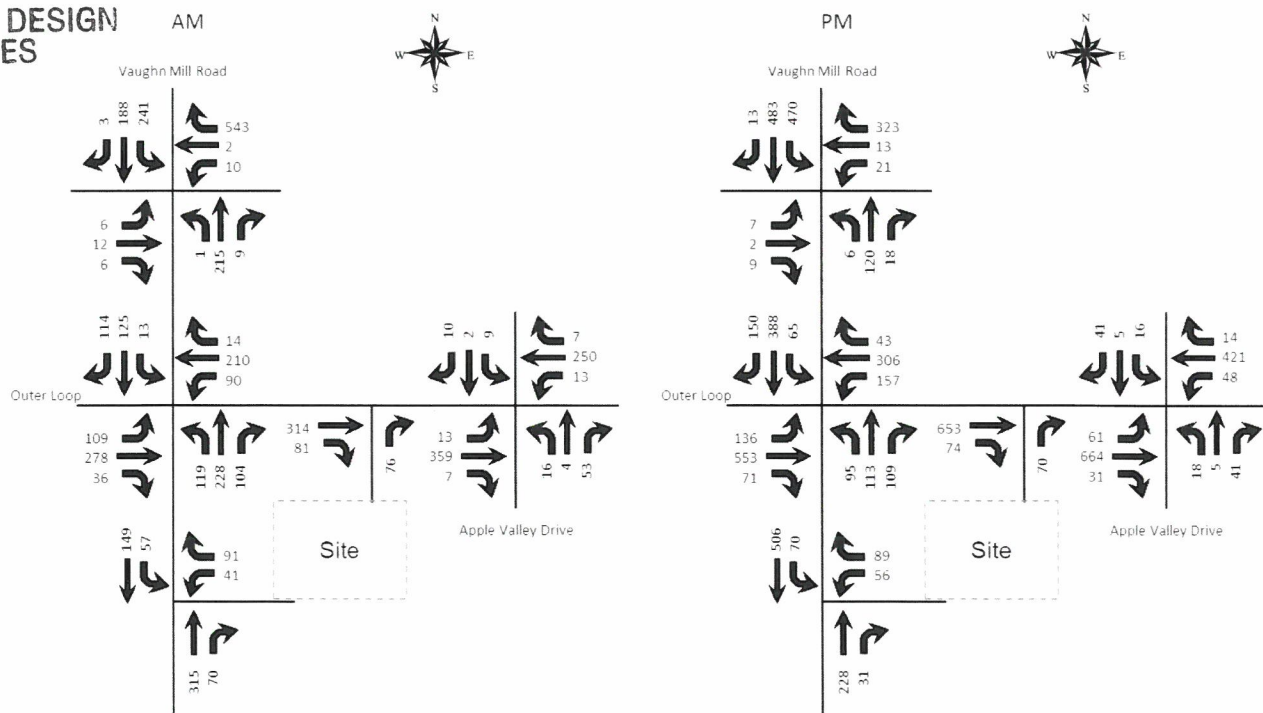


Figure 6. 2024 Build Peak Hour Volumes

## 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. The Level of Service for stop-controlled intersections is based upon the total delay experienced.

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

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

	A.M.			P.M.		
Approach	2023 Existing	2024 No Build	2024 Build	2023 Existing	2024 No Build	2024 Build
<b>Outer Loop at Vaughn Mill Road</b>	<b>D</b> <b>36.3</b>	<b>D</b> <b>36.4</b>	<b>D</b> <b>38.3</b>	<b>D</b> <b>35.1</b>	<b>D</b> <b>35.2</b>	<b>D</b> <b>37.2</b>
Outer Loop Eastbound	B 14.6	B 14.8	B 16.5	C 22.1	C 22.3	C 26.9
Outer Loop Westbound	B 11.2	B 11.2	B 12.8	B 15.2	B 15.3	B 19.0
Vaughn Mill Road Northbound	E 67.7	E 67.7	E 67.4	E 55.4	E 55.3	E 60.5
Vaughn Mill Road Southbound	D 49.5	D 49.3	D 48.6	E 59.0	E 59.0	D 53.0
<b>Outer Loop at Apple Valley Drive</b>	<b>B</b> <b>13.2</b>	<b>B</b> <b>13.1</b>	<b>B</b> <b>12.9</b>	<b>B</b> <b>13.4</b>	<b>B</b> <b>13.4</b>	<b>B</b> <b>13.6</b>
Outer Loop Eastbound	A 4.5	A 4.5	A 4.9	A 7.3	A 7.3	A 7.8
Outer Loop Westbound	A 4.8	A 4.9	A 4.9	A 6.6	A 6.7	A 6.8
Apple Valley Road Northbound	E 72.3	E 72.3	E 72.3	E 72.2	E 72.2	E 72.2
Shopping Center Southbound	E 71.9	E 71.9	E 71.9	E 72.1	E 72.1	E 72.1
<b>Fegenbush Lane at Vaughn Mill Road</b>						
Vaughn Mill Road Eastbound	F 89.1	F 92.3	F 110.8	F 50.4	F 50.4	F 58.4
Fegenbush Road Northbound	A 8.5	A 8.5	A 8.5	B 10.5	B 10.5	B 10.6
<b>Vaugh Mill Road at Entrance</b>						
Entrance Westbound			B 14.4			C 16.1

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	A.M.			P.M.		
Approach	2023 Existing	2024 No Build	2024 Build	2023 Existing	2024 No Build	2024 Build
Vaughn Mill Road Southbound			A 8.4			A 7.9

Key: Level of Service, Delay in seconds per vehicle

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 2024 No Build volumes are shown in **Figure 7**. The site volumes were added for the 2024 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 will be required at the entrance. Right turn lanes are not required for the eastbound approach on Outer Loop or the northbound approach on Vaughn Mill Road.

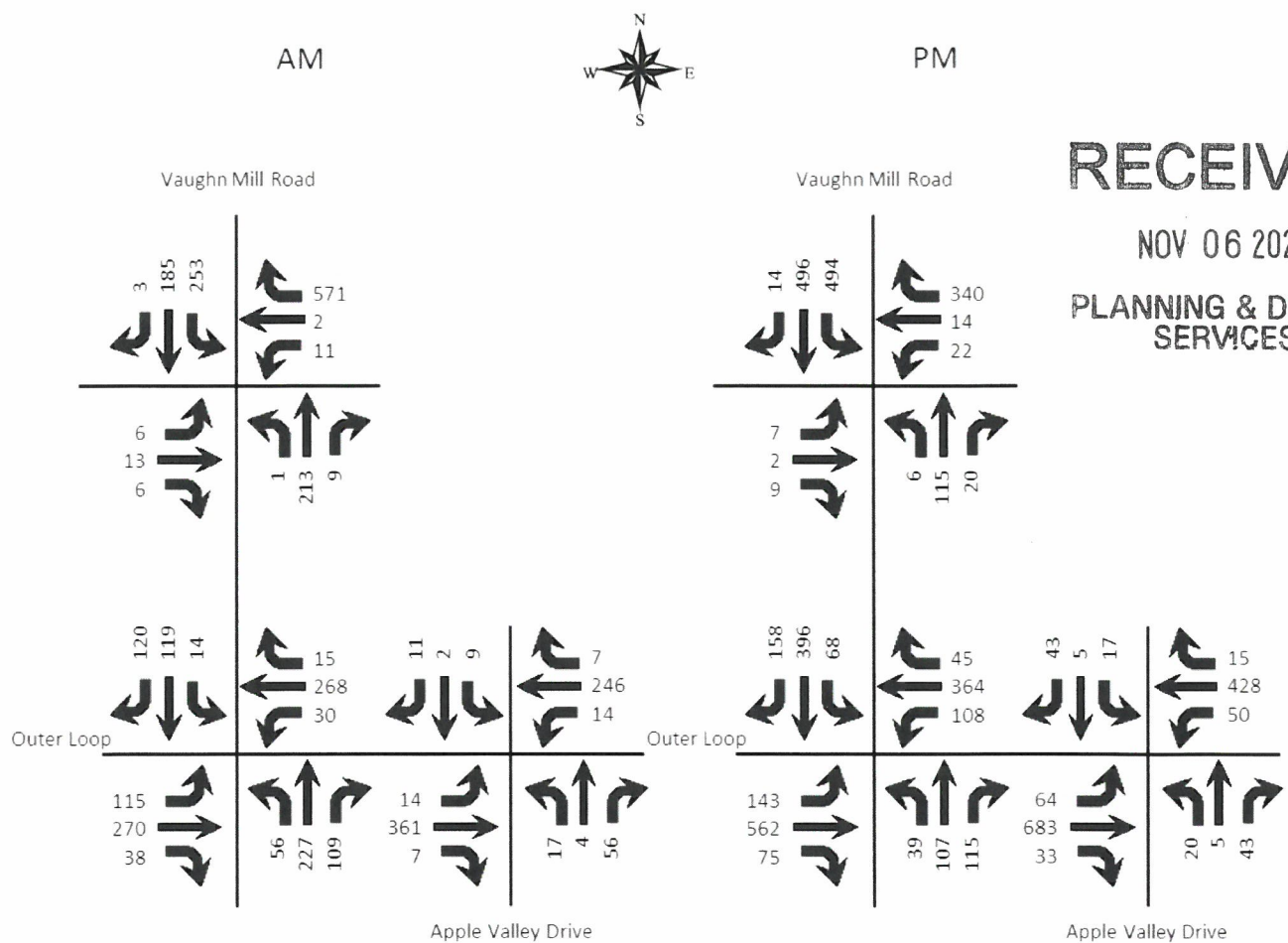


Figure 7. 2034 No Build Peak Hour Volumes

Wawa Outer Loop  
Traffic Impact Study

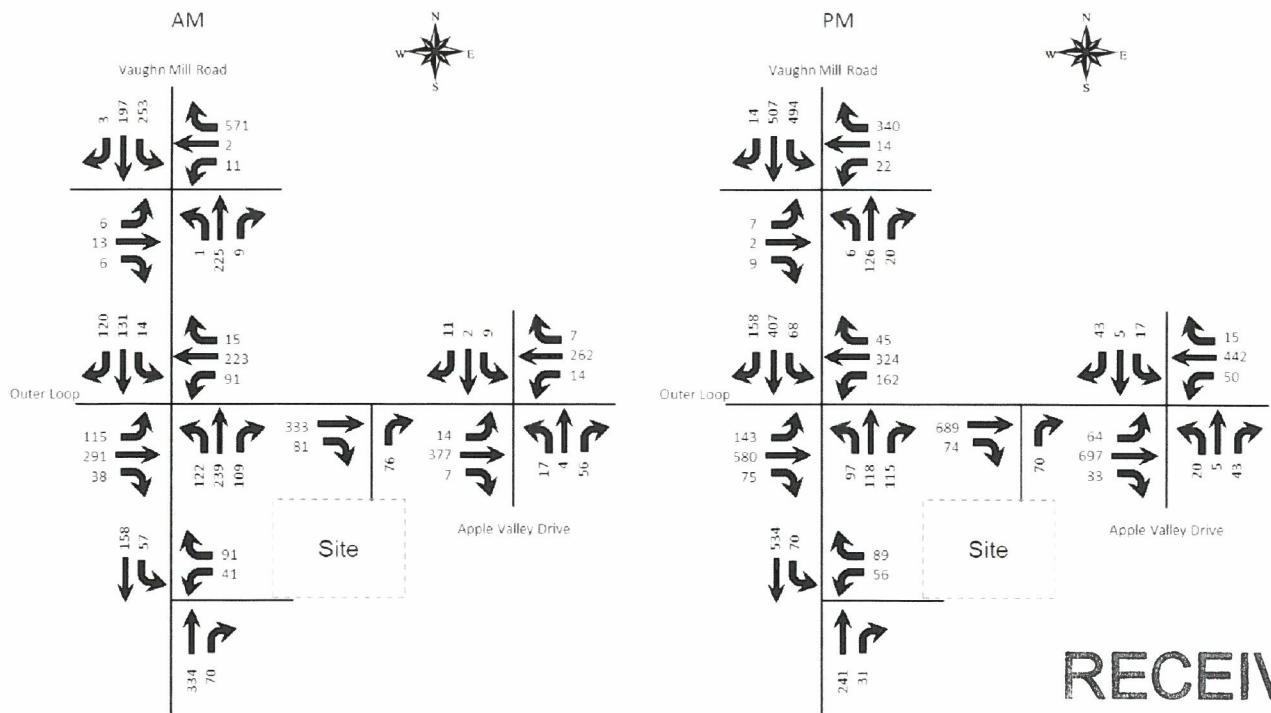


Figure 8. 2034 Build Peak Hour Volumes

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Table 3. 2034 Peak Hour Level of Service

Approach	A.M.			P.M.		
	2023 Existing	2034 No Build	2034 Build	2023 Existing	2034 No Build	2034 Build
<b>Outer Loop at Vaughn Mill Road</b>	<b>D</b> <b>36.3</b>	<b>D</b> <b>36.9</b>	<b>D</b> <b>38.5</b>	<b>D</b> <b>35.1</b>	<b>D</b> <b>35.9</b>	<b>D</b> <b>39.1</b>
Outer Loop Eastbound	B 14.6	B 15.9	B 17.7	C 22.1	C 24.4	C 28.1
Outer Loop Westbound	B 11.2	B 13.4	B 14.1	B 15.2	B 16.4	B 19.8
Vaughn Mill Road Northbound	E 67.7	E 67.8	E 67.3	E 55.4	E 54.4	E 66.5
Vaughn Mill Road Southbound	D 49.5	D 48.2	D 47.5	E 59.0	E 58.6	D 54.7
<b>Outer Loop at Apple Valley Drive</b>	<b>B</b> <b>13.2</b>	<b>B</b> <b>13.3</b>	<b>B</b> <b>13.1</b>	<b>B</b> <b>13.4</b>	<b>B</b> <b>13.7</b>	<b>B</b> <b>13.8</b>
Outer Loop Eastbound	A 4.5	A 4.6	A 5.0	A 7.3	A 7.6	A 8.0
Outer Loop Westbound	A 4.8	A 5.0	A 5.1	A 6.6	A 6.8	A 6.9



	A.M.			P.M.		
Approach	2023 Existing	2034 No Build	2034 Build	2023 Existing	2034 No Build	2034 Build
Apple Valley Road Northbound	E 72.3	E 72.6	E 72.6	E 72.2	E 72.5	E 72.5
Shopping Center Southbound	E 71.9	E 71.9	E 71.9	E 72.1	E 72.3	E 72.3
<b>Fegenbush Lane at Vaughn Mill Road</b>						
Vaughn Mill Road Eastbound	F 89.1	F 133.5	F 158.5	F 50.4	F 67.2	F 80.0
Fegenbush Road Northbound	A 8.5	A 8.6	A 8.6	B 10.5	B 10.8	B 10.9
<b>Vaughn Mill Road at Entrance</b>						
Entrance Westbound			B 14.8			C 16.8
Vaughn Mill Road Southbound			A 8.5			A 7.9

Key: Level of Service, Delay in seconds per vehicle

The northbound approach of Vaughn Mill Road at Fegenbush Lane is operating at Level of Service F currently and the delays will increase during the analysis period. This intersection should be monitored for future improvements, as it is beyond the ability of this proposed development to make improvements at this intersection.

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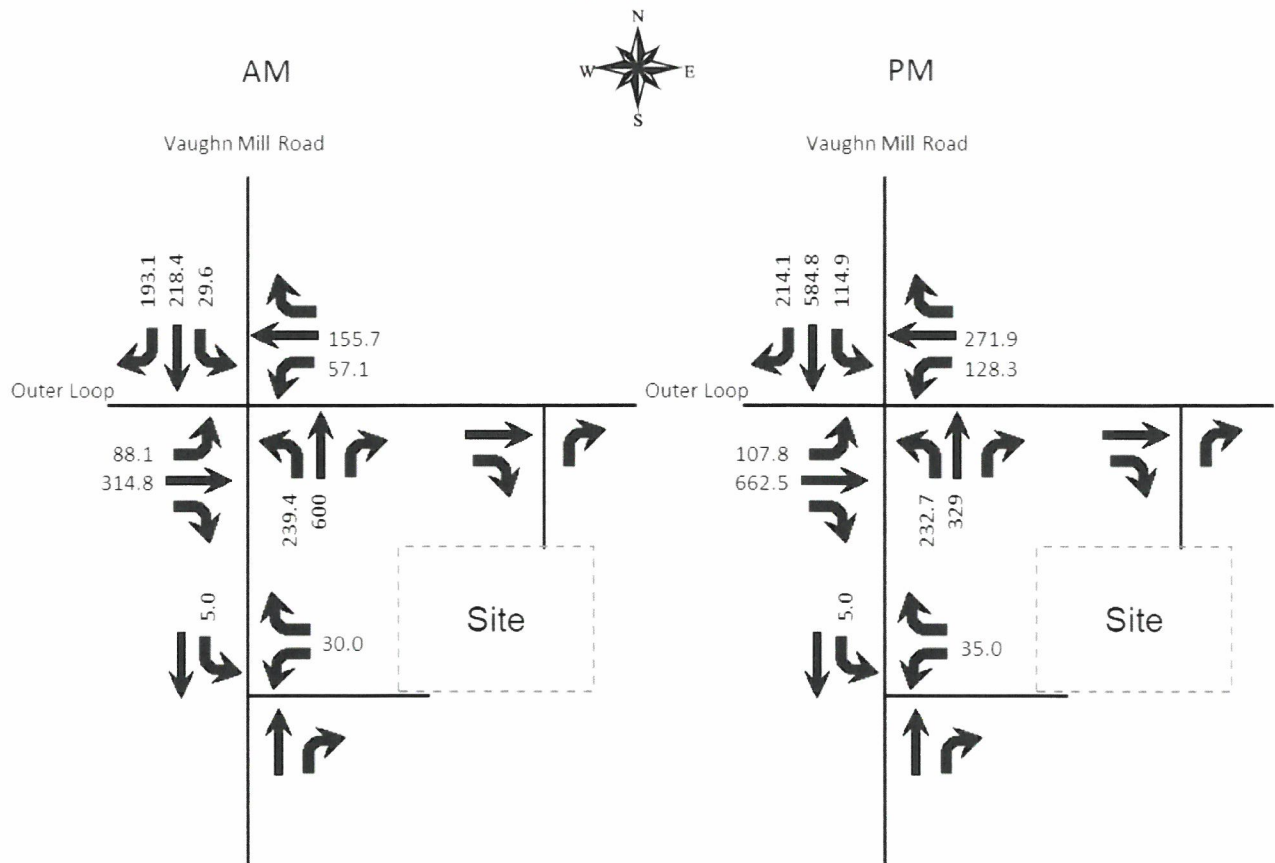


Figure 9. 2034 95<sup>th</sup> Percentile Queue Lengths

The review of the 95<sup>th</sup> percentile queue lengths indicate the northbound left turn lane on Vaughn Mill Road at Outer Loop should be extended to the proposed left turn lane for the entrance. The current left turn lane is 110' long.

## 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, except Vaughn Mill Road at Fegenbush Lane. A southbound left turn lane will be required at the entrance. Right turn lanes are not required for the eastbound approach on Outer Loop or the northbound approach on Vaughn Mill Road.

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Traffic Impact Study

Traffic Counts

Classified Turn Movement Count || All vehicles



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Louisville, KY (Outer Loop)

Site 1 of 3

Vaughn Mill Rd (South)  
Vaughn Mill Rd (North)  
KY-1065 Outer Loop (West)  
KY-1065 Outer Loop (East)

Date

Tuesday, April 25, 2023

Lat/Long

38.137319°, -85.628373°

Weather

Mostly Cloudy  
54°F

0700 - 0900 (Weekday 2h Session) (04-25-2023)

All vehicles

	Northbound					Southbound					Eastbound					Westbound					Int
	Vaughn Mill Rd (South)					Vaughn Mill Rd (North)					KY-1065 Outer Loop (West)					KY-1065 Outer Loop (East)					
TIME	Left	Thru	Right	U-Turn	App Total	Left	Thru	Right	U-Turn	App Total	Left	Thru	Right	U-Turn	App Total	Left	Thru	Right	U-Turn	App Total	Total
0700 - 0715	25	37	13	0	75	6	11	27	0	44	20	40	2	0	62	4	55	4	0	63	244
0715 - 0730	19	62	24	0	105	2	16	27	0	45	23	64	10	0	97	4	62	7	0	73	320
0730 - 0745	9	71	34	0	114	6	36	23	0	65	34	73	18	0	125	3	64	4	0	71	375
0745 - 0800	14	49	20	0	83	5	35	38	0	78	31	58	5	0	94	18	69	2	0	89	344
Hourly Total	67	219	91	0	377	19	98	115	0	232	108	235	35	0	378	29	250	17	0	296	1283
0800 - 0815	11	33	25	0	69	0	25	25	0	50	20	61	3	0	84	4	59	1	0	64	267
0815 - 0830	12	38	11	0	61	1	14	30	0	45	30	49	2	0	81	4	53	2	0	59	246
0830 - 0845	25	35	8	0	68	6	18	36	0	60	21	55	5	0	81	8	75	7	0	90	299
0845 - 0900	22	39	11	0	72	6	23	30	0	59	25	62	10	0	97	9	59	6	0	74	302
Hourly Total	70	145	55	0	270	13	80	121	0	214	96	227	20	0	343	25	246	16	0	287	1114
Grand Total	137	364	146	0	647	32	178	236	0	446	204	462	55	0	721	54	496	33	0	583	2397
Approach %	21.17	56.26	22.57	0.00	-	7.17	39.91	52.91	0.00	-	28.29	64.08	7.63	0.00	-	9.26	85.08	5.66	0.00	-	-
Intersection %	5.72	15.19	6.09	0.00	26.99	1.34	7.43	9.85	0.00	18.61	8.51	19.27	2.29	0.00	30.08	2.25	20.69	1.38	0.00	24.32	-
PHF	0.70	0.76	0.76	0.00	0.81	0.54	0.78	0.74	0.00	0.76	0.79	0.88	0.50	0.00	0.80	0.40	0.92	0.50	0.00	0.83	0.87

1600 - 1800 (Weekday 2h Session) (04-25-2023)

All vehicles

TIME	Northbound					Southbound					Eastbound					Westbound					Int Total
	Vaughn Mill Rd (South)					Vaughn Mill Rd (North)					KY-1065 Outer Loop (West)					KY-1065 Outer Loop (East)					
	Left	Thru	Right	U-Turn	App Total	Left	Thru	Right	U-Turn	App Total	Left	Thru	Right	U-Turn	App Total	Left	Thru	Right	U-Turn	App Total	
1600 - 1615	9	25	40	0	74	14	60	46	0	120	35	154	20	0	209	16	93	7	0	116	519
1615 - 1630	5	19	27	0	51	18	57	38	0	113	39	162	19	0	220	23	95	9	0	127	511
1630 - 1645	10	27	22	0	59	10	60	42	0	112	38	132	15	0	185	27	98	6	0	131	487
1645 - 1700	13	32	29	0	74	18	92	31	0	141	34	134	18	0	186	22	80	6	0	108	509
Hourly Total	37	103	118	0	258	60	269	157	0	486	146	582	72	0	800	88	366	28	0	482	2026
1700 - 1715	8	22	27	0	57	12	102	38	0	152	33	145	17	0	195	24	94	12	0	130	534
1715 - 1730	8	24	25	0	57	20	93	43	0	156	33	113	21	0	167	33	85	11	0	129	509
1730 - 1745	8	23	27	0	58	14	88	37	1	140	35	140	15	0	190	23	85	14	0	122	510
1745 - 1800	10	22	31	0	63	12	67	49	0	128	28	123	24	0	175	34	94	11	0	139	505
Hourly Total	34	91	110	0	235	58	350	167	1	576	129	521	77	0	727	114	358	48	0	520	2058
Grand Total	71	194	228	0	493	118	619	324	1	1062	275	1103	149	0	1527	202	724	76	0	1002	4084
Approach %	14.40	39.35	46.25	0.00	-	11.11	58.29	30.51	0.09	-	18.01	72.23	9.76	0.00	-	20.16	72.26	7.58	0.00	-	-
Intersection %	1.74	4.75	5.58	0.00	12.07	2.89	15.16	7.93	0.02	26.00	6.73	27.01	3.65	0.00	37.39	4.95	17.73	1.86	0.00	24.53	-
PHF	0.71	0.79	0.93	0.00	0.83	0.80	0.92	0.87	0.25	0.94	0.96	0.92	0.85	0.00	0.95	0.77	0.91	0.77	0.00	0.94	0.97

1140 1508 2248 1585 6481  
0.176 0.233 0.347 0.245

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Classified Turn Movement Count || All vehicles



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Louisville, KY (Outer Loop)

Site 2 of 3

Apple Valley Dr  
Driveway  
KY-1065 Outer Loop (West)  
KY-1065 Outer Loop (East)

Date

Tuesday, April 25, 2023

Weather

Mostly Cloudy  
54°F

Lat/Long

38.137368°, -85.621324°

0700 - 0900 (Weekday 2h Session) (04-25-2023)

All vehicles

TIME	Northbound					Southbound					Eastbound					Westbound					Int Total
	Apple Valley Dr					Driveway					KY-1065 Outer Loop (West)					KY-1065 Outer Loop (East)					
	Left 2.1	Thru 2.2	Right 2.3	U-Turn 2.4	App Total	Left 2.5	Thru 2.6	Right 2.7	U-Turn 2.8	App Total	Left 2.9	Thru 2.10	Right 2.11	U-Turn 2.12	App Total	Left 2.13	Thru 2.14	Right 2.15	U-Turn 2.16	App Total	
0700 - 0715	4	2	13	0	19	4	1	2	0	7	1	56	1	0	58	2	50	4	0	56	140
0715 - 0730	8	1	17	0	26	3	0	2	0	5	1	88	0	0	89	6	53	2	0	61	181
0730 - 0745	4	0	11	0	15	1	0	4	0	5	5	101	4	0	110	4	55	1	0	60	190
0745 - 0800	2	2	11	0	15	2	0	2	0	4	2	77	0	0	79	2	77	2	0	81	179
Hourly Total	18	5	52	0	75	10	1	10	0	21	9	322	5	0	336	14	235	9	0	258	690
0800 - 0815	2	1	14	0	17	3	2	2	0	7	5	75	3	0	83	1	48	2	0	51	158
0815 - 0830	5	0	13	0	18	1	0	2	0	3	4	52	0	0	56	5	53	1	0	59	136
0830 - 0845	1	2	11	0	14	3	1	6	0	10	6	50	3	0	59	4	69	2	0	75	158
0845 - 0900	5	1	12	0	18	2	0	2	0	4	2	61	3	0	66	6	65	3	0	74	162
Hourly Total	13	4	50	0	67	9	3	12	0	24	17	238	9	0	264	16	235	8	0	259	614
Grand Total	31	9	102	0	142	19	4	22	0	45	26	560	14	0	600	30	470	17	0	517	1304
Approach %	21.83	6.34	71.83	0.00	-	42.22	8.89	48.89	0.00	-	4.33	93.33	2.33	0.00	-	5.80	90.91	3.29	0.00	-	-
Intersection %	2.38	0.69	7.82	0.00	10.89	1.46	0.31	1.69	0.00	3.45	1.99	42.94	1.07	0.00	46.01	2.30	36.04	1.30	0.00	39.65	-
PHF	0.50	0.50	0.78	0.00	0.70	0.75	0.25	0.63	0.00	0.75	0.65	0.84	0.44	0.00	0.82	0.54	0.76	0.88	0.00	0.78	0.93

1600 - 1800 (Weekday 2h Session) (04-25-2023)

All vehicles

TIME	Northbound					Southbound					Eastbound					Westbound					Int Total
	Apple Valley Dr					Driveway					KY-1065 Outer Loop (West)					KY-1065 Outer Loop (East)					
	Left 2.1	Thru 2.2	Right 2.3	U-Turn 2.4	App Total	Left 2.5	Thru 2.6	Right 2.7	U-Turn 2.8	App Total	Left 2.9	Thru 2.10	Right 2.11	U-Turn 2.12	App Total	Left 2.13	Thru 2.14	Right 2.15	U-Turn 2.16	App Total	
1600 - 1615	2	2	12	0	16	3	1	13	0	17	20	173	10	0	203	9	106	2	0	117	353
1615 - 1630	6	2	7	0	15	5	1	7	0	13	12	176	10	0	198	11	106	5	0	122	348
1630 - 1645	4	0	14	0	18	3	2	14	0	19	11	148	7	0	166	12	94	4	0	110	313
1645 - 1700	6	1	8	0	15	5	1	7	0	13	18	150	4	0	172	16	99	3	0	118	318
Hourly Total	18	5	41	0	64	16	5	41	0	62	61	647	31	0	739	48	405	14	0	467	1332
1700 - 1715	7	2	7	0	16	5	2	7	0	14	18	148	11	0	177	13	99	4	0	116	323
1715 - 1730	5	1	12	0	18	7	1	16	0	24	13	131	4	0	148	14	108	7	0	129	319
1730 - 1745	5	1	11	0	17	4	0	14	0	18	18	146	6	0	170	13	106	10	0	129	334
1745 - 1800	4	1	8	0	13	9	0	10	0	19	13	136	7	0	156	14	106	3	0	123	311
Hourly Total	21	5	38	0	64	25	3	47	0	75	62	561	28	0	651	54	419	24	0	497	1287
Grand Total	39	10	79	0	128	41	8	88	0	137	123	1208	59	0	1390	102	824	38	0	964	2619
Approach %	30.47	7.81	61.72	0.00	-	29.93	5.84	64.23	0.00	-	8.85	86.91	4.24	0.00	-	10.58	85.48	3.94	0.00	-	-
Intersection %	1.49	0.38	3.02	0.00	4.89	1.57	0.31	3.36	0.00	5.23	4.70	46.12	2.25	0.00	53.07	3.89	31.46	1.45	0.00	36.81	-
PHF	0.75	0.63	0.73	0.00	0.89	0.80	0.63	0.73	0.00	0.82	0.76	0.92	0.78	0.00	0.91	0.75	0.96	0.70	0.00	0.96	0.94

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Wawa Outer Loop  
Traffic Impact Study

Classified Turn Movement Count || All vehicles



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Louisville, KY (Outer Loop)

Site 3 of 3

Vaughn Mill Rd  
KY-864 Fegenbush Ln (North)  
Norlynn Dr  
KY-864 Fegenbush Ln (East)

Date

Tuesday, April 25, 2023

Weather

Mostly Cloudy  
54°F

Lat/Long

38.145012°, -85.627719°

0700 - 0900 (Weekday 2h Session) (04-25-2023)

All vehicles

TIME	Northbound					Southbound					Eastbound					Westbound					Int Total
	Vaughn Mill Rd					KY-864 Fegenbush Ln (North)					Norlynn Dr					KY-864 Fegenbush Ln (East)					
	Left 3.1	Thru 3.2	Right 3.3	U-Turn 3.4	App Total	Left 3.5	Thru 3.6	Right 3.7	U-Turn 3.8	App Total	Left 3.9	Thru 3.10	Right 3.11	U-Turn 3.12	App Total	Left 3.13	Thru 3.14	Right 3.15	U-Turn 3.16	App Total	
0700 - 0715	1	44	1	0	46	44	26	0	0	70	3	5	3	0	11	2	0	96	0	98	225
0715 - 0730	0	51	1	0	52	55	42	1	0	98	2	2	0	0	4	3	0	124	0	127	281
0730 - 0745	0	60	3	0	63	72	45	2	0	119	1	4	2	0	7	3	1	160	0	164	353
0745 - 0800	0	47	4	0	51	69	62	0	0	131	0	1	1	0	2	2	1	161	0	164	348
Hourly Total	1	202	9	0	212	240	175	3	0	418	6	12	6	0	24	10	2	541	0	553	1207
0800 - 0815	0	35	3	1	39	40	33	0	0	73	3	2	0	0	5	0	0	85	0	85	202
0815 - 0830	0	46	5	0	51	41	31	2	0	74	0	1	3	0	4	1	2	101	0	104	233
0830 - 0845	1	42	1	0	44	50	48	1	0	99	1	1	2	0	4	1	0	97	0	98	245
0845 - 0900	0	40	2	0	42	58	48	2	0	108	0	3	2	0	5	4	1	90	0	95	250
Hourly Total	1	163	11	1	176	189	160	5	0	354	4	7	7	0	18	6	3	373	0	382	930
Grand Total	2	365	20	1	388	429	335	8	0	772	10	19	13	0	42	16	5	914	0	935	2137
Approach %	0.52	94.07	5.15	0.26	-	55.57	43.39	1.04	0.00	-	23.81	45.24	30.95	0.00	-	1.71	0.53	97.75	0.00	-	
Intersection %	0.09	17.08	0.94	0.05	18.16	20.07	15.68	0.37	0.00	36.13	0.47	0.89	0.61	0.00	1.97	0.75	0.23	42.77	0.00	43.75	
PHF	0.25	0.84	0.56	0.00	0.84	0.83	0.71	0.38	0.00	0.80	0.50	0.60	0.50	0.00	0.55	0.83	0.50	0.84	0.00	0.84	0.85

1600 - 1800 (Weekday 2h Session) (04-25-2023)

All vehicles

TIME	Northbound						Southbound						Eastbound						Westbound						Int Total
	Vaughn Mill Rd						KY-864 Fegenbush Ln (North)						Norlynn Dr						KY-864 Fegenbush Ln (East)						
	Left 3.1	Thru 3.2	Right 3.3	U-Turn 3.4	App Total	Left 3.5	Thru 3.6	Right 3.7	U-Turn 3.8	App Total	Left 3.9	Thru 3.10	Right 3.11	U-Turn 3.12	App Total	Left 3.13	Thru 3.14	Right 3.15	U-Turn 3.16	App Total					
1600 - 1615	1	32	3	0	36	104	95	2	0	201	1	3	1	0	5	2	4	76	0	82	324				
1615 - 1630	0	31	5	0	36	126	94	4	0	224	2	4	2	0	8	2	2	63	0	67	335				
1630 - 1645	1	32	4	0	37	129	107	2	0	238	1	3	0	0	4	6	2	61	0	69	348				
1645 - 1700	1	31	6	0	38	109	110	1	0	220	1	0	2	0	3	5	2	80	0	87	348				
Hourly Total	3	126	18	0	147	468	406	9	0	883	5	10	5	0	20	15	10	280	0	305	1355				
1700 - 1715	2	21	5	0	28	114	117	1	0	232	3	1	3	0	7	6	4	64	0	74	341				
1715 - 1730	1	27	2	0	30	128	120	6	0	254	2	0	3	0	5	5	5	82	0	92	381				
1730 - 1745	2	29	5	0	36	117	123	5	0	245	1	1	1	0	3	5	2	95	0	102	386				
1745 - 1800	2	31	4	0	37	137	85	3	0	225	0	3	0	0	3	3	1	75	0	79	344				
Hourly Total	7	108	16	0	131	496	445	15	0	956	6	5	7	0	18	19	12	316	0	347	1452				
Grand Total	10	234	34	0	278	964	851	24	0	1839	11	15	12	0	38	34	22	596	0	652	2807				
Approach %	3.60	84.17	12.23	0.00	-	52.42	46.28	1.31	0.00	-	28.95	39.47	31.58	0.00	-	5.21	3.37	91.41	0.00	-					
Intersection %	0.36	8.34	1.21	0.00	9.90	34.34	30.32	0.86	0.00	65.51	0.39	0.53	0.43	0.00	1.35	1.21	0.78	21.23	0.00	23.23					
PHF	0.75	0.87	0.75	0.00	0.87	0.91	0.96	0.54	0.00	0.94	0.58	0.50	0.75	0.00	0.64	0.88	0.65	0.84	0.00	0.87	0.94				

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## TIS Simplified Traffic Forecast

Count Year	2023	Number of Counts	12
Opening Year	2024		
Design Year	2034	Growth Rate	-2.33%
Years Back	15		

**KYTC Traffic Count  
Station #1**

STA ID	C05
Paste Count Data Here	
2023	
2022	
2021	10947
2020	
2019	
2018	11862
2017	
2016	
2015	8906
2014	
2013	
2012	11669
2011	
2010	
2009	
2008	
2007	
2006	11500
2005	
2004	
2003	12900
2002	
2001	
2000	11100
1999	
1998	
1997	
1996	
1995	
1994	8560

**KYTC Traffic Count  
Station #2**

STA ID	C03
Paste Count Data Here	
2023	
2022	
2021	6314
2020	
2019	
2018	
2017	
2016	
2015	6071
2014	
2013	
2012	6476
2011	
2010	
2009	5810
2008	
2007	
2006	6400
2005	
2004	
2003	6930
2002	
2001	
2000	5680
1999	
1998	
1997	
1996	
1995	
1994	3510

**KYTC Traffic Count  
Station #3**

STA ID	504
Paste Count Data Here	
2023	
2022	
2021	
2020	1736
2019	
2018	
2017	3201
2016	
2015	
2014	2953
2013	
2012	
2011	3430
2010	
2009	
2008	3270
2007	
2006	
2005	3110
2004	
2003	
2002	
2001	3530
2000	
1999	
1998	
1997	
1996	
1995	2390
1994	

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## HCS Reports

### HCS Signalized Intersection Results Summary

General Information										Intersection Information											
Agency	Diane B. Zimmerman Traffic Engineering LLC							Duration, h	0.250												
Analyst	DBZ		Analysis Date		8/2/2023			Area Type	Other												
Jurisdiction			Time Period		AM Peak			PHF	0.87												
Urban Street	Outer Loop		Analysis Year		2023			Analysis Period	1> 7:15												
Intersection	Vaughn Mill Road		File Name		AM 23.xus																
Project Description	Wawa																				
Demand Information										EB			WB			NB			SB		
Approach Movement										L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h										108	256	36	29	254	14	53	215	103	13	112	113
Signal Information																					
Cycle, s	160.0	Reference Phase	2																		
Offset, s	0	Reference Point	End																		
Uncoordinated	No	Simult. Gap E/W	On	Green	5.6	2.4	94.9	37.1	0.0	0.0											
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.5	0.0	4.7	3.6	0.0	0.0											
				Red	3.0	0.0	2.3	3.0	0.0	0.0											
Timer Results										EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase										5	2	1	6		8		4				
Case Number										1.1	4.0	1.1	4.0		6.0		5.0				
Phase Duration, s										14.5	104.2	12.1	101.9		43.7		43.7				
Change Period, ( Y+R ), s										6.5	7.0	6.5	7.0		6.6		6.6				
Max Allow Headway ( MAH ), s										2.9	0.0	2.9	0.0		3.0		3.0				
Queue Clearance Time ( g s ), s										6.4		2.9			33.7		35.9				
Green Extension Time ( g e ), s										0.2	0.0	0.0	0.0		1.2		1.2				
Phase Call Probability										1.00		0.70			1.00		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										5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( v ), veh/h										124	336		27	251		61	366		15	129	130
Adjusted Saturation Flow Rate ( s ), veh/h/ln										1753	1801		1810	1824		1212	1781		1032	1870	1585
Queue Service Time ( g s ), s										4.4	14.4		0.9	7.7		7.0	31.7		2.3	9.1	10.3
Cycle Queue Clearance Time ( g e ), s										4.4	14.4		0.9	7.7		16.0	31.7		33.9	9.1	10.3
Green Ratio ( g/C )										0.64	0.61		0.63	0.59		0.23	0.23		0.23	0.23	0.28
Capacity ( c ), veh/h										736	1094		643	1081		258	413		81	434	447
Volume-to-Capacity Ratio ( X )										0.169	0.307		0.042	0.233		0.236	0.885		0.185	0.297	0.291
Back of Queue ( Q ), ft/ln ( 95 th percentile)										76.6	256.9		16.7	140.5		102.7	550.8		27.6	195.8	187
Back of Queue ( Q ), veh/ln ( 95 th percentile)										3.0	10.0		0.7	5.4		3.9	21.9		1.1	7.7	7.4
Queue Storage Ratio ( RQ ) ( 95 th percentile)										0.29	0.00		0.05	0.00		1.03	0.00		0.28	0.00	1.25
Uniform Delay ( d 1 ), s/veh										11.2	15.2		12.3	10.6		57.2	59.4		75.7	50.7	45.0
Incremental Delay ( d 2 ), s/veh										0.0	0.7		0.0	0.5		0.2	10.0		0.4	0.1	0.1
Initial Queue Delay ( d 3 ), s/veh										0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Control Delay ( d ), s/veh										11.3	15.9		12.3	11.1		57.4	69.4		76.1	50.8	45.1
Level of Service (LOS)										B	B		B	B		E	E		E	D	D
Approach Delay, s/veh / LOS										14.6		B	11.2		B	67.7		E	49.5		D
Intersection Delay, s/veh / LOS										36.3						D					
Multimodal Results										EB			WB			NB			SB		
Pedestrian LOS Score / LOS										1.90		B	2.09		B	1.95		B	1.95		B
Bicycle LOS Score / LOS										1.25		A	1.05		A	1.19		A	0.94		A

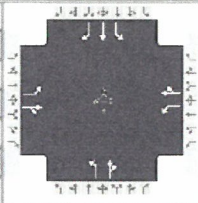
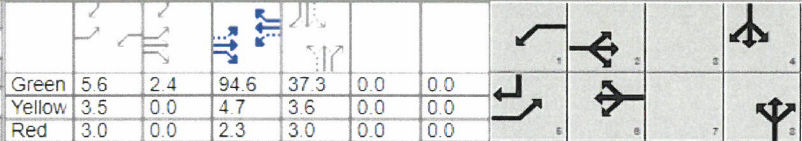


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Wawa Outer Loop  
Traffic Impact Study

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## HCS Signalized Intersection Results Summary

General Information					Intersection Information															
Agency	Diane B. Zimmerman Traffic Engineering LLC				Duration, h	0.250														
Analyst	DBZ	Analysis Date	8/2/2023		Area Type	Other														
Jurisdiction		Time Period	AM Peak		PHF	0.87														
Urban Street	Outer Loop	Analysis Year	2024 No Build		Analysis Period	1> 7.15														
Intersection	Vaughn Mill Road	File Name	AM 24 NB.xus																	
Project Description		Wawa																		
Demand Information					EB			WB			NB			SB						
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R				
Demand ( v ), veh/h					109	257	36	29	255	14	53	216	104	13	113	114				
Signal Information																				
Cycle, s	160.0	Reference Phase	2																	
Offset, s	0	Reference Point	End																	
Uncoordinated	No	Simult. Gap E/W	On																	
Force Mode	Fixed	Simult. Gap N/S	On																	
Green					5.6	2.4	94.6	37.3	0.0	0.0										
Yellow					3.5	0.0	4.7	3.6	0.0	0.0										
Red					3.0	0.0	2.3	3.0	0.0	0.0										
Timer Results					EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase					5		2		1		6				8				4	
Case Number					1.1		4.0		1.1		4.0				6.0				5.0	
Phase Duration, s					14.5		104.0		12.1		101.6				43.9				43.9	
Change Period, ( Y+R ), s					6.5		7.0		6.5		7.0				6.6				6.6	
Max Allow Headway ( MAH ), s					2.9		0.0		2.9		0.0				3.0				3.0	
Queue Clearance Time ( g s ), s					6.4				2.9						33.9				36.1	
Green Extension Time ( g e ), s					0.2		0.0		0.0		0.0				1.2				1.2	
Phase Call Probability					1.00				0.70						1.00				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					5	2	12	1	6	16	3	8	18	7	4	14				
Adjusted Flow Rate ( v ), veh/h					125	337		27	252		61	368		15	130	131				
Adjusted Saturation Flow Rate ( s ), veh/h/ln					1753	1801		1810	1824		1210	1781		1030	1870	1585				
Queue Service Time ( g s ), s					4.4	14.5		0.9	7.7		7.0	31.9		2.3	9.2	10.3				
Cycle Queue Clearance Time ( g c ), s					4.4	14.5		0.9	7.7		16.0	31.9		34.1	9.2	10.3				
Green Ratio ( g/C )					0.64	0.61		0.63	0.59		0.23	0.23		0.23	0.23	0.28				
Capacity ( c ), veh/h					733	1091		641	1078		259	416		81	436	449				
Volume-to-Capacity Ratio ( X )					0.171	0.309		0.042	0.234		0.235	0.885		0.185	0.298	0.292				
Back of Queue ( Q ), ft/ln ( 95 th percentile)					77.8	258.6		16.8	141.3		102.6	554.4		27.6	197	188.5				
Back of Queue ( Q ), veh/ln ( 95 th percentile)					3.0	10.0		0.7	5.5		3.9	22.0		1.1	7.8	7.4				
Queue Storage Ratio ( RQ ) ( 95 th percentile)					0.30	0.00		0.05	0.00		1.03	0.00		0.28	0.00	1.26				
Uniform Delay ( d 1 ), s/veh					11.3	15.3		12.4	10.6		57.1	59.3		75.7	50.5	44.8				
Incremental Delay ( d 2 ), s/veh					0.0	0.7		0.0	0.5		0.2	10.2		0.4	0.1	0.1				
Initial Queue Delay ( d 3 ), s/veh					0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0				
Control Delay ( d ' ), s/veh					11.4	16.0		12.4	11.1		57.3	69.5		76.1	50.7	45.0				
Level of Service ( LOS )					B	B		B	B		E	E		E	D	D				
Approach Delay, s/veh / LOS					14.8	B		11.2	B		67.7	E		49.3	D					
Intersection Delay, s/veh / LOS					36.4						D									
Multimodal Results					EB			WB			NB			SB						
Pedestrian LOS Score / LOS					1.90	B		2.09	B		1.95	B		1.95	B					
Bicycle LOS Score / LOS					1.25	A		1.05	A		1.20	A		0.94	A					



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## HCS Signalized Intersection Results Summary

General Information						Intersection Information									
Agency	Diane B. Zimmerman Traffic Engineering LLC					Duration, h	0.250								
Analyst	DBZ		Analysis Date	8/2/2023		Area Type	Other								
Jurisdiction			Time Period	AM Peak		PHF	0.87								
Urban Street	Outer Loop		Analysis Year	2024 Build		Analysis Period	1> 7:15								
Intersection	Vaughn Mill Road		File Name	AM 24 B.xus											
Project Description	Wawa														
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h				109	278	36	90	210	14	119	228	104	13	125	114
Signal Information															
Cycle, s	160.0	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	No	Simult. Gap E/W	On	Green	7.8	0.2	93.3	38.6	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.5	0.0	4.7	3.6	0.0	0.0					
				Red	3.0	0.0	2.3	3.0	0.0	0.0					
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase				5	2	1	6		8		4				
Case Number				1.1	4.0	1.1	4.0		6.0		5.0				
Phase Duration, s				14.5	100.5	14.3	100.3		45.2		45.2				
Change Period, ( Y+R ), s				6.5	7.0	6.5	7.0		6.6		6.6				
Max Allow Headway ( MAH ), s				2.9	0.0	2.9	0.0		3.1		3.1				
Queue Clearance Time ( g_s ), s				6.5		4.9			35.0		37.2				
Green Extension Time ( g_e ), s				0.2	0.0	0.1	0.0		1.4		1.4				
Phase Call Probability				1.00		0.98			1.00		1.00				
Max Out Probability				0.00		0.00			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				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( v ), veh/h				125	361		85	212		137	382		15	144	131
Adjusted Saturation Flow Rate ( s ), veh/h/ln				1753	1804		1810	1820		1195	1785		1017	1870	1585
Queue Service Time ( g_s ), s				4.5	16.6		2.9	7.1		17.0	33.0		2.3	10.1	10.2
Cycle Queue Clearance Time ( g_c ), s				4.5	16.6		2.9	7.1		27.0	33.0		35.2	10.1	10.2
Green Ratio ( g/C )				0.63	0.58		0.63	0.58		0.24	0.24		0.24	0.24	0.29
Capacity ( c ), veh/h				752	1054		617	1062		259	431		81	451	462
Volume-to-Capacity Ratio ( X )				0.167	0.343		0.138	0.199		0.529	0.886		0.183	0.318	0.284
Back of Queue ( Q ), ft/ln ( 95 th percentile)				80.1	292.4		54.1	134.2		236	573.4		27.5	212.5	186.1
Back of Queue ( Q ), veh/ln ( 95 th percentile)				3.1	11.3		2.2	5.2		8.9	22.8		1.1	8.4	7.3
Queue Storage Ratio ( RQ ) ( 95 th percentile)				0.31	0.00		0.15	0.00		2.36	0.00		0.28	0.00	1.24
Uniform Delay ( d_1 ), s/veh				11.8	17.3		13.2	12.2		60.9	58.6		75.5	49.9	43.8
Incremental Delay ( d_2 ), s/veh				0.0	0.9		0.0	0.4		0.6	11.0		0.4	0.1	0.1
Initial Queue Delay ( d_3 ), s/veh				0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Control Delay ( d ), s/veh				11.8	18.2		13.2	12.6		61.5	69.5		75.9	50.0	43.9
Level of Service ( LOS )				B	B		B	B		E	E		E	D	D
Approach Delay, s/veh / LOS				16.5		B	12.8		B	67.4		E	48.6		D
Intersection Delay, s/veh / LOS				38.3					D						
Multimodal Results				EB			WB			NB			SB		
Pedestrian LOS Score / LOS				1.90		B	2.09		B	1.95		B	1.95		B
Bicycle LOS Score / LOS				1.29		A	1.08		A	1.34		A	0.97		A



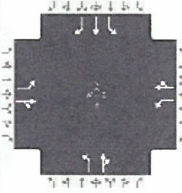
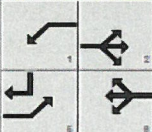
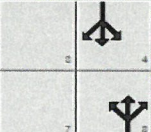
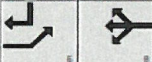
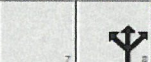
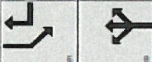
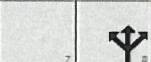
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## HCS Signalized Intersection Results Summary

General Information				Intersection Information															
Agency	Diane B. Zimmerman Traffic Engineering LLC					Duration, h	0.250												
Analyst	DBZ	Analysis Date	8/2/2023		Area Type	Other													
Jurisdiction		Time Period	AM Peak		PHF	0.87													
Urban Street	Outer Loop	Analysis Year	2034 No Build		Analysis Period	1> 7.15													
Intersection	Vaughn Mill Road	File Name	AM 34 NB.xus																
Project Description		Wawa																	
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand ( v ), veh/h				115	270	38	30	268	15	56	227	109	14	119	120				
Signal Information																			
Cycle, s	160.0	Reference Phase	2																
Offset, s	0	Reference Point	End																
Uncoordinated	No	Simult. Gap E/W	On	Green	5.7	2.3	92.9	39.1	0.0	0.0									
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.5	0.0	4.7	3.6	0.0	0.0									
				Red	3.0	0.0	2.3	3.0	0.0	0.0									
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase				5		2		1		6				8				4	
Case Number				1.1		4.0		1.1		4.0				6.0				5.0	
Phase Duration, s				14.5		102.1		12.2		99.9				45.7				45.7	
Change Period, ( Y+R ), s				6.5		7.0		6.5		7.0				6.6				6.6	
Max Allow Headway ( MAH ), s				2.9		0.0		2.9		0.0				3.0				3.0	
Queue Clearance Time ( g_s ), s				6.8				3.0						35.5				37.8	
Green Extension Time ( g_e ), s				0.2		0.0		0.0		0.0				1.2				1.2	
Phase Call Probability				1.00				0.71						1.00				1.00	
Max Out Probability				0.00				0.00						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				5	2	12	1	6	16	3	8	18	7	4	14				
Adjusted Flow Rate ( v ), veh/h				132	354		28	266		64	386		16	137	138				
Adjusted Saturation Flow Rate ( s ), veh/h/ln				1753	1801		1810	1823		1203	1781		1013	1870	1585				
Queue Service Time ( g_s ), s				4.8	15.9		1.0	9.4		7.4	33.5		2.5	9.5	10.8				
Cycle Queue Clearance Time ( g_c ), s				4.8	15.9		1.0	9.4		16.8	33.5		35.8	9.5	10.8				
Green Ratio ( g/C )				0.63	0.59		0.62	0.58		0.24	0.24		0.24	0.24	0.29				
Capacity ( c ), veh/h				702	1070		612	1058		268	435		81	457	466				
Volume-to-Capacity Ratio ( X )				0.188	0.331		0.046	0.252		0.240	0.888		0.198	0.299	0.296				
Back of Queue ( Q ), ft/ln ( 95 th percentile)				85.7	280		18.1	176.5		107.6	580.8		29.7	203.2	195				
Back of Queue ( Q ), veh/ln ( 95 th percentile)				3.3	10.9		0.7	6.8		4.1	23.0		1.2	8.0	7.7				
Queue Storage Ratio ( RQ ) ( 95 th percentile)				0.33	0.00		0.05	0.00		1.08	0.00		0.30	0.00	1.30				
Uniform Delay ( d_1 ), s/veh				12.2	16.4		13.2	12.9		56.1	58.3		75.5	49.3	43.7				
Incremental Delay ( d_2 ), s/veh				0.0	0.8		0.0	0.6		0.2	11.4		0.4	0.1	0.1				
Initial Queue Delay ( d_3 ), s/veh				0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0				
Control Delay ( d ), s/veh				12.2	17.2		13.3	13.4		56.3	69.7		76.0	49.4	43.8				
Level of Service (LOS)				B	B		B	B		E	E		E	D	D				
Approach Delay, s/veh / LOS				15.9	B		13.4	B		67.8	E		48.2	D					
Intersection Delay, s/veh / LOS				36.9						D									
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score /LOS				1.90	B		2.09	B		1.95	B		1.95	B					
Bicycle LOS Score /LOS				1.29	A		1.08	A		1.23	A		0.97	A					



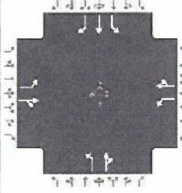
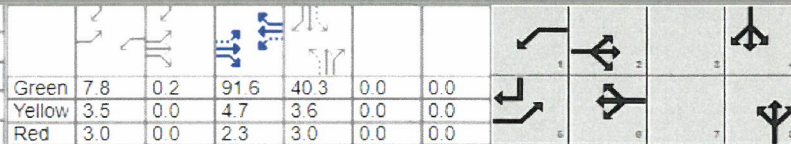
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## HCS Signalized Intersection Results Summary

General Information						Intersection Information													
Agency	Diane B. Zimmerman Traffic Engineering LLC					Duration, h	0.250												
Analyst	DBZ	Analysis Date	8/2/2023			Area Type	Other												
Jurisdiction		Time Period	AM Peak			PHF	0.87												
Urban Street	Outer Loop	Analysis Year	2034 Build			Analysis Period	1> 7:15												
Intersection	Vaughn Mill Road		File Name	AM 34 B.xus															
Project Description		Wawa																	
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand ( v ), veh/h				115	291	38	91	223	15	122	239	109	14	131	120				
Signal Information																			
Cycle, s	160.0	Reference Phase	2																
Offset, s	0	Reference Point	End																
Uncoordinated	No	Simult. Gap E/W	On																
Force Mode	Fixed	Simult. Gap N/S	On																
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase				5		2		1		6		8						4	
Case Number				1.1		4.0		1.1		4.0		6.0						5.0	
Phase Duration, s				14.5		98.7		14.3		98.6		46.9						46.9	
Change Period, ( Y+R ), s				6.5		7.0		6.5		7.0		6.6						6.6	
Max Allow Headway ( MAH ), s				2.9		0.0		2.9		0.0		3.1						3.1	
Queue Clearance Time ( g_s ), s				6.9				5.0				36.6						38.9	
Green Extension Time ( g_e ), s				0.2		0.0		0.1		0.0		1.4						1.4	
Phase Call Probability				1.00				0.98				1.00						1.00	
Max Out Probability				0.00				0.00				0.01						0.03	
Movement Group Results				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14				
Adjusted Flow Rate ( v ), veh/h				132	378		86	226		140	400		16	151	138				
Adjusted Saturation Flow Rate ( s ), veh/h/ln				1753	1803		1810	1820		1188	1785		1000	1870	1585				
Queue Service Time ( g_s ), s				4.9	18.1		3.0	8.2		17.4	34.6		2.5	10.5	10.6				
Cycle Queue Clearance Time ( g_c ), s				4.9	18.1		3.0	8.2		27.8	34.6		36.9	10.5	10.6				
Green Ratio ( g/C )				0.62	0.57		0.62	0.57		0.25	0.25		0.25	0.25	0.30				
Capacity ( c ), veh/h				721	1034		589	1041		268	450		82	472	479				
Volume-to-Capacity Ratio ( X )				0.183	0.366		0.146	0.217		0.524	0.888		0.196	0.319	0.288				
Back of Queue ( Q ), ft/ln ( 95 th percentile)				88.1	314.8		57.1	155.7		239.4	600		29.6	218.4	193.1				
Back of Queue ( Q ), veh/ln ( 95 th percentile)				3.4	12.2		2.3	6.0		9.1	23.8		1.2	8.6	7.6				
Queue Storage Ratio ( RQ ) ( 95 th percentile)				0.34	0.00		0.16	0.00		2.39	0.00		0.30	0.00	1.29				
Uniform Delay ( d_1 ), s/veh				12.6	18.4		14.1	13.6		59.9	57.6		75.4	48.6	42.7				
Incremental Delay ( d_2 ), s/veh				0.0	1.0		0.0	0.5		0.6	12.0		0.4	0.1	0.1				
Initial Queue Delay ( d_3 ), s/veh				0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0				
Control Delay ( d ), s/veh				12.7	19.4		14.2	14.1		60.5	69.7		75.8	48.8	42.8				
Level of Service ( LOS )				B	B		B	B		E	E		E	D	D				
Approach Delay, s/veh / LOS				17.7		B	14.1		B	67.3		E	47.5		D				
Intersection Delay, s/veh / LOS				38.5						D									
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				1.90		B	2.10		B	1.95		B	1.95		B				
Bicycle LOS Score / LOS				1.33		A	1.11		A	1.38		A	0.99		A				

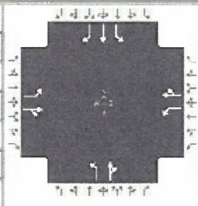



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## HCS Signalized Intersection Results Summary

General Information					Intersection Information											
Agency	Diane B. Zimmerman Traffic Engineering LLC				Duration, h	0.250										
Analyst	DBZ	Analysis Date	8/2/2023		Area Type	Other										
Jurisdiction		Time Period	PM Peak		PHF	0.97										
Urban Street	Outer Loop	Analysis Year	2023		Analysis Period	1> 4:45										
Intersection	Vaughn Mill Road	File Name	PM 23.xus													
Project Description	Wawa															
Demand Information					EB			WB			NB			SB		
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h					135	532	71	102	344	43	37	101	108	65	375	149
Signal Information																
Cycle, s	160.0	Reference Phase	2													
Offset, s	0	Reference Point	End													
Uncoordinated	No	Simult. Gap E/W	On													
Force Mode	Fixed	Simult. Gap N/S	On													
Timer Results					EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase					5	2	1	6		8		4				
Case Number					1.1	4.0	1.1	4.0		6.0		5.0				
Phase Duration, s					14.5	98.9	14.4	98.9		46.6		46.6				
Change Period, ( Y+R ), s					6.5	7.0	6.5	7.0		6.6		6.6				
Max Allow Headway ( MAH ), s					2.9	0.0	2.9	0.0		3.0		3.0				
Queue Clearance Time ( g_s ), s					7.0		5.6			39.0		33.0				
Green Extension Time ( g_e ), s					0.2	0.0	0.1	0.0		1.1		1.4				
Phase Call Probability					1.00		0.99			1.00		1.00				
Max Out Probability					0.00		0.00			0.25		0.02				
Movement Group Results					EB			WB			NB			SB		
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement					5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( v ), veh/h					139	622		103	391		38	215		67	387	154
Adjusted Saturation Flow Rate ( s ), veh/h/ln					1795	1846		1795	1834		989	1684		1184	1885	1585
Queue Service Time ( g_s ), s					5.0	34.5		3.6	14.9		6.1	17.6		8.3	31.0	12.0
Cycle Queue Clearance Time ( g_c ), s					5.0	34.5		3.6	14.9		37.0	17.6		25.9	31.0	12.0
Green Ratio ( g/C )					0.62	0.57		0.62	0.57		0.25	0.25		0.25	0.25	0.30
Capacity ( c ), veh/h					617	1062		414	1054		101	421		211	471	475
Volume-to-Capacity Ratio ( X )					0.226	0.586		0.249	0.371		0.378	0.512		0.318	0.821	0.323
Back of Queue ( Q ), ft/ln ( 95 th percentile)					90.1	540		68.9	245.7		72.1	309.8		113.1	560.1	212.6
Back of Queue ( Q ), veh/ln ( 95 th percentile)					3.6	21.4		2.7	9.7		2.8	12.0		4.5	22.2	8.4
Queue Storage Ratio ( RQ ) ( 95 th percentile)					0.35	0.00		0.19	0.00		0.72	0.00		1.13	0.00	1.42
Uniform Delay ( d_1 ), s/veh					13.0	21.8		17.6	13.6		74.1	51.6		62.7	56.6	43.4
Incremental Delay ( d_2 ), s/veh					0.1	2.4		0.1	1.0		0.9	0.4		0.3	7.8	0.1
Initial Queue Delay ( d_3 ), s/veh					0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Control Delay ( d ), s/veh					13.1	24.2		17.7	14.6		75.0	52.0		63.1	64.4	43.6
Level of Service ( LOS )					B	C		B	B		E	D		E	E	D
Approach Delay, s/veh / LOS					22.1		C	15.2		B	55.4		E	59.0		E
Intersection Delay, s/veh / LOS					35.1						D					
Multimodal Results					EB			WB			NB			SB		
Pedestrian LOS Score / LOS					1.90		B	2.10		B	1.95		B	1.95		B
Bicycle LOS Score / LOS					1.74		B	1.32		A	0.91		A	1.49		A



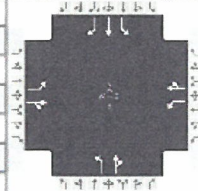
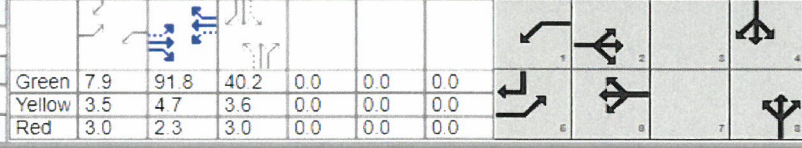
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## HCS Signalized Intersection Results Summary

General Information				Intersection Information																	
Agency	Diane B. Zimmerman Traffic Engineering LLC					Duration, h	0.250														
Analyst	DBZ		Analysis Date	8/2/2023		Area Type	Other														
Jurisdiction			Time Period	PM Peak		PHF	0.97														
Urban Street	Outer Loop		Analysis Year	2024 No Build		Analysis Period	1> 4.45														
Intersection	Vaughn Mill Road		File Name	PM 24 NB.xus																	
Project Description				Wawa																	
Demand Information				EB			WB			NB			SB								
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R						
Demand ( v ), veh/h				136	535	71	103	346	43	37	102	109	65	377	150						
Signal Information																					
Cycle, s	160.0	Reference Phase	2																		
Offset, s	0	Reference Point	End																		
Uncoordinated	No	Simult. Gap E/W	On																		
Force Mode	Fixed	Simult. Gap N/S	On																		
				Green	7.9	91.8	40.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
				Yellow	3.5	4.7	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
				Red	3.0	2.3	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT			
Assigned Phase				5		2		1		6		8						4			
Case Number				1.1		4.0		1.1		4.0		6.0						5.0			
Phase Duration, s				14.5		98.8		14.4		98.7		46.8						46.8			
Change Period, ( Y+R ), s				6.5		7.0		6.5		7.0		6.6						6.6			
Max Allow Headway ( MAH ), s				2.9		0.0		2.9		0.0		3.0						3.0			
Queue Clearance Time ( g_s ), s				7.1				5.7				39.2						33.1			
Green Extension Time ( g_e ), s				0.2		0.0		0.1		0.0		1.1						1.4			
Phase Call Probability				1.00				0.99				1.00						1.00			
Max Out Probability				0.00				0.00				0.27						0.02			
Movement Group Results				EB			WB			NB			SB								
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R						
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14						
Adjusted Flow Rate ( v ), veh/h				140	625		104	392		38	218		67	389	155						
Adjusted Saturation Flow Rate ( s ), veh/h/ln				1795	1846		1795	1834		987	1684		1182	1885	1585						
Queue Service Time ( g_s ), s				5.1	34.9		3.7	15.0		6.1	17.8		8.3	31.1	12.1						
Cycle Queue Clearance Time ( g_c ), s				5.1	34.9		3.7	15.0		37.2	17.8		26.0	31.1	12.1						
Green Ratio ( g/C )				0.62	0.57		0.62	0.57		0.25	0.25		0.25	0.25	0.30						
Capacity ( c ), veh/h				615	1060		411	1052		101	423		210	473	477						
Volume-to-Capacity Ratio ( X )				0.228	0.590		0.253	0.373		0.379	0.515		0.319	0.822	0.324						
Back of Queue ( Q ), ft/ln ( 95 th percentile)				91.3	545.2		69.7	246.7		72.1	312.2		113.2	563.1	213.4						
Back of Queue ( Q ), veh/ln ( 95 th percentile)				3.6	21.6		2.8	9.7		2.8	12.1		4.5	22.3	8.4						
Queue Storage Ratio ( RQ ) ( 95 th percentile)				0.35	0.00		0.19	0.00		0.72	0.00		1.13	0.00	1.42						
Uniform Delay ( d_1 ), s/veh				13.1	21.9		17.8	13.6		74.1	51.5		62.7	56.5	43.3						
Incremental Delay ( d_2 ), s/veh				0.1	2.4		0.1	1.0		0.9	0.4		0.3	7.9	0.1						
Initial Queue Delay ( d_3 ), s/veh				0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0						
Control Delay ( d ), s/veh				13.2	24.4		17.9	14.6		75.0	51.9		63.1	64.5	43.5						
Level of Service ( LOS )				B	C		B	B		E	D		E	E	D						
Approach Delay, s/veh / LOS				22.3	C		15.3	B		55.3	E		59.0	E							
Intersection Delay, s/veh / LOS				35.2						D											
Multimodal Results				EB			WB			NB			SB								
Pedestrian LOS Score / LOS				1.90	B		2.10	B		1.95	B		1.95	B							
Bicycle LOS Score / LOS				1.75	B		1.32	A		0.91	A		1.49	A							



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HCS Signalized Intersection Results Summary													SERVICES		
General Information							Intersection Information								
Agency		Diane B. Zimmerman Traffic Engineering LLC					Duration, h		0.250						
Analyst		DBZ		Analysis Date		8/2/2023		Area Type		Other					
Jurisdiction				Time Period		PM Peak		PHF		0.97					
Urban Street		Outer Loop		Analysis Year		2024 Build		Analysis Period		1> 4:45					
Intersection		Vaughn Mill Road		File Name		PM 24 B.xus									
Project Description		Wawa													
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h				136	553	71	157	306	43	95	113	109	65	388	150
Signal Information															
Cycle, s	160.0	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	No	Simult. Gap E/W	On												
Force Mode	Fixed	Simult. Gap N/S	On												
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase				5	2	1	6		8		4				
Case Number				1.1	4.0	1.1	4.0		6.0		5.0				
Phase Duration, s				14.5	93.2	14.8	93.5		52.0		52.0				
Change Period, ( Y+R ), s				6.5	7.0	6.5	7.0		6.6		6.6				
Max Allow Headway ( MAH ), s				2.9	0.0	2.9	0.0		3.1		3.1				
Queue Clearance Time ( g s ), s				7.6		8.1			47.4		32.9				
Green Extension Time ( g e ), s				0.2	0.0	0.2	0.0		0.0		1.7				
Phase Call Probability				1.00		1.00			1.00		1.00				
Max Out Probability				0.00		0.00			1.00		0.03				
Movement Group Results				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( v ), veh/h				140	643		158	352		98	229		67	400	155
Adjusted Saturation Flow Rate ( s ), veh/h/ln				1795	1847		1795	1830		977	1691		1170	1885	1585
Queue Service Time ( g s ), s				5.6	39.4		6.1	14.9		14.4	17.9		8.1	30.9	11.5
Cycle Queue Clearance Time ( g c ), s				5.6	39.4		6.1	14.9		45.4	17.9		26.1	30.9	11.5
Green Ratio ( g/C )				0.59	0.54		0.59	0.54		0.28	0.28		0.28	0.28	0.33
Capacity ( c ), veh/h				586	996		370	990		133	480		245	535	529
Volume-to-Capacity Ratio ( X )				0.239	0.646		0.428	0.356		0.735	0.477		0.273	0.748	0.292
Back of Queue ( Q ), ft/ln ( 95 th percentile)				101.8	617		123	252.9		210.3	314.1		108.6	548.7	204.7
Back of Queue ( Q ), veh/ln ( 95 th percentile)				4.0	24.5		4.9	10.0		8.2	12.2		4.3	21.8	8.1
Queue Storage Ratio ( RQ ) ( 95 th percentile)				0.39	0.00		0.34	0.00		2.10	0.00		1.09	0.00	1.36
Uniform Delay ( d r ), s/veh				15.6	26.1		21.9	16.6		73.5	47.5		58.3	52.1	39.4
Incremental Delay ( d 2 ), s/veh				0.1	3.2		0.3	1.0		16.8	0.3		0.2	5.1	0.1
Initial Queue Delay ( d 3 ), s/veh				0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Control Delay ( d ), s/veh				15.7	29.3		22.1	17.6		90.3	47.7		58.5	57.2	39.5
Level of Service ( LOS )				B	C		C	B		F	D		E	E	D
Approach Delay, s/veh / LOS				26.9		C	19.0		B	60.5		E	53.0		D
Intersection Delay, s/veh / LOS				37.2					D						
Multimodal Results				EB			WB			NB			SB		
Pedestrian LOS Score / LOS				1.91		B	2.10		B	1.95		B	1.95		B
Bicycle LOS Score / LOS				1.78		B	1.35		A	1.03		A	1.51		B

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HCS Signalized Intersection Results Summary													SERVICES			
General Information							Intersection Information									
Agency		Diane B. Zimmerman Traffic Engineering LLC					Duration, h		0.250							
Analyst		DBZ		Analysis Date		8/2/2023		Area Type		Other						
Jurisdiction				Time Period		PM Peak		PHF		0.97						
Urban Street		Outer Loop		Analysis Year		2034 No Build		Analysis Period		1> 4.45						
Intersection		Vaughn Mill Road		File Name		PM 34 NB.xus										
Project Description		Wawa														
Demand Information				EB			WB			NB			SB			
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R	
Demand ( v ), veh/h				143	562	75	108	364	45	39	107	115	68	396	158	
Signal Information																
Cycle, s		160.0	Reference Phase													2
Offset, s		0	Reference Point													End
Uncoordinated		No	Simult. Gap E/W													On
Force Mode		Fixed	Simult. Gap N/S													On
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT					
Assigned Phase				5	2	1	6		8		4					
Case Number				1.1	4.0	1.1	4.0		6.0		5.0					
Phase Duration, s				14.5	97.0	14.4	96.9		48.6		48.6					
Change Period, ( Y+R ), s				6.5	7.0	6.5	7.0		6.6		6.6					
Max Allow Headway ( MAH ), s				2.9	0.0	2.9	0.0		3.0		3.0					
Queue Clearance Time ( g s ), s				7.5		6.0			41.1		34.6					
Green Extension Time ( g e ), s				0.2	0.0	0.1	0.0		0.9		1.5					
Phase Call Probability				1.00		0.99			1.00		1.00					
Max Out Probability				0.00		0.00			0.61		0.05					
Movement Group Results				EB			WB			NB			SB			
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R	
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14	
Adjusted Flow Rate ( v ), veh/h				147	657		109	413		40	229		70	408	163	
Adjusted Saturation Flow Rate ( s ), veh/h/ln				1795	1846		1795	1834		970	1684		1170	1885	1585	
Queue Service Time ( g s ), s				5.5	38.6		4.0	16.4		6.5	18.6		8.7	32.6	12.6	
Cycle Queue Clearance Time ( g c ), s				5.5	38.6		4.0	16.4		39.1	18.6		27.2	32.6	12.6	
Green Ratio ( g/C )				0.61	0.56		0.61	0.56		0.26	0.26		0.26	0.26	0.31	
Capacity ( c ), veh/h				585	1039		376	1032		101	441		216	494	494	
Volume-to-Capacity Ratio ( X )				0.252	0.632		0.291	0.401		0.396	0.519		0.325	0.827	0.329	
Back of Queue ( Q ), ft/ln ( 95 th percentile)				100.2	599.5		76.5	263.7		76.1	323		117.8	589	220.3	
Back of Queue ( Q ), veh/ln ( 95 th percentile)				4.0	23.8		3.0	10.4		3.0	12.5		4.7	23.4	8.7	
Queue Storage Ratio ( RQ ) ( 95 th percentile)				0.39	0.00		0.21	0.00		0.76	0.00		1.18	0.00	1.47	
Uniform Delay ( d 1 ), s/veh				14.1	23.7		19.8	14.4		74.0	50.4		62.0	55.6	42.2	
Incremental Delay ( d 2 ), s/veh				0.1	2.9		0.2	1.1		0.9	0.4		0.3	8.8	0.1	
Initial Queue Delay ( d 3 ), s/veh				0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0	
Control Delay ( d ), s/veh				14.2	26.7		20.0	15.5		75.0	50.8		62.4	64.4	42.4	
Level of Service ( LOS )				B	C		B	B		E	D		E	E	D	
Approach Delay, s/veh / LOS				24.4		C	16.4		B	54.4		D	58.6		E	
Intersection Delay, s/veh / LOS				35.9					D							
Multimodal Results				EB			WB			NB			SB			
Pedestrian LOS Score / LOS				1.91		B	2.10		B	1.95		B	1.95		B	
Bicycle LOS Score / LOS				1.81		B	1.37		A	0.93		A	1.55		B	

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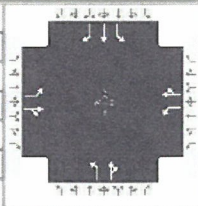
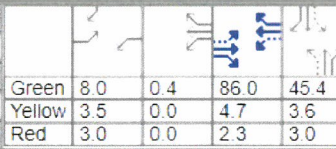
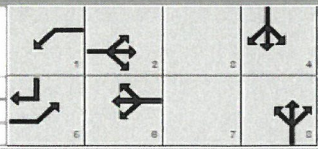
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## HCS Signalized Intersection Results Summary

General Information						Intersection Information									
Agency	Diane B. Zimmerman Traffic Engineering LLC					Duration, h	0.250								
Analyst	DBZ		Analysis Date		8/2/2023	Area Type	Other								
Jurisdiction			Time Period		PM Peak	PHF	0.97								
Urban Street	Outer Loop		Analysis Year		2034 Build	Analysis Period	1> 4.45								
Intersection	Vaughn Mill Road		File Name		PM 34 B.xus										
Project Description	Wawa														
Demand Information				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h				143	580	75	162	324	45	97	118	115	68	407	158
Signal Information															
Cycle, s	160.0	Reference Phase	2	Green	8.0	0.4	86.0	45.4	0.0	0.0					
Offset, s	0	Reference Point	End	Yellow	3.5	0.0	4.7	3.6	0.0	0.0					
Uncoordinated	No	Simult. Gap E/W	On	Red	3.0	0.0	2.3	3.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On												
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase				5	2	1	6		8		4				
Case Number				1.1	4.0	1.1	4.0		6.0		5.0				
Phase Duration, s				14.5	93.0	15.0	93.5		52.0		52.0				
Change Period, ( Y+R ), s				6.5	7.0	6.5	7.0		6.6		6.6				
Max Allow Headway ( MAH ), s				2.9	0.0	2.9	0.0		3.1		3.1				
Queue Clearance Time ( g_s ), s				7.9		8.3			47.4		34.8				
Green Extension Time ( g_e ), s				0.2	0.0	0.2	0.0		0.0		1.7				
Phase Call Probability				1.00		1.00			1.00		1.00				
Max Out Probability				0.00		0.00			1.00		0.07				
Movement Group Results				EB			WB			NB			SB		
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( v ), veh/h				147	675		164	373		100	240		70	420	163
Adjusted Saturation Flow Rate ( s ), veh/h/ln				1795	1847		1795	1830		959	1691		1158	1885	1585
Queue Service Time ( g_s ), s				5.9	42.6		6.3	16.3		12.5	19.0		8.6	32.8	12.2
Cycle Queue Clearance Time ( g_c ), s				5.9	42.6		6.3	16.3		45.4	19.0		27.7	32.8	12.2
Green Ratio ( g/C )				0.59	0.54		0.59	0.54		0.28	0.28		0.28	0.28	0.33
Capacity ( c ), veh/h				571	993		350	989		120	480		236	535	529
Volume-to-Capacity Ratio ( X )				0.258	0.680		0.469	0.377		0.833	0.501		0.297	0.785	0.308
Back of Queue ( Q ), ft/ln ( 95 th percentile)				107.8	662.5		128.3	271.9		232.7	329		114.9	584.8	214.1
Back of Queue ( Q ), veh/ln ( 95 th percentile)				4.3	26.3		5.1	10.7		9.1	12.8		4.6	23.2	8.4
Queue Storage Ratio ( RQ ) ( 95 th percentile)				0.41	0.00		0.36	0.00		2.33	0.00		1.15	0.00	1.43
Uniform Delay ( d_1 ), s/veh				15.9	27.0		23.2	17.2		75.3	47.8		59.4	52.8	39.6
Incremental Delay ( d_2 ), s/veh				0.1	3.8		0.3	1.0		35.3	0.3		0.3	6.9	0.1
Initial Queue Delay ( d_3 ), s/veh				0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Control Delay ( d ), s/veh				16.0	30.7		23.5	18.2		110.6	48.2		59.7	59.7	39.7
Level of Service ( LOS )				B	C		C	B		F	D		E	E	D
Approach Delay, s/veh / LOS				28.1		C	19.8		B	66.5		E	54.7		D
Intersection Delay, s/veh / LOS				39.1						D					
Multimodal Results				EB			WB			NB			SB		
Pedestrian LOS Score / LOS				1.91		B	2.10		B	1.95		B	1.95		B
Bicycle LOS Score / LOS				1.85		B	1.39		A	1.05		A	1.56		B



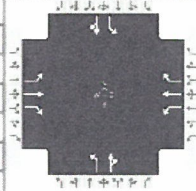
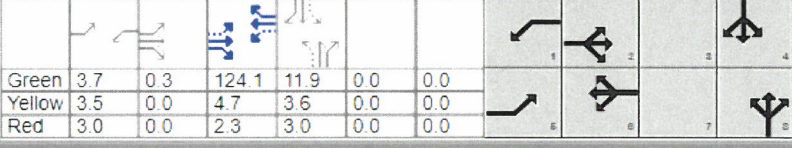
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## HCS Signalized Intersection Results Summary

General Information						Intersection Information																							
Agency	Diane B. Zimmerman Traffic Engineering LLC					Duration, h	0.250																						
Analyst	DBZ		Analysis Date	8/2/2023		Area Type	Other																						
Jurisdiction			Time Period	AM Peak		PHF	0.93																						
Urban Street	Outer Loop		Analysis Year	2023		Analysis Period	1> 7:15																						
Intersection	Apple Valley Dr		File Name	AM 23.xus																									
Project Description	Wawa																												
Demand Information						EB			WB			NB			SB														
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R												
Demand ( v ), veh/h						13	341	7	13	233	7	16	4	53	9	2	10												
Signal Information																													
Cycle, s	160.0	Reference Phase	2																										
Offset, s	0	Reference Point	End																										
Uncoordinated	No	Simult. Gap E/W	On																										
Force Mode	Fixed	Simult. Gap N/S	On																										
Timer Results						EBL			EBT			WBL			WBT			NBL			NBT			SBL			SBT		
Assigned Phase						5			2			1			6						8						4		
Case Number						1.1			3.0			1.1			3.0						6.0						6.0		
Phase Duration, s						10.5			131.3			10.2			131.1						18.5						18.5		
Change Period, ( Y+R ), s						6.5			7.0			6.5			7.0						6.6						6.6		
Max Allow Headway ( MAH ), s						2.9			0.0			2.9			0.0						3.1						3.1		
Queue Clearance Time ( g_s ), s						2.3						2.3									8.0						9.3		
Green Extension Time ( g_e ), s						0.0			0.0			0.0			0.0						0.2						0.2		
Phase Call Probability						0.50						0.46									0.99						0.99		
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						5	2	12	1	6	16	3	8	18	7	4	14												
Adjusted Flow Rate ( v ), veh/h						15	404	8	14	251	8	17	61		10	13													
Adjusted Saturation Flow Rate ( s ), veh/h/in						1485	1856	1610	1810	1841	1610	1423	1577		1129	1330													
Queue Service Time ( g_s ), s						0.3	8.4	0.2	0.3	5.7	0.2	1.8	6.0		1.3	1.5													
Cycle Queue Clearance Time ( g_c ), s						0.3	8.4	0.2	0.3	5.7	0.2	3.3	6.0		7.3	1.5													
Green Ratio ( g/C )						0.80	0.78	0.78	0.80	0.78	0.78	0.07	0.07		0.07	0.07													
Capacity ( c ), veh/h						778	1442	1251	797	1427	1249	138	117		87	99													
Volume-to-Capacity Ratio ( X )						0.020	0.280	0.007	0.018	0.176	0.006	0.125	0.524		0.112	0.131													
Back of Queue ( Q ), ft/in ( 95 th percentile)						4.4	127.9	3.2	3.4	91.6	2.3	30	113.4		20.5	26.8													
Back of Queue ( Q ), veh/in ( 95 th percentile)						0.1	5.0	0.1	0.1	3.5	0.1	1.2	4.4		0.7	0.9													
Queue Storage Ratio ( RQ ) ( 95 th percentile)						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00													
Uniform Delay ( d_1 ), s/veh						3.3	4.1	5.1	3.6	4.7	4.1	70.8	71.3		74.9	69.2													
Incremental Delay ( d_2 ), s/veh						0.0	0.4	0.0	0.0	0.3	0.0	0.1	1.4		0.2	0.2													
Initial Queue Delay ( d_3 ), s/veh						0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0													
Control Delay ( d ), s/veh						3.3	4.5	5.1	3.6	4.9	4.1	70.9	72.7		75.1	69.5													
Level of Service (LOS)						A	A	A	A	A	A	E	E		E	E													
Approach Delay, s/veh / LOS						4.5		A	4.8		A	72.3		E	71.9		E												
Intersection Delay, s/veh / LOS						13.2						B																	
Multimodal Results						EB			WB			NB			SB														
Pedestrian LOS Score / LOS						1.85		B	1.85		B	2.16		B	2.16		B												
Bicycle LOS Score / LOS						1.13		A	0.94		A	0.62		A	0.52		A												

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Diane B. Zimmerman  
Traffic Engineering, LLC

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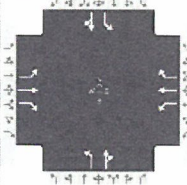
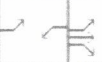

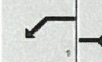
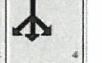
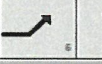



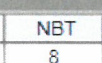
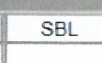
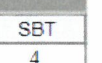
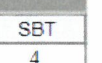
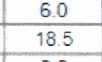

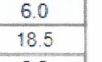
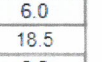


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Wawa Outer Loop  
Traffic Impact Study

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## HCS Signalized Intersection Results Summary

General Information						Intersection Information													
Agency	Diane B. Zimmerman Traffic Engineering LLC					Duration, h	0.250												
Analyst	DBZ		Analysis Date	8/2/2023		Area Type	Other												
Jurisdiction			Time Period	AM Peak		PHF	0.93												
Urban Street	Outer Loop		Analysis Year	2024 No Build		Analysis Period	1> 7:15												
Intersection	Apple Valley Dr		File Name	AM 24 NB.xus															
Project Description	Wawa																		
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand ( v ), veh/h				13	343	7	13	234	7	16	4	53	9	2	10				
Signal Information																			
Cycle, s	160.0	Reference Phase	2																
Offset, s	0	Reference Point	End	Green	3.7	0.3	124.1	11.9	0.0	0.0									
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.5	0.0	4.7	3.6	0.0	0.0									
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	0.0	2.3	3.0	0.0	0.0									
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase				5		2		1		6				8				4	
Case Number				1.1		3.0		1.1		3.0				6.0				6.0	
Phase Duration, s				10.5		131.3		10.2		131.1				18.5				18.5	
Change Period, ( Y+R ), s				6.5		7.0		6.5		7.0				6.6				6.6	
Max Allow Headway ( MAH ), s				2.9		0.0		2.9		0.0				3.1				3.1	
Queue Clearance Time ( g_s ), s				2.3				2.3						8.0				9.3	
Green Extension Time ( g_e ), s				0.0		0.0		0.0		0.0				0.2				0.2	
Phase Call Probability				0.50				0.46						0.99				0.99	
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				5	2	12	1	6	16	3	8	18	7	4	14				
Adjusted Flow Rate ( v ), veh/h				15	406	8	14	252	8	17	61		10	13					
Adjusted Saturation Flow Rate ( s ), veh/h/ln				1485	1856	1610	1810	1841	1610	1423	1577		1129	1330					
Queue Service Time ( g_s ), s				0.3	8.5	0.2	0.3	5.7	0.2	1.8	6.0		1.3	1.5					
Cycle Queue Clearance Time ( g_c ), s				0.3	8.5	0.2	0.3	5.7	0.2	3.3	6.0		7.3	1.5					
Green Ratio ( g/C )				0.80	0.78	0.78	0.80	0.78	0.78	0.07	0.07		0.07	0.07					
Capacity ( c ), veh/h				777	1442	1251	795	1427	1249	138	117		87	99					
Volume-to-Capacity Ratio ( X )				0.020	0.282	0.007	0.018	0.176	0.006	0.125	0.524		0.112	0.131					
Back of Queue ( Q ), ft/ln ( 95 th percentile)				4.4	129.1	3.2	3.4	92	2.3	30	113.4		20.5	26.8					
Back of Queue ( Q ), veh/ln ( 95 th percentile)				0.1	5.0	0.1	0.1	3.6	0.1	1.2	4.4		0.7	0.9					
Queue Storage Ratio ( RQ ) ( 95 th percentile)				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00					
Uniform Delay ( d_1 ), s/veh				3.3	4.1	5.1	3.6	4.7	4.1	70.8	71.3		74.9	69.2					
Incremental Delay ( d_2 ), s/veh				0.0	0.4	0.0	0.0	0.3	0.0	0.1	1.4		0.2	0.2					
Initial Queue Delay ( d_3 ), s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0					
Control Delay ( d ), s/veh				3.3	4.5	5.1	3.6	4.9	4.1	70.9	72.7		75.1	69.5					
Level of Service ( LOS )				A	A	A	A	A	A	E	E		E	E					
Approach Delay, s/veh / LOS				4.5		A	4.9		A	72.3		E	71.9		E				
Intersection Delay, s/veh / LOS				13.1						B									
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				1.85		B	1.85		B	2.16		B	2.16		B				
Bicycle LOS Score / LOS				1.13		A	0.94		A	0.62		A	0.52		A				

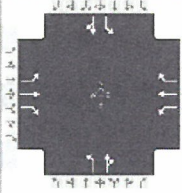



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Wawa Outer Loop  
Traffic Impact Study

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## HCS Signalized Intersection Results Summary

General Information					Intersection Information											
Agency	Diane B. Zimmerman Traffic Engineering LLC				Duration, h	0.250										
Analyst	DBZ	Analysis Date	8/2/2023		Area Type	Other										
Jurisdiction		Time Period	AM Peak		PHF	0.93										
Urban Street	Outer Loop	Analysis Year	2024 Build		Analysis Period	1> 7:15										
Intersection	Apple Valley Dr	File Name	AM 24 B.xus													
Project Description	Wawa															
Demand Information					EB			WB			NB			SB		
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R
Demand ( v ), veh/h					13	359	7	13	250	7	16	4	53	9	2	10
Signal Information																
Cycle, s	160.0	Reference Phase	2													
Offset, s	0	Reference Point	End													
Uncoordinated	No	Simult. Gap E/W	On		Green	3.7	0.3	124.0	11.9	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On		Yellow	3.5	0.0	4.7	3.6	0.0	0.0					
					Red	3.0	0.0	2.3	3.0	0.0	0.0					
Timer Results					EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase					5	2	1	6		8		4				
Case Number					1.1	3.0	1.1	3.0		6.0		6.0				
Phase Duration, s					10.5	131.3	10.2	131.0		18.5		18.5				
Change Period, ( Y+R ), s					6.5	7.0	6.5	7.0		6.6		6.6				
Max Allow Headway ( MAH ), s					2.9	0.0	2.9	0.0		3.1		3.1				
Queue Clearance Time ( g_s ), s					2.3		2.3			8.0		9.3				
Green Extension Time ( g_e ), s					0.0	0.0	0.0	0.0		0.2		0.2				
Phase Call Probability					0.50		0.46			0.99		0.99				
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					5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( v ), veh/h					16	430	8	14	269	8	17	61		10	13	
Adjusted Saturation Flow Rate ( s ), veh/h/ln					1485	1856	1610	1810	1841	1610	1423	1577		1129	1330	
Queue Service Time ( g_s ), s					0.3	9.6	0.2	0.3	6.2	0.2	1.8	6.0		1.3	1.5	
Cycle Queue Clearance Time ( g_c ), s					0.3	9.6	0.2	0.3	6.2	0.2	3.3	6.0		7.3	1.5	
Green Ratio ( g/C )					0.80	0.78	0.78	0.80	0.78	0.78	0.07	0.07		0.07	0.07	
Capacity ( c ), veh/h					764	1442	1251	772	1427	1248	138	117		87	99	
Volume-to-Capacity Ratio ( X )					0.020	0.298	0.007	0.018	0.188	0.006	0.125	0.524		0.112	0.131	
Back of Queue ( Q ), ft/ln ( 95 th percentile)					4.5	148.2	3.4	3.4	99	2.3	30	113.4		20.5	26.8	
Back of Queue ( Q ), veh/ln ( 95 th percentile)					0.2	5.8	0.1	0.1	3.8	0.1	1.2	4.4		0.7	0.9	
Queue Storage Ratio ( RQ ) ( 95 th percentile)					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	
Uniform Delay ( d_1 ), s/veh					3.3	4.5	5.4	3.7	4.7	4.1	70.8	71.3		74.9	69.2	
Incremental Delay ( d_2 ), s/veh					0.0	0.5	0.0	0.0	0.3	0.0	0.1	1.4		0.2	0.2	
Initial Queue Delay ( d_3 ), s/veh					0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay ( d ), s/veh					3.3	4.9	5.4	3.7	5.0	4.1	70.9	72.7		75.1	69.5	
Level of Service ( LOS )					A	A	A	A	A	A	E	E		E	E	
Approach Delay, s/veh / LOS					4.9		A	4.9		A	72.3		E	71.9		E
Intersection Delay, s/veh / LOS					12.9						B					
Multimodal Results					EB			WB			NB			SB		
Pedestrian LOS Score / LOS					1.85		B	1.85		B	2.16		B	2.16		B
Bicycle LOS Score / LOS					1.16		A	0.97		A	0.62		A	0.52		A



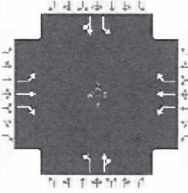
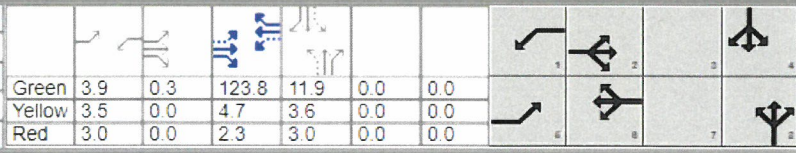
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Wawa Outer Loop  
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## HCS Signalized Intersection Results Summary

General Information					Intersection Information													
Agency		Diane B. Zimmerman Traffic Engineering LLC			Duration, h		0.250											
Analyst		DBZ	Analysis Date		8/2/2023	Area Type		Other										
Jurisdiction			Time Period		AM Peak	PHF		0.93										
Urban Street		Outer Loop	Analysis Year		2034 No Build	Analysis Period		1> 7.15										
Intersection		Apple Valley Dr	File Name		AM 34 NB.xus													
Project Description		Wawa																
Demand Information					EB			WB			NB			SB				
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R		
Demand ( v ), veh/h					14	361	7	14	246	7	17	4	56	9	2	11		
Signal Information																		
Cycle, s		160.0	Reference Phase														2	
Offset, s		0	Reference Point														End	
Uncoordinated		No	Simult. Gap E/W														On	
Force Mode		Fixed	Simult. Gap N/S														On	
Green					3.9	0.3	123.8	11.9	0.0	0.0								
Yellow					3.5	0.0	4.7	3.6	0.0	0.0								
Red					3.0	0.0	2.3	3.0	0.0	0.0								
Timer Results					EBL		EBT	WBL		WBT	NBL		NBT	SBL		SBT		
Assigned Phase					5		2	1		6			8			4		
Case Number					1.1		3.0	1.1		3.0			6.0			6.0		
Phase Duration, s					10.7		131.1	10.4		130.8			18.5			18.5		
Change Period, ( Y+R ), s					6.5		7.0	6.5		7.0			6.6			6.6		
Max Allow Headway ( MAH ), s					2.9		0.0	2.9		0.0			3.1			3.1		
Queue Clearance Time ( g s ), s					2.4			2.3					8.3			9.6		
Green Extension Time ( g e ), s					0.0		0.0	0.0		0.0			0.2			0.2		
Phase Call Probability					0.52			0.49					0.99			0.99		
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					5	2	12	1	6	16	3	8	18	7	4	14		
Adjusted Flow Rate ( v ), veh/h					17	427	8	15	265	8	18	65		10	14			
Adjusted Saturation Flow Rate ( s ), veh/h/in					1485	1856	1610	1810	1841	1610	1422	1576		1125	1327			
Queue Service Time ( g s ), s					0.4	9.0	0.2	0.3	6.1	0.2	1.9	6.3		1.3	1.6			
Cycle Queue Clearance Time ( g c ), s					0.4	9.0	0.2	0.3	6.1	0.2	3.5	6.3		7.6	1.6			
Green Ratio ( g/C )					0.80	0.78	0.78	0.80	0.77	0.77	0.07	0.07		0.07	0.07			
Capacity ( c ), veh/h					768	1439	1249	779	1425	1246	137	117		84	99			
Volume-to-Capacity Ratio ( X )					0.022	0.297	0.007	0.019	0.186	0.006	0.134	0.551		0.115	0.142			
Back of Queue ( Q ), ft/in ( 95 th percentile)					4.7	137.1	3.2	3.7	98.1	2.3	31.9	119.7		20.6	29			
Back of Queue ( Q ), veh/in ( 95 th percentile)					0.2	5.4	0.1	0.1	3.8	0.1	1.3	4.6		0.7	1.0			
Queue Storage Ratio ( RQ ) ( 95 th percentile)					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00			
Uniform Delay ( d 1 ), s/veh					3.3	4.2	5.2	3.6	4.8	4.1	70.9	71.5		75.2	69.3			
Incremental Delay ( d 2 ), s/veh					0.0	0.5	0.0	0.0	0.3	0.0	0.2	1.5		0.2	0.2			
Initial Queue Delay ( d 3 ), s/veh					0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0			
Control Delay ( d ), s/veh					3.3	4.6	5.2	3.7	5.1	4.1	71.1	73.0		75.4	69.5			
Level of Service (LOS)					A	A	A	A	A	A	E	E		E	E			
Approach Delay, s/veh / LOS					4.6		A	5.0		A	72.6		E	71.9		E		
Intersection Delay, s/veh / LOS					13.3						B							
Multimodal Results					EB			WB			NB			SB				
Pedestrian LOS Score / LOS					1.85		B	1.85		B	2.16		B	2.16		B		
Bicycle LOS Score / LOS					1.17		A	0.96		A	0.62		A	0.53		A		

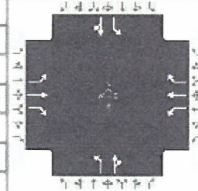
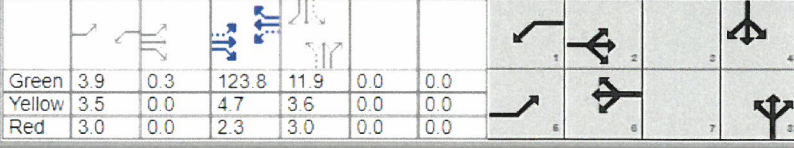


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Wawa Outer Loop  
Traffic Impact Study

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## HCS Signalized Intersection Results Summary

General Information					Intersection Information															
Agency	Diane B. Zimmerman Traffic Engineering LLC					Duration, h	0.250													
Analyst	DBZ		Analysis Date		8/2/2023		Area Type	Other												
Jurisdiction			Time Period		AM Peak		PHF	0.93												
Urban Street	Outer Loop		Analysis Year		2034 Build		Analysis Period	1> 7:15												
Intersection	Apple Valley Dr		File Name		AM 34 B.xus															
Project Description					Wawa															
Demand Information					EB			WB			NB			SB						
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R				
Demand ( v ), veh/h					14	377	7	14	262	7	17	4	56	9	2	11				
Signal Information																				
Cycle, s	160.0	Reference Phase	2	End	Green	3.9	0.3	123.8	11.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Offset, s	0	Reference Point	End	On	Yellow	3.5	0.0	4.7	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Uncoordinated	No	Simult. Gap E/W	On	On	Red	3.0	0.0	2.3	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	On	On																
Timer Results					EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase					5		2		1		6				8				4	
Case Number					1.1		3.0		1.1		3.0				6.0				6.0	
Phase Duration, s					10.7		131.1		10.4		130.8				18.5				18.5	
Change Period, ( Y+R ), s					6.5		7.0		6.5		7.0				6.6				6.6	
Max Allow Headway ( MAH ), s					2.9		0.0		2.9		0.0				3.1				3.1	
Queue Clearance Time ( g_s ), s					2.4				2.3						8.3				9.6	
Green Extension Time ( g_e ), s					0.0		0.0		0.0		0.0				0.2				0.2	
Phase Call Probability					0.52				0.49						0.99				0.99	
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					5	2	12	1	6	16	3	8	18	7	4	14				
Adjusted Flow Rate ( v ), veh/h					17	451	8	15	282	8	18	65		10	14					
Adjusted Saturation Flow Rate ( s ), veh/h/ln					1485	1856	1610	1810	1841	1610	1422	1576		1125	1327					
Queue Service Time ( g_s ), s					0.4	10.3	0.3	0.3	6.5	0.2	1.9	6.3		1.3	1.6					
Cycle Queue Clearance Time ( g_c ), s					0.4	10.3	0.3	0.3	6.5	0.2	3.5	6.3		7.6	1.6					
Green Ratio ( g/C )					0.80	0.78	0.78	0.80	0.77	0.77	0.07	0.07		0.07	0.07					
Capacity ( c ), veh/h					754	1439	1249	756	1424	1246	137	117		84	99					
Volume-to-Capacity Ratio ( X )					0.022	0.313	0.007	0.020	0.198	0.006	0.134	0.551		0.115	0.142					
Back of Queue ( Q ), ft/ln ( 95 th percentile)					4.8	158.5	3.4	3.7	106	2.3	31.9	119.7		20.6	29					
Back of Queue ( Q ), veh/ln ( 95 th percentile)					0.2	6.2	0.1	0.1	4.1	0.1	1.3	4.6		0.7	1.0					
Queue Storage Ratio ( RQ ) ( 95 th percentile)					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00					
Uniform Delay ( d_1 ), s/veh					3.3	4.6	5.5	3.7	4.8	4.1	70.9	71.5		75.2	69.3					
Incremental Delay ( d_2 ), s/veh					0.0	0.5	0.0	0.0	0.3	0.0	0.2	1.5		0.2	0.2					
Initial Queue Delay ( d_3 ), s/veh					0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0					
Control Delay ( d ), s/veh					3.3	5.1	5.5	3.7	5.1	4.1	71.1	73.0		75.4	69.5					
Level of Service ( LOS )					A	A	A	A	A	A	E	E		E	E					
Approach Delay, s/veh / LOS					5.0		A		5.1		A		72.6		E		71.9		E	
Intersection Delay, s/veh / LOS										13.1					B					
Multimodal Results					EB			WB			NB			SB						
Pedestrian LOS Score / LOS					1.85		B		1.85		B		2.16		B		2.16		B	
Bicycle LOS Score / LOS					1.19		A		0.99		A		0.62		A		0.53		A	

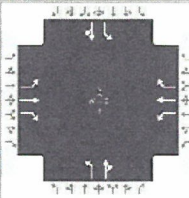
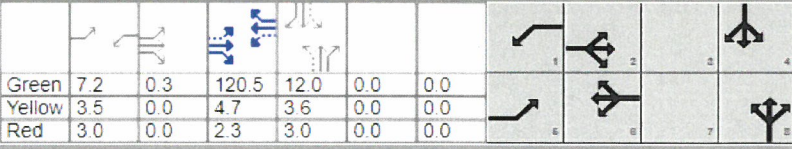


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## HCS Signalized Intersection Results Summary

General Information						Intersection Information													
Agency		Diane B. Zimmerman Traffic Engineering LLC				Duration, h		0.250											
Analyst		DBZ		Analysis Date		8/2/2023		Area Type		Other									
Jurisdiction				Time Period		PM Peak		PHF		0.94									
Urban Street		Outer Loop		Analysis Year		2023		Analysis Period		1> 4.45									
Intersection		Apple Valley Dr		File Name		PM 23.xus													
Project Description		Wawa																	
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand ( v ), veh/h				61	647	31	48	405	14	18	5	41	16	5	41				
Signal Information																			
Cycle, s	160.0	Reference Phase	2																
Offset, s	0	Reference Point	End																
Uncoordinated	No	Simult. Gap E/W	On																
Force Mode	Fixed	Simult. Gap N/S	On																
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT								
Assigned Phase				5	2	1	6		8		4								
Case Number				1.1	3.0	1.1	3.0		6.0		6.0								
Phase Duration, s				13.9	127.8	13.7	127.5		18.6		18.6								
Change Period, ( Y+R ), s				6.5	7.0	6.5	7.0		6.6		6.6								
Max Allow Headway ( MAH ), s				2.9	0.0	2.9	0.0		3.0		3.0								
Queue Clearance Time ( g_s ), s				3.1		2.9			8.8		8.8								
Green Extension Time ( g_e ), s				0.1	0.0	0.1	0.0		0.2		0.2								
Phase Call Probability				0.93		0.90			1.00		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				5	2	12	1	6	16	3	8	18	7	4	14				
Adjusted Flow Rate ( v ), veh/h				60	636	30	51	431	15	19	49		17	49					
Adjusted Saturation Flow Rate ( s ), veh/h/ln				1810	1870	1572	1810	1870	1522	1378	1586		1249	1612					
Queue Service Time ( g_s ), s				1.1	19.3	1.0	0.9	11.8	0.4	2.2	4.7		2.1	4.6					
Cycle Queue Clearance Time ( g_c ), s				1.1	19.3	1.0	0.9	11.8	0.4	6.8	4.7		6.8	4.6					
Green Ratio ( g/C )				0.80	0.75	0.75	0.80	0.75	0.75	0.07	0.07		0.07	0.07					
Capacity ( c ), veh/h				789	1412	1187	626	1408	1146	108	119		102	121					
Volume-to-Capacity Ratio ( X )				0.076	0.451	0.026	0.082	0.306	0.013	0.177	0.412		0.167	0.406					
Back of Queue ( Q ), ft/ln ( 95 th percentile)				15	272	13.6	12.9	198.6	5.6	34.3	89.4		33.5	87.9					
Back of Queue ( Q ), veh/ln ( 95 th percentile)				0.6	10.7	0.5	0.5	7.8	0.2	1.4	3.5		1.2	3.5					
Queue Storage Ratio ( RQ ) ( 95 th percentile)				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00					
Uniform Delay ( d_1 ), s/veh				3.8	6.8	6.1	4.8	6.3	4.9	73.8	70.7		73.9	70.6					
Incremental Delay ( d_2 ), s/veh				0.0	0.9	0.0	0.0	0.6	0.0	0.3	0.9		0.3	0.8					
Initial Queue Delay ( d_3 ), s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0					
Control Delay ( d ), s/veh				3.8	7.6	6.2	4.9	6.9	4.9	74.1	71.5		74.2	71.4					
Level of Service ( LOS )				A	A	A	A	A	A	E	E		E	E					
Approach Delay, s/veh / LOS				7.3		A	6.6		A	72.2		E	72.1		E				
Intersection Delay, s/veh / LOS				13.4						B									
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				1.86		B	1.86		B	2.16		B	2.16		B				
Bicycle LOS Score / LOS				1.78		B	1.31		A	0.60		A	0.60		A				

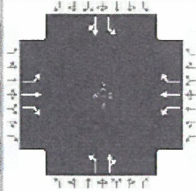
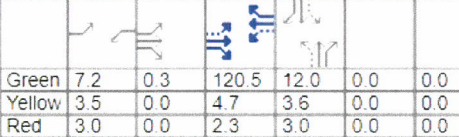
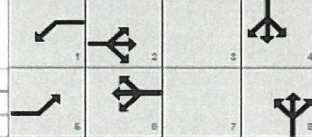


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## HCS Signalized Intersection Results Summary

General Information						Intersection Information													
Agency		Diane B. Zimmerman Traffic Engineering LLC				Duration, h		0.250											
Analyst		DBZ		Analysis Date		8/2/2023		Area Type		Other									
Jurisdiction				Time Period		PM Peak		PHF		0.94									
Urban Street		Outer Loop		Analysis Year		2024 No Build		Analysis Period		1> 4.45									
Intersection		Apple Valley Dr		File Name		PM 24 NB.xus													
Project Description		Wawa																	
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand ( v ), veh/h				61	650	31	48	407	14	18	5	41	16	5	41				
Signal Information																			
Cycle, s	160.0	Reference Phase	2																
Offset, s	0	Reference Point	End																
Uncoordinated	No	Simult. Gap E/W	On																
Force Mode	Fixed	Simult. Gap N/S	On																
Green				7.2	0.3	120.5	12.0	0.0	0.0	1				2					
Yellow				3.5	0.0	4.7	3.6	0.0	0.0	3				4					
Red				3.0	0.0	2.3	3.0	0.0	0.0	5				6					
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase				5		2		1		6				8				4	
Case Number				1.1		3.0		1.1		3.0				6.0				6.0	
Phase Duration, s				13.9		127.8		13.7		127.5				18.6				18.6	
Change Period, ( Y+R ), s				6.5		7.0		6.5		7.0				6.6				6.6	
Max Allow Headway ( MAH ), s				2.9		0.0		2.9		0.0				3.0				3.0	
Queue Clearance Time ( g_s ), s				3.1				2.9						8.8				8.8	
Green Extension Time ( g_e ), s				0.1		0.0		0.1		0.0				0.2				0.2	
Phase Call Probability				0.93				0.90						1.00				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				5	2	12	1	6	16	3	8	18	7	4	14				
Adjusted Flow Rate ( v ), veh/h				60	640	31	51	433	15	19	49		17	49					
Adjusted Saturation Flow Rate ( s ), veh/h/ln				1810	1870	1572	1810	1870	1522	1378	1586		1249	1612					
Queue Service Time ( g_s ), s				1.1	19.5	1.0	0.9	11.9	0.4	2.2	4.7		2.1	4.6					
Cycle Queue Clearance Time ( g_c ), s				1.1	19.5	1.0	0.9	11.9	0.4	6.8	4.7		6.8	4.6					
Green Ratio ( g/C )				0.80	0.75	0.75	0.80	0.75	0.75	0.07	0.07		0.07	0.07					
Capacity ( c ), veh/h				788	1412	1187	623	1408	1146	108	119		102	121					
Volume-to-Capacity Ratio ( X )				0.076	0.454	0.026	0.082	0.307	0.013	0.177	0.412		0.167	0.406					
Back of Queue ( Q ), ft/ln ( 95 th percentile)				15	274.8	13.7	12.9	199	5.6	34.3	89.4		33.5	87.9					
Back of Queue ( Q ), veh/ln ( 95 th percentile)				0.6	10.8	0.5	0.5	7.8	0.2	1.4	3.5		1.2	3.5					
Queue Storage Ratio ( RQ ) ( 95 th percentile)				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00					
Uniform Delay ( d_1 ), s/veh				3.8	6.8	6.1	4.9	6.4	4.9	73.8	70.7		73.9	70.6					
Incremental Delay ( d_2 ), s/veh				0.0	0.9	0.0	0.0	0.6	0.0	0.3	0.9		0.3	0.8					
Initial Queue Delay ( d_3 ), s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0					
Control Delay ( d ), s/veh				3.8	7.7	6.2	4.9	6.9	4.9	74.1	71.5		74.2	71.4					
Level of Service ( LOS )				A	A	A	A	A	A	E	E		E	E					
Approach Delay, s/veh / LOS				7.3		A		6.7		A		72.2		E		72.1		E	
Intersection Delay, s/veh / LOS				13.4						B									
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				1.86		B		1.86		B		2.16		B		2.16		B	
Bicycle LOS Score / LOS				1.79		B		1.31		A		0.60		A		0.60		A	

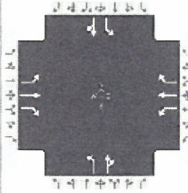
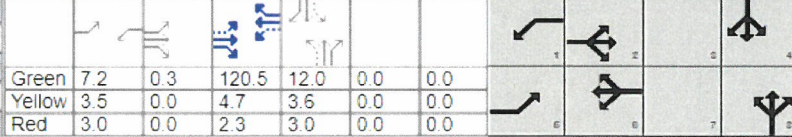


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## HCS Signalized Intersection Results Summary

General Information						Intersection Information													
Agency	Diane B. Zimmerman Traffic Engineering LLC					Duration, h	0.250												
Analyst	DBZ		Analysis Date		8/2/2023	Area Type	Other												
Jurisdiction			Time Period		PM Peak	PHF	0.94												
Urban Street	Outer Loop		Analysis Year		2024 Build	Analysis Period	1> 4.45												
Intersection	Apple Valley Dr		File Name		PM 24 B.xus														
Project Description		Wawa																	
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand ( v ), veh/h				61	664	31	48	421	14	18	5	41	16	5	41				
Signal Information																			
Cycle, s	160.0	Reference Phase	2																
Offset, s	0	Reference Point	End																
Uncoordinated	No	Simult. Gap E/W	On																
Force Mode	Fixed	Simult. Gap N/S	On																
				Green	7.2	0.3	120.5	12.0	0.0	0.0									
				Yellow	3.5	0.0	4.7	3.6	0.0	0.0									
				Red	3.0	0.0	2.3	3.0	0.0	0.0									
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase				5		2		1		6				8				4	
Case Number				1.1		3.0		1.1		3.0				6.0				6.0	
Phase Duration, s				14.0		127.8		13.7		127.5				18.6				18.6	
Change Period, ( Y+R ), s				6.5		7.0		6.5		7.0				6.6				6.6	
Max Allow Headway ( MAH ), s				2.9		0.0		2.9		0.0				3.0				3.0	
Queue Clearance Time ( g s ), s				3.1				2.9						8.8				8.8	
Green Extension Time ( g e ), s				0.1		0.0		0.1		0.0				0.2				0.2	
Phase Call Probability				0.93				0.90						1.00				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				5	2	12	1	6	16	3	8	18	7	4	14				
Adjusted Flow Rate ( v ), veh/h				60	658	31	51	448	15	19	49		17	49					
Adjusted Saturation Flow Rate ( s ), veh/h/ln				1810	1870	1572	1810	1870	1522	1378	1586		1249	1612					
Queue Service Time ( g s ), s				1.1	21.2	1.0	0.9	12.4	0.4	2.2	4.7		2.1	4.6					
Cycle Queue Clearance Time ( g c ), s				1.1	21.2	1.0	0.9	12.4	0.4	6.8	4.7		6.8	4.6					
Green Ratio ( g/C )				0.80	0.75	0.75	0.80	0.75	0.75	0.07	0.07		0.07	0.07					
Capacity ( c ), veh/h				775	1412	1187	606	1408	1146	108	119		102	121					
Volume-to-Capacity Ratio ( X )				0.078	0.466	0.026	0.084	0.318	0.013	0.177	0.412		0.167	0.406					
Back of Queue ( Q ), ft/ln ( 95 th percentile)				15.1	298.5	14.6	12.9	206.6	5.6	34.3	89.4		33.5	87.9					
Back of Queue ( Q ), veh/ln ( 95 th percentile)				0.6	11.8	0.6	0.5	8.1	0.2	1.4	3.5		1.2	3.5					
Queue Storage Ratio ( RQ ) ( 95 th percentile)				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00					
Uniform Delay ( d + ), s/veh				3.8	7.4	6.5	5.1	6.4	4.9	73.8	70.7		73.9	70.6					
Incremental Delay ( d 2 ), s/veh				0.0	0.9	0.0	0.0	0.6	0.0	0.3	0.9		0.3	0.8					
Initial Queue Delay ( d 3 ), s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0					
Control Delay ( d ), s/veh				3.9	8.2	6.5	5.1	7.0	5.0	74.1	71.5		74.2	71.4					
Level of Service ( LOS )				A	A	A	A	A	A	E	E		E	E					
Approach Delay, s/veh / LOS				7.8		A	6.8		A	72.2		E	72.1		E				
Intersection Delay, s/veh / LOS				13.6						B									
Multimodal Results				EB			WB			NB			SB						
Pedestrian LOS Score / LOS				1.86		B	1.86		B	2.16		B	2.16		B				
Bicycle LOS Score / LOS				1.81		B	1.34		A	0.60		A	0.60		A				

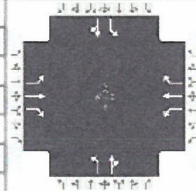
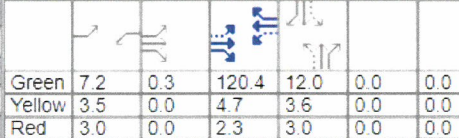
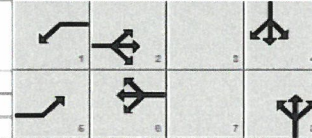


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## HCS Signalized Intersection Results Summary

General Information						Intersection Information															
Agency		Diane B. Zimmerman Traffic Engineering LLC				Duration, h		0.250													
Analyst		DBZ		Analysis Date		8/2/2023		Area Type		Other											
Jurisdiction						Time Period		PM Peak		PHF								0.94			
Urban Street		Outer Loop		Analysis Year		2034 No Build		Analysis Period		1> 4:45											
Intersection		Apple Valley Dr		File Name		PM 34 NB.xus															
Project Description		Wawa																			
Demand Information						EB			WB			NB			SB						
Approach Movement						L	T	R	L	T	R	L	T	R	L	T	R				
Demand ( v ), veh/h						64	683	33	50	428	15	20	5	43	17	5	43				
Signal Information						 															
Cycle, s	160.0	Reference Phase	2																		
Offset, s	0	Reference Point	End																		
Uncoordinated	No	Simult. Gap E/W	On																		
Force Mode	Fixed	Simult. Gap N/S	On																		
Green						7.2	0.3	120.4	12.0	0.0	0.0										
Yellow						3.5	0.0	4.7	3.6	0.0	0.0										
Red						3.0	0.0	2.3	3.0	0.0	0.0										
Timer Results						EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT								
Assigned Phase						5	2	1	6		8		4								
Case Number						1.1	3.0	1.1	3.0		6.0		6.0								
Phase Duration, s						14.0	127.7	13.7	127.4		18.6		18.6								
Change Period, ( Y+R ), s						6.5	7.0	6.5	7.0		6.6		6.6								
Max Allow Headway ( MAH ), s						2.9	0.0	2.9	0.0		3.0		3.0								
Queue Clearance Time ( g_s ), s						3.2		3.0			9.2		9.2								
Green Extension Time ( g_e ), s						0.1	0.0	0.1	0.0		0.2		0.2								
Phase Call Probability						0.94		0.91			1.00		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						5	2	12	1	6	16	3	8	18	7	4	14				
Adjusted Flow Rate ( v ), veh/h						63	673	32	53	455	16	21	51		18	51					
Adjusted Saturation Flow Rate ( s ), veh/h/in						1810	1870	1572	1810	1870	1522	1375	1585		1246	1611					
Queue Service Time ( g_s ), s						1.2	21.3	1.0	1.0	12.7	0.4	2.4	4.9		2.3	4.8					
Cycle Queue Clearance Time ( g_c ), s						1.2	21.3	1.0	1.0	12.7	0.4	7.2	4.9		7.2	4.8					
Green Ratio ( g/C )						0.80	0.75	0.75	0.80	0.75	0.75	0.07	0.07		0.07	0.07					
Capacity ( c ), veh/h						770	1411	1186	600	1408	1146	106	119		100	121					
Volume-to-Capacity Ratio ( X )						0.082	0.477	0.027	0.089	0.323	0.014	0.200	0.430		0.181	0.423					
Back of Queue ( Q ), ft/in ( 95 th percentile)						15.7	295.1	14.9	13.4	210.2	6	38.3	93.5		35.7	91.9					
Back of Queue ( Q ), veh/in ( 95 th percentile)						0.6	11.6	0.6	0.5	8.3	0.2	1.5	3.6		1.3	3.6					
Queue Storage Ratio ( RQ ) ( 95 th percentile)						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00					
Uniform Delay ( d_1 ), s/veh						3.9	7.1	6.3	5.2	6.5	5.0	74.2	70.7		74.2	70.7					
Incremental Delay ( d_2 ), s/veh						0.0	0.9	0.0	0.0	0.6	0.0	0.3	0.9		0.3	0.9					
Initial Queue Delay ( d_3 ), s/veh						0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0					
Control Delay ( d ), s/veh						3.9	8.0	6.3	5.2	7.1	5.0	74.5	71.7		74.5	71.6					
Level of Service ( LOS )						A	A	A	A	A	A	E	E		E	E					
Approach Delay, s/veh / LOS						7.6		A	6.8		A	72.5		E	72.3		E				
Intersection Delay, s/veh / LOS						13.7						B									
Multimodal Results						EB			WB			NB			SB						
Pedestrian LOS Score / LOS						1.86		B	1.86		B	2.16		B	2.16		B				
Bicycle LOS Score / LOS						1.86		B	1.35		A	0.61		A	0.60		A				



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## HCS Signalized Intersection Results Summary

General Information					Intersection Information															
Agency	Diane B. Zimmerman Traffic Engineering LLC				Duration, h	0.250														
Analyst	DBZ	Analysis Date	8/2/2023		Area Type	Other														
Jurisdiction		Time Period	PM Peak		PHF	0.94														
Urban Street	Outer Loop	Analysis Year	2034 Build		Analysis Period	1> 4:45														
Intersection	Apple Valley Dr	File Name	PM 34 B.xus																	
Project Description		Wawa																		
Demand Information					EB			WB			NB			SB						
Approach Movement					L	T	R	L	T	R	L	T	R	L	T	R				
Demand ( v ), veh/h					64	697	33	50	442	15	20	5	43	17	5	43				
Signal Information																				
Cycle, s	160.0	Reference Phase	2																	
Offset, s	0	Reference Point	End																	
Uncoordinated	No	Simult. Gap E/W	On																	
Force Mode	Fixed	Simult. Gap N/S	On																	
					Green	7.2	0.3	120.4	12.0	0.0	0.0									
					Yellow	3.5	0.0	4.7	3.6	0.0	0.0									
					Red	3.0	0.0	2.3	3.0	0.0	0.0									
Timer Results					EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase					5		2		1		6				8				4	
Case Number					1.1		3.0		1.1		3.0				6.0				6.0	
Phase Duration, s					14.0		127.7		13.7		127.4				18.6				18.6	
Change Period, ( Y+R ), s					6.5		7.0		6.5		7.0				6.6				6.6	
Max Allow Headway ( MAH ), s					2.9		0.0		2.9		0.0				3.0				3.0	
Queue Clearance Time ( g_s ), s					3.2				3.0						9.2				9.2	
Green Extension Time ( g_e ), s					0.1		0.0		0.1		0.0				0.2				0.2	
Phase Call Probability					0.94				0.91						1.00				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					5	2	12	1	6	16	3	8	18	7	4	14				
Adjusted Flow Rate ( v ), veh/h					63	691	33	53	470	16	21	51		18	51					
Adjusted Saturation Flow Rate ( s ), veh/h/in					1810	1870	1572	1810	1870	1522	1375	1585		1246	1611					
Queue Service Time ( g_s ), s					1.2	22.7	1.1	1.0	13.3	0.4	2.4	4.9		2.3	4.8					
Cycle Queue Clearance Time ( g_c ), s					1.2	22.7	1.1	1.0	13.3	0.4	7.2	4.9		7.2	4.8					
Green Ratio ( g/C )					0.80	0.75	0.75	0.80	0.75	0.75	0.07	0.07		0.07	0.07					
Capacity ( c ), veh/h					758	1411	1186	585	1407	1145	106	119		100	121					
Volume-to-Capacity Ratio ( X )					0.084	0.490	0.028	0.091	0.334	0.014	0.200	0.430		0.181	0.423					
Back of Queue ( Q ), ft/in ( 95 th percentile)					15.7	312.6	15.8	13.5	218	6	38.3	93.5		35.7	91.9					
Back of Queue ( Q ), veh/in ( 95 th percentile)					0.6	12.3	0.6	0.5	8.6	0.2	1.5	3.6		1.3	3.6					
Queue Storage Ratio ( RQ ) ( 95 th percentile)					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00					
Uniform Delay ( d_1 ), s/veh					3.9	7.5	6.7	5.4	6.5	5.0	74.2	70.7		74.2	70.7					
Incremental Delay ( d_2 ), s/veh					0.0	0.9	0.0	0.0	0.6	0.0	0.3	0.9		0.3	0.9					
Initial Queue Delay ( d_3 ), s/veh					0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0					
Control Delay ( d ), s/veh					3.9	8.4	6.7	5.4	7.2	5.0	74.5	71.7		74.5	71.6					
Level of Service ( LOS )					A	A	A	A	A	A	E	E		E	E					
Approach Delay, s/veh / LOS					8.0		A		6.9		A		72.5		E		72.3		E	
Intersection Delay, s/veh / LOS					13.8						B									
Multimodal Results					EB			WB			NB			SB						
Pedestrian LOS Score / LOS					1.86		B		1.86		B		2.16		B		2.16		B	
Bicycle LOS Score / LOS					1.88		B		1.38		A		0.61		A		0.60		A	



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HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Fegenbush Ln at Vaughn Mill							
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC							Jurisdiction								
Date Performed	8/2/2023							East/West Street	Vaughn Mill Road							
Analysis Year	2023							North/South Street	Fegenbush Lane							
Time Analyzed	AM Peak							Peak Hour Factor	0.86							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Wawa															
<b>Lanes</b>																
<b>Vehicle Volumes and Adjustments</b>																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	10	1	2	3	40	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume (veh/h)		203		9						12	540				240	178
Percent Heavy Vehicles (%)		3		0						8						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type / Storage		Undivided														
<b>Critical and Follow-up Headways</b>																
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.20						4.18						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.30						2.27						
<b>Delay, Queue Length, and Level of Service</b>																
Flow Rate, v (veh/h)			247							14						
Capacity, c (veh/h)			256							1046						
v/c Ratio			0.96							0.01						
95% Queue Length, Q <sub>95</sub> (veh)			9.0							0.0						
Control Delay (s/veh)			89.1							6.5	0.2					
Level of Service (LOS)			F							A	A					
Approach Delay (s/veh)		89.1								0.4						
Approach LOS		F								A						

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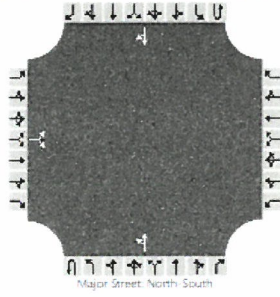
Wawa Outer Loop  
Traffic Impact Study

HCS Two-Way Stop-Control Report																	
General Information								Site Information									
Analyst	DBZ							Intersection				Fegenbush Ln at Vaughn Mill					
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC							Jurisdiction									
Date Performed	6/2/2023							East/West Street				Vaughn Mill Road					
Analysis Year	2024							North/South Street				Fegenbush Lane					
Time Analyzed	AM Peak No Build							Peak Hour Factor				0.86					
Intersection Orientation	North-South							Analysis Time Period (hrs)				0.25					
Project Description	Wawa																
<b>Lanes</b>																	
<b>Vehicle Volumes and Adjustments</b>																	
Approach	Eastbound				Westbound				Northbound				Southbound				
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Priority		10	11	12		7	8	9	10	1	2	3	40	4	5	6	
Number of Lanes		0	1	0		0	0	0		0	1	0		0	1	0	
Configuration			LR							LT						TR	
Volume (veh/h)		204		9						12	543				241	179	
Percent Heavy Vehicles (%)		3		0						6							
Proportion Time Blocked																	
Percent Grade (%)		0															
Right Turn Channelized																	
Median Type - Storage		Undivided															
<b>Critical and Follow-up Headways</b>																	
Base Critical Headway (sec)		7.1		6.2						4.1							
Critical Headway (sec)		6.43		6.20						4.18							
Base Follow-Up Headway (sec)		3.5		3.3						2.2							
Follow-Up Headway (sec)		3.53		3.30						2.27							
<b>Delay, Queue Length, and Level of Service</b>																	
Flow Rate, v (veh/h)			248							14							
Capacity, c (veh/h)			254							1044							
v/c Ratio			0.97							0.01							
95% Queue Length, Q <sub>95</sub> (veh)			9.2							0.0							
Control Delay (s/veh)			92.3							6.5	0.2						
Level of Service (LOS)			F							A	A						
Approach Delay (s/veh)		92.3								0.4							
Approach LOS		F								A							

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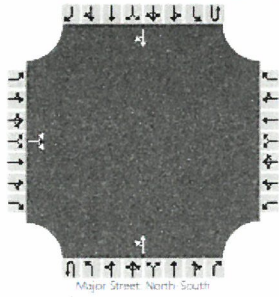
Wawa Outer Loop  
Traffic Impact Study

HCS Two-Way Stop-Control Report																	
General Information								Site Information									
Analyst	DBZ							Intersection	Fegenbush Ln at Vaughn Mill								
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC							Jurisdiction									
Date Performed	8/2/2023							East/West Street	Vaughn Mill Road								
Analysis Year	2024							North/South Street	Fegenbush Lane								
Time Analyzed	AM Peak Build							Peak Hour Factor	0.86								
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25								
Project Description	Wawa																
<b>Lanes</b>																	
																	
<b>Vehicle Volumes and Adjustments</b>																	
Approach	Eastbound				Westbound				Northbound				Southbound				
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Priority		10	11	12		7	8	9	10	1	2	3	40	4	5	6	
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0	
Configuration			LR								LT					TR	
Volume (veh/h)		216		9							12	543			241	191	
Percent Heavy Vehicles (%)		3		0							8						
Proportion Time Blocked																	
Percent Grade (%)		0															
Right Turn Channelized																	
Median Type / Storage		Undivided															
<b>Critical and Follow-up Headways</b>																	
Base Critical Headway (sec)		7.1		6.2							4.1						
Critical Headway (sec)		6.43		6.20							4.18						
Base Follow-Up Headway (sec)		3.5		3.3							2.2						
Follow-Up Headway (sec)		3.53		3.30							2.27						
<b>Delay, Queue Length, and Level of Service</b>																	
Flow Rate, v (veh/h)			262								14						
Capacity, c (veh/h)			251								1032						
v/c Ratio			1.04								0.01						
95% Queue Length, Q <sub>95</sub> (veh)			10.6								0.0						
Control Delay (s/veh)			110.8								6.5	0.2					
Level of Service (LOS)			F								A	A					
Approach Delay (s/veh)		110.8								0.4							
Approach LOS		F								A							

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HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Fegenbush Ln at Vaughn Mill							
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC							Jurisdiction								
Date Performed	8/2/2023							East/West Street	Vaughn Mill Road							
Analysis Year	2034							North/South Street	Fegenbush Lane							
Time Analyzed	AM Peak No Build							Peak Hour Factor	0.86							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Wawa															
Lanes																
																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	10	1	2	3	4	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR								LT					TR
Volume (veh/h)		214		9						13	571				253	188
Percent Heavy Vehicles (%)		3		0						8						
Proportion Time Blocked																
Percent Grade (%)	0															
Right Turn Channelized																
Median Type - Storage	Undivided															
Critical and Follow-up Headways																
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.20						4.18						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.30						2.27						
Delay, Queue Length, and Level of Service																
Flow Rate, v (veh/h)			259							15						
Capacity, c (veh/h)			235							1023						
v/c Ratio			1.10							0.01						
95% Queue Length, Q <sub>95</sub> (veh)			11.5							0.0						
Control Delay (s/veh)			133.5							8.6	0.2					
Level of Service (LOS)			F							A	A					
Approach Delay (s/veh)	133.5								0.4							
Approach LOS	F								A							

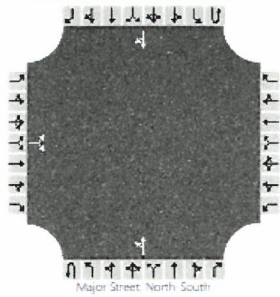
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HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Fegenbush Ln at Vaughn Mill							
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC							Jurisdiction								
Date Performed	8/2/2023							East/West Street	Vaughn Mill Road							
Analysis Year	2034							North/South Street	Fegenbush Lane							
Time Analyzed	AM Peak Build							Peak Hour Factor	0.86							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Wawa															
<b>Lanes</b>																
																
<b>Vehicle Volumes and Adjustments</b>																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	10	1	2	3	40	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR								LT					TR
Volume (veh/h)		226		9						13	571				253	200
Percent Heavy Vehicles (%)		3		0						8						
Proportion Time Blocked																
Percent Grade (%)	0															
Right Turn Channelized																
Median Type / Storage	Undivided															
<b>Critical and Follow-up Headways</b>																
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.20						4.18						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.30						2.27						
<b>Delay, Queue Length, and Level of Service</b>																
Flow Rate, v (veh/h)			273							15						
Capacity, c (veh/h)			233							1010						
v/c Ratio			1.17							0.01						
95% Queue Length, Q <sub>95</sub> (veh)			13.0							0.0						
Control Delay (s/veh)			158.5							6.6	0.2					
Level of Service (LOS)			F							A	A					
Approach Delay (s/veh)	158.5								0.4							
Approach LOS	F								A							

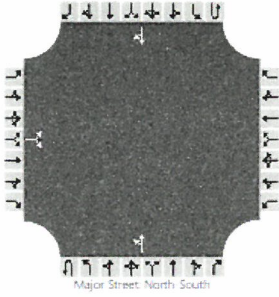
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HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Fegenbush Ln at Vaughn Mill							
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC							Jurisdiction								
Date Performed	8/2/2023							East/West Street	Vaughn Mill Road							
Analysis Year	2023							North/South Street	Fegenbush Lane							
Time Analyzed	PM Peak							Peak Hour Factor	0.94							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Wawa															
<b>Lanes</b>																
																
<b>Vehicle Volumes and Adjustments</b>																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	10	1	2	3	40	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR								LT					TR
Volume (veh/h)		114		18						34	321				483	470
Percent Heavy Vehicles (%)		3		0						0						
Proportion Time Blocked																
Percent Grade (%)	0															
Right Turn Channelized																
Median Type / Storage	Undivided															
<b>Critical and Follow-up Headways</b>																
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.30						2.20						
<b>Delay, Queue Length, and Level of Service</b>																
Flow Rate, v (veh/h)			140							36						
Capacity, c (veh/h)			211							692						
v/c Ratio			0.66							0.05						
95% Queue Length, Q <sub>95</sub> (veh)			4.1							0.2						
Control Delay (s/veh)			50.4							10.5	0.7					
Level of Service (LOS)			F							B	A					
Approach Delay (s/veh)	50.4								1.6							
Approach LOS	F								A							

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HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection				Fegenbush Ln at Vaughn Mill				
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC							Jurisdiction								
Date Performed	8/2/2023							East/West Street				Vaughn Mill Road				
Analysis Year	2024							North/South Street				Fegenbush Lane				
Time Analyzed	PM Peak No Build							Peak Hour Factor				0.94				
Intersection Orientation	North-South							Analysis Time Period (hrs)				0.25				
Project Description	Wawa															
<b>Lanes</b>																
<b>Vehicle Volumes and Adjustments</b>																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	10	1	2	3	4	5	6	
Number of Lanes		0	1	0		0	0	0		0	1	0		0	1	0
Configuration			LR							LT					TR	
Volume (veh/h)		115		18						34	323				470	485
Percent Heavy Vehicles (%)		3		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type / Storage		Undivided														
<b>Critical and Follow-up Headways</b>																
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.30						2.20						
<b>Delay, Queue Length, and Level of Service</b>																
Flow Rate, v (veh/h)			141							36						
Capacity, c (veh/h)			212							691						
v/c Ratio			0.67							0.05						
95% Queue Length, Q <sub>95</sub> (veh)			4.1							0.2						
Control Delay (s/veh)			50.4							10.5	0.7					
Level of Service (LOS)			F							B	A					
Approach Delay (s/veh)		50.4								1.6						
Approach LOS		F								A						

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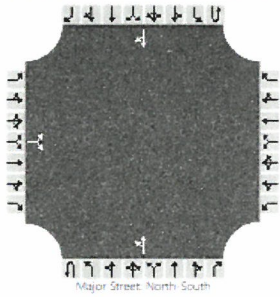
Wawa Outer Loop  
Traffic Impact Study

HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection				Fegenbush Ln at Vaughn Mill				
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC							Jurisdiction								
Date Performed	8/2/2023							East/West Street				Vaughn Mill Road				
Analysis Year	2024							North/South Street				Fegenbush Lane				
Time Analyzed	PM Peak Build							Peak Hour Factor				0.94				
Intersection Orientation	North-South							Analysis Time Period (hrs)				0.25				
Project Description	Wawa															
<b>Lanes</b>																
<b>Vehicle Volumes and Adjustments</b>																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	10	1	2	3	4	4	5	6
Number of Lanes		0	1	0		0	0	0		0	1	0		0	1	0
Configuration			LR								LT					TR
Volume (veh/h)		126		18						34	323				470	496
Percent Heavy Vehicles (%)		3		0						0						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized																
Median Type / Storage		Undivided														
<b>Critical and Follow-up Headways</b>																
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.30						2.20						
<b>Delay, Queue Length, and Level of Service</b>																
Flow Rate, v (veh/h)			153							36						
Capacity, c (veh/h)			209							684						
v/c Ratio			0.73							0.05						
95% Queue Length, Q <sub>95</sub> (veh)			4.8							0.2						
Control Delay (s/veh)			58.4							10.6	0.7					
Level of Service (LOS)			F							B	A					
Approach Delay (s/veh)		58.4								1.6						
Approach LOS		F								A						

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Wawa Outer Loop  
Traffic Impact Study

HCS Two-Way Stop-Control Report																	
General Information								Site Information									
Analyst	DBZ							Intersection	Fegenbush Ln at Vaughn Mill								
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC							Jurisdiction									
Date Performed	8/2/2023							East/West Street	Vaughn Mill Road								
Analysis Year	2034							North/South Street	Fegenbush Lane								
Time Analyzed	PM Peak No Build							Peak Hour Factor	0.94								
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25								
Project Description	Wawa																
<b>Lanes</b>																	
																	
<b>Vehicle Volumes and Adjustments</b>																	
Approach	Eastbound				Westbound				Northbound				Southbound				
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Priority		10	11	12		7	8	9	10	1	2	3	40	4	5	6	
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0	
Configuration			LR								LT					TR	
Volume (veh/h)		121		20						36	340				494	510	
Percent Heavy Vehicles (%)		3		0						0							
Proportion Time Blocked																	
Percent Grade (%)		0															
Right Turn Channelized																	
Median Type / Storage		Undivided															
<b>Critical and Follow-up Headways</b>																	
Base Critical Headway (sec)		7.1		6.2						4.1							
Critical Headway (sec)		6.43		6.20						4.10							
Base Follow-Up Headway (sec)		3.5		3.3						2.2							
Follow-Up Headway (sec)		3.53		3.30						2.20							
<b>Delay, Queue Length, and Level of Service</b>																	
Flow Rate, v (veh/h)			150							38							
Capacity, c (veh/h)			195							660							
v/c Ratio			0.77							0.06							
95% Queue Length, Q <sub>95</sub> (veh)			5.2							0.2							
Control Delay (s/veh)			67.2							10.8	0.8						
Level of Service (LOS)			F							B	A						
Approach Delay (s/veh)		67.2								1.7							
Approach LOS		F								A							

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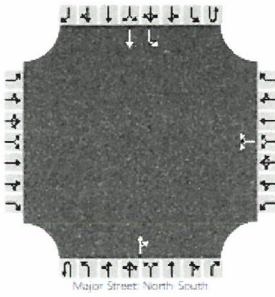
Wawa Outer Loop  
Traffic Impact Study

HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection				Fegenbush Ln at Vaughn Mill				
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC							Jurisdiction								
Date Performed	8/2/2023							East/West Street				Vaughn Mill Road				
Analysis Year	2034							North/South Street				Fegenbush Lane				
Time Analyzed	PM Peak Build							Peak Hour Factor				0.94				
Intersection Orientation	North-South							Analysis Time Period (hrs)				0.25				
Project Description	Wawa															
<b>Lanes</b>																
<p>Major Street: North-South</p>																
<b>Vehicle Volumes and Adjustments</b>																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	10	1	2	3	40	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR								LT					TR
Volume (veh/h)		132		20						36	340				494	521
Percent Heavy Vehicles (%)		3		0						0						
Proportion Time Blocked																
Percent Grade (%)	0															
Right Turn Channelized																
Median Type / Storage	Undivided															
<b>Critical and Follow-up Headways</b>																
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.43		6.20						4.10						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.53		3.30						2.20						
<b>Delay, Queue Length, and Level of Service</b>																
Flow Rate, v (veh/h)			162							38						
Capacity, c (veh/h)			192							653						
v/c Ratio			0.84							0.06						
95% Queue Length, Q <sub>95</sub> (veh)			6.1							0.2						
Control Delay (s/veh)			80.0							10.9	0.6					
Level of Service (LOS)			F							B	A					
Approach Delay (s/veh)	80.0								1.8							
Approach LOS	F								A							

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Wawa Outer Loop  
Traffic Impact Study

HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection				Vaughn Mill at Entrance				
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC							Jurisdiction								
Date Performed	7/28/2023							East/West Street				Entrance				
Analysis Year	2024							North/South Street				Vaughn Mill Road				
Time Analyzed	AM Peak Build							Peak Hour Factor				0.87				
Intersection Orientation	North-South							Analysis Time Period (hrs)				0.25				
Project Description	Outer Loop Wawa															
<b>Lanes</b>																
																
<b>Vehicle Volumes and Adjustments</b>																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	10	1	2	3	4	5	6	
Number of Lanes		0	0	0		0	1	0		0	1	0		1	1	0
Configuration							LR					TR		L	T	
Volume (veh/h)						41		91			315	70		57	149	
Percent Heavy Vehicles (%)						0		0						0		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized																
Median Type / Storage	Undivided															
<b>Critical and Follow-up Headways</b>																
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		
<b>Delay, Queue Length, and Level of Service</b>																
Flow Rate, v (veh/h)						152								66		
Capacity, c (veh/h)						535								1128		
v/c Ratio						0.28								0.06		
95% Queue Length, Q <sub>95</sub> (veh)						1.2								0.2		
Control Delay (s/veh)						14.4								8.4		
Level of Service (LOS)						B								A		
Approach Delay (s/veh)					14.4								2.3			
Approach LOS					B								A			

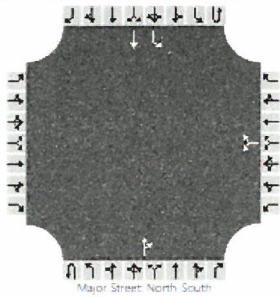
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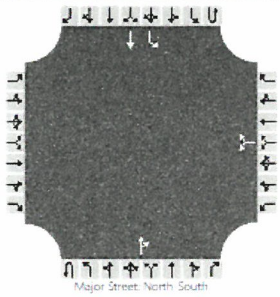
Wawa Outer Loop  
Traffic Impact Study

HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Vaughn Mill at Entrance							
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC							Jurisdiction								
Date Performed	7/28/2023							East/West Street	Entrance							
Analysis Year	2034							North/South Street	Vaughn Mill Road							
Time Analyzed	AM Peak Build							Peak Hour Factor	0.87							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Outer Loop Wawa															
<b>Lanes</b>																
																
<b>Vehicle Volumes and Adjustments</b>																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	10	1	2	3	40	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	1	1	0
Configuration							LR					TR		L	T	
Volume (veh/h)						41		91			334	70		57	158	
Percent Heavy Vehicles (%)						0		0						0		
Proportion Time Blocked																
Percent Grade (%)					0											
Right Turn Channelized																
Median Type   Storage	Undivided															
<b>Critical and Follow-up Headways</b>																
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		
<b>Delay, Queue Length, and Level of Service</b>																
Flow Rate, v (veh/h)						152								66		
Capacity, c (veh/h)						516								1108		
v/c Ratio						0.29								0.06		
95% Queue Length, Q <sub>95</sub> (veh)						1.2								0.2		
Control Delay (s/veh)						14.8								8.5		
Level of Service (LOS)						B								A		
Approach Delay (s/veh)					14.8								2.2			
Approach LOS					B								A			

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Wawa Outer Loop  
Traffic Impact Study

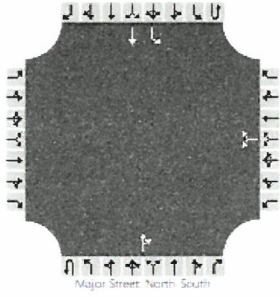
HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection				Vaughn Mill at Entrance				
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC							Jurisdiction								
Date Performed	7/28/2023							East/West Street				Entrance				
Analysis Year	2024							North/South Street				Vaughn Mill Road				
Time Analyzed	PM Peak Build							Peak Hour Factor				0.97				
Intersection Orientation	North-South							Analysis Time Period (hrs)				0.25				
Project Description	Outer Loop Wawa															
<b>Lanes</b>																
 <p>Major Street: North-South</p>																
<b>Vehicle Volumes and Adjustments</b>																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	10	1	2	3	4	5	6	
Number of Lanes		0	0	0		0	1	0		0	1	0		1	1	0
Configuration							LR					TR		L	T	
Volume (veh/h)						56		89			226	31		70	506	
Percent Heavy Vehicles (%)						0		0						0		
Proportion Time Blocked																
Percent Grade (%)							0									
Right Turn Channelized																
Median Type / Storage							Undivided									
<b>Critical and Follow-up Headways</b>																
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		
<b>Delay, Queue Length, and Level of Service</b>																
Flow Rate, v (veh/h)							149							72		
Capacity, c (veh/h)							472							1308		
v/c Ratio							0.32							0.06		
95% Queue Length, Q <sub>95</sub> (veh)							1.3							0.2		
Control Delay (s/veh)							16.1							7.9		
Level of Service (LOS)							C							A		
Approach Delay (s/veh)							16.1							1.0		
Approach LOS							C							A		

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Wawa Outer Loop  
Traffic Impact Study

HCS Two-Way Stop-Control Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Vaughn Mill at Entrance							
Agency/Co.	Diane B. Zimmerman Traffic Engineering LLC							Jurisdiction								
Date Performed	7/26/2023							East/West Street	Entrance							
Analysis Year	2034							North/South Street	Vaughn Mill Road							
Time Analyzed	PM Peak Build							Peak Hour Factor	0.97							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Outer Loop Wawa															
<b>Lanes</b>																
																
<b>Vehicle Volumes and Adjustments</b>																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	10	1	2	3	40	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	1	1	0
Configuration							LR					TR		L	T	
Volume (veh/h)						56		89			241	31		70	534	
Percent Heavy Vehicles (%)						0		0						0		
Proportion Time Blocked																
Percent Grade (%)							0									
Right Turn Channelized																
Median Type / Storage	Undivided															
<b>Critical and Follow-up Headways</b>																
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		
<b>Delay, Queue Length, and Level of Service</b>																
Flow Rate, v (veh/h)						149								72		
Capacity, c (veh/h)						452								1294		
v/c Ratio						0.33								0.06		
95% Queue Length, Q <sub>95</sub> (veh)						1.4								0.2		
Control Delay (s/veh)						16.8								7.9		
Level of Service (LOS)						C								A		
Approach Delay (s/veh)					16.8								0.9			
Approach LOS					C								A			

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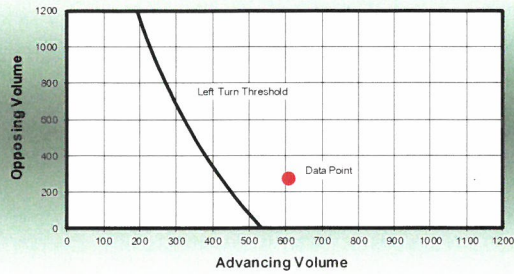
Vaughn Mill Road

**Left Turn Lane Warrants**

Input Fields

Left Turn Volume (vph)	70	Speed Limit (mph)	35
Advancing Volume (vph)	604	No. of through lanes	1
Opposing Volume (vph)	272	Percent Heavy Vehicles (decimal percent)	0.01

Left Turn Lane Warrants



**Left Turn Lane WARRANTED**

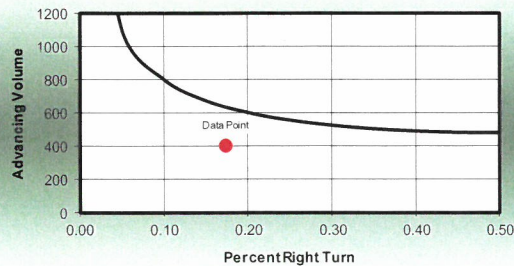
Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

**Right Turn Lane Warrants**

Input Fields

Right Turn Volume (vph)	70	Speed Limit (mph)	35
Advancing Volume (vph)	404		

Right Turn Lane Warrants



**Right Turn Lane NOT Warranted**

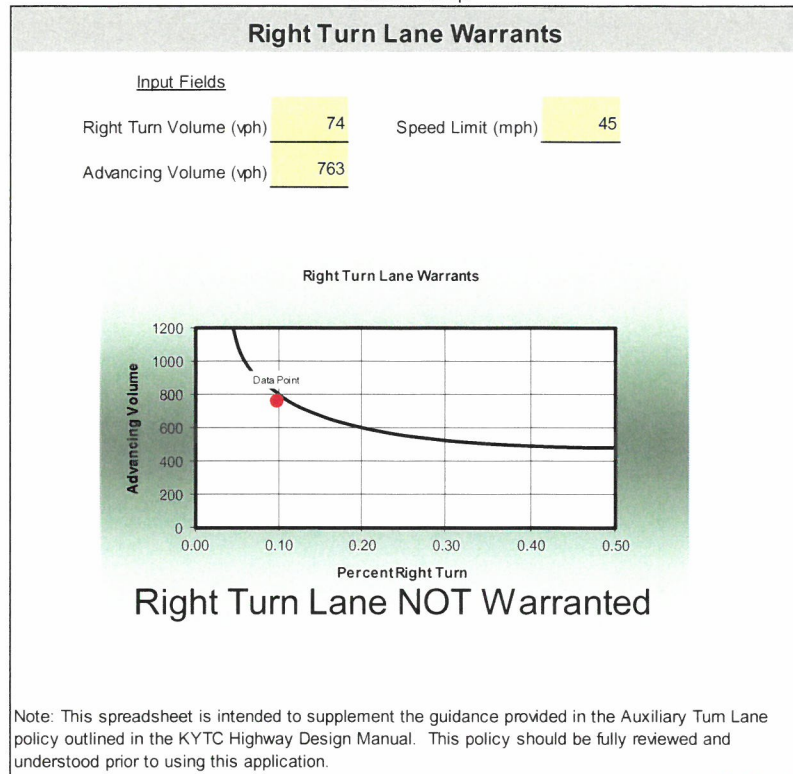
Note: This spreadsheet is intended to supplement the guidance provided in the Auxiliary Turn Lane policy outlined in the KYTC Highway Design Manual. This policy should be fully reviewed and understood prior to using this application.

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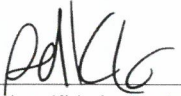
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Wawa Outer Loop  
Traffic Impact Study

I, Diane Bridwell Zimmerman, certify that this Traffic Impact Study has been prepared under my direct supervision, that I am a Professional Engineer registered in the State of Kentucky and have successfully completed the Traffic Impact Study Requirements training course required by KYTC. Furthermore, I certify that this study has been completed in accordance with the KYTC Traffic Impact Study Requirements and in accordance with engineering standards of practice. The results presented have been determined to be accurate representations of existing and anticipated conditions based on the assumptions and methodologies presented in this report.

Diane Bridwell Zimmerman, Professional Engineer License #16462

	<b>College of Engineering</b> <small>Kentucky Transportation Center</small>	<b>TECHNOLOGY TRANSFER PROGRAM</b>
<b>TRAFFIC IMPACT STUDY COURSE Certificate of Completion (3.5 PDH)</b>		
<b>Diane Zimmerman</b> KY PE License No. 16462		<b>TIM THARPE</b> Tim Tharpe, KYTC Director of Traffic Operations
Completed:	02/18/2022	 Adam Kirk, Instructor
Expires:	02/18/2026	
Company:	University of Kentucky	
The official status of this certificate can be verified with the KYTC Division of Traffic Operations		

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